ANNALS OF THE SOUTH AFRICAN MUSEUM

VOLUME XLI

ANNALS

OF THE

SOUTH AFRICAN MUSEUM

VOLUME XLI

PRINTED FOR THE
TRUSTEES OF THE SOUTH AFRICAN MUSEUM
BY THE RUSTICA PRESS (PTY.) LIMITED, COURT ROAD, WYNBERG, CAPE
1952 — 1955

TRUSTEES OF THE SOUTH AFRICAN MUSEUM

Prof. R. S. Adamson, F.R.S.S.Afr.
Prof. C. G. S. de Villiers
Mr. Councillor H. E. Gearing
Prof. D. L. Scholtz
Mr. C. J. Sibbett, J.P.

SCIENTIFIC STAFF OF THE SOUTH AFRICAN MUSEUM

Keppel Harcourt Barnard, M.A., D.Sc., F.L.S., Director.
Albert John Hesse, B.Sc., Ph.D., Assistant in Charge of the Entomological Department.
Lieuwe Dirk Boonstra, D.Sc., Assistant in Charge of the Palaeontological Department.
Miss E. Margaret Shaw, B.A., Assistant in Charge of the Ethnological and Numismatic Departments.
Miss G. Joyce Lewis, Ph.D., Assistant in Charge of the Botanical Department.
A. J. H. Goodwin, M.A., Honorary Keeper of the Archaeological Collections.

LIST OF CONTRIBUTORS

INDEX OF NEW GENERIC NAMES INTRODUCED IN THIS VOLUME

DATE OF ISSUE OF THE PARTS

Part 1, October, 1952.
Part 2, October, 1953.
Part 3, April, 1954.
Part 4, June, 1954.
Part 5, February, 1955.
Part 6, April, 1955.

LIST OF PLATES

INDEX OF GENERA

ANNALS

OF THE

SOUTH AFRICAN MUSEUM

VOLUME XLI

PART I, *containing:—*

ISSUED OCTOBER 1952 - *PRICE* 7*s.* 6*d.*

PRINTED FOR THE
TRUSTEES OF THE SOUTH AFRICAN MUSEUM, CAPE TOWN
BY THE RUSTICA PRESS LIMITED, COURT ROAD, WYNBERG, CAPE

ANNALS
OF THE
SOUTH AFRICAN MUSEUM

VOLUME XLI

1. *A revision of some South African Brachiopoda; with Descriptions of New Species.*—By J. Wilfred Jackson, D.Sc., F.S.A., F.G.S. (Late of Manchester Museum). (With Plates I-III.)

1. *Introduction*

More than twenty years ago I received through the courtesy of the Director of the South African Museum a small collection of South African Brachiopoda for report and description. Various unavoidable circumstances prevented me from giving the necessary time and attention to the collection, and, in consequence, the report on the same has been considerably delayed.*

The collection, though a small one, is of great interest as it contains several hitherto undescribed species and thus adds materially to our knowledge of the brachiopod fauna of the South African Province. The specimens came from several stations extending from the neighbourhood of Saldanha Bay on the west coast to Delagoa Bay on the east. Those from the Saldanha Bay area include a new species of *Megathiris* and one of *Crania*. Hitherto *Megathiris* has not been reported from Cape waters. From False Bay there is also a strongly-costate *Kraussina* which differs sufficiently from the well-known *Kraussina rubra* (Pallas) as to merit specific recognition. In addition there is a small species of *Gryphus* from the south coast, off Cape St. Blaize and Cape St. Francis, which appears to be undescribed. The remaining species comprise a new *Terebratulina* (formerly referred to *Terebratulina septentrionalis* Couth.), and *Terebratulina abyssicola* Adams and Reeve, previously recorded from the Cape. To these are to be added *Lingula* (two species) from Durban and Delagoa Bay, and *Agulhasia davidsoni* from two new stations, one being off Durban.

The description of the above series provides an opportunity of discussing and revising a number of other South African species preserved in the British Museum (Natural History) and in other collections. I have to thank the authorities of the above institution for the privilege of examining many of their

* Additional material was sent to the author in 1949, and his revised report was received in 1950. Post-war difficulties have further delayed the publication of this report. Ed.

specimens; also Messrs. H. McClelland and J. R. le Brockton Tomlin, M.A., for the loan of material. My own private collection has also been fully utilized.

The most important results achieved through the close study of this material is the placing of the *Kraussina*-series on a better basis, and the removal of certain forms erroneously ascribed to that genus. For many years this series has been in a state of confusion and a stumbling block to students of the Brachiopoda through the erroneous identifications that have been made.

Some particulars with regard to punctation are added in the hope that these may prove useful in future researches on this group.

2. *Previous Research*

The Brachiopod fauna of South Africa is not a very large one, but it includes some interesting species. Very little research has been conducted upon these in recent years, and nearly all the records date from the latter part of the eighteenth century or the first two-thirds of the nineteenth century.

The first notice of Brachiopoda in Cape waters appears to be that of Pallas, who, in 1766,[1]* described *Anomia rubra* (now *Kraussina rubra*). Chemnitz, in 1785,[2] described the same species as *Anomia striata promontorii bonae spei*, and another species, also from the Cape, as *Cognata Anomia craniolaris basi perforata*. Owing to Chemnitz not being a binomial writer, his species are not recognized. G. B. Sowerby, in 1847,[3] redescribed Chemnitz's second species as *Terebratula cognata*, which is now recognized as *Kraussina cognata* (Sow.)

In 1819, Lamarck[4] described a species from Mauritius as *Terebratula pisum*. This species has given rise to much confusion and has been misidentified on several occasions. It is mentioned here as being an undoubted member of the fauna of the Natal coast. The form attributed to this species by Davidson[5] is not that of Lamarck: it is referred to on a subsequent page.

G. B. Sowerby, in 1847,[3] described a *Terebratula algoensis* from Algoa Bay, coll. J. S. Bowerbank. The specimen, a bleached ventral valve, is in the British Museum. It has been referred to *Kraussina rubra* by Reeve, while Krauss regarded it as the same as his *Terebratula natalensis*. A discussion of this species is given later.

Dr. F. Krauss, in 1848,[6] gave three species for South African waters, viz. *Terebratula capensis* (Gmel.), *Terebratula cognata* (Chem.) Sow., and *Terebratula natalensis* Krauss (Natal). The *T. capensis* (Gmel.) is *Kraussina rubra* (Pallas); *T. cognata* (Chem.) Sow. is *Kraussina cognata* (Sow.); *T. natalensis* Krauss has been referred to *Kraussina* and considered to be the same species as *Terebratula pisum* Lamarck. The question as to its generic and specific position is discussed on a later page.

In 1850,[7] A. Adams and Lovell Reeve described as new two species of brachiopods as follows:— *Terebratula capensis*, dredged off the Cape of Good Hope at a depth of 120 fathoms; and *Terebratula abyssicola*, Cape of Good Hope,

* Superior numbers refer to the Bibliography at end.

120 fathoms. The *T. capensis* Ad. and Rve. is not that of Gmelin (=*Kraussina rubra*): it was changed by Davidson in 1852[8a] to *Kraussia deshayesii* (later *Kraussina*) and regarded by him as nearly related to *Terebratula pisum* Lam. Like the latter, it is not a *Kraussina*, but goes with *pisum* Lam. and *pisum* Dav. The *Terebratula abyssicola* Ad. and Rve. is now *Terebratulina abyssicola* (Ad. and Rve.).

In 1870,[9] the late Dr. Dall described a *Terebratella*, which he later, 1871,[10] called *Terebratella rubiginosa*, from Simons Bay, Cape of Good Hope. The single specimen is in the United States National Museum. Little can be said concerning this species until more examples are forthcoming. I have been unable to examine the original figure, but the description of the loop suggests that it is of a peculiar type.

A rather remarkable species was described and figured by W. King in 1871[11] under the name of *Agulhasia davidsoni*, the examples having been obtained on the Agulhas Bank, South Africa, from a depth of 45 to 60 fathoms. It is a very small species with a curious and long beak to the ventral valve. The genus is said to have Cretaceous representatives in Europe.

During the 'Challenger' Expedition three species of brachiopods were met with at the Cape. These were described by Davidson in 1880[5] as follows: *Terebratula vitrea* var. *minor* Philippi (p. 29, pl. II, figs. 5-6); *Terebratulina caput-serpentis* var. *septentrionalis* Couth. (p. 33, pl. I, figs. 6-9); and *Kraussina pisum* (Val, apud Lam.) (p. 54, pl. IV, figs. 7-8). All were dredged at Station 142, off the Cape of Good Hope, lat. 35°4′S., long. 18°37′E., December 1873. 150 fathoms. *Terebratula vitrea* var. *minor* is now known as *Gryphus affinis* (Calcara) and is common in the Mediterranean. The specimens dredged at the Cape are not that species. They are referred on a later page to a new form of *Gryphus*. *Terebratulina septentrionalis* is a distinct species and not a variety of *T. caput-serpentis* (now *retusa* L.). It occurs at many stations in the North Atlantic, off Northern Europe and off the eastern states of America. The Cape specimens are distinct from that form and are dealt with later in this memoir. The examples referred by Davidson to *Kraussina pisum* are specifically distinct from Lamarck's species. These two species are also generically distinct from *Kraussina*.

In 1892,[12] Fischer and Oehlert gave a list of nine species as inhabiting Cape waters and remarked on the great dissimilarity between this fauna and that of the Magellanic Province. They called attention to the recorded presence of two species of *Kraussina* in the Australian region, viz. *K. lamarckiana* and *K. atkinsoni*. These two species, however, do not belong to the genus *Kraussina*: the first is the genotype of *Megerlina* and the second may also belong to that genus.

In the Journal of Conchology for 1901[13] E. A. Smith recorded *Kraussina atkinsoni* (T. Woods)—a Tasmanian species—for Algoa Bay, Cape Colony (Brit. Mus. presented by J. H. Ponsonby). I have examined the specimens in question—four in number (B.M. 1900.6.13.5-8)—and find them to be undoubted juveniles of the *Terebratula pisum* Lam., which is not a true *Kraussina*.

In my opinion, the Tasmanian species also does not belong to the genus *Kraussina*, as it possesses a different type of cardinalia and brachidium.

In 1908,[14b] Blochmann recorded the discovery by the 'Valdivia' Expedition of a small species of *Liothyrina* (=*Gryphus*) in company with *Kraussina rubra* and *Terebratulina abyssicola* (not *septentrionalis*) on the Agulhas Bank. He figured the brachidium of the *Liothyrina* (pl. 39, fig. 31) and regarded it as distinct from *Liothyrina* (now *Gryphus*) *affinis*. It is possibly the same species as that referred to *Gryphus* sp. nov. in this memoir.

Dr. J. Allan Thomson, in 1918,[15] listed ten species as occurring at the Cape, and called attention to the fact that no additions had been made to the brachiopod fauna of South Africa during the previous thirty years. He remarked especially on the absence of *Crania*, and discussed the relation of the fauna with that of Australia and other places.

Dr. W. H. Dall, in 1920,[16] recorded *Pantellaria* (olim *Mühlfeldtia*) *echinata* (F. & O.) as from the Cape of Good Hope, 224 fathoms (Jeffreys coll.), one specimen in the United States National Museum. The type locality of this species is 'Off Cape Bojador, Sudan [*sic.*] coast of West Africa, 407 fathoms'. In a paper in 1921,[17] the present author referred to the presence in the British Museum (Natural History) of an immature example of *Mühlfeldtia truncata* labelled 'South Africa. J. H. Ponsonby coll., 1900. 6.13.4.' The occurrence at the Cape of this and the previously mentioned species—both Northern forms, one Mediterranean and east Atlantic, the other West African—is very remarkable, but one feels somewhat doubtful as to the provenance of the specimens.

In 1932, Lt.-Col. W. H. Turton[54] published an account of the marine shells of Port Alfred. These were largely dead and drifted specimens and included a few brachiopods, one of which resembled a *Crania*.

PLATE I

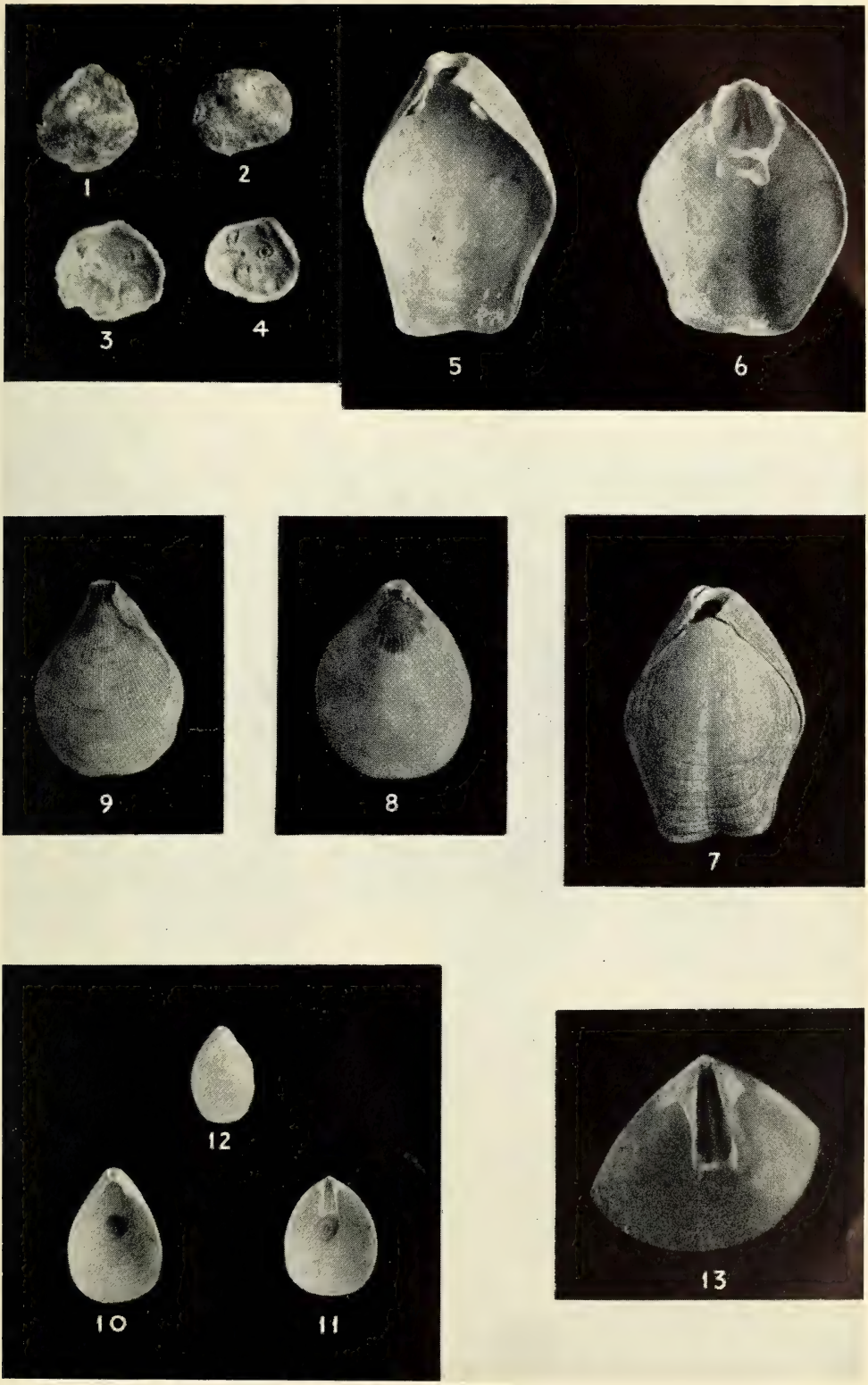
Figs. 1-4. *Crania roseoradiata* sp. nov. Syntypes, A. 5665. Dredged in 45 fathoms 7 miles SSW. of Constable Hill (Saldanha Bay). Four dorsal valves. South African Museum.

Figs. 5-7. *Terebratulina abyssicola* (Adams and Reeve). A. 5617. Dredged in 85 fathoms, 33°6′S., 28°11′E., off SE. coast of the Cape. South African Museum. Fig. 7, exterior view; figs. 5-6, interior views.

Fig. 8. *Terebratulina meridionalis* sp. nov. Holotype. Station 142, 'Challenger' Expedition (nearly 40 miles due south of Cape Point), 150 fathoms. British Museum (Nat. Hist.). No. 78.6.15.3.

Fig. 9. *Terebratulina septentrionalis* Couthouy. Casco Bay, Maine. British Museum (Nat. Hist.).

Figs. 10-13. *Gryphus capensis* sp. nov. Holotype, A. 5627. Dredged in 75 fathoms, 29 miles SW. of Cape St. Francis. Paratype, A. 5626. Dredged in 125 fathoms, 73 miles S. by W. of Cape St. Blaize. South African Museum. Figs. 10-11: Holotype. Fig. 12: Paratype. Fig. 13: interior of Holotype.



South African Brachiopoda.

3. *Description of Species*

ORDER ATREMATA BEECHER, 1891
Superfamily LINGULACEA Waagen, 1885.
Family LINGULIDAE Gray, 1840.

Genus *Lingula* Bruguière.

1797. *Ency. Meths. Vers.* I, p. 151, II, pl. 250.

Lingula sp. aff. *murphiana* (King MS.) Reeve.

Lingula murphiana (King MS.) L. Reeve, 'Mon. of Lingula', *Conch. Icon.*, November 1859, pl. I, fig. 3. Davidson, 'Mon. Rec. Brach.', *Trans. Linn. Soc.*, ser. 2, vol. IV, Zool. pt. III, 1888, p. 215, pl. XXIX, fig. 11, and pl. XXX, figs. 1-3.

In 1920, when studying the brachiopods in the British Museum (Natural History), I noted a spirit specimen in the zoological department labelled: '*Lingula anatina* Lam. Durban. J. H. Ponsonby. 99.4.14.1.'

Many years ago, Mr. R. Cairns presented me with a large example of *Lingula* with a label: 'Durban, 1900. J. P. Cregoe.' On making inquiries about this collector, Dr. K. H. Barnard tells me that Cregoe contributed quite a lot to the Invertebrate collection of the South African Museum about that period, chiefly from Natal and Lourenço Marques; but the Museum files contain no biographical details.

The *Lingula* in question agrees closely in shape and size (viz. L. 58·5: W. 26·1 mm.) with the *L. murphiana* figured by Reeve (op. cit., pl. 1, fig. 3) and has the same coppery-red colour with green border anteriorly. It also agrees with two other large examples in my collection from New South Wales (precise locality unknown).

Reeve's description of his species is as follows: 'Murphy's Lingula. Shell oblong-ovate, anteriorly square, posteriorly attenuated, umboes small, sharp, yellowish-green, stained with coppery-red; valve closed throughout.
King MS. Mus. Cuming.
Hab. Moreton Bay, Australia; Strange.'

The specimen figured is, L. 57·8: W. 25·7 mm.

He further remarks: 'Whether this should be regarded as an Australian form of *L. anatina* or as a distinct species, it is certain that the differences are obvious and constant. The late Captain Phillip King, who was an excellent conchologist . . . was struck by the peculiarities of this *Lingula*, and sent specimens home to Mr. Cuming with the above name. More have been collected by Mr. Strange in nearly the same locality, and all are distinguished from *L. anatina* collected abundantly by Mr. Cuming in the Bay of Manila, by a more square outline, and by a peculiar coppery-red tone of colour.'

Davidson (op cit.) figures two large examples from Moreton Bay in his collection at the British Museum, and gives an amplified description and the colour as coppery-red, with bands of different shades of green and brown. He

gives the size as: L. 2 in. 6 lines: W. 1 in. 1 line (=L. 63·5; W. 27·7 mm.). The size of the specimen in his plate XXX, figs. 1-3, is somewhat less, being: L. 53·5: W. 24 mm.

Lingula murphiana, though first described from Queensland, appears to have a wide distribution. According to W. H. Dall's List of 1920,[16] the United States National Museum possesses the following: N.E. Australia, coll. Stearns, 2 specimens; Australia, coll. Cuming, 2 specimens; Fiji Islands, U.S. Ex. Exp., 2 specimens; Vita Leva, near Rawa River, U.S. Ex. Exp., 2 specimens; and off Shimbaya Gulf, Japan, E. S. Morse, 1 specimen.

One wonders how much reliance has been placed on colour in these determinations. It seems to be a variable character in some forms.

I have in my possession four very large specimens of the same shape and colouring as the Queensland form collected at Karachi by Lt.-Col. H. C. Winckworth in September 1932 and given to me by his brother Mr. R. Winckworth. The sizes of these are: 64 × 28·1; 62·4 × 29; 60·8 × 29; and 59·3 × 27·7 mm. If these had been found at the Queensland locality, they would have been referred to *L. murphiana* Rve.

From the same collector I have a smaller *Lingula* found at Trincomali, Ceylon, October 1929, also rather dark in colour with a green border. It measures: L. 43·3; W. 18·8 mm. It might very well be a younger stage of the above examples.

Dall[16] cites *Lingula translucida* Dall—a ruddy-brown species—from Karachi, coll. Captain Shopland, 2 specimens and Fulton, 2 specimens, but does not figure the species. He also cites the same form from Java, coll. Ward, 2 specimens and Palmer, 1 specimen, and from Tataan Island, Philippines, 12 fms., coll. Bureau of Fisheries, 1 specimen. It is uncertain which is the type station. Dall gives Java, but cites the catalogue number for Karachi.

With regard to the *Lingula anatina* of authors, this Eastern Seas species (Type station, Amboyna, Moluccas) was referred to the *Patella unguis* of Linnè by Dall in 1920,[16] but the shell to which Linnè refers in Rumphius' *D'Amboinische Rariteitkamer*, 1741, t. 40, fig. L, is a *Parmophorus* or *Scutus* and not a brachiopod. Solander, in his *Portland Catalogue*, 1786, No. 1718, p. 77, mentions *Mytilus lingua* or green Duck's-bill Limpet, S., *Humphrey's Conchology*, pl. 2, fig. 2, from Amboyna. This last work was published in 1770 and the figured shell is certainly a *Lingula*. Though the name *anatina* has been in use for a long time, the species should be known as *Lingula lingua* (Sol.).

Lingula sp. aff. *exusta* Reeve

Lingula exusta Reeve, 'Mon. of Lingula', *Conch. Icon.*, November 1859, pl. II, fig. 9. Davidson, 'Mon. Rec. Brach.', *Trans. Linn. Soc.*, ser. 2, vol. IV, Zool. pt. III, 1888, p. 217, pl. XXVIII, figs. 20-21*a*.

Dr. K. H. Barnard has recently submitted to me two specimens of a *Lingula* which he collected in 1912 at Delagoa Bay, Indian Ocean, S.E. Africa. The specimens are rather small and measure: 20 × 8 and 17·2 × 6·4 mm. Both

are light brown in colour and resemble the *Lingula exusta* of Reeve, though about half the size of the type.

Reeve describes the species from a specimen in the Mus. Cuming as follows:

'The Swarthy Lingula. Shell oblong-ovate, rather thin, reddish-yellow, deeply stained with brown towards the margin, shining, umboes rather sharply beaked.

Hab. Moreton Bay, Australia; Strange.'

He further states: 'If *L. murphiana* be an Australian form of *L. anatina*, this might be regarded as the representative in the same locality of *L. hians*. Both species exhibit a peculiar coppery-redness, heightened in this to a dark, shining, swarthy tone of colour.'

Davidson (op. cit.) gives a fuller description mentioning its shining, darkish, coppery yellow-brown colour. He reproduces Reeve's figure in fig. 20; fig. 21 being from a specimen from the same locality in his collection at the British Museum. He gives the length as 1 in. 7 lines and breadth 8 lines (= 40·6 × 17·1 mm.).

Dall, in his 1920 List ([16]p. 265) gives Brammo Bay, Dunk Id., N. Queensland, coll. E. J. Banfield, 1 specimen, in the United States National Museum. This is much farther north than the original locality.

I possess some half-dozen specimens of a *Lingula* from Singapore with similar colouring and shape to the Delagoa Bay examples, one or two being only slightly larger.

There is need for further research in connection with the various forms of *Lingula*, as there appears to be much confusion with regard to species.

The form known as *L. anatina* (now referred to *lingua*), though normally of a light green colour (as in Reeve, 1841, pl. II, fig. 10), is at times suffused with a bronzy colour, especially near the margins, or may be of a dark brown colour all over the surface, as in specimens in my collection from Amboyna, Moluccas ('Siboga'), and Zamboanga, Philippines (coll. F. G. Pearcey, 1875).

Order NEOTREMATA Beecher, 1891.

Superfamily craniacea Waagen, 1885.

Family craniidae King, 1846.

Genus *Crania* Retzius.

1781. *Schrift. Berlin Ges. nat. Fr.* 2 (4), p. 72.

Crania roseoradiata sp. nov.

(Pl. I, figs. 1-4.)

Description: Shell (upper, or dorsal, valve) small, depressed, somewhat ovate in outline, with a short, almost straight posterior margin, apex low, subcentral, directed posteriorly; surface eroded, strongly wrinkled by growth-lines, and radiated by rose-coloured streaks or flames on a whitish background. Interior very finely granulose, margin thin and narrow beyond the heavy submarginal encircling ridge. Muscular impressions of posterior adductors well-marked,

oval, obliquely disposed on low tubercles within the posterior angles of the shell; imprints of protractors in small pits on external side and near the anterior extremities of posterior adductors impressions; imprint of median odd muscle very slight and situated on floor of valve between the posterior adductors; imprints of anterior adductors very distinct in ovate pits with strong posterior ridges, closer together than posterior pair and situated just behind the centre of the valve; small pits for insertion of retractors of arms immediately adjacent and external to the last; imprints of protractors of arms very slight on floor of valve in front of anterior adductors. Anterior to the muscle impressions are two shallow, ovate, cavities (one on either of the median line) showing indistinctly the grooves of the pallial sinuses.

Dimensions: Syntypes, Length, 9 mm., breadth, 10 mm.
„ 7·7 mm., „ 9 mm.

Catalogue No. A5665, in the South African Museum.

Type-locality: 7 miles SSW. of Constable Hill, Saldanha Bay, dredged in 45 fms., with *Megathiris* sp. nov.

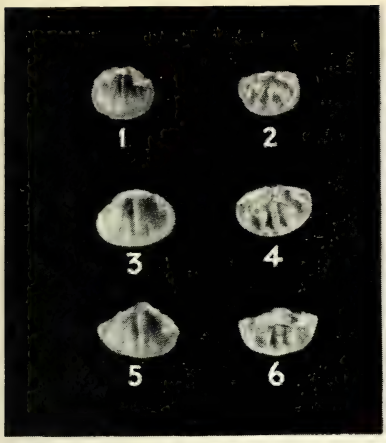
Remarks: This is the first authentic *Crania* to be reported from South Africa. In 1931, Lt.-Col. W. H. Turton submitted for my opinion a very imperfect dead valve, 12 × 11 mm., from Port Alfred which I tentatively referred to *Crania*. In 1932, Turton figured the specimen as *Crania* sp. ([54]pl. LXX, fig. 1843). Port Alfred lies nearly 500 miles to the east of Saldanha Bay. The nearest record of the genus appears to be a species from West Africa assigned by Reeve[18] to *Crania rostrata* Hoeninghaus. Four examples of this form are in the Cuming Collection at the British Museum (Natural History). Two are attached to fragments of dark-grey limestone and are the originals of the two lower figures of Reeve ([18]pl. I, fig. 3). Davidson[19] places *Crania rostrata* among the synonyms of *C. turbinata* (Poli), but says 'the so-termed *C. rostrata* figured by Reeve in his *Conch. Icon.* does not agree with Hoeninghaus's figures of his species'. He misquotes Reeve by giving 'South Africa' instead of 'West Africa' (*vide* Cuming) as the habitat. One of the British Museum specimens shows interior details and the ventral valve agrees closely with the figure of the interior given by Hoeninghaus.[20] The position and number of the pallial sinuses are the same and there is the same arrangement

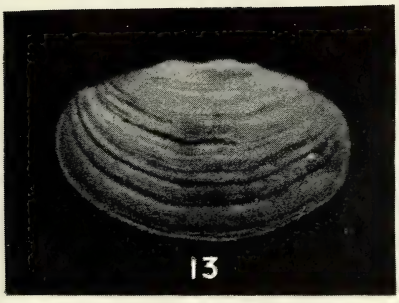
---

PLATE II

Figs. 1, 2, 7, 8, 14, 15. *Megathiris detruncata* (Gmelin). Messina, Mediterranean (J. W. J. coll.). Figs. 1-2: interior views of ventral and dorsal valves. Figs. 7-8: exterior views of same. Fig. 14: interior view of dorsal valve (fig. 2). Fig. 15: interior view of ventral valve (fig. 1).

Figs. 3-6, 9-13, 16, 17. *Megathiris capensis* sp. nov. Holotype, A. 5616a. Paratype, A. 5616b. Dredged in 45 fathoms, 7 miles SSW. of Constable Hill (Saldanha Bay). South African Museum. Figs 3, 4: interior views of ventral and dorsal valves of Holotype. Figs. 5, 6: interior views of ventral and dorsal valves of Paratype. Figs. 9, 10: exterior views of ventral and dorsal valves of Holotype. Figs. 11, 12: exterior views of ventral and dorsal valves of Paratype. Fig. 13: exterior view of dorsal valve of Holotype. Fig. 16: interior view of dorsal valve of Holotype. Fig. 17: lophophore in spirit specimen.





South African Brachiopoda.

with regard to the muscular impressions and prominent rostrellum. The dorsal valve was not figured by Hoeninghaus so no comparison can be made here. Until a much-desired revision is made of the various forms attributed to either *Crania anomala* (Müll.) or *Crania turbinata* (Poli) little advance in knowledge can be attained. Hoeninghaus's type of *Crania rostrata* appears to have come from the Mediterranean.

The absence of the ventral valve in the new Cape species renders it impossible for a complete comparison to be made with the West African *C. 'rostrata'*; but a comparison of the dorsal valve shows that the two forms are sufficiently distinct to merit a new name being given to the Cape species.

It is of some interest to compare *C. roseoradiata* with the *C. suessi* Reeve.[18] The latter species was founded on five specimens in the Cuming Collection reported to have been collected by Mr. Strange at Sydney. It is described as being faintly tinged with orange-red. The five specimens are in the British Museum and are now rather bleached: they possess somewhat yellowish rays. They bear a label in German? handwriting (?Pfeiffer's) 'Sidney, M. Strange' (note misspelling). In general form they somewhat resemble the West African examples described and figured by Reeve as *C. rostrata* Hoen., and the coloured rays of the upper valve suggest a relationship with the *C. roseoradiata* of this memoir. *Crania suessi* Reeve has also been recorded from Mast Head Reef, Queensland, 17–20 fathoms.[21] This record is based upon a few worn valves and there is some hesitation as to species.

The occurrence of *Crania* at the Cape is an interesting addition to the South African fauna, but until a further study has been made it is difficult to ascertain whether it is of northern or southern facies.

Order TELOTREMATA Beecher, 1891.
Superfamily TEREBRATULACEA Waagen, 1883.
Family TEREBRATULIDAE Gray, 1840.
Subfamily CANCELLOTHYRINAE Thomson, 1926.
Genus *Agulhasia* King.

1871. *Ann. Mag. Nat. Hist.* (4), vii, p. 109.

Agulhasia davidsoni King

Agulhasia davidsoni King, loc. cit., 1871, p. 111, pl. XI, figs. 1-7.

Terebratulina (*Agulhasia*) *davidsoni* King. Davidson, 'Monograph of Recent Brachiopoda', *Trans. Linn. Soc.*, ser. 2, vol. IV, Zool. pt. I, 1886, pp. 36-7, pl. 7, figs. 1-5.

Agulhasia davidsoni King. Thomson, *Brachiopod Morphology and Genera* (*Recent and Tertiary*), 1927, pp. 182-3, fig. 52 (after Davidson).

Remarks: The original specimens of this interesting species were obtained from 45 to 60 fathoms, on the Agulhas Bank, South Africa, and were described by Professor W. King in 1871 (op. cit., *supra*). I have been unable to examine the original examples, but the excellent description by Davidson ([19]pp. 36-7)

shows that the species is a remarkable one and sufficiently distinct from the young of some species of *Terebratulina*, as was at one time thought.

This extremely small species is characterized by the beak being produced into a tubular rostrum and by the possession of a long pedicle-collar (see Davidson,[19] pl. 7, figs. 1a and 2).

Through the kindness of Dr. K. H. Barnard I have been able to examine three specimens of this species dredged by the Cape Government trawler s.s. *Pieter Faure* from two new stations, one off the south-eastern Province, and the other off Natal.

The details are as follows:

Lat. 34°S., long. 25°44′E. dredged (no depth given). 2 specimens. A. 5633. South African Museum. Size: L. 4·2, W. 2·5 and L. 4·0, W. 2·3 mm. Cape Natal (i.e. Durban), W. × N. 6 miles, 54 fathoms, 1 specimen. A. 5634. South African Museum. Size: L. 4·2, W. 2·7 mm.

These specimens are smaller than the size given by Davidson, viz. 3 lines × 2 lines (= 6·3 × 4·6 mm.).

The specimens are interesting, not only in providing evidence of an extended eastern range of the species, but also on account of the opportunity they offer of studying the peculiar foraminal characters. As pointed out by Thomson ([28]p. 74 and footnote), 'the long beak is apicate, with a very long delthyrium which is partly filled by lateral trigonal deltidial plates, leaving an elongate pedicle-opening. The pedicle-collar extends nearly to the cardinal margin, and has the effect of restricting the pedicle mainly to an opening on the cardinal margin.' Davidson's figures ([19]pl. 7, figs. 1a and 2, repeated by Thomson, fig. 52) show this quite clearly.

King (op. cit.) confused the deltidial plates with the area, and the pedicle-collar with the deltidium.

Beecher ([29]p. 390) referred to the deltidial plates as being obsolete; this being probably due to the imperfect descriptions by King and Davidson.

Unfortunately details are lacking concerning the character of the animal, though the cardinalia and brachidium have been figured.

The range of *Agulhasia* has been given as Cretaceous to Recent, but no Cretaceous forms have been cited. *Terebrirostra* or *Lyra* from the Cretaceous possesses a somewhat similar tubular beak, but with the foramen at the apex: it belongs to an entirely different Family.

Genus *Terebratulina* d'Orbigny.

1847. *C.R. Ac. Sc. Paris*, XXV, p. 268.

Terebratulina abyssicola (Adams and Reeve)

(Pl. I, figs. 5-7)

Terebratula abyssicola Adams and Reeve, *Voy. Samarang*, Moll., 1850, p. 72, pl. 21, fig. 5: Reeve, 'Terebratula', *Conch. Icon.*, 1860, pl. 4, fig. 14.

Terebratula radiata Reeve, 'Terebratula', *Conch. Icon.*, 1860, pl. 3, figs. 7a-b.

Terebratulina abyssicola, Davidson, 'Mon. Rec. Brach.', *Trans. Linn. Soc.*, ser. 2, vol. IV, Zool. pt. I, 1886, pp. 37-8, pl. 5, fig. 54.

Terebratulina radiata, ibid., 1886, pp. 34-5, pl. 6, figs. 9-14.

Terebratulina africana Turton, *The Marine Shells of Port Alfred, South Africa*, 1932, p. 260, pl. LXX, fig. 1842.

Non *Terebratulina radiata* Baily, *Quart. Journ. Geol. Soc.*, vol. XIV, 1858, p. 136, pl. VIII, figs. 3a-d (= Jurassic species from Crimea).

Non *Terebratulina radiata* Moore, *The Geologist*, vol. III, 1860, p. 444, pl. XIII, figs. 11-14 (= Great Oolite species from Hampton Cliff, England).

Habitat: South-east coast of South Africa, lat. 33°6′S., long. 28°11′E., 85 fathoms (= opposite East London), 3 large examples A. 5617, South African Museum: also 4 miles off Cape Morgan, 17 fathoms, 8 small examples, A. 5618, South African Museum.

Remarks: There has been much confusion in the past with regard to this species, its type locality, and its relation to the *T. radiata* Reeve. The latter is merely the adult form of *T. abyssicola* Ad. and Rve., which antedates *T. radiata* by ten years. The type-locality is 'Cape of Good Hope (dredged at the depth of 120 fathoms); Belcher', as given by Reeve. The reference to Corea in Reeve's 'Corrigenda' is evidently a mistake. In the Zoological Department (Cuming Collection) of the British Museum are four specimens (three juveniles and one large example attached to some extraneous object) of *T. abyssicola*, with a legend on the bottom of the box 'Hab. Cape of Good Hope, 120 fms. M.C. ?Type'. The attached specimen looks like that figured in the 'Samarang' Report (pl. 21, fig. 5) and in *Conch. Icon.* (pl. 4, fig. 14), but is smaller and more globular. It shows the beginning of a sulcus in the dorsal valve, and the striae are like those on the umbonal part of a South African Museum specimen (A. 5617). The British Museum also possesses specimens of *T. abyssicola* from Port Alfred, Cape Colony (Coll. Lt.-Col. Turton, 1903, 12.19. 463-5). Davidson's figure of *T. abyssicola* (pl. 5, fig. 54) is a poor copy of that of Adams and Reeve.

As far as one can judge from a casual microscopic examination, the punctae of the 'Type-specimen' of *T. abyssicola* are the same as in Reeve's type of *T. radiata*, being small and slit-like and of the same density. The type-specimen of *T. radiata* is preserved with two other examples in the Zoological Department at the British Museum (Cuming Coll.), while the originals of Davidson's figures of the same species are in the Geological Department (Davidson Coll.) of the same Institution. The original of Davidson's *T. radiata* (pl. 6, fig. 11) has small, ovate punctae (slit-like) with the same density as Reeve's type.

The exact density of the punctae of the British Museum specimens has not been counted, but examples of *T. abyssicola* from other sources have been examined. Five somewhat dwarfed specimens from East London yielded the following results: in one the density was 352–368 per sq. mm., with dimensions of 30–40 × 15 μ; in three others the density ranged from 448 to 512 per

sq. mm., the dimensions being 20–30 × 15 μ; while the fifth example was very densely punctate with 576 pores per sq. mm., with dimensions of 15–20 × 15 μ. Four others from East London yielded 384 per sq. mm., and two from Port Elizabeth, 384–432 per sq. mm.

The three large examples, A. 5617 (pl. I, figs. 5-7), in the South African Museum are larger than any figured by Davidson (pl. 6, figs. 9-14), their dimensions being:

	Length	*Breadth*	*Thickness*
No. 1	24·0	19·2	15·0 mm.
No. 2	27·5	19·3	16·5 „
No. 3	28·4	29·0	16·8 „

The type of folding is sulciplicate (as Davidson, pl. 6, fig. 10), and all are rayed with black flames or streaks. The beaks are mesothyrid and the deltidial plates disjunct.

The number of pores per sq. mm. in these three examples ranges from 308–400, the dimensions being 30–40 × 15 μ, on the outer side, and 10 × 10 μ on the inner.

The eight small examples, A. 5618, in the South African Museum range in length from 4·5 to 13·4 mm., the beaks are submesothyrid to mesothyrid and the deltidial plates disjunct. They possess a uniplicate type of folding, the larger ones showing the beginning of the sulciplicate stage. Some are marked with black streaks, and all agree closely with shallow water forms in my collection from East London and Port Elizabeth. Some of these appear to be stunted or dwarf examples and show irregularities of growth: the shell also is much thickened.

This species under the name of *T. radiata* was cited as a new brachiopod for Western Australia by W. B. Alexander, in 1914.[26] The solitary specimen obtained had united deltidial plates, and this fact, together with its habitat, seems to suggest the *Terebratulina* (olim *Terebratula*) *cancellata* (Koch), since transferred to a new genus *Cancellothyris* by J. A. Thomson,[27] who also changed

---

PLATE III

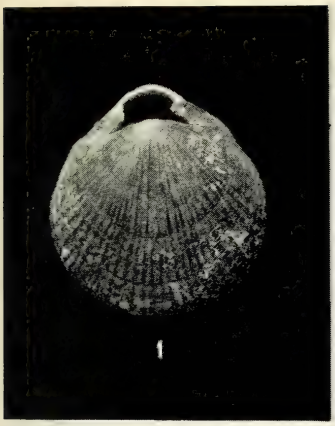
Figs. 1, 2. *Kraussina rubra* (Pallas). Agulhas Bank, South Africa, 22 fathoms (J. W. J. coll.). Fig. 1: exterior view. Fig. 2: interior view of dorsal valve.

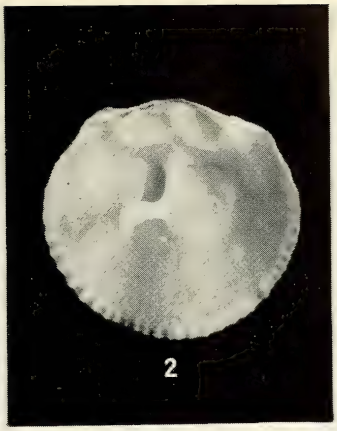
Figs. 3-5. *Kraussina crassicostata* sp. nov. Holotype, A. 5615. Dredged in 23 fathoms, False Bay, Cape. South African Museum. Fig. 3: exterior view. Figs. 4, 5: interior views of dorsal and ventral valves.

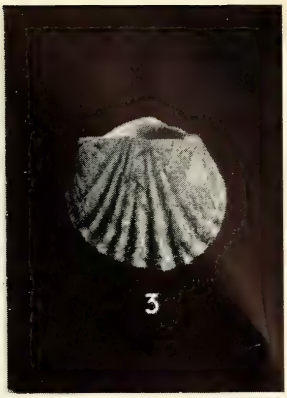
Figs. 6 and 9. *Megerlina striata* sp. nov. Holotype, Station 142, 'Challenger' Expedition (nearly 40 miles due south of Cape Point), 150 fathoms. British Museum (Nat. Hist.). No. 78.6.15.27. Fig. 6: exterior view. Fig. 9: punctation.

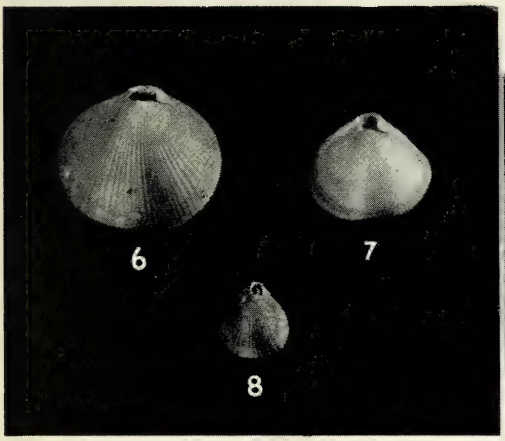
Figs. 7 and 10. *Megerlina pisum* (Lam.). South Africa, J. H. Ponsonby coll. British Museum (Nat. Hist.). No. 99.4.14.3765. Fig. 7: exterior view. Fig 10: punctation in specimen in J. W. J. coll. (ex. Agnes Crane, from Cape, 150 fathoms).

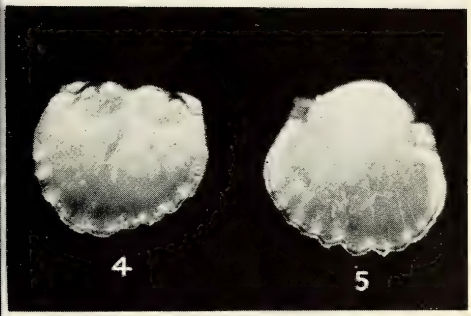
Fig. 8. *Megerlina capensis* (Adams and Reeve). Cape. Lombe Taylor coll. British Museum (Nat. Hist.). No. 74.12.11.386.

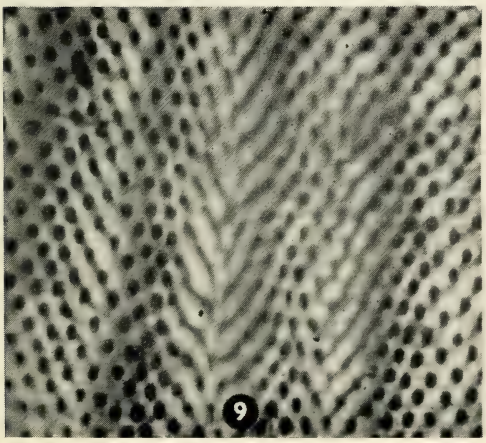


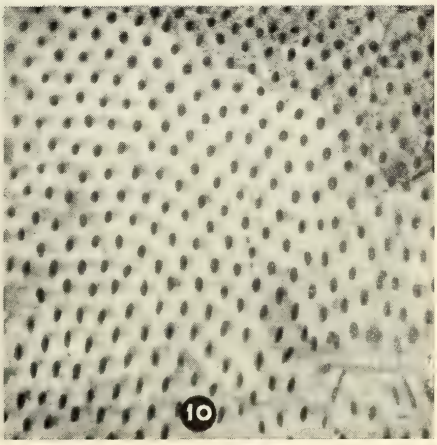












South African Brachiopoda.

the specific name to *australis* on account of *cancellata* being preoccupied by *Terebratula cancellata* Eichwald, 1829. But, unless the *T. cancellata* Eichwald turns out to belong to *Cancellothyris* also, there appears to be no reason for the change of the specific name.

Turton, in 1932 (pl. LXX, fig. 1842), figured as *Terebratulina africana* sp. nov. a small example from Port Alfred, near which place *T. abyssicola* is common. His figure shows a shell without apparent folding, the ventral valve having a submesothyrid foramen, disjoint deltidial plates and a pedicle-collar: the dorsal valve has rather long crura and an almost completed loop. The shell is thin and white with radiating striae and fine growth-lines, giving it a cancellated appearance, and does not seem to show evanescence of the striae, as in the next species. The absence of information regarding punctation renders it difficult to decide whether Turton's shell is to be referred to *T. abyssicola*, which occurs in the near neighbourhood. Turton's *T. radiata* ([54]p. 260) is a synonym of the last species.

Terebratulina meridionalis sp. nov.
(Pl. I, fig. 8)

Terebratulina caput-serpentis var. *septentrionalis* Davidson (non Couthouy), *Voy. Challenger*, Zool. vol. I, 1880, pp. 33-6, pl. I, figs. 6-9.

Terebratulina septentrionalis Davidson (pars), 'Mon. Rec. Brach.', *Trans. Linn. Soc.*, ser. 2, vol. IV, Zool. pt. I, 1886, pp. 28-32.

Description: Shell of medium size, ovate, with curved sides and slightly truncated front, widest at the middle. Valves regularly convex, ventral slightly deeper than the dorsal and possessing a slight, narrow, distinct sulcus anteriorly. Folding uniplicate. Surface of valves finely capillate, striae strong and simple in umbonal region, increasing by bifurcation, and becoming evanescent later; finely punctate. Beak short, suberect, foramen large, almost circular, submesothyrid, attrite; deltidial plates disjunct; pedicle-collar short. Hinge teeth without dental plates or swollen bases. Cardinalia in dorsal valve as is usual in *Terebratulina*, with socket-ridges fused to the crural bases and forming prominent ridges which project a little behind the dorsal umbo; small transverse cardinal process; no median hinge-plates. Crura long, descending branches of loop short, transverse band arched ventrally, crural processes united and transforming the loop into a ring. Muscular impressions feeble.

Dimensions: Holotype, length 22 mm., breadth 18 mm., thickness 9·5 mm.

Holotype and Locality: Specimen in the British Museum (Nat. Hist.), dredged by the 'Challenger' Expedition at Station 142, Cape of Good Hope (= nearly 40 miles due south of Cape Point) in 150 fathoms.

Remarks: In his 'Challenger' Report, Davidson (p. 33, pl. I, figs. 6-9) recorded the *Terebratulina septentrionalis* Couthouy (as a variety of *T. caput-serpentis* = *retusa*) as abundant at Station 142, lat. 35°4′S., long. 18°37′E., off the Cape of Good Hope, in 150 fathoms, together with '*Terebratula vitrea* var.

minor' and '*Kraussina pisum*'. In the same work he recorded the species from lat. 46°40′S., long. 37°50′E. (= Marion Island) in 150 fathoms, associated with '*Platydia anomioides*' and '*Waldheimia kerguelensis*'.

In his later work (p. 28), Davidson appears to cast some doubt upon the authenticity of the Cape locality, but at the same time gives the Marion Island latitude and longitude in error for the Cape.

By the courtesy of the British Museum authorities I have been able to examine the 'Challenger' examples and to compare them with typical *T. septentrionalis* Couthouy from Casco Bay, Maine, and other places. Some of these are preserved in the Zoological Department of that Institution, and I was surprised to find that one box, registered 78.6.15.28, contained two distinct species, one with evanescent striae and the other (a large, solitary example) agreeing with the true *T. septentrionalis* from Halifax, 83 fathoms ('Challenger' specimens, 78.6.15.24). I came to the conclusion that the true *T. septentrionalis* had probably been used for comparison and accidentally left in the same box with the others.

At the same Institution I also had the privilege of examining some specimens preserved in spirit and coming from Station 142. These I found agreed exactly with the examples mentioned above which showed evanescent striae; and like them differed sufficiently from *T. septentrionalis* to merit the erection of the present new species.

Compared with a spirit specimen of *T. septentrionalis* from Casco Bay, Maine, of almost the same size, viz. length 22 mm., breadth 17 mm., thickness 11 mm. (pl. I, fig. 9), the new species shows important differences in striation as well as in punctation. The striation of *T. meridionalis* is evanescent (pl. I, fig. 8) and contrasts strongly with that of *T. septentrionalis* (pl. I, fig. 9). The number of striae is about the same in both species. On the outer surface of the ventral valve, about the middle, *T. meridionalis* has small ovate pores, 20–30 × 15 μ in diameter, and 256–288 per sq. mm. In *T. septentrionalis* from Casco Bay, the pores are small and rounded, 15–20 × 15–20 μ, and 320–384 per sq. mm. at the middle of the ventral valve. Anteriorly both species are very similar in the possession of a slightly truncated front and low dorsal uniplication. The foramen in each species is also submesothyrid and there are rudimentary deltidia.

In addition to the British Museum material I have had the advantage of comparing others in my own collection as well as examples in the South African Museum. These are all from essentially the same neighbourhood as the 'Challenger' specimens and confirm the conclusion reached above. Specimens from 'Off Cape Point, S. Africa, 190 fathoms' (in my own collection, ex South African Museum) agree exactly with the 'Challenger' example from Station 142 (p. I, fig. 8). They are smaller in size, but low uniplication is visible. They have small, ovate pores 256–320 per sq. mm., and 20–30 × 15 μ in size.

Three small specimens in the South African Museum, A. 5623, dredged in 85 fathoms, off Cape Point, 10 miles S. 16° W., belong to the same species, and

a very young example in the same Museum, A. 5632, dredged at the same depth and place as the above, is probably the same.

The *T.* '*septentrionalis*' and the two other species of brachiopods recorded by Davidson from Marion Island require further investigation in the light of present knowledge.

With regard to '*Waldheimia kerguelensis*', the figures given by Davidson ([5]pl. III, figs. 3-5) suggest a somewhat different species from that under the same name from Kerguelen Island ([5]pl. III, fig. 1).

Terebratulina sp. indet.

Included in the South African Museum material are several juvenile examples of a *Terebratulina* which must remain unidentified pending further material. The specimens are all from the western side of the Cape—the opposite side from which *T. abyssicola* was dredged. Three lots are from the neighbourhood of Table Bay, and two lots are from off Saldanha Bay. Some notes on these may be useful in connection with further dredgings in these waters.

A. 5620. Table Bay, 22 fathoms (South African Museum).

There are three juvenile examples from this locality which possess a rather coarser and more distinct ornament than *T. meridionalis*. Near the umbo there are 13 or more strong, rounded striae which soon break up into fascicules of finer striae by bifurcation and trifurcation. There are also a few interpolated fine striae. All extend to the anterior margin with occasionally a second bifurcation at a late stage. The beak is short, suberect; foramen large and almost circular, submesothyrid, attrite. The deltidia in two examples are just touching at the points, but in the largest example they are disjunct (perhaps broken or worn by the umbo of the dorsal valve). In the smallest example the folding is uniplicate and in the two others slightly sulciplicate. The species presents some resemblance to *T. abyssicola*, but differs in punctation. It has long oval pores on the outer surface ranging from 224 to 288 per sq. mm., the dimensions being 30 (–45) × 15–20 μ. On the inside of the valve they are round and measure 15 × 15 μ.

A. 5621. 28 miles S. 76° W. of Lion's Head, Cape Peninsula, 140 fathoms. Four juvenile examples (South African Museum).

The punctation in these ranges from 272 to 288 per sq. mm., the diameters being 20 × 15–20 μ, on the outer side.

A. 5619. 34 miles S. 63° W. of Lion's Head, Cape Peninsula, 154 fathoms. Four juvenile examples (South African Museum).

The punctation ranges from 272 to 304 per sq. mm., with diameters of 15–20 × 10–15 μ, on outer side.

These two lots seem to agree with A. 5620, but are too young for critical comparison. The punctae are near those of *T. meridionalis* and less than in *T. abyssicola*.

A. 5628. Off Saldanha Bay, 20 fathoms. Five juvenile examples (South African Museum).

The punctation ranges from 320 to 352 per sq. mm., with diameters of ?30 × 20 μ (outer) and 10 × 10 μ (inner). One specimen has spicules in the genital sinuses of the ventral valve near those of *T. valdiviae* Bl.

A. 5622. 5 miles W. by S. of Constable Head (Saldanha Bay), 47 fathoms. One juvenile example (South African Museum).

The punctation ranges from 308 to 320 per sq. mm., with diameters of 15 × 15 μ (outer). The striation is somewhat of the evanescent type and not that of *T. abyssicola.*

The above two lots are puzzling, but are too immature for a definite conclusion to be reached.

Subfamily GRYPHINAE Sahni, 1929

(nom. nov., to replace *Terebratulinae* Dall, 1870, which conflicts with the genus *Terebratulina*).

Genus *Gryphus* Megerle von Mühlfeldt.

1811. *Ges. nat. Fr. Berlin, Mag.* V., p. 64.

Gryphus capensis sp. nov.

(Pl. I, figs. 10-13.)

Description: Shell small, longitudinally oval, with somewhat straight sides and very slightly truncated front, widest at the middle and tapering posteriorly. Valves regularly convex, ventral deeper than dorsal; anterior commissure rectimarginate. Beak short, rounded and with no apparent ridges, incurved dorsalwards and truncated by a small, circular, marginate foramen, separated from the hinge-line by a symphytium: the foramen is also slightly labiate and has a short, but distinct, pedicle-collar.

Interior of ventral valve smooth and with fairly strong muscle-impressions in the umbonal region; teeth small, situated at the basal angles of the symphytium: dorsal valve with cardinalia consisting of thin, concave hinge-plates uniting the socket-ridges and crural bases; small accessory outer socket-ridges; no median hinge-plates; cardinal process small and transverse; crural processes some distance down the almost parallel descending branches of the loop; transverse band narrow and arched ventrally; thin, thread-like septum separating the distinct muscle impressions in the umbonal region.

Dimensions: A. 5626 (Paratype), length 9·9 mm., breadth 6·5 mm.
A. 5627 (Holotype), length 13·5 mm., breadth 9·7 mm.

Type-specimens: As above; both in the South African Museum.

Type-localities: Holotype: 29 miles SW. of Cape St. Francis, 75 fathoms.
Paratype: 73 miles S. by W. of Cape St. Blaize, 125 fathoms.

Remarks: In his Annotated List of the Recent Brachiopoda, the late Dr. W. H. Dall, in 1920,[16] showed that the familiar generic name *Liothyrina* Oehlert must give way to the earlier name of *Gryphus* of Megerle von Mühlfeldt, 1811, the type species of which is the *Anomia vitrea* Born, 1778, a common Mediterranean species.

The general characters of the new Cape species seem to place it in the *Gryphus* group rather than in that of *Liothyrella* Thomson. As pointed out in a previous paper,[23] the *Gryphus* (olim *Liothyrina*) group comprises fairly large shells with a somewhat truncated front, and, in some cases, broad dorsal uniplication, together with a loop with long, almost parallel, descending branches, with crural processes a little distance down, and a broad transverse band, as in *Gryphus vitreus*, *sphenoideus*, *cubensis*, *bartletti*, and *stearnsi*: the *Liothyrella* group, on the other hand, comprises broadly dorsally uniplicate oval shells, usually of small size, with a rounded front, and possessing a loop of a short triangular form, with crural processes close in, and a very narrow transverse band, as in *Liothyrella uva*, *notorcadensis*, *antarctica*, etc. The features in these two groups are correlated with certain types of spiculation in the animal (see Blochmann,[14a, 14b]).

Though *Gryphus capensis* is smaller than the other species assigned to the genus, its loop bears considerable resemblance to that of *G. stearnsi* or *G. sphenoideus*, as figured by Blochmann ([14b]pl. 39, figs. 29 and 23a); the transverse band is, however, much narrower.

A small *Gryphus*-like species was dredged by the 'Challenger' Expedition in 1873, off the Cape of Good Hope, at Station 142, lat. 35°4′S., long 18°37′E., at a depth of 150 fathoms. Davidson ([5]pp. 29-30, pl. II, figs. 5-6) referred the species to *Terebratula vitrea* var. *minor* Philippi (now *Liothyrella affinis* Calcara). The specimens are in the British Museum: they are not so elongate as *G. capensis*, being slightly broader. A similar species was dredged by the 'Valdivia' Expedition in 1898, from the Agulhas Bank, and was described, but not named, by Blochmann in 1906 ([14a]p. 699) and in 1908 ([14b]pp. 605, 613, and 630, pl. 39, fig. 31). He compared it with the 'Challenger' specimen and concluded that both were specifically distinct from *L. affinis* in the character of the loop and in other features. In 1906 he referred it to the *Gryphus* (= *Liothyrina*) series and ranged it with the larger species *G. vitreus*, etc.—a group without certain spicules penetrating the bases of the cirri. In his distributional map of 1908 ([14b]pl. 40), however, it is placed with the series containing *Liothyrella affinis*, *antartica*, etc.

Unfortunately the 'Valdivia' example has not been fully figured, the loop only having been illustrated by Blochmann ([14b]pl. 39, fig. 31). Without a further examination and a comparison of the 'Challenger' and 'Valdivia' examples with the present species it is not possible to be sure of their identity. The habitat of the two former is some distance to the west of that of *G. capensis*, but does not rule out the probability of the species being identical.

In connexion with the relationship of the South African brachiopod fauna, mention might be made here of other occurrences of species of either *Gryphus* or *Liothyrella* in localities not far removed from the South African region. Of some interest is the record of *Terebratula cernica* Crosse,[24] which was obtained from the stomach of a fish taken at a depth of 80 fathoms off the Island of Mauritius. It is a larger species than *G. capensis* but nothing is known of its

loop or interior features. It was refigured by Davidson in 1886 ([19]p. 16, pl. I, fig. 19) as *Liothyris cernica*, and was later referred tentatively to the *Gryphus vitreus* series by Blochmann ([14b]p. 625, pl. XL). According to the latter, Studer also mentions a fragment of a similar Terebratulid obtained at Mauritius by the 'Gazelle' Expedition, 1874-6. Further, a *Liothyrina* (= *Gryphus*) sp. indet. was recorded by Dall ([25]p. 439, pl. 26, figs. 1-2) from south of Saya de Malha Banks, NNE. of Mauritius. In outward form it approached *G. bartletti* (West Indies); its loop showed affinity with *G. sphenoideus* (West Mediterranean and East Atlantic, off Portugal, etc.); and the spiculae were closely allied to *G. vitreus* (Mediterranean and East Atlantic) ([17]p. 46).

Two examples of a further interesting species of *Gryphus* were dredged by the 'Challenger' Expedition in 1876, off Ascension Island, in 420 fathoms, and were regarded by Davidson ([5]p. 28, pl. II, figs. 10-11) as agreeing in every respect with the *G. cubensis* (Pourtales) from 100 to 300 fathoms off the Florida Reefs. Blochmann, in 1908 ([14b]pp. 622-3, pl. 38, fig. 20) refigured one of the 'Challenger' specimens, and remarked upon its somewhat asymmetric outline. More examples are required in order to establish the exact status of the Ascension Island form.

Family TEREBRATELLIDAE King, 1850.

Subfamily MEGATHYRINAE Dall, 1870.

Genus *Megathiris* d'Orbigny.

1847. *C.R. Ac. Sc., Paris*, xxv, p. 269.

Megathiris capensis sp. nov.

(Pl. II, figs. 3-6, 9-13, 16, 17.)

Description: Shell small, transversely ovate, with a long straight hinge-line, almost or quite equal to the full width of the shell; rounded anteriorly; strongly convex, the ventral valve being considerably deeper than the dorsal; surface smooth except for rather strong growth-lines; test thick and visibly punctate; cardinal area in each valve, that on the dorsal valve being small and visible only at the cardinal extremities. Ventral valve very deep, with truncated rostrum, large submesothyrid foramen, rudimentary deltidial plates separated by linear grooves from the adjacent area which is high and triangular; interior furnished with two short, lateral septa near the anterior border, and one long, thin, median septum extending backwards from just within the anterior border to the umbo where it is high-standing and supports a distinct pedicle-collar; hinge-teeth fairly large, widely separated, and without dental plates; internal surface covered with white, rounded, granulations like shagreen. Dorsal valve shallow with slightly protuberant apex, furnished with three prominent septa thickened and denticulated along their crests; the two lateral septa, which commence within the anterior border, possess bulbous triangular apices with points directed towards the lateral borders of the shell, they extend backwards as low ridges to about the middle of the valve: the median septum, which has a bulbous rounded apex, commences at the same distance from the anterior

border and extends backwards as a low ridge to the hinge platform: cardinalia consisting of two prominent socket ridges, widely separated but united across the umbonal cavity by two broad, excavate, hinge-plates resting on the posterior prolongation of the median septum; no true cardinal process, the diductor muscles being attached to a vertically striated apical portion of the interior of the valve; crura very short, crural processes large, convergent; loop as in *M. detruncata*: lophophore ptycholophous.

The shell shows no sign of folding, the anterior commissure being rectimarginate.

The lophophore is ptycholophous, as in *Megathiris detruncata* (Gmelin). (See plate II, fig. 17.)

Dimensions: Holotype, A. 5616a, 7·1 × 5 mm.
Paratype, A. 5616b, 7·5 × 5 mm.

Type-specimens: As above, both in South African Museum.

Type-locality: Dredged in 45 fathoms, with *Crania roseoradiata* sp. nov., 7 miles SSW. of Constable Hill (Saldanha Bay).

Remarks: The genus has not hitherto been recorded from South Africa, and its occurrence there is of extreme interest since it appears to be peculiarly northern as regards both recent and fossil occurrences. A Tertiary fossil form with some external resemblance to *Megathiris* has been recorded from Chile by Dr. A. Philippi ([44]p. 218, pl. 49, fig. 11). The species is described as *Terebratula depressa* and comes from Lebu, and the author suggests, from its extremely small size, that it is possibly not fully adult. 'It resembles', he says, 'the *T. detruncata* of European Seas very much, which belongs to the genus *Megathiris* d'Orbigny.'

D. P. Oehlert, in 1888 ([45]p. 814), referred *T. depressa* Phil., to *Megathiris*. Von Ihering, in 1903 ([46]p. 338), also placed it in the same genus along with *Argiope barretiana* Davidson which occurs in the West Indies and Florida (43–461 fathoms) and off Rio de Janeiro (70 fathoms). The latter is now regarded as *Argyrotheca barretiana*. Von Ihering ([46]p. 341) regarded the presence of a species of *Megathiris* in the Tertiary of Chile as confirming the Atlantic character of the Tertiary fauna of that country, the presence of this and other forms being explained easily by the free communication of seas in Central America, certainly in Eocene and probably in Miocene times.

Until other, and more adult, examples of the '*Terebratula*' *depressa* Philippi are forthcoming, there remains some doubt as to its generic relationship. It may be pointed out that Philippi's name is pre-occupied by the *Terebratula depressa* Faujas 1799, a Cretaceous (Senonian) species from France and Holland.[47] This was referred to *Megathiris* by d'Orbigny in 1847 ([48]p. 149) and to *Cistella* by de Morgan in 1883 ([49]p. 10 of reprint). *Cistella* is now *Argyrotheca* Dall.

The Cape species is very distinct from the genotype *Megathiris detruncata* (Gmelin) (pl. II, figs. 1, 2, 7, 8, 14, 15), which occurs in the Mediterranean and East Atlantic from Guernsey and the Scilly Is. to Madeira (16–100 fathoms),

and is recorded as a fossil from the Eocene, Miocene and Pliocene of south and eastern Europe.[50] *Megathiris capensis* is larger and more transverse, in addition to being entirely smooth externally and more rugose internally.

Jeffreys ([51]p. 124, pl. 5, figs. 3a-c) records a form of *M. detruncata* from Guernsey which has weaker costation: it resembles a horse's hoof in shape, being longitudinally oval, instead of transversely oblong (as in Mediterranean examples); the costae are much fainter and do not extend to the anterior margin. He also refers to specimens in the M'Andrew collection from Madeira, which, though smaller, have the same form and sculpture. These, he considers, may therefore belong to a distinct and undescribed species.

Sacco, in 1902 ([52]pp. 30-1), figured and briefly described several varieties of *M. detruncata* from the Italian Tertiary rocks. These include a var. *semilaevis* ([52]pl. 6, figs. 17-19) in which the costation does not reach the margin which is smooth: it occurs frequently in the Middle Miocene and Lower Pliocene, and suggests Jeffreys's form previously mentioned and an Italian Eocene species, referred to *M. detruncata* by Davidson ([53]pl. XXI, figs. 6-8). Another of Sacco's varieties is var. *perlaevis* ([52]pl. 6, fig. 20), in which the valves are smooth or nearly so: it occurs somewhat rarely in the Middle Miocene and Lower Pliocene. Sacco's figure of this variety is an external view of the dorsal valve: it strongly suggests the Cape species, but in the absence of an interior view of this fossil a comparison of the cardinalia, etc., with those of the present species cannot be made.

Subfamily KRAUSSININAE Dall, 1870.

The subfamily position of the genus *Kraussina* and some allied genera has been the subject of much difference of opinion in the past. Dall in 1870 ([9]p. 138) created the subfamily *Kraussininae* for *Kraussina rubra* and four other species including *lamarckiana* which later (in 1884) became the genotype of *Megerlina*. The same subfamily was adopted by Davidson in 1887 ([19]p. 118), and by Schuchert in March 1893 ([40]p. 160). But Beecher in 1893 ([29]p. 391) placed *Kraussina* and *Megerlina* in his new subfamily *Magellaniinae* along with *Magellania*, *Terebratella*, and others, and at the same time created a new subfamily *Dallininae* to embrace *Dallina*, *Macandrevia*, *Terebratalia*, *Laqueus*, *Mühlfeldtia*, etc. At that time the genus *Mühlfeldtia* included *truncata* and what is now known as *Frenulina sanguinolenta*. The latter species, under the name *M. sanguinea*, was used by Beecher in illustration of one of the stages in the ontogeny and morphology of the *Dallininae*, the stage being called the 'Mühlfeldtiform' stage. In studies made in 1916 ([30]p. 24) I found that *Mühlfeldtia truncata* differed fundamentally from *Frenulina sanguinolenta* and I transferred the former genus to the *Magellaniinae* and changed Beecher's stage name in the *Dallininae* from 'Mühlfeldtiform' to 'Frenuliniform'. This is now generally accepted. My reasons for the transfer were based upon the absence of dental plates in *Mühlfeldtia truncata*, as well as in the resemblance of the early loops stage to a similar stage of *Terebratella dorsata*, and the appearance of the

secondary loop before the appearance of the primary lamellae. It was pointed out for the first time in that paper that in the *Dallininae* the descending branches of the loop (i.e. the primary loop) were united to the septum at an earlier stage than in the *Magellaniinae*. In the same paper I also emphasized a hitherto unrecognized feature in the *Dallininae* of the universal presence (except in adults of the genus *Dallina*) of dental plates in the ventral valve.

Though possessing close affinities with the *Magellaniinae*, I was not fully satisfied in 1916 that *Mühlfeldtia* rightly belonged to that subfamily or to a new one altogether. The matter was taken up later in the same year by J. A. Thomson ([31]p. 498) and again in 1918 ([15]p. 7). In these valuable papers he foreshadowed a separate subfamily to include *Kraussina*, *Megerlina* and *Mühlfeldtia*, and in his later Manual ([28]p. 219) placed these three genera together with *Pantellaria* and *Aldingia* in the emended but almost forgotten subfamily *Mühlfeldtiinae* Oehlert 1887 ([39]p. 1314). It is unfortunate that Oehlert in proposing this subfamily was not more precise in specifying the genera he proposed to assign to it, but one can assume, from the arrangement of the genera on later pages ([39]pp. 1322-3), that it comprised *Mühlfeldtia* (*M. truncata*) [with Section *Megerlina* (*M. lamarckiana*) and *Ismenia* (*I. pectunculus*)], *Kraussina* (*K. rubra*), and *Platidia* (*P. anomioides*).

The close relationship of *Mühlfeldtia*, *Megerlina* and *Kraussina* as regards loop-development and spiculation was clearly demonstrated by Deslongchamps in 1884 ([32b]p. 122).

Davidson in 1887 ([19]p. 118), placed *Kraussina* and *Megerlina* in the subfamily *Kraussininae*, and Dall in 1920 ([16]pp. 374-6), followed the same procedure, at the same time placing *Mühlfeldtia* and *Pantellaria* in the subfamily *Mühlfeldtiinae*.

Though *Kraussina*, *Megerlina* and *Mühlfeldtia* are so closely related in loop characters, there are certain other minor points in which they differ. *Kraussina* does not possess a pedicle-collar in large adult shells: in these there is only a narrow thickened band fused to the floor of the umbonal cavity (as in *Coptothyris*, *Terebratalia*, and other higher long-looped forms). In very young shells about 4 mm. and 6 mm. in size the band is slightly free anteriorly, which suggests that in still earlier stages there may be a free pedicle-collar. *Megerlina* and *Mühlfeldtia* possess a free or true pedicle-collar up to the adult stage (see [30]p. 25). Pending further detailed study of the animals I feel disposed at present to place *Kraussina*, *Megerlina* and *Mühlfeldtia* in Dall's subfamily *Kraussininae* which antedates *Mühfeldtiinae* Oehlert by several years.

Genus *Kraussina* Davidson.

1859. *SB. Ak. Wien. Math.-naturw.*, pl. xxxvii, p. 189, 210 (pro *Kraussia* preocc.).

From a careful study of numerous specimens and of the literature upon the subject, the only species which I consider as coming within the genus *Kraussina*

proper are *K. rubra* (Pallas), *K. cognata* (Sowerby), *K. gardineri* Dall, and *K. crassicostata* sp. nov., described in a later page.

The area of distribution of this genus is of peculiar interest. So far as is known at present it ranges from the Cape of Good Hope to the Indian Ocean south of the Saya de Malha Banks. The species restricted to the Cape itself are three in number, viz. *K. rubra*, *cognata* and *crassicostata*. The Indian Ocean form is *K. gardineri*. It is seen from the above that the distribution of the genus is somewhat discontinuous, there being no record of its occurrence between Port Alfred and the Saya de Malha Banks, except a reference by Davidson, in 1887 ([19]p. 120), to some small specimens erroneously described by Gray in 1872 under the mistaken name of *Terebratula truncata* (= *Mühlfeldtia truncata*). They were found attached to Ascidia, and to the stems of large algae, off the coast of Natal. These specimens are referred to *Kraussina rubra* by Davidson. The occurrence of *K. rubra* here appears to me to be extremely doubtful in view of the direction taken by the Mozambique Current, viz. towards the Cape. Gray may have been correct in his attribution of the species to *Mühlfeldtia truncata*. In 1921 ([17]p. 49) I referred to the presence in the British Museum (Natural History) of an immature example of this typical Lusitanian species, labelled 'S. Africa. J. H. Ponsonby coll. 1900. 6.13.4'.

Unfortunately full details as to habitat and depth have not always been recorded, hence it is impossible at present to give the bathymetric range of *Kraussina*, but, from the available data and from the thick-shelled character of the Cape species, the genus appears to be one of fairly shallow water.

It is also to be regretted that in most of the literature dealing with *K. rubra* one finds no more precise locality than 'Cape of Good Hope'. More data on these points are badly needed.

The genotype of *Kraussina* is the *Anomia rubra* Pallas 1766. The original generic title proposed by Davidson in 1852 ([8b]p. 369) for the reception of this species was *Kraussia*, but this name having been used by Dana for Crustacea earlier in the same year, *Kraussina* was suggested by Suess in 1859 ([33]p. 210) in collaboration with Davidson, who confirmed it in 1861 ([34]p. 39).

Davidson, in 1887 ([19]p. 118), included seven species in the genus, five in *Kraussina* proper (viz. *rubra*, *cognata*, *deshayesi*, *pisum* and *atkinsoni*), and two in the subgenus *Megerlina* (viz. *lamarckiana* and *davidsoni*). Only two of these are strictly referable to *Kraussina*, viz. *rubra* and *cognata*. The generic position of the remaining five forms will be dealt with in the sequel.

Kraussina rubra (Pallas)
(Pl. III, figs. 1, 2.)

Anomia rubra Pallas, *Misc. Zool.*, 1766, p. 182, pl. XIV, figs. 2-11.

Terebratula capensis Kuster (not Adams and Reeve), 'Mart. and Chem.', *Conch. Cab.*, 1848, p. 32, pl. 3, figs. 15-17.

Terebratula capensis Krauss (not Adams and Reeve), *Südafr. Moll.*, 1848, p. 32, pl. II, fig. 10.

Terebratula (*Kraussia*) *rubra* Reeve, 'Mon. Terebratula', *Conch. Icon.*, 1861, pl. IX, fig. 37.

Kraussina rubra Davidson, 'Mon. Rec. Brach.', *Trans. Linn. Soc.*, ser. 2, vol. IV, Zool. pt. II, 1887, pp. 119-21, pl. XX, figs. 19-23.

Remarks: This well-known species has been met with at several localities around the Cape, but little is known as to its range in depth. It has been seen by the writer from Port Elizabeth, Algoa Bay and Port Alfred, and from the Agulhas Bank, 22 fathoms. A figure of a specimen from the last locality, agreeing closely with Pallas's original, is given here (pl. III, fig. 1) for comparison with the new species described in a later page.

Kraussina rubra has been described and figured by several authorities and appears to present a certain amount of variation in outward form. The *Anomia rubra*, as figured by Pallas, is a transversely oval and costate shell, without apparent fold or sinus; but many specimens of equal size which I have examined show a strong ventral fold and dorsal sulcus: these features are well marked from the umbonal region. In these the shells are ventrally uniplicate or sulcate. Some forms tend to become more elongate than others. There is also some slight variation in the intensity of the costae.

It is not my intention to burden this paper with a full revised description of *Kraussina rubra*, but some important details are necessary in order to emphasize certain differences between this genus and that of *Megerlina* dealt with in a later page.

In the interior of the dorsal valve of *K. rubra* the cardinalia consist of two divergent socket-ridges bounding the dental-sockets. Lying between these ridges is an umbonal callosity with two eye-like depressions on its surface. There are no excavate hinge-plates, even in shells as small as 4 mm. in size. At the apex a small cardinal process is present. A grooved median septum rises from the umbonal callosity and extends some distance down the interior of the valve. From its anterior extremity arise two short, deviating lamellae extending towards the ventral valve: these fork at their ends, giving rise to anterior and posterior processes. These processes are usually quite short, but in some specimens the posterior processes are in the form of long narrow ribbons extending backwards and slightly inwards towards each other: they possess hook-like extremities. The loop is essentially adult in shells 6 mm. long.

The dorsal valve also possesses a slight, but distinct, cardinal area, a feature of unusual occurrence, found also in the genera *Mühlfeldtia* and *Megerlina* (see [17]). There are a few spines within the margin.

In the ventral valve the features of importance are the absence of dental-plates and of a free pedicle-collar. As previously stated, in adult shells, there is a thickened band in place of the latter, but in very small specimens this band may be free anteriorly.

The dense character of the shells of this species renders it somewhat difficult to make a study of the punctation. I have, however, succeeded in one or two cases with interesting results. Adult shells have large oval pores on the

exterior, these pores being denser and larger in the grooves than in the costae. In specimens from Port Elizabeth I have counted as many as 256 pores per sq. mm. in the grooves, as against 168 pores in the costae. In the former they measure 60 × 30–35 μ , and in the latter, 45–50 × 15–20 μ. On the inner surface the dimensions are 15 × 15 μ for all pores. The young specimens, however, exhibit some interesting differences both as regards punctation and interior details. These are perhaps worth recording. In a specimen 6 mm. long, on which fine costation is visible, the punctae appear to be evenly distributed with no differentiation in the grooves or on the costae: they average 244 per sq. mm. at the middle of the ventral valve. Internally this valve has a narrow band within the apex which is slightly free anteriorly. The dorsal valve is like the adult, without excavate hinge-plates; and has a loop consisting of two very broad divergent lamellae, slightly bifurcated at their extremities. Widely-spaced spinules occur just within the margin of the valve. In a smaller specimen 4 mm. long, the punctae are moderately round with no differentiation, being 188 per sq. mm. Internally it is much the same as the other, but the extremities of the divergent lamellae are without bifurcations.

The spiculation of the mantle of *Kraussina rubra* was studied by Deslongchamps in 1864 ([42]p. 25, pl. II, figs. 10-12), and again in 1884 ([32b]pp. 121 et seq. and 160, pl. XIX, fig. 7). The spicules are of a very special form and very small. Two systems exist, one in the mantle, the other in the pallial sinuses. Spicules also exist in the walls of the visceral chamber and in the arms.

Kraussina cognata (Sowerby).

Terebratula cognata Sowerby, *Thes. Conch.*, vol. I, 1847, p. 346, pl. 68, figs. 12-14.
Terebratula cognata Küster, in 'Mart. and Chemn.', *Conch. Cab.*, Bd. VII, I, 1848, p. 46, pl. 4, figs. 5-6 (as figs. 3-4 in text).
Terebratula (*Kraussia*) *cognata* Reeve, 'Monogr. Tereb.', *Conch. Icon.*, 1861, pl. IX, figs. 38a, b.
Kraussina cognata Davidson, 'Mon. Rec. Brach.', *Trans. Linn. Soc.*, ser. 2, vol. IV, Zool. pt. II, 1887, pp. 121-2, pl. XX, figs. 24-6 (var.? 27-30).

Remarks: According to figures and descriptions this species is somewhat subtrapezoidal or elongated, with a nearly straight hinge-line almost as long as the width of the shell. The colour is pale yellow and the surface covered with radiating costae. Chemnitz, in 1785 ([2]p. 78, pl. 76, figs. 688a, b) described and figured a shell from the Cape as '*Cognata Anomiae craniolaris basi perforata*', but from his poor description and illustrations and from the fact of his not being a binomial writer, the *Terebratula cognata* of Sowerby is regarded as the type.

Davidson gives copies of the figures of Sowerby and Reeve which show the type of folding as sulcate.

Unlike *Kraussina rubra*, this species increases in length but retains the megathyrid type of cardinal margin.

This species requires more careful study and more material. I have only been able to examine one or two indifferent specimens which appear to agree with the description of the species. In these the cardinalia, etc., agree essentially with *K. rubra*, and the interior of the dorsal valve is very spinous just within the margin. Spicules are present in the ventral and dorsal mantles. Owing to the almost smooth condition of the surface of the valves, there is no differentiation in the punctation. The pores about the middle of the ventral valve are small, even, and widely-spaced, and number 160–176 per sq. mm. They are 15 × 15 μ in size, but a few reach 20 × 20 μ.

Habitat: South Africa, near the Cape of Good Hope.

Note. Dr. K. H. Barnard has recently submitted a large example of a *Kraussina* containing the dried animal dredged in 10–14 fathoms at Saldanha Bay by the *Pieter Faure*. Its registered number in the South African Museum is A. 5607. It is said to have been identified as *Kraussina cognata* by G. B. Sowerby and may be this species. The dimensions are: L. 32·2, W. 29·5, D. 18·3 mm. The earlier growth-lines suggest a shell wider than long, as in *Kraussina rubra*. The shell is hardly sulcate and of a pale yellow colour, and possesses moderately strong radiating costae.

The occurrence of the genus at Saldanha Bay is of extreme interest: it probably reached the South Atlantic coast by the aid of the Benguela Current.

Two other interesting brachiopods are recorded in this memoir from this neighbourhood, viz. *Crania roseoradiata* sp. nov. and *Megathiris capensis* sp. nov.

Kraussina gardineri Dall

Kraussina gardineri Dall, 'Brach. of the Sea Lark Exped.', *Trans. Linn. Soc. Lond.*, ser. 2, Zool. vol. 13, 1910, p. 440, pl. 26, figs. 3-6.

Description: Shell rude and solid, greyish white, similar in shape to *Mühlfeldtia truncata* when young with shell 12 × 13 mm. in size. During growth, the outline elongates proportionally more that it widens, and an adult measures 24·5 mm. in length by 23 mm. in width at the broadest part. Outline then roughly rhombic. Dorsal valve slightly sulcate; ventral valve with corresponding convexity. Latter valve slightly more convex than dorsal: total thickness of adult about half its length. Beak short and wide; peduncle short; foramen wide and incomplete, margins more or less eroded or defective; wide flattened area of irregular shape on each side of foramen.

Surface of valves with coarse, rounded costae, strongest mesially, with subequal roundly excavated interspaces: costae mostly continuous from beaks, and increasing rather by bifurcation than by intercalation: about forty costae in adult, the laterals being finer and closer-set than the others.

Interior of valves strongly calcified; spinules within margin.

Habitat: Station C1, Indian Ocean, south of the Saya de Malha Banks, in 123–153 fathoms (dredged by J. Stanley Gardiner, after whom it is named).

Remarks: Judging from Dall's figures, the cardinalia and brachidium of this species are essentially of the *Kraussina rubra* type, but there appears to be more excessive calcification in the umbonal cavity.

The occurrence of *Kraussina* in the Indian Ocean is of great interest. Associated with the species was a curious intraplicate Rhynchonellid (*Hemithyris sladeni* Dall) which is tentatively referred to the Early Tertiary New Zealand genus *Aetheia* by Thomson ([28]p. 157); and a *Liothyrina* sp. indet., having some affinities with Mediterranean forms (see also Jackson,[17] p. 46).

Kraussina crassicostata sp. nov.
(Pl. III, figs. 3-5.)

Description: Shell solid, subcircular, about as broad as long, with a broad, straight hinge-line somewhat shorter than the greatest width of the shell (= submegathyrid). Valves convex, the ventral much more so than the dorsal; sulcate (i.e. with a shallow sulcus in the dorsal valve opposed to a fold in the ventral valve); margins waved by alternate multicostation. Cardinal area in both valves. Surface covered with 10–12 coarse, angular, radial ridges, strongest mesially and becoming obsolete near the cardinal angles, separated by angular interspaces: ridges continuous from beak, broadening anteriorly, and increasing by bifurcation: they are crossed by fairly strong growth lines. Colour of surface reddish; punctate. Beak well-truncated, foramen very large (due to wear), and incomplete anteriorly,* slight deltidial plates, narrow sessile pedicle collar (i.e. thickened band) within the umbonal cavity. Interior of ventral valve fairly smooth, with distinct muscle impressions posteriorly; bluntly ridged round the margin (= reverse of external ornament); row of small spines just within the margin; teeth small, without dental plates, situated at anterior angles of inner margins of the two widely-separated portions of the transversely-grooved area. Interior of dorsal valve smooth, with well-defined muscle impressions, bluntly ridged margin, and row of spinules, as in ventral valve: cardinalia and brachidium essentially of the *Kraussina rubra* type: no hinge-plates proper, their place being occupied by two eye-shaped pits (for insertion of the pedicle-muscles) in a thick callus in the umbonal cavity between the distant and thick socket-ridges. Cardinal process small and prominent, united laterally to the posterior bases of the socket-ridges by narrow, vertically striated, muscular impressions, within the posterior margin of the umbonal cavity; rudimentary outer socket-ridges bounding the widely separated portions of the area of this valve. Mesial septum distinct, extending from the umbonal callus (where it appears to be grooved on its upper surface) to about the centre of the valve, where it supports two, short and narrow, divergent and ventrally directed lamellae.†

Dimensions: A. 5615 (Holotype), length 16·2 mm., breadth 16·2 mm., thickness 11·3 mm.

* Owing to wear it is not possible to define the type of foramen.

† In the holotype the extremities are broken, but in another example the extremities are flattened and forked (as in *K. rubra*).

Type-specimens: Holotype and two metatypes, No. A. 5615, in the South African Museum, Cape Town.

Type-locality: False Bay, 23 fathoms.

Remarks: This species differs from the genotype, *Kraussina rubra*, in possessing much coarser and less numerous costae which tend to become obsolete near the cardinal angles; the ventral valve is also deeper. *Kraussina cognata* (Sow.) is a longer species with a flattened dorsal valve, and of a pale yellow colour: *Kraussina gardineri* Dall is greyish in colour and possesses a more calcified cardinalia, etc.

The external surface of the ventral valve has large ovate punctae in the grooves with diameters of 45 × 30 μ, and about 256 per sq. mm., while the costae have smaller ovate punctae of less density: internally the punctae are very small and round, about 10 × 10 μ.

Spicules are present in fragments of the ventral mantle adhering to the interior of the shell, especially in the sinuses.

In some specimens in the Manchester Museum of apparently the same species and dredged with *Allopora nobilis* Kent near the Cape of Good Hope, in 26 fathoms, the punctae are similarly diversified, but are somewhat larger and rather less in relative density than in A. 5615.

Genus *Megerlina* Deslongchamps.

1859. *Etud. crit. Brachiop.*, p. 159.

1884. *Bull. Soc. Linn. Normand.*, viii, pp. 210, 243.

Having dealt with the species appertaining to the genus *Kraussina* proper, attention may be directed to other forms which in the past have been erroneously referred to that genus. Three related South African species are included in this group which may be termed the '*Terebratula pisum* series'.

Davidson, in his description of the 'Challenger' Brachiopoda ([5]p. 54), committed a most remarkable error in attributing to the *Terebratula pisum* Lamarck an altogether different species. I have examined the Cape specimens figured and described by Davidson as *Kraussina pisum* (Lam.), in the 'Challenger' Report ([5]pl. IV, figs. 7, 7a, 7b and 8) and later in his 'Monograph of Recent Brachiopoda' ([19]p. 123, pl. XXI, figs. 1-4). The figure 7a of pl. IV of the former report is reversed in printing from the stone (as are some others in the same work): that in the latter report (pl. XXI, fig. 2) is not reversed. The latter, and adjacent figures, however, are not so correct in detail as those in the earlier work, as they do not show the strong ventral plication of the species in question. Davidson's specimens are preserved in the British Museum: figs. 7, 7a and 7b, are the same shell drawn in different views and repeated in 'Recent Brachiopoda', pl. XXI, fig. 2; this shell is in the Zoological Department of the above Institution and is registered No. 78.6.15.27. Figures 1, 1a, 1b, 3 and 3a of pl. XXI are drawn from other specimens now preserved in the Geological Department of the same Institution (Reg. No. B. 12405). Figure 8 (interior

view) of pl. IV ('Challenger' Report) is repeated as fig. 4 of pl. XXI, in the Monograph.

The above species is certainly not the *Terebratula pisum* of Lamarck, 1819, as, according to the original description ([4]pp. 245-6), this is a small, smooth, subglobose red shell, resembling a cherry stone, and 9 mm. wide. The habitat given is 'Isle de France' (= Mauritius). Davidson's '*Kraussina pisum*' bears costae, somewhat like *Megerlina lamarckiana* (Dav.), but finer, and presents no resemblance to a cherry stone. It is also of a uniform light yellow colour, with no red markings at all. This species does not possess the *Kraussina*-type of cardinalia and brachial support, but shows a greater resemblance to *Megerlina* in these features. What I regard as the true *Terebratula pisum* Lamk. possesses essentially the same type of cardinalia and brachial support and must be placed in the same genus. A new specific name, therefore, is required for Davidson's shell. One other species, viz. *T. capensis* Ad. and Rve. = *deshayesi* Dav., also comes into the same genus, viz. *Megerlina.*

Megerlina striata sp. nov.
(Pl. III, figs. 6, 9.)

Kraussina pisum (non Lamk.) Davidson, *Voy. Challenger*, Zool. vol. I, 1880, p. 54, pl. IV, figs. 7-8. 'Mon. Rec. Brach.', *Trans Linn. Soc.*, ser. 2, vol. IV, Zool. pt. II, 1887, p. 123, pl. XXI, figs. 1-4.

Description: Shell small, transversely oval (except in young); colour yellowish-white. Dorsal valve slightly convex, with a distinct central longitudinal depression extending from a prominent umbonal swelling to the anterior margin and increasing in width rather rapidly. Hinge line nearly straight, about two-thirds the width of the valve. Ventral valve deeper than dorsal, longitudinally keeled. Folding sulcate. Beak slightly incurved, with a rather large incomplete foramen, bounded laterally by two small deltidial plates which curve upwards towards the dorsal umbo but fail to meet; beak-ridges very distinct, leaving a small flattened cardinal area between them and the deltidial plates. Foramen submesothyrid. Surface of valves covered with numerous distinct radii which increase by bifurcation and interpolation: cardinal angles smooth (i.e. radii absent on these portions); concentric growth-lines present at variable intervals. Interior of ventral valve with traces of radii like the exterior but reversed; spinous within margin. Pedicle-collar sessile, closely appressed to apex of umbonal cavity but slightly free in front especially near bases of teeth. The latter are comparatively small and not supported by dental plates. Interior of dorsal valve covered with rows of pustules radiating from apex; spinous within margin. Rudimentary area present in this valve.

The cardinalia (as seen in immature shell) consist of two rather stout divergent socket-ridges, excavate below, and supported on inner sides anteriorly by two spurs which extend to the median septum and enclose two eye-shaped muscular pits. Cardinal process feeble. Median septum extending from near

apex to centre of valve where it gives off two broad, thin diverging lamellae, the upper extremities of which are slightly forked, the posterior forks curving inwards to some extent. Midway down each lamella, on the exterior or dorsal face, an accessory process, or ledge, is present, analogous to that in *Megerlina lamarckiana*, but less developed.

Shell with large subcircular punctae.

Dimensions:	*Length*	*Breadth*	*Thickness*
Holotype 1. (pl. III, fig. 6)	14·1	16·2	5·9 mm.
Paratype 2.	13·5	14·9	5·1 ,,
,, 3. (interior details)	9·3	8·5	3·7 ,,

Note. No. 1 = pl. IV, fig. 7 of 'Challenger' Report, and pl. XXI, fig. 2 of Recent Brachiopoda.

Habitat: Station 142, lat. 35°4′S., long. 18°37′E., off Cape of Good Hope, 150 fathoms ('Challenger' Expedition). Type in the British Museum (Nat. Hist.) Registered No. 78.6.15.27.

Remarks: The above description is based upon three examples in the Zoological Department of the British Museum, the largest of which was figured by Davidson, as stated above. Owing to the risk of damage in opening the two large examples, the details of the cardinalia and brachidium are taken from the smallest specimen (N. 3), but these have been checked to some extent by No. 2 which was partly opened. There is reason to believe that No. 1 would exhibit a slightly more adult condition of the loop, etc.

Two other examples of this species were also figured by Davidson ([19]pl. 21, figs. 1 and 3) and are now in the Geological Department of the above Institution. These have also been examined externally and found to agree with those above.

The shells of this species have much larger punctae than those of *M. pisum* and *M. capensis*. The pores are subcircular in outline and range from 208 to 240 per sq. mm. about the middle of the ventral valve. The size of the pores in No. 1 is 45–50 × 45–50 μ (outer surface) (pl. III, fig. 9). They appear to be evenly distributed over the radii and grooves.

The South African Museum possesses the following specimens which seem to belong here:

A. 6410. 1 specimen (broken), dredged in 40 fathoms, St. Sebastian Bay, Agulhas Bank (K. H. Barnard, 1922).

A. 5663. 5 specimens dredged off East London in 32 fathoms, by the *Pieter Faure*.

A. 7690. 2 specimens (locality and depth unknown). *Pieter Faure* coll.

A. 5605. 1 specimen (broken) dredged off Cape St. Blaize (depth unknown). *Pieter Faure* coll.

The shells are mainly transversely oval, sulcate, and of a light yellowish colour, except one shell of A. 7690 which is white, and possess rather strong radii. In A. 5605 the radii are evanescent.

The four larger shells of A. 5663 measure: 10 × 10·7, 9·9 × 10, 10 × 9·3 and 8·5 × 8·7 mm.

Megerlina pisum (Lamarck)
(Pl. III, figs. 7, 10.)

Terebratula pisum Lamarck, *Animaux sans Vert.*, vol. VI, 1819, p. 245. (Text written by Valenciennes owing to Lamarck's blindness.)

Terebratula natalensis Krauss in Küster, *Conch. Cab.*, von Mart. u. Chem., Bd. VII, I, 1844 and 1848, p. 36, pl. 2b, figs. 4-7. (Plate published, 1844, text, 1848.)

Terebratula pisum Lamk. Sowerby, *Thes. Conch.*, I, 1846, p. 345, pl. 69, figs. 37-9.

Terebratula algoensis Sowerby, *Thes. Conch.*, I, 1847, p. 362, pl. 71, figs. 91-2.

Terebratula natalensis Krauss, *Südafrikanischen Mollusken*, 1848, p. 33, pl. 2, figs. 11a-c.

?*Terebratula* (*Kraussia*) *pisum* Lamk. Reeve, *Conch. Icon.*, vol. XIII, 1861, pl. 9, fig. 36a (non 36b).

Kraussina atkinsoni (non T. Woods), E. A. Smith, *Journ. Conch.*, vol. X, 1901, p. 116.

Description: Lamarck's description ([4]pp. 245-6) is as follows:
'Térébratule pois. Terebratula pisum.
T. testa minuta, subglobosa, laevi, subantiquata, rubella margine integro antice valde sinuato.
Habite à l'Ile-de-France. Par. M. Mathieu. Mus. no. Petite coquille semblable à un noyau de cerise, ne le surpassant pas en grosseur. Elle a 9 millimètres de largeur.

The following is an amplified description, based upon South African examples.

Shell small, transversely oval, with a subterebratulid type of cardinal margin; valves about equal in depth; dorsal valve sulcate, ventral broadly carinate; type of folding sulcate. Surface nearly smooth, with faint traces of costation; test finely punctate. Colour milk-white or slightly suffused with red. Beak suberect; foramen large, submesothyrid, incomplete; deltidial plates discrete, small, trigonal. Pedicle-collar sessile, slightly free in front. Hinge-teeth without dental plates. In the dorsal valve the cardinalia consist of two prominent, divergent, socket-ridges curling over the dental sockets posteriorly, and supported at their anterior corners by rudimentary excavate hinge-plates in the form of two spurs extending inwards towards the centre line of the valve: these enclose an imperfect hinge-trough; cardinal process small. The brachidium rises from the floor of the valve near the middle as two ventrally directed deviating lamellae which bifurcate slightly at their extremities: outer sides of the lamellae with two short accessory processes, representing the anterior portions of the descending branches: the lamellae extend backwards as low convergent plates forming a pseudo-septum as far as the imperfect hinge-trough.

Dimensions:	*Length*	*Breadth*	*Thickness*
Figured specimen (pl. III, fig. 7)	10·3	11·9	5·6 mm.
Others. South Africa	10·7	10·5	5·4 ,,
Umkomaas	9·4	10·2	4·1 ,,
,,	9·3	10·1	4·4 ,,
,,	8·6	9·3	4·3 ,,

Habitat: Umkomaas, Natal; Port Elizabeth, Algoa Bay; Durban, Natal; East London, etc.

Remarks: Though originally described from Mauritius, there are several specimens from such places as Port Elizabeth, Durban, etc., both in the British Museum (Nat. Hist.) and in private hands, which conform closely with Lamarck's description. As Lamarck's type was never figured, it seems desirable that illustrations should be given here of the South African specimens upon which my conclusions as to identity are based. Among the specimens preserved in the Zoological Department of the British Museum are seven from Umkomaas, Natal (J. H. Ponsonby coll. 1901.9.23.61-7), unfortunately without precise details as to depth, etc. Two other and larger specimens together with several juveniles are also in the same Institution, and are labelled simply 'S. Africa. J. H. Ponsonby. 99.4.14.3765-3771'. These two sets, as well as numerous others in private collections, including specimens in my own collection from Durban, Natal, and Port Elizabeth, Algoa Bay (both ex. H. McClelland, 1922), have been used in the study of the species. A specimen from the British Museum set marked 'S. Africa' has been selected to illustrate the exterior features (pl. III, fig. 7) and both this and others have been used for the interior details.

The punctae in the test of this species differ from those of *M. striata* in being more oval and on the whole less numerous (pl. III, fig. 10). Judging from the examination of about 15 specimens the number ranges 120–220 per sq. mm. at the middle of the ventral valve. The most prevalent numbers, however, are 160–190. The dimensions of the punctae are a little variable according to the presence or absence of strong growth-lines: they average 40–45 × 25–30 μ on outer surface, and 15–20 × 15–20 μ on inner surface.

Large spicules occur in the pallial sinuses, but are scanty in the cirri.

Victor Sganzin ([43]p. 12) in his reference to the *Terebratula pisum* Lamk. says it is very small and extremely rare: it is found at a great depth in Tombeau Bay, Mauritius, and dredging is necessary in order to obtain it.

The *Terebratula natalensis* of Krauss ([6]p. 33, pl. 2, figs. 11a-c) appear to belong to the species under review. His figure (fig. 11b) of the hinge-processes and brachial-support is remarkably accurate except that he appears to have overlooked the accessory ledges on the outer sides of the deviating lamellae. In his description he speaks of the shells being generally white in colour, more rarely flushed with red, and notes the sulcate character as well as the finely striated or almost entirely smooth condition of the surface of the valves. He records the species as living in great numbers at Natal Point (= Durban) in a depth of some fathoms, on stones, *Cardita variegata*, *Arca kraussi*, etc.

With regard to the species described and figured by Küster ([35]p. 36, pl. 2b, figs. 4-7) as the *T. natalensis* of Krauss, there is a little uncertainty as to absolute identity. His figures seem to suggest that he may have had before him an example of the *Terebratula capensis* Ad. and Rve. (= *Kraussina deshayesi* Dav.). The costation shown in the figures is stronger than in *M. pisum* (Lamk.).

Sowerby ([36]pp. 345-6), in his remarks on the species, says, 'also found at Sydney by Mr. Jukes'. This is undoubtedly an error: the Sydney citation probably refers to the *Megerlina lamarckiana* (Dav.), which was unknown at that time.

The *Terebratula algoensis* G. B. Sow., was described and figured in 1847 ([37]p. 362, pl. 71, figs. 91-2) from a single bleached ventral valve in the British Museum (N. H.), Zoological Department, labelled 'Algoa Bay; J. S. Bowerbank'. I have examined the specimen, which bears a registration number (rather indistinct), viz. 42.12.19.26, on the interior of the valve, and consider it to be a somewhat irregularly-grown valve of *M. pisum* (Lamk.). The number of punctae per sq. mm. is about 160, and the dimensions are; outer, 45–50 × 25–30 μ; inner, 15–20 × 15–50 μ.

In the *Journal of Conchology* for 1901, E. A. Smith ([13]p. 116) records *Kraussina atkinsoni* (T. Woods)—a Tasmanian species—for Algoa Bay, Cape Colony (Brit. Mus., J. H. Ponsonby). I have examined the specimens in question—four in mumber B.M. 1900.6.13.5-8)—and find them to be undoubted juveniles of *M. pisum* (Lamk.). The number of punctae per sq. mm. ranges from 160 to 182, and the size of the pores on the outer surface is 30–40 × 25–30 μ. In the '*Kraussina*' *atkinsoni* (T. Woods), judging from three specimens in my own collection from Long Bay, S. Tasmania (the type locality), the pore-density per sq. mm. is much greater, being 255–264; and the pores are practically circular and measure: outer, 30–35 × 30–35 μ; inner, 25–30 × 25–30 μ. They are distinctly visible under a lens. I do not consider *atkinsoni* a true *Kraussina* as it differs in shell-characters, and in its cardinalia and brachidium. Davidson's figures ([19]pl. 21, figs. 5-6) are, unfortunately, not quite accurate. The shells in my possession show the sulcate type of folding and two of them have rather indistinct costae on their outer surface. The species seems to be passing from a costate to a smooth stage. The ventral valve has a submesothyrid beak, a fairly large foramen, incomplete, and bordered anteriorly by small triangular deltidial plates; no dental plates; pedicle-collar deep, sessile, vertically striated, and slightly free anteriorly. In the dorsal valve the cardinalia consists of two upstanding socket-ridges on the inner sides of which are slight plates or buttresses which descend to the floor of the valve without meeting in the median line. These descending buttresses extend forward and converge about half-way down the valve, leaving a triangular trough below the apex in which is seen the two scars of the dorsal pedicle muscles. There is little or no cardinal process. Under each of the dental-socket brackets a slight cavity is present. About the centre of the valve arises the rudimentary brachidium in the form of two lamellae directed outwards and ventrally. The

conjunct bases of these lamellae extend backwards to a point which is embraced by the ends of the converging buttresses of the cardinalia, and the whole process presents the appearance of a bifurcated septum. The upper extremities of the lamellae are slightly forked, but bear no accessory processes on their external faces. With the exception of the latter, the whole structure is essentially that of *Megerlina lamarckiana*, or at least an early stage thereof, but whether *atkinsoni* should be placed in *Megerlina* or not is doubtful until more specimens are examined. It should certainly be removed from *Kraussina*.

I have recently received from Dr. Barnard a very small, smooth, white, sulcate shell, showing rather strong growth-halts. The foramen is incomplete: the deltidial-plates imperfect.

The specimen was dredged off Cape Natal (Durban) in 62 fathoms by the *Pieter Faure*, and was identified by G. B. Sowerby as *Kraussina atkinsoni*. Its museum registered number is A. 5604.

For the present, I am inclined to regard it as a juvenile *Megerlina pisum*.

Note. The interior details of the *Terebratula pisum* Lamk. for Mauritius are unknown and I have based my conclusions as to the identity of the South African specimens on outward appearance only. If further examples are obtained at Mauritius showing differences in cardinalia and brachidium the South African species should be known as *Megerlina natalensis* Krauss.

Megerlina capensis (Adams and Reeve)
(Pl. III, fig. 8).

?*Terebratula natalensis* Krauss in Küster, *Conch. Cab.*, von Mart. and Chem., Bd. VII, I, 1844 and 1848, p. 36, pl. 2b, figs. 4-7. (Plate published 1844; text 1848.)

Terebratula capensis Adams and Reeve (non Gmelin), *Voyage of H.M.S. 'Samarang'*, 1850, p. 71, pl. 21, fig. 4 (in colour).

Kraussia deshayesii Davidson, *Proc. Zool. Soc.*, 1852, p. 80, pl. 14, figs. 20-1 (in colour).

Terebratula (*Kraussia*) *deshayesii* Dav. L. Reeve, *Conch Icon.*, vol. XIII, 1861, pl. 9, figs. 35a, b.

?*Terebratula* (*Kraussia*) *pisum* Lamk. L. Reeve, *Conch. Icon.*, vol. XIII, 1861, pl. 9, fig. 36b (non 36a).

Kraussina deshayesii Davidson, 'Mon. Rec. Brach.', *Trans. Linn. Soc.*, ser. 2, vol. IV, Zool. pt. II, 1887, p. 122, pl. 20, figs. 31, 31a and 31b (= same figures as in 1852, but in black: fig. 31a = fig. 20; fig. 31b = fig. 21).

Description: Shell small, subovate, valves almost equal in depth; dorsal valve sulcate, ventral broadly cardinate, type of folding sulcate. Surface of both valves costate, some bifurcated and intercolated costae; concentric growth-lines moderate: test finely punctate. Colour yellowish, suffused with crimson. Beak suberect: foramen large, submesothyrid, incomplete; deltidial plates discrete, small, trigonal. In ventral valve, pedicle-collar sessile, slightly free in front; hinge-teeth without dental plates; interior sparsely tuberculate, with

a fringe of stronger tubercles just within the margin. In the dorsal valve the cardinalia and brachidium are essentially the same as in *M. striata* and *pisum*, but the accessory processes on outer sides of divergent lamellae are represented by slight curved ridges; interior of valve with rows of pustules radiating from the beak, increasing in size progressively, and ending in strong spines just within the margin.

Dimensions:		*Length*	*Breadth*	*Thickness*
Figured specimen (Pl. III, fig. 8).	(1)	7·4	6·7	3·1 mm.
Others	(2)	8·3	7·6	3·4 ,,
	(3)	8·5	8·2	3·8 ,,

Habitat: Cape of Good Hope, 120 fathoms.

Remarks: I have seen four specimens of this species from the Cape, all of which are in the British Museum (three in the Zoological Department and one in the Geological Department). One of these specimens (No. 1) is now refigured (pl. III, fig. 8). It was originally figured by Reeve ([38]pl. IX, fig. 35b) and is part of the Lombe Taylor collection in the above Institution, registered as 74.12.11.386. Reeve also figured another specimen (No. 2 above) from the Cuming collection in the British Museum ([38]pl. IX, fig. 35a).

The species was first described as *Terebratula capensis* in 1850 by Adams and Reeve ([7]pl. XXI, fig. 4) from a specimen dredged by the 'Samarang' in 120 fathoms at the Cape of Good Hope. The figure (presumably natural size) shows a shell 13·3 × 14·2 mm. in size. I have not been able to trace the original example. Davidson, in 1852 ([8a]pl. XIV, figs. 20-1) figured and described the species as *Kraussia deshayesii* as there was already a *K. capensis* (Gmelin) (a synonym of *K. rubra* Pallas). He gave the locality as 'Korea. Coll. Cuming'. The figure is repeated by Davidson in 'Recent Brachiopoda' ([19]pl. XX, figs. 31, 31a, 31b, in black), with the habitat corrected as follows: 'Dredged by Sir Edward Belcher off the Cape of Good Hope, in a depth of 120 fathoms.' This specimen is in the Davidson Collection, Geological Department, British Museum (N.H.) registered as B. 12402, and measures, according to the figure (fig. 31) 10·6 × 9·5 mm.

The shells of this species have rather large ovate pores, evenly spread over the costae and grooves, and ranging from 224 to 280 per sq. mm. about the middle of the ventral valve. The size of the pores (externally) is 40–50 × 30–50 μ.

The South African Museum has one perfect shell and a dorsal valve which I attribute to this species. The specimens were dredged with *M. striata* off East London in 32 fathoms by the *Pieter Faure* and are registered as A. 5663.

The perfect shell is longitudinally oval and measures: 8·3 × 7·6 mm. It agrees closely with Davidson's specimen ([19]pl. 20, fig. 31) in the geological department of the British Museum (Nat. Hist.) and that of pl. III, fig. 8 of this memoir. It is suffused with red. The interior of the odd dorsal valve is papillose: the brachium is broken.

Subfamily MAGELLANIINAE Beecher, 1893.

Genus *Terebratella* d'Orbigny.

1847. *C.R. Ac. Sc. Paris*, XXV, p. 269.

Terebratella rubiginosa Dall

Terebratella sp. Dall, *Amer. Journ. Conch.*, vol. 6, 1870, p. 122, pl. 6, fig. 4.

Terebratella suffusa (non Reeve) Dall, *Amer. Journ. Conch.*, vol. 7, 1871, p. 65.

Terebratella rubiginosa Dall, *Amer. Journ. Conch.*, vol. 7, 1871, p. 65. Dall, *Proc. Acad. Nat. Sci. Philad.*, 1873, p. 135.

Terebratella(?) *rubiginosa* Dall. Davidson, 'Mon. Rec. Brach.', pt. 2, 1887, p. 91, pl. 16, fig. 19 (after Dall).

Terebratella rubiginosa Dall, 'Annot. List of Recent Brach.', *Proc. U.S. Nat. Mus.*, vol. 57, 1920, pp. 372-3.

Remarks: According to Dall (p. 372) the type locality for this species is Simons Bay, Cape of Good Hope. The solitary specimen is in the United States National Museum. Dall reports that, 'The species is entered in the early Smithsonian register with a large number of mollusks collected by Stimpson at the above locality during the Ringgold and Rodgers exploring expedition', and he thought there was no reason to doubt its having formed part of that collection.

It is unfortunate that more is not known of this important member of a typically southern genus. The original specimen has been well described by Dall and Davidson and from their statements it would appear that there is some peculiarity in the septal attachment of the loop. It is to be hoped that more specimens will be obtained in dredgings in Cape waters.

The nearest allied species seems to be the *Terebratella enzenspergeri* Blochmann from Kerguelen Is. ('Gauss' and 'Challenger' Expeditions). This species was originally referred to *Terebratella dorsata* (Gmelin) by Davidson ([5]pp. 44-5, pl. 4, fig. 4), a South American species.

In a joint report on the 'Siboga' brachiopods published in 1937[58] reference was made to ?*Terebratalia* sp. from the region of the Sulu Islands, Moluccas, dredged at 275 metres. Some time afterwards I received a number of other species which had been mislaid and among them I found further and more adult examples of the species in question and coming from the same station and from another near by at 522 metres. They had been referred to *Terebratella dorsata* by a previous worker, but are not that species, nor *Terebratella sanguinea* (Leach) a New Zealand form, though coming near to the latter in general appearance, but smaller. They appear to be a new species of *Terebratella*.

This occurrence of a member of the essentially Southern Hemisphere *Magellaniinae* in this neighbourhood is of particular interest from the point of view of distribution. The form is now being closely studied.

4. *Conclusions*

In this memoir the following six new species are described from South African waters: *Crania roseoradiata*, *Gryphus capensis*, *Terebratulina meridionalis*, *Megathiris capensis*, *Kraussina crassicostata* and *Megerlina striata*. Three of these forms have been misidentified previously, three are quite new to the South African marine fauna-list, *Megathiris* being the most noteworthy. No doubt further dredgings would add others.

Amplified descriptions are given of some of the previously known South African brachiopods.

The South African brachiopod fauna is not a large one, but is, nevertheless, of particular interest. There are fifteen species belonging to nine genera, viz. *Crania* (1 sp.), *Lingula* (2 spp.), *Agulhasia* (1 sp.), *Terebratulina* (2 spp.), *Gryphus* (1 sp.), *Megathiris* (1 sp.), *Kraussina* (3 spp.), *Megerlina* (3 spp.), and *Terebratella* (1 sp.). There are also a few rather doubtful records of other forms.

The peculiar genus *Agulhasia* is confined to South African waters, though it is said to have Cretaceous representatives in Europe. *Kraussina*, as delimited in this memoir, is almost restricted to the Cape, the only exception being a species—*Kraussina gardineri* Dall—found in the northern Indian Ocean, in 123–153 fathoms on the Saya de Malha Banks. This primitive genus is probably an old one, but nothing is known of its geological history. The related genus, *Megerlina*, has three species at the Cape, viz. *striata* (150 fathoms), *pisum* (150 fathoms), and *capensis* (120 fathoms), one of which, *pisum*, is also recorded from a great depth at Mauritius; one representative, the genotype, *M. lamarckiana* (17–110 fathoms), in south-east Australia; one, *M. atkinsoni*, from Tasmania (Long Bay, 10 fathoms); and one species, *M. davidsoni*, found in the crater at St. Paul Island, south Indian Ocean (tide level to 10 metres), where also occurred *Liothyrella winteri* (Blochmann).

From Mauritius are also recorded *Lacazella mauritiana* Dall, allied to the northern *L. mediterranea* (Risso); *?Gryphus cernica* (Crosse) from the stomach of a fish dredged at 80 fathoms; and *Liothyrina* (*?Gryphus*) sp. Blochmann.

At the Island of Réunion a single shell resembling the Mediterranean-East Atlantic *Mühlfeldtia truncata* was found on a crustacean at 200 fathoms: it was described under the name of *Morrisia gigantea* by Deshayes in 1863. Dall[16] places this tentatively in the genus *Pantellaria* and as possibly synonymous with the West African (407 fathoms) *Pantellaria* (olim *Mühlfeldtia*) *echinata* (F. & O.), which he also cites for the Cape of Good Hope, 224 fathoms (Jeffreys's coll. U.S. Nat. Mus.), as well as New South Wales (Angas coll. U.S. Nat. Mus.). This form requires further study. In an earlier part of this memoir I referred to the presence in the British Museum (Nat. Hist.) of an immature example of *Mühlfeldtia truncata* labelled 'South Africa. J. H. Ponsonby coll. 1900'.

From the Saya de Malha Banks (123–153 fathoms) are recorded *Gryphus* sp. indet. Dall, which has affinities with the northern forms *G. vitreus* and *G. sphenoideus*; *Kraussina gardineri* Dall (as stated above) and *?Aetheia* (olim *Hemi-*

thyris) *sladeni* (Dall). The genotype of *Aetheia* is *Terebratula gualteri* Morris from the Oamaruian—Eocene to Miocene—of New Zealand. The recent *Hemithyris colurnus* Hedley from the east coast of Australia (100–250 fathoms) may belong to this genus.

It may be of interest to refer briefly to the known brachiopod fauna from certain places to the south-east of South Africa, especially the Marion Island district including Prince Edward Island and Crozet Island; Kerguelen Island and Heard Island; and St. Paul Island.

The Marion Island group is situated on an elongated submarine ridge of less than 1,000 fathoms in depth and is separated from South Africa by sea less than 2,000 fathoms deep. From this neighbourhood are recorded the following species: '*Waldheimia*' (?*Magellania*) *kerguelenensis* Dav., with two specimens of *Platidia anomioides* (Sc. & Ph.) attached, off Marion Is. 100 fathoms; *Terebratulina septentrionalis* Dav. (?Couth.) off Marion Is. 150 fathoms; *Platidia anomioides*, five examples, off Prince Edward Is., depth ?; and *Liothyrella moseleyi* (Dav.), off Crozet Is. 210 fathoms.

Kerguelen and Heard Islands are situated on a similar submarine elevation of less than 1,000 fathoms deep and separated from the Marion Island group by sea of over 2,000 fathoms deep. From here are recorded *Terebratella enzenspergeri* Bloch. (= *T. dorsata* Dav. non Gmelin), Royal Sound, Kerguelen, 20–30 fathoms and Observatory Bay, Kerguelen; '*Waldheimia*' (?*Magellania*) *kerguelenensis*, Balfour Bay, Kerguelen, 20–60 fathoms, and Observatory Bay, Kerguelen, 5–6 fathoms; and the same species with three examples of *Tegulorhynchia pyxidata* (Dav.) and ?*Gryphus* sp. (= *Terebratula uva* Dav. non Brod.), two fragments of a dead shell, off Heard Island 150 fathoms.

St. Paul Island lies on a small elevation of the sea-floor less than 1,000 fathoms deep and separated from the Kerguelen group by sea over 1,000 fathoms deep. The species recorded from here are *Liothyrella winteri* (Bloch.), 371 fathoms, and *Megerlina davidsoni* (Vélain), low water in crater.

The new observations in this memoir provide further material for the study of former land connections in southern regions. Little advance, however, can be made in this study until further researches are carried out in the case of the Tertiary brachiopods of many areas. The absence of Tertiary marine rocks in South Africa adds to the difficulty.

There is still much to be done in connexion with the clearer definition of certain genera and species recorded from the island groups named above.

The '*Waldheimia*' *kerguelenensis* Dav., for example, possesses cardinalia of a peculiar type, judging from Davidson's figures, assuming these to be correct ([5]pl. III, fig. 8; [19]pl. X, fig. 16). Eichler ([55]pl. XLIII, fig. 16) shows a different type of cardinalia in a somewhat younger Kerguelen example of *Magellania* presumed by him to be Davidson's species.

The ?*Gryphus* sp. is probably a new species and not related to the *Liothyrella uva* (Brod.) of South America and the Falklands. It may indeed have close affinity with the *Gryphus capensis* Jackson of the Cape.

The *Terebratulina septentrionalis* of Davidson from Marion Island may be closely allied to the *T. meridionalis* Jackson of the present memoir.

The *Platidia anomioides* from Marion Island and Prince Edward Island is another problem. It is apparently a wide-spread northern form (fossil and recent) of the ancient Tethys and has spread west through the ancient Strait of Panama to California. The occurrence off Marion Island, if authentic, would suggest a derivation from the Eastern Tethys, via the East African coast and so to Marion Island, when the latter was connected by shallower seas with South Africa, probably in Tertiary times. In connexion with the above there is the interesting occurrence of the Tethyian genus *Megathiris* at the Cape, and *Lacazella* at Mauritius and *Gryphus* sp. at Saya de Malha Banks.

With regard to the genera *Kraussina* and *Megerlina* in South African waters, these may have spread from the ancient India-Africa isthmus across the Indian Ocean and have been distributed by the Mozambique and Agulhas currents from the east coast round the Cape.

There is also to be considered the occurrence of *Megerlina* at St. Paul Island, South Indian Ocean and off south-east Australia.

There are many other problems, but until the various points raised above are clarified, it would be hazardous to dogmatize on the origin of the South African brachiopod fauna.

So far as present evidence is concerned, it might be pointed out that the peculiar brachiopod fauna of South Africa seems to show little affinity with that of Antarctica, though the presence of *Crania* and *Lingula* seem to link it with the Australian region.

More information is required regarding the duration of the free-swimming larval stage of these marine sedentary animals before we are in a position to answer questions as to former connections between the different oceans and different land-masses.

If the free-swimming stage is long enough, it is possible for species to be transported fair distances by the aid of ocean currents.

The inarticulate brachiopods are interesting from this point of view.

Brachiopoda are essentially dwellers on the continental shelves and the majority inhabit waters less than 166 fathoms in depth: they are also influenced by the nature of the sea-bottom; Lingulids, especially, being mud and sand dwellers and restricted to the littoral region in warm waters. *Lingula* is rare below 7 fathoms, and is usually found living in burrows in low water in estuaries and bays, indicating a preference for habitats more or less freshened by river waters.

The pelagic larvae of *Lingula*, possessing a mouth and functional stomach and therefore self-sustaining, have been met with occasionally. They have thus considerable capacity for transportation over deep oceans in surface currents. Yatsu, in his memoir of 1902,[56] says larvae of *Lingula* '*anatina*' of Japan may live in the free-swimming stage in aquaria for not longer than two months.

J. H. Ashworth, in 1915,[57] gave an interesting account of the larvae of

Lingula (presumed to be *anatina*) obtained by him in the southern part of the Red Sea and in the Indian Ocean about 4° south of Colombo. He also refers to earlier records of *Lingula* larvae near Zamboanga, Mindanao, Philippines; off Japan; and off South Burma. In addition, he cites the occurrence of larvae, presumed to be of *Lingula*, off the west coast of Africa. There is a species recorded from here, the *Lingula parva* E. A. Smith 1871, taken at Whydah, Dahomey.

The researches of Yatsu and Ashworth seem to suggest that the free-swimming stage of *Lingula* is about five or six weeks.

5. *Bibliography*

LIST OF PRINCIPAL REFERENCES

1. P. S. Pallas, 1766, *Miscel. Zool.*, p. 182, pl. 14, figs. 2-11.
2. J. H. Chemnitz, 1785, *Neues systematisches Conchylien-Cabinet*, vol. VIII, p. 94, pl. 77, figs. 703a, b, c, and p. 78, pl. 76, figs. 688a, b.
3. G. B. Sowerby, 1847, *Thesaurus Conchyliorum*, vol. I, p. 346, pl. 68, figs. 12-14, and p. 362, pl. 71, figs. 91-2.
4. J. B. Lamarck, 1819, *Animaux sans Vert.*, vol. VI, p. 245. (Text written by Valenciennes, owing to Lamarck's blindness.)
5. T. Davidson, 1880, 'Report on the Brachiopoda dredged by H.M.S. "Challenger" during the years 1873-1876'. *Voyage of 'Challenger'*, Zool. vol. I.
6. F. Krauss, 1848, *Die Südafrikanischen Mollusken: Brachiopoda*, pp. 32-3, pl. II, figs. 10-11.
7. A. Adams and L. Reeve, 1850, 'Mollusca, in Zool. of the voyage H.M.S. "Samarang" ' *Brachiopoda*, pp. 71-2, pl. XXI, figs. 1-5.

8a. T. Davidson, 1852, *Proc. Zool. Soc.*, p. 80, pl. XIV, figs. 20-1.

8b. id. 1852, *Ann. Mag. Nat. Hist.*, ser. 2, vol. 9, p. 369.

9. W. H. Dall, 1870, *Amer. Journ. of Conchology*, vol. VI, pp. 122, pl. VI, fig. 4.

10. id. 1871, id. vol. VII, p. 65.

11. W. King, 1871, *Ann. Mag. Nat. Hist.*, ser. 4, vol. 7, pp. 109-12, pl. XI, figs. 1-7.
12. P. Fischer and D. P. Oehlert, 1892, *Brachiop. Mission Scient. du Cap Horn* (1882-1883), pp. 330-1.
13. E. A. Smith, 1901, *Journ. of Chonchology*, vol. X, p. 116.

14a. F. Blochmann, 1906, *Zool. Anzeig.*, vol. XXX, pp. 690-702 and 824, figs. 1-3.

14b. id. 1908, *Zeit. für wissen. Zool.*, Bd. XC, pp. 596-644, pls. XXXVI-XL.

15. J. Allan Thomson, 1918, 'Brachiopoda: Australian Antarctic Exped., 1911-1914', *Sci. Rep.*, ser. C, vol. 4, pt. 3, 75 pp. 4 pls. and map.
16. W. H. Dall, 1920, *Proc. U.S. Nat. Mus.*, vol. 57, pp. 261-377.
17. J. W. Jackson, 1921, *Ann. Mag. Nat. Hist.*, ser. 9, vol. 7, pp. 40-9.
18. L. Reeve, 1862, 'Monogr. of Crania', *Conch. Icon.*, pl. I, figs. 2-3.
19. T. Davidson, 1886-1888, 'Monogr. of Recent Brachiopoda', *Trans. Linn. Soc.*, ser. 2, vol. IV, Zool. Part I, pp. 1-73, pls. 1-13, 1886; Part II, pp. 75-182, pls. 14-25, 1887; Part III, pp. 183-248, pls. 26-30, 1888.
20. F. W. Hoeninghaus, 1828, *Beitr. zur Monogr. d. Gattung Crania*, p. 3, fig. 3.
21. C. Hedley, 1906, *Proc. Linn. Soc., New South Wales*, vol. XXXI, p. 467.
22. L. Reeve, 1860, 'Monogr. of Terebratula', *Conch. Icon.*, pl. IV, fig. 14.
23. J. W. Jackson, 1918, *Geol. Mag.*, Dec. 6, vol. 5, pp. 73-9.
24. J. C. H. Crosse, 1873, *Journ. de Conchy.*, vol. XXI, p. 285, and vol. XXII, p. 75, pl. I, fig. 3.
25. W. H. Dall, 1910, *Trans. Linn. Soc., Lond.*, 2nd ser. Zool. vol. XIII, pt. 3, pp. 439-41, pl. 26.
26. W. B. Alexander, 1914, *Records of West Aust. Museum*, vol. I, pp. 239-40.
27. J. A. Thomson, 1926, *Ann. Mag. Nat. Hist.*, ser. 9, vol. 18, p. 525.

28. id. 1927, 'Brachiopod Morphology and Genera (Recent and Tertiary)'. N.Z. Board of Science and Art, Manual No. 7, vi and 338 pp., 2 pls., 103 text-figs.
29. C. E. Beecher, 1893, *Trans. Conn. Acad. Sci.*, vol. IX, pp. 376-91.
30. J. W. Jackson, 1916, *Geol. Mag.*, Dec. 6, vol. 3, pp. 21-6.
31. J. A. Thomson, 1916, *Geol. Mag.*, Dec. 6, vol. 3, pp. 496-505.
32a. E. E. Deslongchamps, 1884, *Bull. Soc. Linn. Normandie*, ser. 3, vol. 8, pp. 210, 243, pl. 7, fig. 11.
32b. id. 1884, *Etudes Crit.*, I, pp. 121, etc., pl. 19, fig. 7, p. 159, pl. 19, fig. 11.
33. E. Suess, 1859, *Sitzungsb. k. Akad. Wissensch. Wien.*, Bd. XXXVII.
34. T. Davidson, 1861, *Ann. Mag. Nat. Hist.*, ser. 3, vol. 8.
35. H. C. Küster, 1844 and 1848, *Conch. Cab.*, by Mart. and Chem., Bd. VII, I, p. 36, pl. 2b, figs. 4-7 (plates 1844; text 1848).
36. G. B. Sowerby, 1846, *Thes. Conch.*, vol. I, pt. VII, pp. 345-6, pl. 69, figs. 37-9.
37. id. 1847, *Thes. Conch.*, vol. I, pt. VII, p. 362, pl. 71, figs. 91-2.
38. L. Reeve, 1861, 'Monogr. of Terebratula', *Conch. Icon.*, pl. IX, fig. 35b.
39. D. P. Oehlert, 1887, in Fischer's *Manuel de Conchyliologie.*
40. C. Schuchert, 1893, *The American Geologist*, vol. XI, No. 3.
41. C. Schuchert and Clara M. Le Vene, 1929, 'Brachiopoda', *Fossilium Catalogus*, by J. F. Pompeckj, p. 24.
42. E. E. Deslongchamps, 1864, *Recherches sur l'Organisation du Manteau chez les Brachiopodes Articulés, etc.*, Paris and Caen.
43. Victor Sganzin, 1843, *Mém. Soc. du Mus. d'hist. Nat. de Strasb.*, vol. 3, pt. 2.
44. A. Philippi, 1887, *Die tertiaren und quartären Versteinerungen Chiles*, 4to, Leipzig.
45. D. P. Oehlert, 1888, *L'Annuaire Géologique Universel*, Tome IV.
46. H. von Ihering, 1903, *Anales del Museo Nacional de Buenos Aires*, ser. III, vol. II.
47. B. Faujas de Saint-Fond, 1799, *Hist. de la mont. St.-Pierre.*
48. A. d'Orbigny, 1847, *Pal. franç. Ter. cret.*, IV.
49. J. de Morgan, 1883, *Bull. Soc. Zool. de France*, tom. VIII.
50. P. Fischer and D. P. Oehlert, 1891, *Exped. Scient. du 'Travailleur' et du 'Talisman'*, 1880-1883, Paris.
51. J. G. Jeffreys, 1858, *Ann. Mag. Nat. Hist.*, ser. 3, vol. 2.
52. F. Sacco, 1902, *I Brachiopodi dei terreni tertiarii del Piemonte e della Liguria*, Torino.
53. T. Davidson, 1870, *Geol. Mag.*, vol. vii, pl. XXI, figs. 6-8.
54. W. H. Turton, 1932, *The Marine Shells of Port Alfred, S. Africa*, 'Brachiopoda': pp. 259-60, pl. LXX, figs. 1836, 1838, 1842 and 1843.
55. P. Eichler, 1911, *Die Brachiopoden der Deutschen Südpolar-Expedition*, 1901-1903.
56. N. Yatsu, 1902, 'On the Development of Lingula anatina', *Journ. Coll. Sci. Imp. Univ. Tokyo*, vol. XVII, art. 4, 112 pp., 8 pls.
57. J. H. Ashworth, 1915, 'On Larvae of Lingula and Pelagodiscus (Discinisca)', *Trans. Roy. Soc. Edinb.*, vol. LI, pt. I, pp. 45-69, pls. IV and V.
58. J. Wilfred Jackson and G. Stiasny, 1937, *The Brachiopoda of the Siboga Expedition*, Mon. XXVII, p. 20.

The *ANNALS OF THE SOUTH AFRICAN MUSEUM* are issued in parts at irregular intervals as material becomes available. As far as possible each volume is devoted exclusively to a particular subject (Zoology, Botany, etc.). Two or more volumes may be in course of publication concurrently.

Most of the Geological and Palaeontological papers are issued in conjunction with the Geological Survey of the Union of South Africa.

Some volumes and parts are out of print, and others are only sold as parts of a set, or volume, respectively. The prices of parts published prior to 1940 have been increased.

Out of print: Vols. I, II, V (Part 9), VII, VIII, IX (Part I), XII (Part 7), XXII, XXIV (Part 2), XXXI (Parts 1, 2, 3).

Vol.			£	s.	d.
III.	1903–1905	Zoology	1	19	0
IV.	1903–1908	Palaeontology	3	7	0
V.	1906–1910	Geology, Palaeontology, Zoology, Anthropology	1	19	6
VI.	1908–1910	Zoology	3	3	6
IX.	1911–1918	Botany (excl. Part 1)	2	16	0
X.	1911–1914	Zoology	4	16	0
XI.	1911–1918	Zoology	3	1	6
XII.	1913–1924	Palaeontology and Geology (excl. Part 7)	3	13	0
XIII.	1913–1923	Archaeology and Zoology	3	10	6
XIV.	1915–1924	Zoology	3	6	6
XV.	1914–1916	Zoology	4	5	0
XVI.	1917–1933	Botany	3	11	0
XVII.	1917–1920	Zoology	3	10	0
XVIII.	1921	Zoology	4	5	6
XIX.	1924–1925	Zoology	3	7	0
XX.	1924–1926	Zoology	2	12	0
XXI.	1925–1927	Zoology	3	6	0
XXIII.	1925–1926	Zoology	1	15	0
XXIV.	1929–1938	Anthropology and Ethnology (excl. Part 2)	2	9	6
XXV.	1927–1928	Zoology	1	19	0
XXVI.	1928	Zoology	1	10	0
XXVII.	1929	Anthropology	1	10	0
XXVIII.	1929–1932	Palaeontology	2	12	0
XXIX.	1929–1931	Zoology	2	8	0
XXX.	1931–1935	Zoology	3	13	6
		INDEX of papers, authors, and subjects, published in Vols. I–XXX	0	1	6
XXXI.	1934–1950	Palaeontology (Part 4 only)	0	14	0
XXXII.	1935–1940	Zoology	3	3	6
XXXIII.	1939	Zoology	2	2	0
XXXIV.	1938	Zoology	2	8	0
XXXV.		Reserved for conclusion of monograph in Vol. XXXIV.			
XXXVI.	1942–1948	Zoology	2	11	0
XXXVII.	1947–	Archaeology (Part 1)	1	6	0
XXXVIII.	1950	Zoology	3	15	0
XXXIX.	1952	Zoology	2	14	6
XL.	1952–	Botany (Part 1)	0	1	0

Copies may be obtained from—

The LIBRARIAN, SOUTH AFRICAN MUSEUM, CAPE TOWN,

except the Geological and Palaeontological parts, which are obtainable from the GOVERNMENT PRINTER, PRETORIA.

ANNALS

OF THE

SOUTH AFRICAN MUSEUM

VOLUME XLI

PART II, *containing:—*

ISSUED OCTOBER 1953 *PRICE* 7*s.* 6*d.*

PRINTED FOR THE
TRUSTEES OF THE SOUTH AFRICAN MUSEUM
BY THE RUSTICA PRESS LIMITED, COURT ROAD, WYNBERG, CAPE

2. *On South African* Coccinellidae, *species incertae*. By H. Andreae, D.Sc., Hon. Curator of Coleoptera, South African Museum.

Coccinella gibba Thunb., *Nov. Spec. Ins.* I, 1781, p. 13, f. 14, from the Cape, is cited in W. Junk's *Coleopterorum Catalogus*, pars. 118, p. 67, as *Epilachna* incertae sedis. Crotch has already remarked (*Revis. Cocc.* 1874, p. 9): 'Little or no reliance can be placed on the localities' in this publication. Yet there is a South African species which agrees with Thunberg's description in so far that all the characters given are within its limits of variation, although exactly the same combination is not found in the specimens in the South African Museum collection. The main points are:

Light brownish red, metasternum black, prothorax with a median black spot, elytra with six black spots each, two basal, three median, forming an arcuate band, one towards the apex near the suture; 5–8 mm. The figure shows no spot on the prothorax and a straight band narrowed in two places, widened in three.

Out of sixteen specimens which I refer to *gibba*, six have a spot on the prothorax, one has the median spots (3, 4, 5) connected, one has the normal spots 6 and 8 missing (8 alone is missing in 8), the metasternum alone is black or fuscous in 7, in the others either some abdominal segments are infuscated at the base or the whole underside is red. 5·5–7·5 mm. Cape: Douglas; Transvaal: Potchefstroom, Pretoria, Pietersburg, Lydenburg, Zoutpansberg.

In the Transvaal specimens, spots 1, 2 or 1, 2, 5, sometimes also 6, 7 or 6, 7, 8, are connected, the elytra showing a design like *E. hirta* ab. *caesarea* Sic., but head and prothorax are red.

J. Weise describes (*Deutsche Ent. Zeitschr.* 1888, p. 83) a form from the Kwango, northern Angola, in which spots 1 and 2 are also connected, forming a dentate band from one humeral callus to the other; he stated that *E. hirta* Thunb. var. *invalida* Muls. gradually changes into var. *insidiosa* Muls., therefore he gave no names to the intermediate forms. *E. gibba* Thunb. apparently differs from var. *invalida* Muls. only by elytral spots 3, 4, 5 connected, 6 and 8 missing, central spot on the prothorax and metasternum black. As it is a very variable species, the definition should be amended.

Light brownish red, prothorax with or without median black spot, elytra red with 8 black spots (2, 3, 2, 1), 1, 2 or 1, 2, 5 or 3, 4, 5, sometimes also 6, 7 or 6, 7, 8, connected, 8 or 6 and 8 may be missing. Underside red, metasternum mostly black or fuscous, abdominal segments often infuscate at the base.

E. gibba Thunb. therefore comprises the specimens with red head and prothorax so far placed in ab. *discors* Muls. and *caesarea* Sic. (both have head and prothorax black), and *invalida* Muls. with connected elytral spots and dark metasternum.

As *E. gibba* (p. 13) has preference, *E. hirta* (p. 23) becomes a subspecies.

Key to the South African forms

1″	Head and prothorax red.	subsp. *gibba*
2″	Elytra red with black markings (2, 3, 2, 1), (2, 3, 2) or (2, 3, 1).	
3″	Some elytral spots connected, metasternum mostly black or fuscous, abdominal segments often infuscate at base.	*gibba* f. typ.
3′	All the spots free, underside red, only sides of metasternum and spots on abdominal segments sometimes infuscate.	ab. *invalida*
2′	Elytra black with free or connected yellowish markings (1, 2, 2, 1), basal and apical lunulate, others rounded or subquadrate.	
4″	Markings 1, 2 or 1, 2, 3 or 1, 2, 3, 1 connected.	ab. *peringueyi*
4′	All the markings free.	ab. *insidiosa*
1′	Head and prothorax black.	subsp. *hirta*
5″	Elytra like 2′.	
6″	Markings 1, 2, 3 free or connected, 4, 5, 6 free. (Ab. 12-*verrucata* F. may belong here; description not available.)	*hirta* f. typ.
6′	Markings 4, 5 forming a transverse band, the others free.	ab. *guttatofasciata*
5′	Elytra like 2″.	
7″	Spots 1, 2, 5 connected, the others free, 8 (and 6) sometimes missing.	ab. *caesarea*
7′	All the spots free, or others than 2 and 5 connected.	ab. *discors*

Of the other species described from the Cape in the same paper and not identified so far, *C. trinotata*, p. 11, fig. 11, may be identical with or closely allied to *Martinella justitiae* Gorh. from Natal; the descriptions agree fairly well, except that in the type of *justitiae* the suture is partly black and the three spots are united into one patch. Of the two specimens in the South African Museum, the male agrees completely with the description while the female has no black suture, only a triangular patch with rounded angles and concave sides indicating that it is formed from three spots. So far no specimen with free spots has been recorded.

C. oculata, p. 14, fig. 18, and *C. lunata*, p. 19, fig. 28, are probably not from South Africa; *lunata* might be a *Cyrtocaria* (Madagascar).

In *Germ. Mag. Ent.*, IV, 1821, p. 183, Wiedemann described *C. erythrochila* from the Cape, collected by the Rev. Hesse, Cape Town, which has not been recorded again. The author compares it with two species of *Exochomus*, *auritus* (*flavipes*) and *haemorrhoidalis*, but points out that the scutellum is much larger and the fine punctation of the elytra almost striate. The coloration is very peculiar: aeneous, sides of prothorax and elytra with a broad, reddish-yellow margin.

To this species I refer a specimen in the collection of the South African Museum from Jakkalswater, Bushmanland, coll. R. M. Lightfoot, Oct. 1911,

although it is smaller (3 mm. instead of 2 lines) and the last abdominal segment as well as the legs (except the posterior side of the femora) is testaceous. These differences I take to be sexual, the type being a female and the present specimen a male. It is a *Hyperaspis* allied to *H. pumila* Muls. but without yellow spot on the disc of the elytra, the testaceous margin twice as broad at the shoulder, widened towards the apex and terminated by the apical patch which is just indicated by a slight widening of the rounded end.

3. *The genus* Anobium *Thunb.* By H. Andreae, D.Sc., Hon. Curator of Coleoptera, South African Museum.

In *Novae Insectorum Species*, I, 1781, p. 8, Thunberg established his genus *Anobium* with six species, all recorded from South Africa, three from other countries also; this caused some trouble and was not accepted by other entomologists. Fabricius in *Mantissa Insectorum*, 1787, p. 35, mentions only two as synonyms, the others he could obviously not identify, and in the Junk catalogue, part 23, 1910, three are mentioned, the others remain *species dubiae*.

Thunberg's description: 'Antennae clava perfoliata, triarticulata. Thorax marginatus, rotundatus. Corpus convexum, lineari-oblongum. Elytra flexilia.' looks rather vague, but it actually applies only to some *Cleridae*, subfam. *Corynetinae*,* and even here the genera *Tenerus* Cast., *Tarsostenus* Spin., *Corynetinus* Reitt. and *Opetiopalpus* Spin. are excluded; only seven genera with together twenty-three species described from South Africa and some unnamed species in the South African Museum's collection were left. Under these circumstances it was not difficult to identify all Thunberg's species.

1. *A. ruficolle* Thunb., l.c., p. 8, is now *Necrobia ruficollis* F., as stated by Fabricius and Junk, *Catalogus*; a cosmopolitan.

2. *A. capense* Thunb., l.c., p. 9, is now *Prosymnus capensis* (Thunb.), so far unknown. Three unnamed specimens in the museum's collection agree with the description, except the base of the antennae, joints 1–6, which are rufo-testaceous; this is unimportant, the rufous or testaceous base of antennae has also been overlooked in No. 4 and No. 6. The fasciae of the elytra are formed by white appressed hairs, elsewhere the upper side bears unusually long and strong black bristles. The terminal joints of maxillary and labial palpi are elongate triangular, and the femora are deeply grooved on the under side. The species shows all the important characters of *Prosymnus* Cast., the different vestiture of the elytra alone would not justify the establishing of a new genus. Length 3·5 to 5 mm. Apparently rare. Cape: Cape Town, coll. J. C. Bridwell; Kalk Bay, coll. R. M. Lightfoot; Bredasdorp, coll. H. Fry.

* In *Nova Acta Soc. Sc. Upsala*, VII, 1821, p. 174, Thunberg described *Dasytes opacus* and *D. rufipes*, and transferred his *Anobium coeruleum* and *A. viride* to the genus *Dasytes*, citing the transfer of *coeruleum* to *Dasytes* by Fabricius (*Syst. Eleuth.*, II, 1801, p. 75) and accepting it, although both species are really *Cleridae* and have nothing to do with *Dasytes*. *Dasytes rufipes* Thunb., so far not identified, is according to the description certainly different from *Anobium rufipes* Thunb. and probably a *Dasytes*.

3. *A. bifasciatum* Thunb., l.c., p. 9. Now *Thriocera bifasciata* Thunb., syn. *T. bifasciata* Hintz. The two descriptions agree very well, but Thunberg's figure (rather poor and not agreeing with the description) has probably so far prevented the identification. Cape: widely distributed but rare. Described by Hintz (*Deutsche Ent. Zeitschr.*, 1902, p. 403) as *T. bifasciata* from Dunbrody, two spec., probably coll. Father O'Neil; by Gorham (*Proc. Zool. Soc. Lond.*, 1905, 2, p. 274) as *T. bicinctella* from Port Elizabeth, two spec., coll. Dr. H. Brauns. In South African Museum coll., one spec. from Dunbrody, apparently coll. by Father O'Neil, no date, and two from Knysna, Oct. 1916, coll. L. Peringuey. I found one at Parow near Cape Town, 28/8/47, and one on the farm Tierhoek, Piquetberg Mts., 19/10/47. The var. *tricolor* Hintz is recorded from Dunbrody (Hintz), 2 spec.), Port Elizabeth (Gorham, 2 spec.) and East London (South African Museum coll., Oct. 1912, R. M. Lightfoot, one spec.).

4. *A. viride* Thunb., l.c., p. 9, now type of the genus *Notostenus* Spin. (Clerites II, 1844, p. 89). A well-known species, frequent on flowers of the arum lily. Thunberg's statement: 'Habitat in Africa & India Orientali' is a mistake, the species is South African. One hundred and ten specimens in the South African Museum coll., mostly from the western Cape, but also from Port St. Johns and Durban.

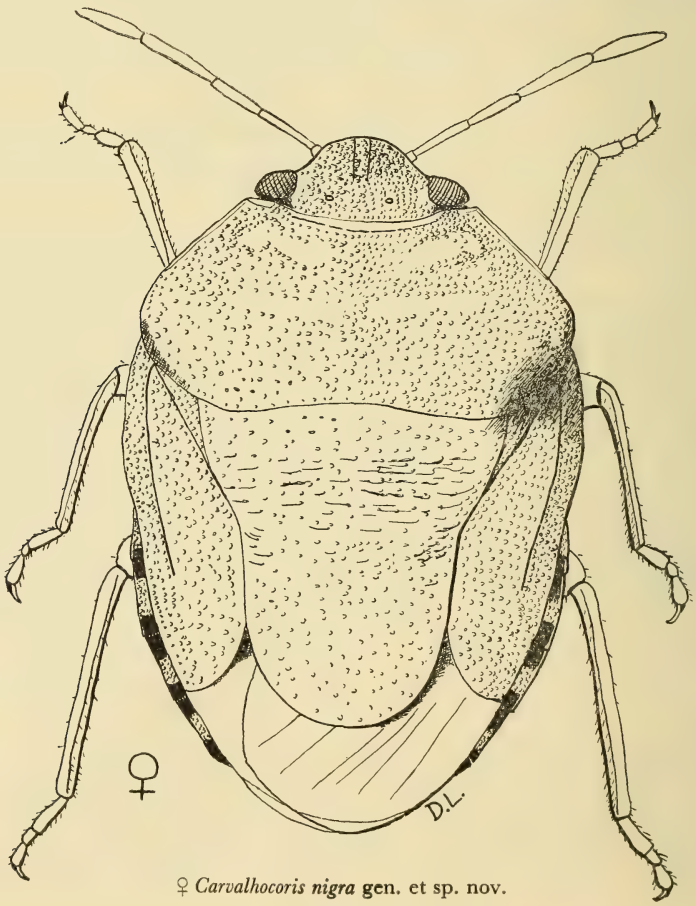
5. *A. rufipes* Thunb., l.c., p. 10, is *Necrobia rufipes* De Geer. This was stated by Fabricius (*Mant. Ins.*, 1787, p. 35), but not taken over by Schenkling in Junk, *Catalogus*, part 23; a cosmopolitan.

6. *A. coeruleum* Thunb., l.c., p. 10, is a *Dolichopsis*, not a *Notostenus*, as stated in Junk, *Catalogus*, part 23, p. 136. A very variable species, colour from golden green to violaceous blue, elytra different from head and prothorax or upper side unicolorous, antennae with articles 2 to 4 (sometimes 5 also) testaceous, rufous or dark fuscous above, rufous below, prothorax fairly convex or rather flat, punctation uniform and rather close or sparse on the disc, especially in the anterior half, length 2·5 to 5 mm. The extreme forms may easily be mistaken for different species, but the intermediate forms make any division impossible. Frequent from Cape Town to the Cedarbergen and Zwartbergen, on flowers of various plants, especially Ficoideae, Selaginaceae and Compositae. *Dolichopsis cyanella* Gorh. (Trans. Ent. Soc. Lond., 1878, p. 155) is the same species and therefore a synonym.

4. *Notes on the Ethiopian Pentatomidae. IV. A new genus and species from the Cape Province.* By D. Leston, F.Z.S., F.R.E.S. (With one text-figure.)

Carvalhocoris gen. nov.

Moderate size, oval; base of venter tuberculate; mesosternum with a low but distinct carina of even height throughout; odoriferous aperture large and oblique, continued by a long, smooth and gently curving 'horn' towards and almost reaching the anterior border of the mesosternum at its furthermost point; evaporating area distinct, its lateral border raised; rostrum reaching to posterior trochanters, second segment longest, third widest and subequal to the fourth.



♀ *Carvalhocoris nigra* gen. et sp. nov.

Head breadth to length ratio as 3: 2; greatly deflected, sides sinuate, apex widely rounded, margins not reflexed; interlobar sutures straight; upper surface slightly convex.

Pronotum with anterior margin broadly emarginate, anterior border between and behind the eyes smooth and impunctate; lateral margins reflexed, more so anteriorly, rounded gradually but slightly, entire; postero-lateral angles rounded, obtuse, rather raised; posterior border gently emarginate, postero-internal angles about 150°.

Scutellum long, broadly rounded at apex, sides narrowing just before the middle; disc raised slightly, posterior portion deflected gradually downwards. Apex of corium reaching caudally as far as the apex of the scutellum; membrane dark, almost obscuring the few parallel veins; reaching to apex of abdomen. The whole upper surface densely punctate, rugosely so on the scutellum, connexivum punctate. Tibiae flat and canaliculate externally. Antennae short, ratios of segments 6: 10: 11: 14: 13; fourth and fifth segments slightly thicker than second and third; first not surpassing apex of head. Head, thorax and abdomen beneath punctate but less so than the upper surface.

Type: *Carvalhocoris nigra* sp. nov.

This genus should be placed in *Pentatominae*, tribe *Pentatomini*; it pertains to most of the genera placed in *Menidaria* Distant. From *Amphimachus* Stål it can be distinguished by the shorter scutellum, from *Aegaleus* Stål by the absence of impunctate fasciae on the scutellum and from *Menida* Motsch. by the smaller ventral spine. This last genus has been used as a dumping ground for many species and is a composite one as at present used; it is possible that certain species included in it should be placed within *Carvalhocoris*.

Carvalhocoris nigra sp. nov.

Shining black except for the antennae, these flavous, darker apically. Head above with a fine narrow flavous margin anteriorly; anterior margin of pronotum narrowly flavous but irregularly so in the centre; lateral margins of the pronotum narrowly flavous; corio-pronotal junction externally flavous. Connexivum flavous with contiguous black spots either side of the sutures. Under side flavous with dark brown punctures; tibiae and femora flavous spotted with brown, heavily so on the latter. A linear series of three large black spots, one on each thoracic pleurite centrally. Ventral spiracles brown. Length, ♀ 6 mm.; maximum pronotal width, ♀ 4 mm.

Type: ♀ Prieska, Cape of Good Hope, October 1887 (now in South African Museum, Cape Town).

Paratypes: ♂ Aliwal North, Cape Province, December 1922. ♀ same, 4,350 ft., January 1923. (Both collected by Turner and now in British Museum (N.H.).)

I am happy to be able to name this genus in honour of Dr. J. C. M. Carvalho, the eminent Brazilian hemipterist and explorer. My thanks are tendered to the Director, and Dr. Hesse, of the South African Museum, for submitting a small collection of their specimens to me for determination.

5. *Notes on the Ethiopian Pentatomoidea. X. Some specimens from southern Africa in the South African Museum, with a note on the remarkable pygophore of* Elvisura irrorata *Spinola and description of a new species of* Piezodorus *Fieber.* By D. Leston, F.Z.S., F.R.E.S. (With 17 text-figures.)

By courtesy of the Director and Dr. A. J. Hesse, I have examined a collection of previously undetermined Shieldbugs belonging to the South African Museum, Cape Town. Most of the specimens were taken at localities within, or adjacent to, the Union.

The literature contains not a few references to the fauna of South Africa; the pioneer workers were Palisot de Beauvois, Thunberg and Germar. The first important work is that of Stål (1865); in the first volume of *Hemiptera Africana* he collated all the earlier records and placed them in recognizable modern genera. Later, Stål (1876) brought his classification up to date and the broad outlines of generic and higher taxonomy in use to-day are entirely due to this great Swedish entomologist.

It is only in later works that localities are given with sufficient precision to form a basis for zoogeography, and these works include Wallengren (1875); Distant (1892, 1898); Schouteden (1912); Schumacher (1913); Hesse (1925, 1935) and Leston (1952*a*, 1952*b*). Besides these, new species from the area are described in papers by Bergroth, Distant, Montandon, Jensen-Haarup, Schouteden and Leston, as well as in the catalogues of Westwood, Dallas and Walker. Solely to aid further knowledge of the distribution of species, the following list is given.

Brachyplatidae Lest., 1952*a* (*Plataspidae*)

Gelastaspis browni Kirk.

1902. Kirkaldy. Entomologist. xxxv, p. 166

Umtali, Southern Rhodesia (A. Bodong)

Cydnidae Billberg, 1820

Legnotus tibialis Stål

1853. Stål, *Ofv. Vet. Ak. Forh*, x, p. 222

M'fongosi, Zululand, iv–v, 1934, xii–ii, 1934–5, v, 1935 (W. E. Jones)

Legnotus melaleucus (Thunb.)

1783. Thunberg, *Nov. Ins. Sp.*, ii, p. 50

Kamieskroon, Namaqualand, ix, 1930 (South African Museum staff)

PENTATOMIDAE Leach, 1815
SCUTELLERINAE Leach, 1815
SCUTELLERINI Leach, 1815

The nomenclature and classification of the *Scutellerinae* have recently been investigated (Leston, 1953*a*, 1953*b*); as a result, the groups *Scutellerini* Leach, *Sphaerocorini* Stål and *Elvisurini* Stål are now treated as subtribes within *Scutellerini*. All three subtribes occur in the Union of South Africa.

Elvisura irrorata Spinola
1837. Spinola, *Essai Hém.* p. 359
Karkloof (now: Kloof), Natal, xii, 1915 (Bell Marley)

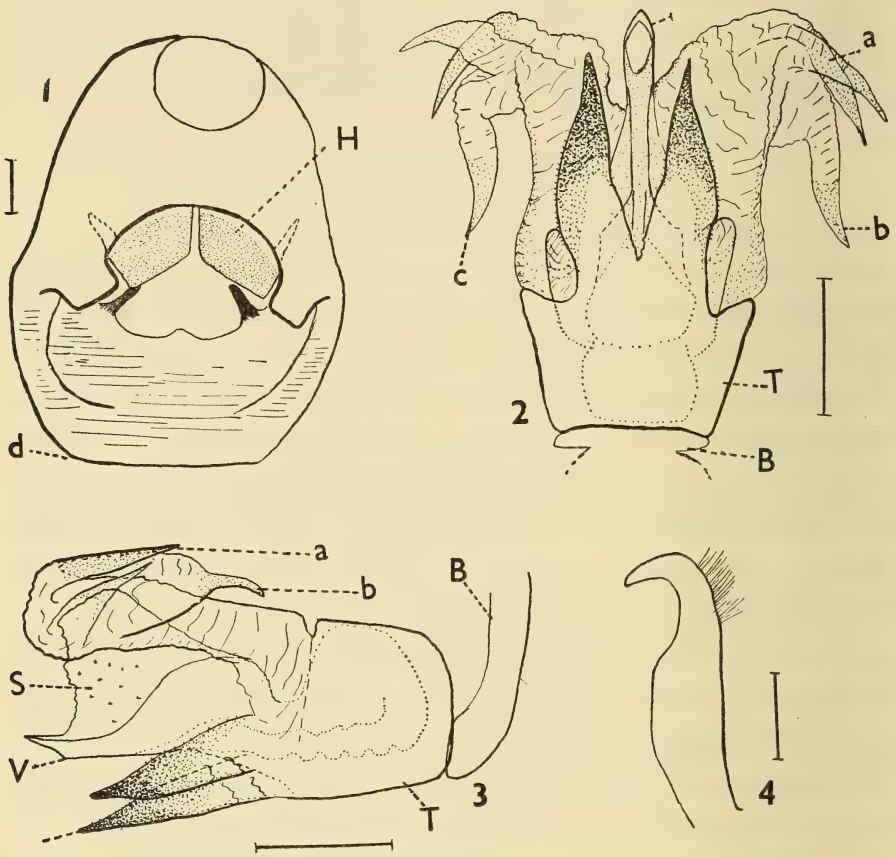
This was a female, but through the courtesy of the British Museum (Nat. Hist.) authorities I have been able to examine the genitalia of a male of this rarity. The genus is distinct from all other *Scutellerinae* in that the scutellum is distinctly keeled and the bugs have a marked resemblance to Buprestid beetles.

The male genitalia are shown in figures 1–4. The pygophore is large with a well-developed caudal lip: the cephalad margin is remarkable for the presence of a pair of large, flat, rectangular and freely movable flaps attached immediately within the margin; they appear to be adherent throughout their length but with a root-like attachment at their outer corner. The flaps are very thin but sclerotized, with a pale band along the proximal border; the distal border is fringed by a few fine hairs (not shown in the figure).

In work now in progress on the Angolan Pentatomid fauna a pair of movable pieces has been found on the internal-lateral margins of the pygophore in *Crollius* Dist.; they were triangular and large so that, when brought together in the resting position, they completely covered the pygophoral opening. Dr. R. I. Sailer of the U.S. National Museum has informed me, *in litt.*, that he has discovered similar processes on the pygophore of other *Podopini*, including *Podops* Lap.; he proposes to call them *hypopygeal appendages*. It is probable that the hypopygeal appendages are homologous in the Podopid genera with the flaps noted in *Elvisura irrorata*; thus it is proposed to adopt this term for the structures noted in *E. irrorata*, but the difference in position of the appendages in the two groups must, of course, be stressed; it is not a major difference presenting insuperable difficulties in homology. A difficulty is met, however, in assessing its taxonomic import; is it a primitive character? The little known of the life-histories of *Podops* and of *Elvisura* suggests quite different ecological roles so that structural convergence is hardly to be considered seriously.

The theca of *E. irrorata* (figs. 2 and 3) is strongly sclerotized and short; it is quite impossible for the vesica and conjunctival appendages to be retracted (a constant character in the *Scutellerini*). Ventrally there projects a pair of appendages, third conjunctival appendages in Singh-Pruthi's terminology; they are sclerotic except towards the base, where they fuse, and are thus freely movable. On the dorsal surface of the theca project the fused first and second conjunctival

appendages. As in all other *Scutellerini*, the second is more sclerotized while the first is membraneous except for the tips. The first conjunctival appendages are apically bifid and terminally sharp. The principal difference to be noted in the



Elvisura irrorata Spinola

1. Pygophore from above. H, hypopygeal appendages; p, posterior margin.
2. Aedeagus, ventral. B, basal plates; T, theca; V, vesica; a, b, c, first, second and third conjunctival appendages.
3. Aedeagus, lateral. S, supravesical process.
4. Paramere, lateral.

Scale = 0·5 mm.

appendages of *Elvisura* from those of other genera is the large size of the common basal area of the first and second conjunctival appendages. The third pair of appendages are covered, sparsely, by minute points.

The vesica exhibits the usual basal convolutions and well-developed ejaculatory reservoir while the gonopore is oblique and large: these are all common characteristics of the *Scutellerini* but, in addition, the external part of the vesica

supports a rigid, densely sclerotized, thin and rough-edged vertical lamina. This structure has also been noted in *Steganocerus multipunctatus* and (Leston, 1953*b*) termed the supravesical process. It is flecked in *E. irrorata* by a few minute broad-based spines and whereas in *S. multipunctatus* the supravesical process is somewhat thick and terminated at its highest point forwards by a bifurcation, in *E. irrorata* it is thin and simple anteriorly, albeit very ragged at the margins.

As in most *Scutellerini*, the actual path taken by the ductus seminis remains untraced due to the density and complexity of the vesica; the basal plates have not been studied nor figured except merely to show their attachment.

The parameres are simple hook-like pieces with a ridge of hairs; they take a form common to many *Scutellerini*.

Thus the entire male genitalia of *E. irrorata* is of the usual Scutellerinine pattern as described elsewhere (Leston, 1953); it differs in possessing (1) a supravesical process similar to that found in *Steganocerus* and (2) a pair of movable processes on the pygophore which are tentatively homologized with the hypopygeal processes of certain genera of *Podopini*.

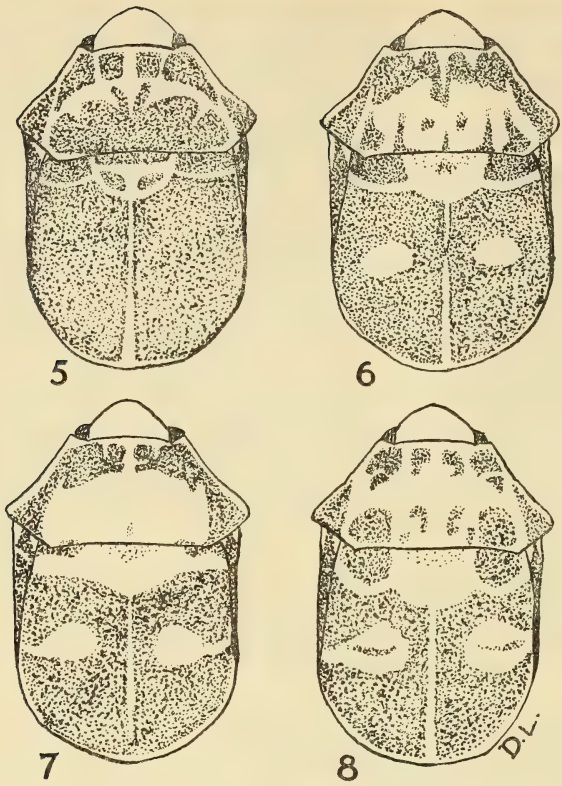
Cryptacrus comes (Fabr.)
1803. Fabricius, *Syst. Rhyngotorum*, p. 130
Amatongas Forest (between Umtali and Beira); the specimen is of
var. *apicalis* Dist.

Pachycorini Dallas, 1851 (*Tetyrini*)
Deroplax circumducta (Germar)
1837. Germar, *Rev. Ent.* (Silbermann), v, p. 190

Vryburg, Bechuanaland, 1904 (Jones); Otjitundua (160 miles north-west of Outjo), South West Africa, ii, 1926 (S. Afr. Mus. Exp.). The South West African specimen is close to *D. nigropunctata* (Stål), but I am unable to distinguish between these two species. They must remain distinct pending an examination of Stål's type.

Deroplax silphoides (Thunb.)
1783. Thunberg, *Nov. Ins. Sp.*, ii, p. 29

Pretoria, Transvaal, x, 1944 (R. Wilson). This specimen is similarly marked to a long series in the British Museum from Nyasaland. It is referred to the variable *D. silphoides*. Figs. 5–8 depict the range in variation; it is considered undesirable to add further to the number of named varieties of this species. The male genitalia have been examined (figs. 9–12); they are similar to the genitalia of *D. circumducta* figured elsewhere (Leston, 1953*b*) and quite unlike the genitalia of *Scutellerini*. The pygophore encloses a wide proctiger which is marked by a pale band near the base. The aedeagus, shown laterally in fig. 9, encloses a long filimentous vesica of the 'penisfilum' type in Baker's terminology (Baker, 1931). Surrounding the vesica is a long, finger-like extenstion of the conjunctiva. The first and second conjunctival appendages only are present



Deroplax silphoides (Thunb.). 5–8. Variation in a variety from Nyasaland.

(the third is always present in *Scutellerini*); they are, as usual, joined basally. The first pair is long and membraneous, terminating in a lightly sclerotized point; the second is biramous, sclerotized, with one arm produced into a filiform process extending to the apex of the vesica. The parameres are shown in two views (figs. 11, 12); the head bifurcates and is closely spinose. On the dorsum of the parameres is a tubercle carrying an armature of bristles while the basal area of the tubercle is similarly armed. It should be noted that figures 9 and 10 are somewhat diagrammatic.

Amyotinae Lest., 1953*a* (*Asopinae*)

Dorycoris pavoninus (Westw.)

1837. Westwood, *Cat. Hemipt.*, coll. Hope, i, p. 39

Stellenbosch, iv, 1932 (P. v. Heerden). The specimen is of a form near to var. *fuscosus*.

Podopinae Dallas, 1851 (*Graphosomatinae*)

This subfamily includes the two tribes *Podopini* Dallas and *Tarisini* Stål (*Graphosomini* auctt.). How far it is a natural assemblage remains for future investigation to elucidate, but while the *Podopini* are reasonably homogeneous the *Tarisini* are certainly not so and probably many of the species are *Pentatominae*.

Bolbocoris rufus (Westw.)

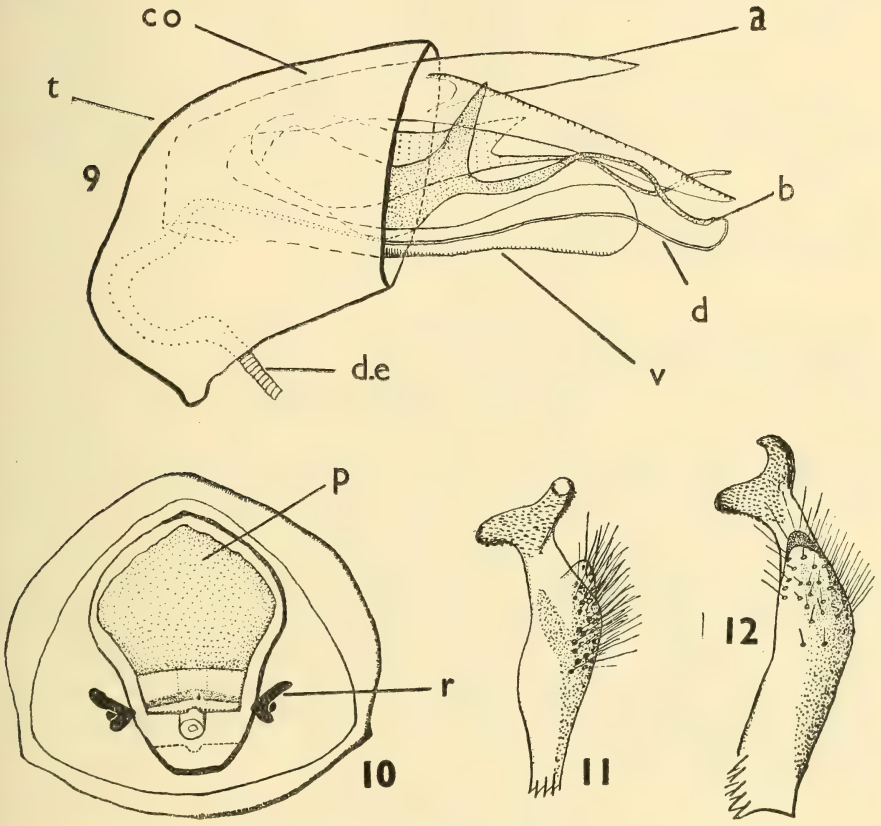
1837. Westwood, op. cit., i, p. 12

Kamanyab, S.W.A., iii, 1925 (S. Afr. Mus. Exp.); Kaross (30 miles NW. of Kamanyab), S.W.A., ii, 1925 (S. Afr. Mus. Exp.). Despite the widespread

distribution of two of its species the genus *Bolbocoris* is centred in South Africa, with at least five species in the Transvaal.

Pentatominae Leach, 1815

This enormous subfamily is overdue for revision, but until this has been attempted the Stålian groups are retained.



Deroplax silphoides (Thunb.)

9. Aedeagus, lateral. t, theca; co, conjunctiva; a, b, first and second conjunctival appendages; d, ductus seminis; v, vesica; d.e, ductus ejaculatorius.
10. Pygophore, terminal. p, proctiger; r, right paramere.
11, 12. Two views of right paramere.

Pentatomini Leach, 1815

Menida lythrodes (Germar)

1837. Germar, *Rev. Ent.* (Silbermann), v, p. 175

Letaba, Transvaal, v and xii, 1945 (E. C. G. Bedford). 'From orange-tree —fed on red-scale and on orange.'

Menida decoratula (Stål)

1853. Stål, *Ofv. Vet. Ak. Forh.*, x, p. 222

Kaoko Otavi, S.W.A., iii, 1926 (S. Afr. Mus. Exp.).

Menida distanti Horvath

1892. Horvath, *Term. Füzet*, xv, p. 258

Louis Trichardt, Transvaal, i, 1928 (R. F. Lawrence); Bulawayo, Southern Rhodesia, v, 1917 (R. W. E. Tucker); Mtunzini, Zululand, vi, 1940.

Agonoscelis puberula Stål

1853. Stål, op. cit., x, p. 216

Outjo, S.W.A. (S. Afr. Mus. Exp.); Potgietersrust, Transvaal, iv, 1934 (R. F. Lawrence); Upington, Cape Province, vii, 1936 (S. Afr. Mus. staff).

Agonoscelis odendaali Dist.

1910. Distant, *Ann. Mag. Nat. Hist.*, (8), vi, p. 95

Salisbury, Southern Rhodesia, v, 1913.

Agonoscelis erosa (Westw.)

1837. Westwood, op. cit., i, p. 33

Outjo, S.W.A., i, 1926 (S. Afr. Mus. Exp.).

Amphimachus circumflexus (Stål)

1855. Stål, op. cit., xii, p. 182

Florida, Transvaal, x, 1918 (R. W. E. Tucker). No locality was given by Stål; the majority of specimens seen come from the Transvaal.

Antestia lymphata Kirk.

1909. Kirkaldy, *Cat. Hemiptera*, i, p. 129

Salisbury, Southern Rhodesia. This specimen has been reported upon elsewhere (Leston, 1952*c*); it is distinct from the coffee-bugs and these have been removed to *Antestiopsis* Lest. *A. lymphata* Kirk. appears to be extremely rare; the British Museum possesses only Dallas's original type and paratype, described by him as *Pentatoma maculata.* The South African Museum's specimen is the first to have a precise locality.

Gen. *Piezodorus* Fieber

1861. Fieber, *Europ. Hem.*, lxx, p. 329

1905. Jakovlev, *Rev. russe Ent..*, v, p. 142 (*Pausias*)

Pausias, type *Piezodorus martini* Put., is only distinguishable from *Piezodorus* in that the spiracles are pale, whereas in the latter they are dark; *P. hessei* has pale spiracles, but in all other respects it is a true *Piezodorus*. These conditions are best satisfied, as are the zoogeographical factors, by sinking *Pausias* (Syn. Nov.).

When dealing with a large number of specimens from many parts of Africa it has been found that the usual taxonomic characters: length of ventral spine, shape of mesosternal carina, antennal ratios, etc., give little help in separating species. The separation of *P. pallescens*, *purus*, and *hybneri* can probably only be based on the genitalia of the males, but the degree of variation in the parameres

needs further investigation. It appears that the three might best be considered as facets of a single polytypic species; the zoogeography has not helped in this group and ecological factors are probably the cause of the different 'species'.

Key to the African (south of the Equator) species

The only other species reported from the area is *P. bequaerti* Schout. from the Belgian Congo.

1.	Spiracles pale. Length over 11 mm.	*hessei*
	Spiracles dark. Length less than 11 mm.	2
2.	Posterior tibiae usually flattened. Second antennal segment always longer than third.	*purus*
	Posterior tibiae not flattened. Second antennal segment equal to or shorter than third.	3
3.	Parameres as in fig. 16.	*hybneri*
	Parameres more elaborate.	*pallescens*

Piezodorus purus (Stål)
1853. Stål, op. cit., x, p. 221

Kaoko Otavi, S.W.A., iii, 1926; Warmbad (12 miles SE. of Zesfontein), Kaokoveld, S.W.A., ii, 1925; Outjo, S.W.A., i, 1926; Kamanyab, S.W.A., iii, 1925; Kaross (30 miles NW. of Kamanyab), S.W.A., ii, 1925 (all S. Afr. Mus. Exp.).

Keimoes and Riemvasmak, Gordonia, Cape Province, vii, 1925 (K. H. Barnard); Aughrabies Falls, Kenhardt Div., Cape Province, v, 1934 (R. F. Lawrence); Murraysburg District, Cape Province, iii, 1931 (Mus. staff).

The determination of *Piezodorus* species is a matter of some difficulty; the species are variable and the Oriental *hybneri* (Gmel.), now spread over much of East and Central Africa, has been confused with *purus* by authors. The genitalia are very similar throughout the genus.

Fig. 13 shows the aedeagus of *purus* laterally; the conjunctival appendages are very large and almost entirely membraneous; it has been found difficult to homologize them with the appendages in other groups. The head of the paramere (fig. 14) enables this species to be distinguished from both *hybneri* and *pallescens* (Germ.). The latter is also a common species in South Africa.

Piezodorus hessei sp. nov.

♀. Pale yellow-brown, a red band across the pronotum between the postero-external angles, ante-ocular area of head red; a black metallic line just within and parallel with the lateral paraclypeal margins. Hemielytra with a brown speck on the apex of the median margin of the clavus. Antennae indefinitely reddish. Venter pale yellow-brown, spiracular eminences pale dirty-yellow.

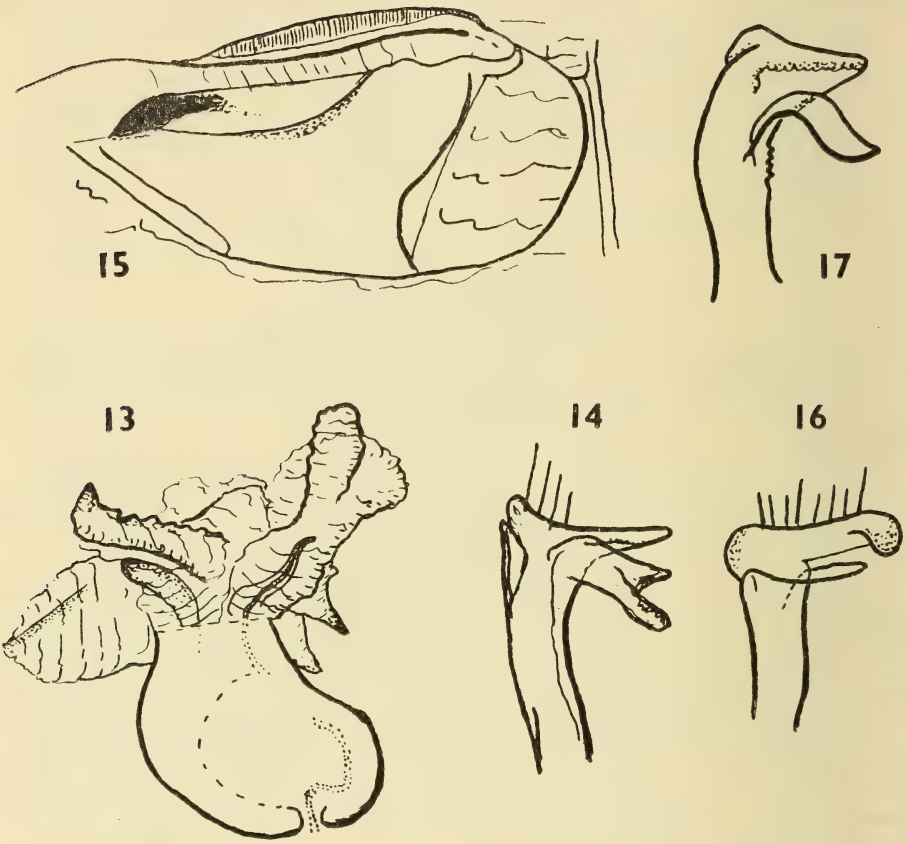
Pronotum and head punctate, the former with its anterior margin raised and rounded, its lateral margins straight, reflexed and yellow. Elytral texture thin, semi-transparent. Membrane glassy, colourless. Antennal segments 0·42, 1·00,

1·16, 1·11 and 1·01 mm. long respectively. Ventral spine stout, reaching to before the intermediate coxae.

♀ Length 12·4 mm. Maximum pronotal breadth 6·2 mm.

♂ Length 11·8 mm. Maximum pronotal breadth 6·2 mm.

Holotype ♀: Otjikondo (40 miles WNW. of Outjo, S.W.A., 1, 1925 (S. Afr. Mus. Exp.).



Piezodorus purus Stål. 13, aedeagus, lateral. 14, head of paramere, lateral.
Piezodorus hessei sp. nov. 15, metathoracic gland opening, and evaporatorium.
Piezodorus hybneri (Gmel.). 16, head of paramere, lateral.
Piezodorus hessei sp. nov. 17, head of paramere, lateral.

Paratypes: Three ♂♂ same locality as holotype; one ♀ Kaoko Otavi, Kaokoveld, S.W.A., iii, 1926; one ♂ Otshu, Hoarusib River (50 miles W. of Kaoko Otavi), S.W.A., iii, 1926; one ♂ Kaross (30 miles NW. of Kamanyab), S.W.A., ii, 1925 (all S. Afr. Mus. Exped.).

Holotype and paratypes in the South African Museum except for one paratype presented to the British Museum (Nat. Hist.), and two retained in the author's collection.

Gynenica capeneri Lest.

1953. Leston, *Rev. zool. bot. Afr.* (in press)

M'fongosi, Zululand, i, 1935 (W. E. Jones). This species appears to be confined to Natal and Zululand.

Gynenica marginella Dallas

1851. Dallas, *List. Hemipt. Brit. Mus.*, i, p. 181

Resolution, Grahamstown, Cape Province, i–iv, 1928 (Miss Walton).

Stenozygum alienatum (Fabr.)

1803. Fabricius, *Syst. Rhyngotorum*, p. 173

Wankie, Southern Rhodesia, xi, 1923 (C. W. Tyler).

Boerias brunnea Jensen-H.

1931. Jensen-Haarup, *Ent. Medd.*, xvii, p. 325

Knysna, Cape Province, i, 1931 (K. H. Barnard). The previously known localities for this species are given by Leston (1952*b*); it is confined to the south-west of the Cape Province.

Boerias maculata (Dist.)

1910. Distant, op. cit., (8), vi, p. 87

Warrenton, Cape Province, iv, 1931 (J. T.). Not previously recorded from the Cape Province, but known from Southern Rhodesia, the Transvaal, and Basutoland.

Boerias rubrocincta (Dist.)

1910. Distant, op. cit., (8), vi, p. 87

Pretoria, Transvaal, v, 1927 (S.M.); Smithfield, O.F.S., 1910 (Kannemeyer), 'On orangia'. These two records considerably extend the published distribution. Distant described the species from Natal.

Boerias victorini (Stål)

1856. Stål, op. cit., xiii, p. 194

[*nec* Jeannel, 1913]

Keurbooms River, Knysna, Cape Province, i, 1931 (K. H. Barnard).

Durmia haedula (Stål)

1865. Stål, *Hemipt. Afric.*, i, p. 149

Louis Trichardt, Transvaal, i–ii, 1928 (R. F. Lawrence).

Durmia tomentiventris (Germ.)

1837. Germar, *Rev. Ent.* (Silbermann), v, p. 168

M'fongosi, Zululand, i–ii, 1935 (W. E. Jones).

Carbula litigatrix Kirk.

1909. Kirkaldy, *Cat. Hemipt.*, i, p. 88

M'fongosi, Zululand, i, 1935 (W. E. Jones); Cayimaeis (Caimaiais, 25 miles SE. of Zesfontein), Kaokoveld, S.W.A., iii, 1925 (S. Afr. Mus. Exp.).

Veterna sanguineirostris (Thunb.)

1822. Thunberg, *Hemipt. Rostr. Cap.*, ii, p. 4

1890. Distant, *C.R. Soc. ent. Belge*, xxxiv, p. lv (*mimica*)

1892. id., *Naturalist in Transvaal*, p. 250 (*patula*)

I can find no constant characters upon which to separate *V. patula* Dist. and *V. mimica* Dist. from this species; they are weak but geographical subspecies; *sanguineirostris* centred in the Cape Province, *patula* in the Transvaal, Natal, and Southern Rhodesia, and *mimica* in the Belgian Congo. (Syn. Nov.)

Subspecies *sanguineirostris*

Somerset West, Cape Province, viii-ix (A. J. Hesse).

Subspecies *patula*

Pretoria, Transvaal, xi, 1930.

Diploxys fallax Stål

1865. Stål, *Hemipt. Afric.*, i, p. 129

M'fongosi, Zululand, i, 1935 (W. E. Jones).

Coponia waterbergensis (Dist.)

1902. Distant, *Ann. S. Afr. Mus.*, ii, p. 252

Louis Trichardt, Transvaal, i-ii, 1928 (R. F. Lawrence). The specific distinctions are obscure in this genus but the specimen before me has been compared with Distant's type. Undoubtedly *C. cornuta* (Dist.), *C. thoracica* (Dist.) and *C. waterbergensis* are very closely allied, and their differences, based on the pronotal angles, are scarcely specific.

Lerida punctata (P. de Beauv.)

1805. Palisot de Beauvois, *Ins. Afr. Amer.*, p. 84

M'fongosi, Zululand, i, 1935 (W. E. Jones).

Farnya versicolor (Dist.)

1881. Distant, *Proc. Zool. Soc. Lond.*, p. 271

Junction of Marico and Limpopo Rivers, Transvaal, iii, 1887. (A. W. Eriksson.) This was collected by the celebrated explorer-collector; it is the first Transvaal record. Elsewhere (Leston, 1952*a*) I have reported its capture in Natal.

Aethemenes stalianus Kirk.

1909. Kirkaldy, *Cat. Hemipt.*, i, p. 47

Bindura, Southern Rhodesia (D. Coghill).

Antestiopsis orbitalis (Westw.) (Comb. Nov.)

1837. Westwood, *Cat. Hemipt. coll. Hope*, i, p. 35

Michell's Pass, Ceres, Cape Province, x, 1934 (Museum staff).

Halydicoris corticinus (Germ.)

1837. Germar, op. cit., v, p. 178

Pretoria, Transvaal, ii, 1930 (I.B.K.); Port St. Johns, Cape Province (G. Shortridge); Schuiverberg, Transvaal.

PHYLLOCEPHALINI Dallas 1851

Amyot and Serville introduced the name Phyllocephalides for this group, but being vernacular it is invalid. The first Latin group name is Dallas's *Phyllocephalidae*.

Dalsira projecta (Dist.)

1898. Distant, *Ann. Mag. Nat. Hist.* (7), ii, p. 303

'Transvaal'.

Dalsira subtruncata (Walker)

1868. Walker, *Cat. Heteropt. Hemipt. Brit. Mus.*, iii, p. 491

Letaba, Transvaal, xi, 1948.

HALYINI Spinola, 1850

Atelocera notatipennis Stål

1858. Stål, *Ofv. Vet. Ak. Forh.*, xv, p. 312

Moroqueng (Morokwen), Bechuanaland, 1905; Vryburg, Bechuanaland, x, 1939 (Mus. staff).

Atelocera natalensis Stål

1853. Stål, op. cit., x, p. 216

Northern Damaraland, i, 1888 (A. W. Eriksson).

AEPTINI Stål, 1876

Aeptus singularis Dallas

1851. Dallas, *List. Hemipt. coll. Brit. Mus.*, i, p. 146

Louis Trichardt, Transvaal, 1, 1928 (R. F. Lawrence).

MYROCHEINI Stål, 1876

Delegorguella atomaria (Dallas)

1851. Dallas, op. cit., i, p. 136

Vryburg, Bechuanaland, i-ii, 1930 (C. G. Stone).

Neococalus clausus (Walker)

1867. Walker, *Cat. Heteropt. Hemipt. coll. Brit. Mus.*, i, p. 175

Acornhoek, East Transvaal, xi, 1918 (R. W. Tucker); Port St. Johns, Cape Province; Willowvale, Eastern Cape Province, 1, 1917.

DINIDORINAE Stål, 1870

Coridius nubilus (Westw.) (Comb. Nov.)

1837. Westwood, op. cit., 1, p. 25

Pretoria, Transvaal, iii, 1932; Vredefort, O.F.S., 1902; Port St. Johns, Cape Province, 1902 (G. Shortridge); Kakamas, Kenhardt Div. v, 1934 (R. F. Lawrence).

REFERENCES

Distant, W. L., 1892, *A naturalist in the Transvaal*, London.

id., 1898, 'Rhynchota from the Transvaal, Mashonaland and British Nyasaland', *Ann. Mag. nat. Hist.*, (7) 2: 294–316.

Hesse, A. J., 1925, 'Contributions to a knowledge of the fauna of S.W. Africa. iv. A list of the Heteropterous and Homopterous Hemiptera of S.W. Africa', *Ann. S. Afr. Mus.*, xxiii: 1–190.

id., 1935, 'Scientific results of the Vernay-Lang Kalahari expedition, March to September, 1930', *Ann. Transvaal Mus.*, xvi: 581–603.

Leston, D., 1952*a*, 'Notes on the Ethiopian Pentatomoidea, v. On the specimens collected by Mr. A. L. Capener, mainly in Natal, *Ann. Mag. nat. Hist.*, (12) 5: 512–20.

id., 1952*b*, 'Notes on the Ethiopian Pentatomoidea. vi. Some insects in the Hope Department, Oxford', *Ann. Mag. nat. Hist.*, (12) 5: 893–904.

id., 1952*c*, 'Notes on the Ethiopian Pentatomoidea. i. The genotype of *Antestia*', *Rev. zool. bot. Afr.*, xlv: 268–70.

id., 1953*a*, 'The suprageneric nomenclature of the British Pentatomoidea', *Ent. Gaz.*, iv: in press.

id., 1953*b*, 'Notes on the Ethiopian Pentatomoidea. viii. Scutellerinae Leach of Angola, with remarks upon the male genitalia and classification of the subfamily', *Publ. Cult. Comp. Diam. Angola*: in press.

Schouteden, H., 1912, 'Cimicidae, Coreidae, Reduviidae de la région du Zoutpansberg (Transvaal)', *Rev. zool. Afr.*, ii: 101–14.

Schumacher, F., 1913, 'Ein Beitrag zur Kenntnis der Rhynchoten-Fauna Südafrikas, insbesondere von Deutsch-Südwestafrika, Klein-Namaland und dem Kalaharigebiet', Schultze, Reise, v (*Denkschr. med. Ges. Jena*, xvii: 49–88).

Stål, C., 1865, *Hemiptera Africana*, i, Stockholm.

id., 1876, 'Enumeratio Hemipterorum, v', *K. Svensk Vet.-Ak. Handl.*, xiv (4): 1–162.

Wallengren, H. D. J., 1875, 'Insecta Transvaaliensia—Bidrag till Transvaalska Republikens i Sodra Afrika insektfauna', *Ofv. K. Vet.-Ak. Forh.*, xxxii (1): 83–137.

6. *Studien über südafrikanischen Meloiden* (*Coleoptera*). Von Dr. Z. Kaszab, Ungarisches Naturwissenschaftliches Museum, Budapest.

Herr A. J. Hesse war so liebenswürdig und schickte mir einige von Péringuey beschriebene Meloiden, sowie die undeterminierten, meist neuen Arten der Sammlung des South African Museums in Cape Town, zur Untersuchung. Aus diesem Material beschreibe ich im folgenden 12 neue Arten, ausserdem wurde es mir möglich die Gattung *Iselma* Haag-R. näher zu studieren und statt der vollkommen unbrauchbaren Bestimmungstabelle von Péringuey, einen neuen, auf Grund morphologischer Merkmale aufgebauten Bestimmungsschlüssel zu publizieren. Diese Arbeit soll nur eine Vorstudie zu einer grösseren monographischen Aufarbeitung der afrikanischen Meloiden sein, an welcher ich gegenwärtig arbeite.

Gen. *Iselma* Haag-R.

1879. Haag-Rutenberg, *D. Ent. Z.*, xxiii, p. 402.

Iselma lanuginosa sp. nov.

Einfärbig glänzend schwarz, Ober- und Unterseite, besonders aber der Vorderkörper sehr lang und dicht, aufstehend schwarz behaart. *Kopf* breit und rundlich, Stirn gewölbt, Scheitel breit abgerundet. Schläfen lang, Stirn zwischen den Augen hinten bis zum Scheitel in der Mittellinie unpunktiert und etwas aufgebogen, die Punktierung sehr fein und dicht. *Halsschild* deutlich breiter als der Kopf, etwa so lang wie breit, vor der Mitte am breitesten, nach vorne gerade und plötzlich, hinten ebenfalls ziemlich stark verschmälert, Basis nur schwach gerandet, die Mitte breit und flach eingedrückt, Scheibe beiderseits neben der Mittellinie etwas weiter nach hinten grubenartig vertieft. Die Punktierung auf der Scheibe spärlich, an den Seiten aber dicht, dazwischen ist der Grund glatt. Die Behaarung einfach aufstehend, ohne anliegende Behaarung. *Flügeldecken* an der Basis sehr breit, nach hinten verschmälernd, die Basis an der Innenseite der Schultern breit und stark eingedrückt, dieser Eindruck reicht weiter auf der Scheibe der Flügeldecken nach hinten und die Spuren dieser sind noch weit hinter der Mitte erkennbar. Schultern breit abgerundet, stark vortretend. Nahtwinkel der Flügeldecken am Ende abgerundet. Die Skulptur der Flügeldecken besteht vorne aus ziemlich grossen und spärlichen Punkten, nach hinten wird die Punktierung immer feiner und auch etwas raspelartig. Die Behaarung dicht, lang und schräg nach hinten gerichtet, ohne anliegende Haare. *Fühler* beim Männchen lang und fadenförmig, die beiden

ersten Glieder dicht, lang behaart, glänzend, die übrigen Glieder matt und mit äusserst feinen, kurzen, seidenartigen Haaren bedeckt. Die Glieder 3–10 haben am Ende je einige lange Haare. Das 3. Glied länger als das 4., dann werden die Glieder stufenweise länger und dünner, das Endglied mehr als 1, 5-mal so lang wie das 10. und auch viel dünner, etwas gebogen. *Beine* einfach, die Tarsen dünn, Vordertarsen ebenso lang wie die Schienen, die einzelnen Glieder lang, Hinterschienen mit gleichgrossen, kurzen, am Ende schräg abgestutzten Enddornen. Hinterschienen am Ende mit rötlichen Haaren. Sämtliche Schenkel unten sehr lang behaart, Schienen, besonders die Vorder- und Mittelschienen anliegend behaart. *Unterseite* ebenfalls lang, schwarz, abstehend behaart, sehr fein und dicht etwas raspelartig punktiert, das 5. freiliegende Abdominalsegment unten am Ende beim Männchen beiderseits abgerundet, die Mitte kurz ausgeschnitten, das 6. in der Mitte tief V-förmig ausgerandet und beiderseits spitzig. *Länge:* 15 mm. *Breite:* 5 mm.

1 Männchen aus NW. Cape Province, Nieuwoudtville, Sept. 1936, leg. C. W. Thorne & K. H. Barnard in der Sammlung des South African Museum (Monotypus).

Diese Art ist durch die sehr lange, dichte Behaarung des Körpers, den langen, schmalen Eindruck auf den Flügeldecken, die Form und Eindrücke des Halsschildes sehr gut ausgezeichnet. Sie ist nur mit den Arten *I. hirsuta* Thunb., *I. ursus* Thunb. und den neuen Arten *I. analis* sp. nov., sowie *I. simillima* sp. nov. verwandt. Alle diese Arten besitzen aber kürzere und spärlichere Behaarung, sowie abweichende Skulptur und Form der Oberseite.

Iselma simillima sp. nov.

Sie steht *I. ursus* Thunb. sehr nahe, so dass ich verzichte eine ausführliche Beschreibung zu bringen. *I. simillima* unterscheidet sich von *I. ursus* Thunb. durch die Kopfform, der Kopf ist kleiner, flacher, hinten länger und schmäler, am Scheitel abgerundet, Schläfen kurz und nach hinten verschmälert, die Oberseite grob punktiert, Halsschild länger als breit, Seiten abgerundet, nach hinten nur wenig verschmälert, Scheibe beiderseits flach gedrückt und dicht punktiert. Flügeldecken mit Erzschein, die Punktierung dicht und fein, hie und da in Querrichtung zusammenfliessend. Letztes Abdominalsegment am Ende fast gerade abgeschnitten, beiderseits mit abgerundet stumpfwinkligen, etwas mehr behaarten und gewölbten Ecken. Die Behaarung der Oberseite einfärbig schwarz, die lange Behaarung aufstehend, dazwischen befindet sich kurze, anliegende, oder schräg abstehende, dichte, ebenfalls schwarze Behaarung. *Länge:* 13 mm. *Breite:* 4, 5 mm.

2 Männchen aus Cape Province, Giftberg, südlich von Van Rhynsdorp, 1911, leg. R. M. Lightfoot (Holo- und Paratypus) in der Sammlung des South African Museum. Die Paratype wurde für die Sammlung des Ungarischen Naturwissenschaftlichen Museums in Budapest überlassen.

Iselma analis sp. nov.

Glänzend schwarz, die Flügeldecken mit schwachem Metallglanz, schwarz behaart. *Kopf* schmal und lang, Stirn etwas gewölbt, Schläfen nach hinten am Scheitel breit abgerundet, die Punktierung grob aber spärlich, die Mittellinie hinten am Scheitel sogar unpunktiert, Oberseite sehr lang abstehend behaart, ohne anliegende Behaarung. *Halsschild* lang eiförmig, vor der Mitte am breitesten, stark gewölbt, nach hinten abgerundet und nur wenig verschmälert, nach vorne gerade, die Scheibe kaum merkbar verflacht. Oberfläche grob und sehr dicht fast einander berührend punktiert, die Punktierung in der Mitte der Scheibe etwas spärlicher. Die Behaarung sehr lang abstehend, spärlich und schwarz, dazwischen sind aber kurze, anliegende, verschiedenartig gerichtete, rötliche Haare vorhanden. Basalrand schmal, aber ziemlich scharf. *Flügeldecken* parallelseitig, grob und dicht, in Querrichtung zusammenfliessend punktiert, Oberfläche neben der Naht etwas flach. Die Innenseite der Schultern nur leicht eingedrückt, der Eindruck reicht aber nicht nach hinten. Das Ende der Flügeldecken einzeln abgerundet. Die Behaarung lang aufstehend, sehr spärlich, dazwischen mit schräg aufstehenden, kurzen, schwarzen und anliegenden Haaren. *Fühler* ziemlich dick, die Glieder 3–5 zylindrisch, mit geraden Seiten, aber an der Basis viel schmäler als am Ende, die Glieder 6–7 an der äusseren Seite merklich konkav, an der inneren Seite aber konvex, so dass das Ende etwas sägeartig erscheint, die Glieder 7–11 dünner, länger, das Endglied fadenförmig. *Beine* einfach, Tarsen sehr lang und dünn, die Enddorne der Hinterschienen kurz und gleichlang, am Ende schräg abgestutzt. *Unterseite* fein und raspelartig punktiert, das Analsegment beim Männchen am Ende in der Mitte etwas ausgeschnitten, seitlich vollkommen abgerundet und die Oberfläche am Ende breit verflacht. *Länge:* 7–9 mm. *Breite:* 3–3,9 mm.

2 Männchen und 1 Weibchen aus Cape Province, Giftberg, südlich von Van Rhynsdorp, Sept. 1911, leg. R. M. Lightfoot (Holo- und Paratypen) in der Sammlung des South African Museum; die Paratype wurde für die Sammlung des Ungarischen Naturwissenschaftlichen Museums in Budapest überlassen.

Diese Art ist unter den Verwandten von *I. ursus* Thunb. die kleinste. Sie unterscheidet sich von *I. ursus* Thunb. ausser der Grösse noch durch die Kopfform, welche bei *I. ursus* Thunb. breiter, flacher und am Scheitel abgestutzt erscheint. Von der nächst verwandten *I. simillima* sp. nov. unterscheidet sie sich durch die sekundären Geschlechtsmerkmale des Männchens, die abweichende Skulptur der Ober- und Unterseite und durch den viel kleineren Körper.

Iselma hessei sp. nov.

Gross und breit, schwarz, glänzend. Flügeldecken von den Schultern an parallel dem Seitenrand bis zum Ende mit einer sehr breiten, roten Binde. *Kopf* langoval, mit langen, etwas parallelen Schläfen, Scheitel hinten halbkreisförmig breit abgerundet, Stirn ziemlich flach, in der Mitte etwas buckelig, sehr grob und dicht punktiert, die Mittellinie aber unregelmässig, hie und da

unpunktiert. Die Behaarung abstehend und lang, schwarz, ziemlich spärlich, ohne anliegende Haare. *Halsschild* länger als breit, etwas vor der Mitte am breitesten, nach vorne gerade verjüngt, nach hinten ziemlich parallel und nur vor der Basis eingeschnürt, Basalrand breit und scharf. Oberfläche in der Mitte und beiderseits auf der Scheibe undeutlich verflacht. Die ganze Oberseite äusserst grob und spärlich mit tiefen, rundlichen Punkten besetzt, die Punktierung an den Seiten feiner und dichter, die Scheibe hie und da unpunktiert, glatt. Die Behaarung aufstehend, lang und schwarz, dazwischen auch mit feineren, dünneren, etwas schräg abstehenden schwarzen Haaren. *Flügeldecken* breit parallelseitig, Schultern abgerundet und stark vorstehend, die Innenseite breit abgeflacht, Oberfläche gegen die Naht breit, scheinbar flach. Die Punktierung sehr grob und dicht, in Querrichtung unregelmässig zusammenfliessend, die breite rote Binde aber nur sehr spärlich und auch feiner punktiert. Die ganze Punktierung wird gegen das Ende feiner. Aus den Punkten wachsen ziemlich kurze und anliegende, dunkle Haare, dazwischen nur hie und da einige lange, schräg abstehende Haare. *Fühler* lang, beim Männchen ziemlich stark gesägt, die einzelnen Glieder am Ende nach aussen etwas spitzwinklig vorgezogen. *Beine* einfach, ohne besondere Kennzeichen. Hinterschienen mit kurzen, am Ende schräg abgestutzten Enddornen. *Unterseite* fein und dicht, raspelartig punktiert, schwarz behaart; letztes Abdominalsegment am Ende gerundet ausgeschnitten, seitlich beiderseits mit stumpfen Ecken. *Länge:* 15 mm. *Breite:* 5 mm.

1 Männchen aus NW. Cape Province, Namaqualand, Bowesdorp (zwischen Garies und Springbok), Sept. 1941, leg. Museum Staff (Monotypus) in der Sammlung des South African Museum.

Diese Art ist wegen ihrer ganz eigenartigen Farbe der Flügeldecken sofort zu erkennen und sieht keiner anderen *Iselma*-Art ähnlich. Morphologisch steht die neue Art in der Gruppe von *I. flavipennis* Haag-R. und *I. namaqua* Pér., von welchen sie aber durch die vollkommen abweichende Farbe der Flügeldecken, die sehr grobe Skulptur des Vorderkörpers und durch die Fühlerform des Männchens leicht zu unterscheiden ist.

Ich benenne diese interessante neue Art zu Ehren des Herrn Kollegen Dr. A. J. Hesse im S.A. Museum, Cape Town.

Iselma csikii sp. nov.

Gestreckt, Vorderkörper braunschwarz, Flügeldecken in der Mitte heller, an den Seiten und neben der Naht breit dunkler braun, die ganze Ober- und Unterseite mit anliegenden, sehr dichten, grauweissen Haaren bedeckt, so dass der Körper grau erscheint. *Kopf* langoval, stark gewölbt, Schläfen lang und parallel, hinten halbkreisförmig abgerundet; die Punktierung gleichmässig, ziemlich fein und dicht, die Zwischenräume zwischen den Punkten etwa so gross wie die Punkte selbst. Die Behaarung kurz, hinten nach vorne und vorne nach innen gerichtet. *Halsschild* viel länger als breit, in der Mitte am breitesten,

nach vorne stärker und fast gerade verjüngt, nach hinten ziemlich parallelseitig und nur vor dem sehr scharfen und dicken Basalrand ausgeschweift. Die Mitte nur leicht und die Scheibe beiderseits kaum merkbar verflacht. Die Skulptur fein aber sehr dicht, die Behaarung anliegend und verschiedenartig gerichtet. *Flügeldecken* lang parallelseitig, Schultern abgerundet etwas vortretend, die Skulptur besteht aus äusserst dicht stehenden, raspelartigen, in der Quere stellenweise zusammenfliessenden Punkten. Die Behaarung sehr dicht und anliegend, schräg nach aussen gerichtet. *Fühler* fadenförmig, die Glieder ziemlich gleichförmig, am Ende kaum dünner, das 3. Glied das längste, doppelt so lang wie das 4. und auch länger als das Endglied. Die Glieder von 4. an werden stufenweise kürzer, so dass das 10. merklich kürzer ist als das 4. *Beine* einfach, Tarsen mit langen Gliedern, Schienen am Ende mit langen goldgelben Haaren, Tarsen unten ebenfalls goldgelb behaart. Die Enddorne der Hinterschienen kurz und dick, ihr Ende breit und schräg abgestutzt, der innere Enddorn etwas länger. *Unterseite* sehr dicht mit raspelartigen Punkten besetzt, vollkommen anliegend grauweiss behaart. *Länge:* 9 mm. *Breite:* 3 mm.

1 Weibchen aus Ost-Afrika, Tanagebiet, Witu (Monotypus) in der Sammlung des Ungarischen Naturwissenschaftlichen Museums in Budapest.

Diese Art ist durch mehrere Eigenschaften sehr charakteristisch. Sie besitzt das nördlichste Vorkommen in der Gattung und morphologisch steht sie in der Nähe von *I. quadrimaculata* Borchm., doch steht sie weit von den bekannten Arten. Eine ähnliche Färbung und Behaarung des Körpers, sowie eine ähnliche Fühlerform kommt bei den übrigen Arten nicht vor.

Ich erlaube mir diese neue Art Herrn Direktor E. Csiki, dem verdienstvollen ungarischen Coleopterologen zu widmen.

Im folgenden gebe ich eine Bestimmungstabelle der bisher bekannten Arten der Gattung *Iselma* Haag-R.

1 (40) Die Enddorne der Hinterschienen viel kürzer als das 1. Glied der Hintertarsen.

2 (15) Der ganze Körper schwarz, selten mit metallischem Schimmer.

3 (12) Der ganze Körper tiefschwarz, höchstens die Flügeldecken mit schwachem Metallschimmer.

4 (5) Flügeldecken am Ende zugespitzt, schwarz behaart, Kopf und Halsschild eingedrückt (nach Haag-Rutenberg). 1. *hirsuta* Thunb.

5 (4) Flügeldecken am Ende abgerundet.

6 (7) Ober- und Unterseite mit äusserst langen und dichten, vollkommen schwarzen Haaren besetzt, die Behaarung ist doppelt, d.h. es sind längere, mehr aufstehende und dazwischen kürzere aber kaum anliegendere Haare vorhanden. Flügeldecken an der Basis neben den Schultern stark eingedrückt, der Eindruck reicht schräg weit nach hinten. Halsschild in der Mitte und beiderseits neben der Mitte stark eingedrückt. L.: 15 mm. NW. Cape Province (Nieuwoudtville). . . . 2. *lanuginosa* sp. nov.

7 (6) Die Behaarung, besonders die anliegenderen Haare viel kürzer, die längeren Haare viel spärlicher, der Eindruck nur an der Schulter deutlich, nicht nach hinten verlängert, die Eindrücke des Halsschildes viel schwächer, oder sogar vollkommen fehlend.

8 (9) Kopf flach und breit, hinten abgestutzt, Schläfen mit gerundet rechtwinkligen Beulen, ohne Mandibeln scheinbar quadratisch. Halsschild beiderseits neben der Mitte sehr schwach eingedrückt, grob und dicht punktiert. Flügeldecken sehr dicht,

vorne etwas zusammenfliessend punktiert, die anliegende Behaarung dunkelbraun und neben der Naht etwas seidenglänzend. L.: 9–12 mm. Cape Province. . . . 3. *ursus* Thunb.

9 (8) Kopf länglich, Stirn mehr gewölbt, hinten vollkommen breit abgerundet, ohne Mandibeln länger als breit. Flügeldecken mit deutlicherem Erzschein, dichter behaart, auch hinten mit in der Querrichtung zusammenfliessender Punktierung.

10 (11) Grösser; letztes Abdominalsegment beim Männchen in der Mitte etwas ausgeschnitten und die Seiten beiderseits etwas eckig aufgebogen. 3. Glied der Fühler beim Männchen breiter und auch etwas länger als das 4. Kopf breiter und flacher, hinten weniger abgerundet. L.: 13 mm. Cape Province (Giftberg, Van Rhynsdorp). . . . 4. *simillima* sp. nov.

11 (10) Kleiner; letztes Abdominalsegment beim Männchen abgestutzt, Oberfläche breit verflacht, Seiten beiderseits ohne Ecke. Das 3. Fühlerglied beim Männchen schmäler und etwas kürzer als das 4. Kopf schmäler und länger, hinten breiter abgerundet, Stirn gewölbter. L.: 7–9 mm. Cape Province (Giftberg, Van Rhynsdorp). . . . 5. *analis* sp. nov.

12 (3) Flügeldecken mit ausgesprochenem Metallschimmer, die Unterseite, besonders aber das Abdomen ebenfalls metallisch. Kopf und Halsschild, sowie die Brust meist auch mit metallischem Schimmer.

13 (14) Halsschild länger als breit, mit scharfem und dickem Basalrand, beiderseits neben der Mitte der Scheibe mit je einem flachen, länglichen Eindruck; Kopf ziemlich gross, viel breiter als die Hälfte des Halsschildes. Die anliegende Behaarung des Körpers braungelb, die aufstehenden Haare besonders am Vorderkörper sehr lang und schwarz, die Flügeldecken mit Bronzeglanz. Oberfläche der Flügeldecken schwach eingeflacht. L.: 10–11, 5 mm. Cape Province (Clanwilliam). . . . 6. *planidorsis* Pér.

14 (13) Halsschild kugelig, nach allen Richtungen gewölbt, so breit wie lang, die Basis nur schwach gerandet, Scheibe in der Mitte und beiderseits neben der Mitte eingedrückt. Kopf sehr klein und flach, nur halb so breit wie der Halsschild. Die anliegende Behaarung dunkelbraun, die aufstehende schwarz. Flügeldecken blaugrün, Unterseite bläulich, Kopf und Halsschild mit grünlich-kupferigem Schimmer. L.: 7–9, 5 mm. Cape Province (Clanwilliam, Worcester). . . . 7. *metallescens* Pér.

15 (2) Körper schwarz, Flügeldecken aber einfärbig rotgelb, gelbrot, braungelb, oder gelbrot mit schwarzen Flecken, oder schwarz mit gelbroten Makeln.

16 (23) Flügeldecken mit gelber, oder rötlicher Zeichnung, oder gelb mit schwarzen Flecken.

17 (18) Flügeldecken schwarz, die Seiten von den Schultern bis zum Nahtwinkel aber sehr breit rot gesäumt. Kopf und Halsschild ausserordentlich grob punktiert, die Punktierung der Flügeldecken auch sehr grob und viel dichter als die des Halsschildes. Halsschild ohne anliegende Behaarung, nur sehr lang schwarz behaart, Flügeldecken mit schwarzer, anliegender Behaarung und nur hie und da mit einigen langen, aufstehenden Haaren. Letztes Abdominalsegment des Männchens ausgeschnitten. L.: 15 mm. N.W. Cape Province (Namaqualand, Bowesdorp.) . . . 8. *hessei* sp. nov.

18 (17) Flügeldecken gelbrot mit schwarzen Flecken, oder schwarz mit gelben Makeln.

19 (20) Flügeldecken gelbrot mit dunkler, breiter Naht, welche sich nach hinten erweitert, oder die dunkle Färbung erweitert sich oft so stark, dass nur die Schultern und je eine lange Makel am Seitenrand hinter den Schultern gelb bleibt. Halsschild sehr lang, fast zylindrisch gewölbt, sehr spärlich und ziemlich fein punktiert. Die anliegende Behaarung der Flügeldecken gelbrot. L.: 6–11 mm. S.W. Afrika (Abachaus, 48 km. NW. von Otjiwarongo). . . . 9. *hobohmi* Kasz.

20 (19) Flügeldecken gelbrot mit schwarzen Flecken, die Naht höchstens am Ende dunkel.

21 (22) Beine und Fühler dunkel, höchstens die Hinterschienen gelbrot. Flügeldecken gelbrot, mit je 2 grossen, der Länge nach miteinander verbundenen schwarzbraunen Flecken; nur die Basis, das Ende, die schmale Naht und der Seitenrand, sowie die Mitte an den Seiten zwischen beiden Flecken gelb. Halsschild sehr dicht und ziemlich fein punktiert, die Mitte stark eingedrückt. Kopf breit und gewölbt. Die

Oberfläche hellgelb dicht behaart. Fühler des Männchens am Ende des 4. und 5. Gliedes dick. L.: 12 mm. Ost-Afrika (Lukuledi).
. . . 10. *quadrimaculata* Borchm.

22 (21) Schienen und Tarsen, sowie die Fühler gelbrot. Flügeldecken gelbrot, am Ende aber mit je einem grossen, ovalen, schwarzen Fleck, so dass die Naht im hinteren Fünftel auch schwarz ist. Kopf viel schmäler, Halsschild viel spärlicher punktiert, Flügeldecken hellgelb, Vorderkörper braun und Unterseite ganz anliegend gelbgrau behaart. L.: 12 mm. Ost-Afrika (Barikiva). . . . 11. *tibialis* Borchm.

23 (16) Flügeldecken einfärbig gelbrot, rotgelb, höchstens mit äusserst schmaler dunkler Naht, oder der ganze Körper einfärbig graubraun.

24 (25) Der ganze Körper einfärbig graubraun. Die Behaarung sehr dicht und anliegend grauweiss, Halsschild lang, mit scharfem Basalrand, Kopf schmal und lang, mit parallelen und langen Schläfen, hinten aber breit abgerundet. Das 3. Fühlerglied sehr langgestreckt, fast doppelt so lang wie das 4. L.: 9 mm. Ost-Afrika (Tanagebiet, Witu). . . . 12. *csikii* sp. nov.

25 (24) Körper schwarz, die Flügeldecken aber gelbrot, oder rotgelb.

26 (35) Flügeldecken nur mit einfärbiger, schwarzer Behaarung. Meist grosse Arten.

27 (28) Flügeldecken mit dunkler Naht. Fühler stark und lang, etwas gesägt, Halsschild oval, dicht und grob punktiert. Die schwarze Behaarung der Flügeldecken kurz. L.: 11–14 mm. (nach Haag-Rutenberg und Péringuey). Cape Province, Cape Division.
. . . 13. *rufipennis* Haag-R.

28 (27) Flügeldecken einfärbig gelb oder rot, die Naht nicht dunkel.

29 (34) Grösser, 11–15 mm.

30 (33) Flügeldecken gelb, Halsschild breit, stark gewölbt, kaum länger als die grösste Breite.

31 (32) Die Mitte, sowie die Scheibe beiderseits neben der Mitte des Halsschildes flach eingedrückt. Oberfläche des Halsschildes sehr grob punktiert. L.: 13–14 mm. Cap der guten Hoffnung. . . . 14. *flavipennis* Haag-R.

32 (31) Halsschild äusserst grob punktiert, die Mittellinie der Scheibe unpunktiert und etwas aufgewölbt, die Scheibe beiderseits hie und da mit einigen (oder nur mit je einem) Spiegelfleck. Flügeldecken stärker punktiert und an den Seiten lederartig gerunzelt. L.: 14–16 mm. NW. Cape Province (Namaqualand). 15. *namaqua* Pér.

33 (30) Flügeldecken rot. Halsschild schmäler und länger, sehr grob aber spärlich punktiert, Kopf ebenfalls schmal und sehr lang, Wangen parallel, Kopf hinten halbkreisförmig abgerundet. Flügeldecken grob punktiert und die Punkte meist in Querrichtung zusammenfliessend. L.: 11–15 mm. N.W. Cape Province (Namaqualand). . . . 16. *brunneipes* Haag-R.

34 (29) Kleiner, 9 mm. nicht überragend. Halsschild ziemlich rundlich, stark punktiert, dazwischen fein gerunzelt, die Mitte und beiderseits die Scheibe schwach verflacht. Kopf ziemlich breit und kurz, Schläfen hinten sich plötzlich verschmälernd. Flügeldecken sehr dicht und grob punktiert, zusammenfliessend. L.: 7–9 mm. Cape Province (Clanwilliam). . . . 17. *boschimana* Pér.

35 (26) Flügeldecken hell behaart, oder die Haare am Grunde schwarz, am Ende aber gelb, so dass die Behaarung von oben gesehen hell erscheint, oder zwischen den gelben Haaren sind auch schwarze Haare untermischt.

36 (37) Fühler stark gesägt. Oberseite doppelt behaart, die lange, aufstehende Behaarung ist schwarz, die kürzere einfärbig gelbrot, die Basis der Haare auch gelbrot; Kopf und Halsschild mit dichter und anliegender, gelber Behaarung. Halsschild länglich und die Scheibe beiderseits flach eingedrückt. Die Punktierung der Flügeldecken ziemlich spärlich. L.: 10–12 mm. Cape Province (Grahamstown, Willowmore).
. . . 18. *optata* Pér.

37 (36) Fühler einfach, fadenförmig, nicht gesägt, Halsschild kürzer, meist rundlich. Die kürzere Behaarung der Flügeldecken am Grunde schwarz, am Ende aber gelb, so dass die Behaarung von oben gesehen einfärbig gelb erscheint.

38 (39) Halsschild in der Mitte der Scheibe und auch beiderseits eingedrückt. Kopf verhältnissmässig klein und länglich, die Punktierung der Flügeldecken sehr dicht. Grösser, die Behaarung mehr bräunlich. L.: 8–9 mm. Cape Province (Cape Town, Van Rhynsdorp). . . . 19. *rubripennis* Lap.

39 (38) Halsschild scheibenförmig, die Mitte und die Scheibe beiderseits meist ebenfalls flach, der Kopf viel kürzer, rundlich und breiter. Die Punktierung der Flügeldecken etwas feiner und dichter. Die Behaarung mehr gelblich. Kleinere Art. L.: 6–8 mm. N.W. Cape Province (Namaqualand). . . . 20. *pallidipennis* Haag-R.

40 (1) Der innere Enddorn der Hinterschienen etwas länger als das lange 1. Hintertarsenglied. Der äussere Enddorn kaum halb so lang als der innere. Körper schwarz, Flügeldecken gelb.

41 (42) Halsschild länglich oval, die Mittellinie erhaben und lang, Kopf mit anliegender gelber Behaarung. L.: 7 mm. (nach Péringuey). NW. Cape Province (Namaqualand). . . . 21. *okiepana* Pér.

42 (41) Halsschild rundlich, kugelig, die Mittellinie nur in der Mitte etwas erhaben, oder vollkommen flach. Kopf ohne gelbe Behaarung. Flügeldecken blassgelb, gelb behaart, hie und da mit einigen schwarzen, aufrecht stehenden Haaren. L.: 6–8 mm. N.W. Cape Province (Bushmanland). . . . 22. *longispina* Kasz.

Gen. *Zonitomorpha* Pér.

1909. Péringuey, *Trans. Roy. Soc. S. Afr.*, i, p. 272.

Zonitomorpha costata sp. nov.

Einfärbig gelbrot, die Fühler von 3. Glied an schwarz, die Basis des 3. Gliedes aber noch gelbrot, Flügeldecken am Ende bis zum hinteren Drittel schwarz, vorne hinter dem Schildchen mit einer breiten, gemeinsamen Binde, welche die Basis mit den Schultern und die Seiten frei lässt. Beine und Unterseite gelbrot, die Tarsen aber zweifärbig, d. h. die Glieder 2–4 der Vorder- und Mitteltarsen, sowie die Basis des Krallengliedes schwarz, an den Hintertarsen aber das 2., 3. und die Basis des 4. Gliedes schwarz. *Kopf* oval, ohne Mandibeln länger als breit, Stirn zwischen den Augen schmal und flach, etwa nur so breit wie der Querdurchmesser eines Auges an der schmalsten Stelle, Clypeus ebenfalls flach, Schläfen lang und ziemlich parallel, hinten schräg abgestutzt und in der Mitte gerade, Oberfläche hinter den Augen breit verflacht, die Mitte kaum buckelig. Die Punktierung vorne dicht und fein, hinter den Augen und am Scheitel sehr spärlich, aber etwas gröber. *Halsschild* sehr lang und trapezförmig, vorne so breit wie der Kopf, die Vorderecken breit abgerundet, nach hinten fast gerade erweitert, etwa $1\frac{1}{4}$-mal so lang wie an der Basis breit; in der Quere stark gewölbt, weit vor der Mitte beiderseits grubig vertieft, die Basis in der Mitte etwas verflacht, der Basalrand fein, aber scharf, die Mitte etwas ausgeschnitten. Die Punktierung ist unregelmässig, die Mittellinie hie und da unpunktiert, die Scheibe beiderseits dicht und etwas feiner punktiert, im übrigen ist die Punktierung sehr spärlich. *Flügeldecken* lang und parallel, hinter der Mitte nur leicht gewölbt, Seitenrand von oben überall gut sichtbar. Schultern durch einen flachen Eindruck abgegrenzt, breit verrundet. Oberfläche mit Spuren von Längsnerven, von welchen der innere und äussere weit hinter der Mitte, der mittlere aber nur vor dem Ende erloschen ist. Die Punktierung ist fein und spärlich, gegen das Ende noch feiner und vor dem Ende sogar mikroskopisch, etwas lederartig. *Fühler* die Basis des Halsschildes mit 3 Gliedern überragend, die Glieder sind gleichdick, das 1. Glied lang und dick, das 2. länger als breit, das 3. breiter, die Glieder vom 3. an fast gleichlang und gleichbreit, etwa doppelt so lang wie breit. *Beine* lang und schlank, das 1. Glied

sämtlicher Tarsen länger als die beiden folgenden Glieder zusammen. Die beiden Enddorne der Hinterschienen sind sehr kurz und dick, zugespitzt. Krallen sehr stark gekämmt. *Unterseite* äusserst fein raspelartig punktiert und anliegend kurz, gelb behaart. *Länge:* 14 mm. *Breite:* 4, 6 mm.

1 Weibchen aus S.W. Afrika, Kaross (ungefähr 100 km. SO. von Zesfontein, Kaokoveld), Febr. 1925, leg. Mus. Exped. (Monotypus) in der Sammlung des South African Museum.

Diese Art steht der *Z. seminigra* Pic noch am nächsten, ist aber von ihr durch die vollkommen abweichende Skulptur der Decken, sowie die verschiedene Färbung des Körpers leicht zu unterscheiden.

Zonitomorpha sellata Fåhraeus

Diese Art hat in Süd-Rhodesien, Transvaal und Natal eine weite Verbreitung; sie ist eine der häufigsten *Zonitomorpha*-Arten der Gegend. Die Untersuchung eines grösseren Materials ergab, dass die nomenklatorische forma typica eine sehr seltene Form sein muss, da ich in dem von mir bestimmten, relativ reichen Material kein einziges Stück gefunden habe, welches ich mit der Beschreibung von Fåhraeus vollkommen identifizieren konnte. Die Art ist sehr veränderlich und ich fand eine ganze Reihe bisher unbekannter Formen, welche ich hier im Rahmen einer Bestimmungstabelle publiziere.

1 (22) Flügeldecken gelbrot mit schwarzer Binde oder mit schwarzer Zeichnung oder mit schwarzem Ende.
2 (5) Das Ende der Flügeldecken schwarz, der schwarze Fleck erreicht oft die vordere Hälfte der Flügeldecken.
3 (4) Beine gelb, nur Schenkel und Schienenende, sowie die Tarsen dunkel. 1. Fühlerglied bis zur Mitte rötlich. Das Ende der Flügeldecken bis zum hinteren Drittel schwarz. . . . 13. ab. *stevensoni* m.
4 (3) Beine dunkel, nur die Schienen gelb, Schienenende auch dunkel. Fühler schwarz. Flügeldecken schwarz, nur das vordere Drittel gelbrot. . . . 14. ab. *seminigripennis* m.
5 (2) Das Ende der Flügeldecken gelbrot.
6 (13) Basis der Fühler schwarz.
7 (12) Flügeldecken mit einer mehr-weniger breiten Querbinde vor der Mitte; die Basis der Flügeldecken quer gelbrot. Schenkel meist gelbrot.
8 (9) Hinterbrust rot, nur die Pleuren dunkel. Schenkel gelbrot, das Ende aber dunkel. . . . 9. ab. *pectoralis* m.
9 (8) Hinterbrust schwarz, selten die Pleuren hell.
10 (11) Schenkel dunkel. . . . 10. ab. *nigricornis* m.
11 (10) Schenkel rot, nur das Ende dunkel. . . . 11. ab. *fahraeusi* m.
12 (7) Flügeldecken bis zum hinteren Drittel schwarz, nur die Schultern und das Ende gelbrot. Beine dunkel, nur die Basis der Schienen rot. 12. ab. *nigricolor* m.
13 (6) Basis der Fühler gelbrot.
14 (15) Flügeldecken gelbrot, hinter der Mitte mit einem gemeinsamen, kleinen, runden, schwarzen Fleck an der Naht. Beine gelb, Schenkel und Schienenende, sowie die Tarsen dunkel. Die beiden ersten Glieder der Fühler gelb. . . . 5. ab. *unipunctata* m.
15 (14) Flügeldecken mit schwarzem Ende oder mit einer schwarzen vorderen Querbinde, oder mit 2 kleinen Flecken an den Seiten.
16 (21) Flügeldecken mit einer schwarzen Querbinde vor der Mitte.
17 (18) Nur das 1. Fühlerglied rot. Schenkel dunkel. Basis der Flügeldecken rot. . . . 6. *forma typica* Fahr.

18 (17) Fühler mit 2 gelben Basalgliedern, Schenkel rotgelb, nur das Ende dunkel.
19 (20) Flügeldecken schwarz, nur die Schultern und hinter der Mitte gelbrot. Brust schwarz. . . . 7. ab. *rhodesiana* m.
20 (19) Flügeldecken mit einer breiten schwarzen Querbinde vorne, die die Basis frei lässt. Brust dunkelbraun, die Pleuren aber gelbrot. . . . 8. ab. *testaceicornis* m.
21 (16) Flügeldecken vorne beiderseits neben der Mitte mit je einem dunklen Fleck. . . . 4. ab. *brunneonotata* Pic
22 (1) Flügeldecken einfärbig gelbrot.
23 (24) Basis der Fühler schwarz. Beine gelbrot, Schienen- und Schenkelende, sowie die Tarsen aber dunkel. Brust schwarz. . . . 3. ab. *bang-haasi* Pic
24 (23) Fühlerbasis gelbrot.
25 (26) Die beiden ersten Glieder der Fühler gelbrot. Beine gelb, Tarsen braun, Brust schwarz. . . . 2. ab. *testaceipes* Pic
26 (25) Die 3 ersten Glieder der Fühler gelbrot. Beine gelb, Tarsen braun und die Brust gelb. . . . 1. ab. *unicolor* m.

1. *sellata* ab. *unicolor* ab. nov.: Die ersten 3 Glieder der Fühler gelb. Ober- und Unterseite, sowie die Beine gelbrot, Tarsen aber dunkel. Süd-Rhodesia, Gwanda, 1906, leg. D. Dods (Monotypus, Coll. S.A. Mus. Cape Town).

2. *sellata* ab. *testaceipes* Pic: Die ersten zwei Fühlerglieder rot, Beine gelb, Tarsen braun, Flügeldecken ohne Binde, Abdomen rot, Brust schwarz.

3. *sellata* ab. *bang-haasi* Pic: Fühler schwarz, Schenkelbasis und Flügeldecken rötlich, Abdomen rot, Brust schwarz.

4. *sellata* ab. *brunneonotata* Pic: Fühlerbasis rot, Beine rötlich, Flügeldecken mit je einer kleinen Makel an den Seiten (nach Pic).

5. *sellata* ab. *unipunctata* ab. nov.: Die beiden Basalglieder der Fühler gelb, Schenkel und Schienen rot mit dunklen Enden, Tarsen braun, Brust dunkel, in der Mitte braun, Flügeldecken gelbrot, hinter der Mitte mit einem gemeinsamen runden Fleck an der Naht. Süd-Rhodesien, Sawmills, Febr. 1923, leg. R. H. R. Stevenson (Monotypus, Coll. Mus. Budapest).

6. *sellata forma typica*: Das 1. Fühlerglied rötlich, Schenkel, Schienenende und Tarsen schwarz, Flügeldecken vor der Mitte mit einer schwarzen Querbinde, Abdomen rot, Brust schwarz (nach Fåhraeus, aus der Original-beschreibung).

7. *sellata* ab. *rhodesiana* ab. nov.: Die beiden ersten Glieder der Fühler rot, Flügeldecken schwarz, nur die Schultern und hinter der Mitte rot, Brust schwarz, Beine wie ab. Fahraeusi m., Schenkel rot, höchstens das Ende schwärzlich, Schienen rot, Tarsen braun. S. Rhodesia, Bulawayo, leg. G. Arnold (Monotypus, Coll. S.A. Mus. Cape Town).

8. *sellata* ab. *testaceicornis* ab. nov.: Die beiden Basalglieder der Fühler gelb, Beine rot, Schenkel- und Schienenende, sowie die Tarsen dunkel, Hinterbrust schwarz, die Pleuren aber gelbrot, Flügeldecken gelbrot mit einer breiten schwarzen vorderen Querbinde. Süd-Rhodesien, Gwanda, 1906, leg. D. Dods (Monotypus, Coll. S.A. Mus. Cape Town).

9. *sellata* ab. *pectoralis* ab. nov.: Fühler schwarz, Schenkel rötlich, Hinterbrust schwarz, nur die Pleuren dunkel, Flügeldecken mit schwarzer Querbinde. Süd-Rhodesien, Gwanda, 1906, leg. D. Dods (Monotypus, Coll. S.A. Mus., Cape Town).

10. *sellata* ab. *nigricornis* ab nov.: Fühler schwarz, Schenkel, Schienenende und Tarsen schwarz, Flügeldecken vor der Mitte mit einer Querbinde, Abdomen rot, Brust schwarz. Natal, Durban, 1891, leg. N. Barker (Monotypus, Coll. S.A. Mus., Cape Town).

11. *sellata* ab. *fahraeusi* ab. nov.: Fühler schwarz, Schenkel rot, höchstens das Ende schwärzlich, Hinterbrust schwarz, Flügeldecken wie bei der Stammform, mit einer schwarzen Querbinde. Mfongosi, Zululand, leg. W. E. Jones (Holotypus, Coll. S.A. Mus., Cape Town); Natal, Durban, 1891, leg. N. Barker (2 Paratypen Coll. S.A. Mus., Cape Town, 1 Paratype Coll. Transv. Mus., Pretoria); Süd-Rhodesia, Gwanda, 1906, leg. D. Dods (1 Paratypus Coll. S.A. Mus., Cape Town); Rhodesia, Bulawayo, leg. G. Arnold (1 Paratypus Coll. Transv. Mus., Pretoria); Transvaal (2 Paratypen Coll. Mus. Budapest).

12. *sellata* ab. *nigricolor* ab. nov.: Fühler schwarz, Beine auch schwarz, nur die Basis der Schienen rötlich, Brust schwarz, Flügeldecken schwarz, nur die Schultern und hinter der Mitte rötlich. Süd-Rhodesien, Penkridge, 7 Dec. 1927, leg. R. H. R. Stevenson (Holotypus, Coll. S.A. Mus., Cape Town); S.W. Afrika, Ovamboland, Onolonga, Febr. 1923, leg. Mus. Exped. (1 Paratypus Coll. S.A. Mus., Cape Town).

13. *sellata* ab. *stevensoni* ab. nov.: Das 1. Glied der Fühler bis zur Mitte rot, Flügeldecken gelbrot, das Ende aber bis zum hinteren Drittel schwarz, Brust schwarz, Beine rot, das Ende der Schenkel und Schienen, sowie die Tarsen braun. Süd-Rhodesien, Penkridge, 15 XII 1927, leg. R. H. R. Stevenson (Monotypus, Coll. S.A. Mus., Cape Town).

14. *sellata* ab. *seminigripennis* ab. nov.: Fühler schwarz, Schenkel, Schienenende und Tarsen schwarz, Flügeldecken bis zum vorderen Drittel breit schwarz, vorne gelbrot, Brust schwarz. Zululand, Mfongosi, leg. W. E. Jones (Monotypus, Coll. S.A. Mus., Cape Town).

Gen. *Sitaris* Latr.

1802. Latreille, *Hist. Crust. Ins.*, iii, p. 187.

Sitaris bushmanica sp. nov.

Kleine, breite, robuste Art. Kopf samt den Fühlern und Palpen, die Mittel- und Hinterbrust, sowie die Schenkel sämtlicher Beine schwarzbraun, Halsschild, Schienen, Tarsen und Abdomen gelbrot, die Seiten der Segmente aber mit je einem dunklen Fleck, Flügeldecken gelbrot, in der Mitte aber mit einer queren Makel, sowie das Ende breit schwarz, Schildchen und das Tergit der Hinterbrust schwarz. *Kopf* breit, an den kurzen und nach hinten erweiterten Schläfen am breitesten, diese seitlich abgerundet und hinten beiderseits in der Mitte auch etwas leicht ausgebuchtet, so dass sie doppelt leicht gebuckelt erscheinen. Augen flach-gewölbt, nierenförmig. Stirn zwischen den Augen sehr breit und flach, so breit wie die ersten 4 Fühlerglieder zusammen lang, Clypeus mit einem queren, ziemlich scharfen Kiel. Oberseite dicht und fein punktiert, die Punkte sind zwischen den Augen und neben den Augen stark zusammengedrückt, die Buckel aber hinten kaum punktiert. Sehr fein, dunkel behaart. *Halsschild* breit, Seiten ziemlich parallel, vorne an den breit abgerundeten Vorderecken am breitesten, nach hinten kaum verjüngt, Vorderrand in der Mitte etwas flach ausgebuchtet, Hinterrand in breitem Bogen verrundet. Scheibe beiderseits neben der Mittellinie etwas vor der Mitte sehr flach eingedrückt. Oberfläche äusserst spärlich, aber gröber punktiert als der Kopf. *Schildchen* sehr gross und breit, glänzend, die Mitte breit unpunktiert, das Ende abgestutzt. *Flügeldecken* an der Basis breit und nach hinten verschmälert, innen auch am Schildchen einander nicht berührend, die Innenseite nur sehr leicht ausgeschnitten, aber sehr breit klaffend, aussen ebenfalls nur wenig, aber doch stärker ausgerandet, das letzte Drittel der Flügeldecken ziemlich schmal und parallelseitig und nur halb so breit wie vorne an der breitesten Stelle, das Ende ziemlich scharf zugespitzt. Die Skulptur ist sehr fein lederartig gerunzelt. *Fühler* kurz und etwas flach, die Basis des Halsschildes kaum überragend; die ersten zwei Glieder glänzend, die übrigen matt. Das 2. Glied breiter als lang, das 3. nicht genau 1, 5-mal so lang wie breit, das 4. Glied kaum etwas länger, die darauf folgenden aber stufenweise kürzer und auch etwas schmäler, so dass das 10. Glied so lang wie das 3., aber fast doppelt so lang wie breit ist. *Beine* dünn und ziemlich kurz, Vorder- und Mitteltarsen sehr dünn, deutlich länger als die Schienen, das Klauenglied viel länger als das dickere 1. Glied, Hinterschienen im Querschnitt flach, mit ganz kurzen und dicken, abgestutzten Enddornen. Krallen sehr fein gekämmt. *Unterseite* glänzend, Hinterbrust an

den Seiten sehr dicht, fast zusammenfliessend, die Mitte dagegen viel feiner und sehr spärlich punktiert. *Länge:* 7 mm. (bis zum Ende der Flügeldecken). *Breite:* 3, 9 mm. (an den Schultern).

1 Exemplar aus N.W. Cape Province, Bushmanland, Jackals Water (zwischen Steinkopf und Orange Fluss), R. M. Lightfoot, Oct. 1911 (Monotypus) in der Sammlung des South African Museum.

Sie ist von den bekannten Arten der Gattung *Sitaris* aus Süd-Afrika, uzw. *S. capensis* Pér., *S. notaticollis* Pér. und *S. fitzsimonsi* Kasz. weit entfernt. Alle diese Arten besitzen viel längere und deutlicher ausgeschweifte Flügeldecken, ausserdem eine vollkommen abweichende Färbung und Skulptur. Sie sieht einer *Stenoria* Muls. sehr ähnlich, doch besitzen die *Stenoria*-Arten nicht so stark eingeschnürte Flügeldecken und unter den afrikanischen Arten gibt es keine ähnlich gefärbte und skulptierte Form.

Gen. *Stenoria* Muls. & Rey

1857. Mulsant & Rey, *Ann. Soc. Linn. Lyon.*, iv, p. 394.

Stenoria discomaculata sp. nov.

Kopf schwarz, der Scheitel hinten in der Mitte und der Hals aber oben rötlich, Fühler und Palpen braun, die Mundteile aber unten hell, Halsschild rotgelb, vor der Mitte beiderseits mit je einer grossen, runden Makel auf der Scheibe, Schildchen, Mittel- und Hinterbrust, die ersten 3 Abdominalsegmente, sowie das 4. an den Seiten schwarz, die beiden letzten Segmente gelbrot, Beine schwarz. Flügeldecken braun mit je zwei sehr grossen, queren, gelbroten Makeln, uzw. eine hinter den Schultern und eine hinter der Mitte, beide Flecke erreichen den Seitenrand, die Naht bleibt aber schmal dunkel. *Kopf* breit und flach, Schläfen hinter den Augen kurz und erweitert, breit verrundet, Scheitel in der Mitte gebuckelt und die innere Seite durch einen länglichen Eindruck vom Hinterrand der Augen nach hinten begrenzt, Stirn zwischen den Augen vorne in der Mitte etwas grubig eingedrückt. Clypeus auch eingedrückt. Die Punktierung äusserst dicht, fast zusammenfliessend, Scheitel hinten spärlicher. *Halsschild* breit scheibenförmig, im vorderen Drittel am breitesten, nach vorne in sehr breitem und starkem Bogen verjüngt, nach hinten in leichtem Bogen stark verschmälert, die hintere Ecke fast abgerundet, stumpfwinklig, Hinterrand kaum gerundet, Vorderrand in der Mitte kurz und ziemlich plötzlich ausgeschnitten. Oberfläche etwas vor der Mitte beiderseits schwach verflacht. Die Punktierung äusserst spärlich und viel gröber als die des Kopfes. *Flügeldecken* lang, am Ende gleichmässig verschmälert, hinten deutlich schmäler als an der Basis, Seiten- und Innenrand gerade, Seitenrand nur im hinteren Viertel etwas ausgebuchtet, fein gerandet, Innenrand aber breit klaffend, das Ende abgerundet spitzwinklig. Oberfläche ohne Punktierung, lederartig sehr fein gerunzelt. *Fühler* dünn und etwas abgeflacht, die Basis des Halsschildes weit überragend, die einzelnen Glieder gleichbreit. Das 2. Glied etwas länger als breit, das 3. doppelt so lang wie das 2. und etwas mehr als zweimal so lang wie breit, die

Glieder vom 4. an kaum merklich etwas kürzer, das Endglied aber wieder lang, mehr als 1, 5-mal so lang wie das 10. *Beine* dünn, Schienen ziemlich abgeflacht, die beiden Enddorne der Hinterschienen sehr klein, gleichförmig und spitzig; Tarsen lang und dünn, viel länger als die Schienen, 1. Glied der Vorder- und Mitteltarsen so lang, der Hintertarsen deutlich länger als das Klauenglied. Die Krallen sind sehr fein gekämmt. *Unterseite* anliegend, spärlich hell behaart, Hinterbrust an den Seiten und die Pleuren sehr dicht, fast runzelig punktiert, die Mitte dagegen kaum punktiert, glatt, das Abdomen dicht, etwas raspelartig punktiert. *Länge:* 8, 5 mm. *Breite:* 3 mm.

1 Exemplar aus N.W. Cape Province, Bushmanland, Jackals Water (zwischen Steinkopf und Orange Fluss), R. M. Lightfoot, Oct. 1911 (Monotypus) in der Sammlung des South African Museum.

Eine sehr charakteristische neue Art, welche in der Gattung keine ähnliche besitzt. Die einzige, bisher aus Ost-Afrika bekannte Art: *S. gibbicollis* Borchm. besitzt nur am Ende schwarze Flügeldecken, einfärbig schwarzen Kopf und Halsschild, vollkommen abweichende Form und Skulptur. Die andere hier beschriebene neue Art der Gattung: *S. hessei* sp. nov. steht noch am nächsten, sie besitzt aber ausser der abweichenden Färbung noch sehr grob skulptierte Flügeldecken, viel dickere Fühler und eine ganz abweichende Kopf- und Halsschildform.

Stenoria hessei sp. nov.

Kopf, Fühler und Beine, sowie die Palpen tiefschwarz, die Unterlippe aber gelb, Halsschild glänzend rotgelb mit einem breiten, queren schwarzen Fleck, welcher durch Verschmelzung von zwei Makeln entstanden ist, Flügeldecken schwarz, hinter der Mitte mit je einem ziemlich gut begrenzten rundlichen, gelbweissen Fleck und vor der Mitte mit je einer kleineren, oft schwach begrenzten und verwischten Makel; Abdomen glänzend schwarz, die ersten 4 Segmente schwarz, die Mitte des 4. und die beiden letzten Segmente aber gelbrot. *Kopf* sehr breit und gewölbt, Schläfen kurz, mit breit abgerundeten Ecken, Scheitel hinten in seiner ganzen Breite im Bogen flach gerundet, Stirn zwischen den Augen vorne beiderseits leicht grubig vertieft, die Mittellinie etwas aufgebogen, Clypealsutur etwas eingedrückt. Oberfläche sehr grob und dicht punktiert, die Punkte eng aneinander stossend, am Scheitel aber etwas spärlich. *Halsschild* fast doppelt so breit wie lang, im vorderen Viertel am breitesten, nach vorne plötzlich und gerade verjüngt, nach hinten aber stark und etwas gebogen verengt, die Seiten gehen in den Basalrand an den Hinterecken in eine breit verrundete Ecke über. Vorderrand in der Mitte nur leicht und kurz ausgeschnitten, Hinterrand fast gerade. Oberfläche einfach, ziemlich flach, ohne Eindrücke, äusserst grob und sehr spärlich punktiert, zwischen den groben Punkten aber mit feinerer, dichter Punktierung, die groben Punkte an den Seiten viel dichter. Die Behaarung spärlich und dunkel. *Schildchen* breit und glänzend, dicht und fein punktiert, hinten aber glatt und glänzend. *Flügeldecken* nicht punktiert, aber äusserst grob und dicht gerunzelt, die Runzelung ist vollkommen

unregelmässig. Die Naht ist gerade, aber klaffend, der Seitenrand im hinteren Drittel leicht ausgeschnitten, scharf gerandet, das Ende einzeln abgerundet. Die Behaarung fein und anliegend, spärlich und dunkel. *Fühler* dick und lang, fast die Mitte des Körpers erreichend, die beiden Basalglieder sind kurz, das 2. Glied kugelig, das 3. so lang wie die ersten zwei Glieder zusammen und viel breiter, etwa doppelt so lang wie breit, flach abgeplattet, das 4. etwas kürzer und schmäler, das 5. wieder etwas länger, aber noch schmäler, die folgenden Glieder etwa gleichlang und gleichbreit, das letzte Glied aber dünn. *Beine* dünn, ohne besondere Kennzeichen, Tarsen ebenfalls sehr dünn und lang, viel länger als die Schienen, die beiden Enddorne der Hinterschienen kurz und spitzig. Das 1. Glied der Tarsen nur am Hinterbein etwas länger als das Klauenglied. Die Krallen sind fein kammartig gezähnt. *Länge:* 6–6, 5 mm. *Breite:* 2–2, 5 mm.

3 Exemplare aus Cape Province, Graafwater, Oct. 1947, leg. C. W. Thorne (Holo- und Paratypen) in der Sammlung des South African Museum; eine Paratype wurde für die Sammlung des Ungarischen Naturwissenschaftlichen Museums in Budapest überlassen.

Das Tier wurde aus dem Nest von *Osmia globicola* St. (Hymenoptera, Apidae) gezogen.

Eine sehr interessante und leicht kenntliche Art, welche unter den Arten der Gattung keine nähere Verwandte besitzt. Sie zeigt nur mit *S. discomaculata* sp. nov. eine gewisse morphologische Übereinstimmung, doch hat *S. hessei* sp. nov. vollkommen abweichende Färbung, andere Skulptur der Oberseite, besonders der Flügeldecken, usw.

Ich erlaube mir diese hochinteressante neue Art Herrn Dr. A. J. Hesse in Cape Town zu widmen.

Gen. *Lytta* Fabr.

1775. Fabricius, *Syst. Ent.*, p. 260.

Über die mit *Lytta spilotella* Pér. verwandten Arten aus Südafrika.

In diese Gruppe gehören von beschriebenen Arten *L. spilotella* Pér., *L. elegantula* Pér., *L. enona* Pér. und *L. vellicata* Er. Jetzt kommen noch 3 weitere neue Arten dazu, so dass es nicht überflüssig erscheint für die Arten der Gruppe eine Bestimmungstabelle zu verfertigen, wie folgt:

1 (4) Beine, oder wenigstens die Schenkel rotgelb.

2 (3) Schenkel und Schienen gelb. Kopf rot, nur vorne am Clypeus, unten in der Mitte, dann eine sehr schmale und lange Makel zwischen den Augen auf der Stirn schwarz, Halsschild rotgelb, die Seiten aber ringsum schmal schwarz, Flügeldecken gelbrot mit unregelmässigen, spärlich stehenden, kleinen schwarzen Flecken und mit 4 schwach erhabenen, heller gefärbten Nerven, Unterseite schwarz, Hinterbrust aber breit rotgelb, die Trochanteren und Coxen, sowie die Tarsen und das Ende der Schienen dunkel, Fühler schwarz, das 1. Glied fast bis zur Spitze und die Basis des 2. und 3. Gliedes ebenfalls gelbrot. Die Behaarung anliegend, sehr fein und weissgrau. Halsschild mit scharfer, schmaler Längsmittelfurche, welche von der Basis nach vorne bis zum vorderen Viertel reicht. L.: 14–18 mm. Transvaal (Waterberg, Zoutpansberg). . . . 2. *spilotella* Pér.

3 (2) Nur die Schenkel hell, die Kniee und Schienen, sowie die Tarsen dunkel. Kopf schwarz, Halsschild gelbrot mit schwarzen Flecken, uzw. eine grössere Makel in

der Mitte der Scheibe und beiderseits mit je einem kleineren länglichen Fleck. Flügeldecken gelbrot. L.: 10 mm. (nach Péringuey). Cape Province (Clanwilliam). . . . 1. *elegantula* Pér.

4 (1) Beine schwarz, höchstens die Schienen gelb, Schenkel immer schwarz. Kopf schwarz, mit je einem gelbroten Fleck neben der Innenseite der Augen.

5 (6) Schienen gelb. Unterseite, Halsschild, Schildchen, Fühler und Schenkel schwarz. Halsschild fast so breit wie der Kopf, mit parallelen Seiten, die Längsmittelfurche scharf und von der Basis bis zur Mitte reichend. Flügeldecken gelbrot. mit dunkelbraunen, unregelmässigen und auch unbehaarten Flecken, das Ende der Flügeldecken etwas breiter braun gesäumt. Die Naht, dann ein Längsnerv in der Mitte, einer an der Innenseite der Schulterbeulen, welcher fast bis zum Ende reicht und der Seitenrand erhaben aufgewölbt. Kopf sehr fein und spärlich, Halsschild dichter punktiert, glatt. L.: 14 mm. S.W. Afrika (Bethanie). . . . 3. *namaqua* sp. nov.

6 (5) Schienen, sowie die ganze Unterseite schwarz, Beine und Fühler ebenfalls schwarz.

7 (8) Halsschild schwarz, mit je einem grossen, ovalen, gelbroten Fleck etwas vor der Mitte der Scheibe. Flügeldecken dunkel, die Naht, der Seitenrand, sowie je drei Längsnerven auf der Scheibe gelbrot. Kopf und Halsschild zwischen den Punkten lederartig gerunzelt und matt. Halsschild etwas länger als breit, schmäler als der Kopf, die Längsmittelfurche bis zum vorderen Viertel reichend, Flügeldecken dicht und fein, fast runzelig punktiert. Die Behaarung anliegend, weissgelb. L.: 13–19 mm. S.W. Afrika (Onolonga, Nagusib). . . . 4. *rubrolineata* sp. nov.

8 (7) Halsschild einfärbig schwarz.

9 (10) Flügeldecken gelbrot mit regelmässigen braunen, unbehaarten Flecken. Die Naht, der Seitenrand und ein Längsnerv auf der Scheibe an der Innenseite der Schulterbeulen heller. Halsschild mit je einem Spiegelfleck auf der Scheibe beiderseits neben der Mitte und auch die Mittellinie unpunktiert, zwischen der groben Punktierung sehr fein und dicht punktiert, dazwischen der Grund aber glänzend. Flügeldecken auf mattem Grund dicht und etwas erloschen punktiert. L.: 13–14 mm. S.W. Afrika (Kaross, Zesfontein). . . . 5. *székessyi* sp. nov.

10 (9) Flügeldecken dunkelbraun oder schwarz, nur die Naht, der Seitenrand und die aufgewölbten Längsnerven gelbrot.

11 (12) Flügeldecken auf der Scheibe mit je zwei Längsnerven, welche gelbrot sind. Fühler kurz, die einzelnen Glieder fast konisch, fast so breit wie lang. Kopf dicht und stark punktiert, Scheitel eingedrückt, die Punkte sind nebeneinandergerückt. L.: 15 mm. (nach Péringuey); Cape Province (Uitenhage). . . . 6. *enona* Pér.

12 (11) Flügeldecken nur mit einem dorsalen Längsnerv an der Innenseite der Schulterbeulen, welcher breit gelbrot ist. Fühler kräftig und lang, die einzelnen Glieder sind deutlich länger als breit und ziemlich zylindrisch. Kopf fein und sehr spärlich punktiert, Scheitel nicht eingedrückt. Halsschild mit breiter Längsmittelfurche. L.: 13 mm. Angola (Benguella). . . . 7. *vellicata* Er.

Lytta namaqua sp. nov.

Langgestreckt. Kopf schwarzbraun, mit je einem grossen, gelbroten Fleck an der Innenseite der Augen, Halsschild, die ganze Unterseite, Beine, excl. Schienen schwarzbraun, Schienen gelbrot, Schildchen dunkel, nur das Ende gelb, Flügeldecken gelbrot mit einigen spärlich stehenden und unregelmässigen braunen Flecken, die Schulterbeule und das Ende der Flügeldecken braun, die Naht, der Seitenrand, sowie 2 dorsale Längsnerven heller. *Kopf* gross und rundlich, mit stark gewölbten, grossen Augen, Stirn einfach, kaum gewölbt, Scheitel gerundet, Schläfen etwas parallelseitig, dann in breitem Bogen vollkommen verrundet. Clypealsutur in der Quere scharf eingeschnitten. Oberfläche sehr spärlich und fein punktiert, der Grund ist ziemlich glatt, glänzend, die Mittellinie zwischen den Augen kaum angedeutet. *Halsschild* sehr breit und quer,

kaum etwas schmäler als der Kopf, mit parallelen Seiten und ziemlich flacher Oberseite, vom vorderen Viertel an stark abgeschnürt, Vorderrand gerade abgestutzt, Hinterrand mit breit verrundeten Hinterecken und mit ziemlich gerader Mitte. Die Längsmittelfurche sehr scharf und tief, nach vorne bis zur Mitte reichend. Scheibe beiderseits vor der Basis bis zur Mitte leicht und länglich eingedrückt. Die Skulptur besteht aus ziemlich feiner und ungleichartiger Punktierung, dazwischen ist der Grund mikroskopisch punktiert, doch leicht glänzend. *Flügeldecken* sehr dicht und fein, runzelig punktiert, gegen das Ende aber wird die Punktierung immer feiner, so dass das Ende nur äusserst fein lederartig ist. Der Grund ist zwischen den Punkten fettglänzend. *Fühler* die Basis des Halsschildes erreichend, das 3. Glied etwas mehr als doppelt so lang wie breit, die folgenden Glieder sind kürzer und etwa gleichlang und gleichbreit, das Endglied wieder etwas länger, oval. *Beine* ohne besondere Kennzeichen, die Enddorne der Hinterschienen vollkommen gleich gebildet, kurz und am Ende schräg abgesetzt. Das 1. Glied der Hintertarsen sehr lang, fast so lang wie die beiden folgenden Glieder zusammen, das Endglied viel kürzer. *Unterseite* sehr fein und spärlich mit raspelartigen Punkten besetzt, anliegend weissgrau behaart. *Länge:* 14 mm. *Breite:* 4 mm.

1 Männchen aus S.W. Afrika, Gr. Namaqualand, Bethanie, 1 Feb. 1885 (Monotypus) in der Sammlung des Ungarischen Naturwissenschaftlichen Museums in Budapest.

Sie ist allein mit *L. székessyi* sp. nov. verwandt, welche Art aber viel schmäler ist, nicht paralleles Halsschild, vollkommen abweichende Skulptur und einfärbig dunkle Beine besitzt.

Lytta rubrolineata sp. nov.

Gross und langgestreckt; Kopf schwarz, mit je einem grossen gelbroten Fleck beiderseits neben der Innenseite der Augen, Halsschild ebenfalls schwarz, die Scheibe aber beiderseits etwas näher dem Vorderrand als dem Hinterrand mit je einer grossen, ovalen Makel an der Mittellinie, Flügelddecken schwarz, die Naht, der Seitenrand und die Scheibe mit je 3 langen Längsnerven, welche gelbrot gefärbt sind und vor dem Ende zusammenfliessen, Unterseite, Beine und Fühler schwarz, die Behaarung der Ober- und Unterseite weissgrau, anliegend. *Kopf* gross und rundlich, mit stark gewölbten und grossen Augen, Stirn zwischen den Augen ziemlich flach, Schläfen nach hinten verjüngt und breit abgerundet, die Punktierung fein und spärlich, hie und da etwas dichter, der Grund ist dazwischen mikroskopisch sehr dicht punktiert und kaum glänzend. *Halsschild* deutlich länger als breit, in Querrichtung stark gewölbt, etwas vor der Mitte am breitesten, nach vorne konisch und gerade verengt, nach hinten fast parallel. Die Längsmittelfurche tief und scharf, fast bis zum vorderen Viertel reichend. Oberfläche ungleichartig und runzelig dicht punktiert, der Grund ist sehr dicht lederartig gerunzelt, matt. Die Behaarung anliegend, etwas schuppenartig, die roten Makeln sind in der Mitte unbehaart. *Flügeldecken* mit 3 erhabenen Längsnerven, welche unbehaart sind, die Zwischenräume dicht und fein, runzelig

punktiert, dazwischen ist der Grund chagriniert und matt. Die Behaarung der Zwischenräume etwas fleckenartig, auf einigen Flecken fehlt die Behaarung vollkommen. *Fühler* die Basis des Halsschildes erreichend, das 3. Glied doppelt so lang wie breit, die Glieder vom 4. an stufenweise kürzer, aber gleichbreit, so dass das 10. kaum etwas länger als breit ist, das Endglied langoval, zugespitzt. *Beine* einfach, ohne besondere Kennzeichen, Mittel- und Hinterschienen aussen abgeflacht, die beiden Enddorne der Hinterschienen dick, ziemlich kurz, das Ende schräg abgestutzt, das 1. Glied der Hintertarsen fast so lang wie die beiden folgenden Glieder zusammen und 1, 5-mal so lang wie das Klauenglied. *Unterseite* äusserst fein und spärlich raspelartig punktiert. *Länge:* 13–19 mm. *Breite:* 5–7 mm.

1 Exemplar aus S.W. Afrika, Nagusib (ungefähr 24 km. SO. von Namutoni), Jan. 1923, leg. Mus. Exped. (Holotypus) in der Sammlung des South African Museum und 1 Exemplar aus S.W. Afrika, Onolonga (ungefähr 50 km. SW. von Ondongua, Ovamboland), Febr. 1923, Mus. Exped. (Paratypus), welches für die Sammlung des Ungarischen Naturwissenschaftlichen Museums in Budapest überlassen wurde.

Diese Art ist wegen ihrer Färbung leicht kenntlich und kann mit Sicherheit auf Grund der Färbung von den nächst verwandten Arten unterschieden werden. Ausser der Färbung ist die neue Art auch durch die Skulptur von den bekannten Arten verschieden. *L. spilotella* Pér. besitzt roten Kopf und rotes, schwarz gesäumtes Halsschild, weiter gelbrote, und braun gefleckte Flügeldecken, rote Beine, etc., *L. namaqua* sp. nov. gelbe Schienen, einfärbig schwarzes Halsschild und ausserdem ganz abweichende Form und Skulptur des Vorderkörpers, die Arten *L. vellicata* Er. und *L. enona* Pér. haben beide einfärbig schwarzes Halsschild und abweichende Flügeldeckenzeichnung, usw.

Lytta székessyi sp. nov.

Breit und gross; Kopf schwarz mit je einem gelbroten Fleck beiderseits neben der Innenseite der Augen, Halsschild, die ganze Unterseite, Fühler und Beine schwarz, Flügeldecken gelbrot mit spärlich stehenden, unregelmässigen und unbehaarten braunen Flecken, die Schulterbeulen und das Ende breiter braun. *Kopf* gross und quer, stark gewölbt, Schläfen kaum parallel, abgerundet, Scheitel gewölbt, ohne eingedrückte Mittellinie, Stirn zwischen den Augen vorne in der Mitte etwas aufgewölbt. Die Punktierung ziemlich fein und dicht, dazwischen ist der Grund schwach punktiert, ziemlich glänzend. *Halsschild* so lang wie breit, schmäler als der Kopf, vor der Mitte am breitesten, nach vorne plötzlich und gerade verjüngt, nach hinten gerundet etwas verengt. Hinterrand fein, aber scharf gerandet. Die Längsmittelfurche schwach vertieft, etwas vor der Mitte erloschen, breit und unpunktiert. Scheibe beiderseits neben der Mitte mit je einer grösseren unpunktierten, etwas aufgewölbten Stelle. Die Punktierung dicht und fein, der Grund dazwischen mit mikroskopischen Punkten dicht besetzt, fettglänzend. *Flügeldecken* auf der Scheibe mit je einem Längsnerv an der Innenseite der Schulterbeulen, weiter die Naht, sowie der

Seitenrand scharf nervenartig aufgebogen. Die Oberseite dicht und runzelig punktiert, dazwischen chagriniert und matt. *Fühler* kräftig, die Basis des Halsschildes etwas überragend, mit ziemlich gleichartigen Gliedern. Das 3. und 4. Glied etwas schmäler, scheinbar länger, die Glieder vom 5. an dicker und mehr rundlich, das Endglied lang und zugespitzt. *Beine* ohne besondere Kennzeichen, die beiden Enddorne der Hinterschienen gleichdick und kurz, schräg abgestutzt. Mittel- und Hinterschienen im Querschnitt langoval, Aussenseite abgeplattet. *Unterseite* sehr dicht und fein mit raspelartigen Punkten besetzt, die Punktierung lässt eine breite Längsbinde an der Hinterbrust spiegelglatt frei. *Länge:* 13–14 mm. *Breite:* 4, 5 mm.

1 Exemplar aus S.W. Afrika, Kaokoveld, Zesfontein, Febr. 1925, leg. Mus. Exped. (Holotypus) in der Sammlung des South African Museum und 1 Exemplar aus S.W. Afrika, Kaross (ungefähr 100 km. SO. von Zesfontein), Febr. 1925, leg. Mus. Exped. (Paratypus), welches für die Sammlung des Ungarischen Naturwissenschaftlichen Museums in Budapest überlassen wurde.

Die Art steht *L. namaqua* sp. nov. sehr nahe, sie besitzt eine ähnliche Färbung, doch besitzt *L. namaqua* sp. nov. helle Schienen, breites und paralleles Halsschild, sowie abweichende Skulptur.

Zu Ehren meines lieben Freunden, Direktor Dr. V. Székessy benannt.

Gen. *Decapotoma* Voigts

1902. Voigts, *Wien. Entom. Zeit.*, xxi, p. 177.

(pro *Decatoma* Dejean 1821, preocc.)

Decapotoma csikii sp. nov.

Kleine, breite, einfärbig schwarze, glänzende Art, Fühler auch schwarz, Flügeldecken mit je 8 kleinen, rundlichen Makeln, uzw.: eine an den Seiten neben den Schultern, eine an den Seiten im vorderen Drittel, eine neben den Seiten im hinteren Viertel, eine an der Naht hinter dem Schildchen, eine neben der Naht in der Mitte, eine neben der Naht im hinteren Viertel, weiter eine äusserst kleine an der Innenseite der Schulterbeulen und schliesslich eine runde Makel etwas vor der Mitte der Scheibe, so dass endgültig vorne 3, mitten 3 und hinten 2 Flecke vorhanden sind. *Kopf* sehr breit, mit grossen, stark gewölbten Augen, Schläfen ganz kurz und nach hinten abgerundet, Stirn leicht gewölbt, die Mittellinie unpunktiert, Oberfläche grob und dicht mit nabelartigen Punkten besetzt, aus welchen aufrecht stehende, lange, schwarze Haare wachsen, dazwischen ist der Grund glatt und glänzend. *Halsschild* schmäler als der Kopf, Seiten bis zum vorderen Viertel parallel, vorne gerundet stark verschmälert, in Querrichtung stark gewölbt, Oberfläche ohne Eindrücke, nur vor der Basis in der Mitte etwas verflacht. Die Punktierung sehr grob und spärlich, hie und da etwas dichter, der Grund ist dazwischen vollkommen glatt und glänzend. *Flügeldecken* von den Schultern an nach hinten breit erweitert, das Ende einzeln vollkommen abgerundet, Oberfläche sehr dicht und ziemlich stark punktiert, die Punkte sind stark nebeneinandergerückt, an der Basis ist

die Spur nur einer Längsrippe erkennbar; glänzend, anliegend sehr fein behaart und spärlich mit langen aufstehenden schwarzen, dickeren Haaren besetzt. Die gelben Flecke sind viel spärlicher punktiert. *Fühler* kurz, das Ende sehr dick, das 2. Glied kugelig, das 3. schmal und nur kaum doppelt so lang wie breit, das 4. und 5. ebenso breit, aber kürzer, das 6. kaum merklich breiter, das 7. aber trapezförmig, nur so lang wie das 6., das 8. länger und auch breiter trapezförmig als das 7., das 9. noch erweitert, quer, zylindrisch und das Endglied sehr dick und lang, länger als die beiden vorhergehenden Glieder zusammen. *Beine* einfach, ohne besondere Kennzeichen, Schienen deutlich länger als die Tarsen, schmal und langgestreckt, die beiden Enddorne der Hinterschienen sehr klein und gleichspitzig, dünn. *Länge:* 9 mm. *Breite:* 3, 5 mm.

3 Exemplare aus S.W. Afrika, Kaross (ungefähr 100 km. SO. von Zesfontein, Kaokoveld), Febr. 1925, leg. Mus. Exped. (Holo- und Paratypen) in der Sammlung des South African Museum, von welchen 1 Paratype für die Sammlung des Ungarischen Naturwissenschaftlichen Museums in Budapest überlassen wurde.

Ich kenne keine nähere Verwandte innerhalb der Gattung. Sie ist durch die einfärbig schwarzen Fühler, sowie durch die Flügeldeckenzeichnung sehr charakteristisch und kann mit keiner beschriebenen Art verwechselt werden.

The *ANNALS OF THE SOUTH AFRICAN MUSEUM* are issued in parts at irregular intervals as material becomes available. As far as possible each volume is devoted exclusively to a particular subject (Zoology, Botany, etc.). Two or more volumes may be in course of publication concurrently.

Most of the Geological and Palaeontological papers are issued in conjunction with the Geological Survey of the Union of South Africa.

Some volumes and parts are out of print, and others are only sold as parts of a set, or volume, respectively. The prices of parts published prior to 1940 have been increased.

Out of print: Vols. I, II, V (Parts 1, 2, 9), VII, VIII, IX (Part 1), XII (Part 7), XXII, XXIV (Part 2), XXXI (Parts 1, 2, 3).

Vol.			£	s.	d.
III.	1903–1905	Zoology	1	19	0
IV.	1903–1908	Palaeontology	3	7	0
V.	1906–1910	Geology, Palaeontology, Zoology, Anthropology	1	2	0
VI.	1908–1910	Zoology	3	3	6
IX.	1911–1918	Botany (excl. Part 1)	2	16	0
X.	1911–1914	Zoology	4	16	0
XI.	1911–1918	Zoology	3	1	6
XII.	1913–1924	Palaeontology and Geology (excl. Part 7)	3	13	0
XIII.	1913–1923	Archaeology and Zoology	3	10	6
XIV.	1915–1924	Zoology	3	6	6
XV.	1914–1916	Zoology	4	5	0
XVI.	1917–1933	Botany	3	11	0
XVII.	1917–1920	Zoology	3	10	0
XVIII.	1921	Zoology	4	5	6
XIX.	1924–1925	Zoology	3	7	0
XX.	1924–1926	Zoology	2	12	0
XXI.	1925–1927	Zoology	3	6	0
XXIII.	1925–1926	Zoology	1	15	0
XXIV.	1929–1938	Anthropology and Ethnology (excl. Part 2)	2	9	6
XXV.	1927–1928	Zoology	1	19	0
XXVI.	1928	Zoology	1	10	0
XXVII.	1929	Anthropology	1	10	0
XXVIII.	1929–1932	Palaeontology	2	12	0
XXIX.	1929–1931	Zoology	2	8	0
XXX.	1931–1935	Zoology	3	13	6
		INDEX of papers, authors, and subjects, published in Vols. I–XXX	0	1	6
XXXI.	1934–1950	Palaeontology (Part 4 only)	0	14	0
XXXII.	1935–1940	Zoology	3	3	6
XXXIII.	1939	Zoology	2	2	0
XXXIV.	1938	Zoology	2	8	0
XXXV.		Reserved for conclusion of monograph in Vol. XXXIV.			
XXXVI.	1942–1948	Zoology	2	11	0
XXXVII.	1947–1952	Archaeology	1	16	0
XXXVIII.	1950	Zoology	3	15	0
XXXIX.	1952	Zoology	2	14	6
XL.	1952–	Botany (Part 1)	0	1	0
XLI.	1952–	Zoology (Part 1)	0	7	6
XLII.	1953–	Palaeontology (Part 1)	0	12	6

Copies may be obtained from—

The LIBRARIAN, SOUTH AFRICAN MUSEUM, CAPE TOWN,

except the Geological and Palaeontological parts, which are obtainable from the GOVERNMENT PRINTER, PRETORIA.

ANNALS

OF THE

SOUTH AFRICAN MUSEUM

VOLUME XLI

PART III, *containing:—*

3. *South African Pycnogonida.* By K. H. Barnard, D.Sc., F.L.S. (With 34 text-figures.)

ISSUED APRIL 1954 *PRICE* 15*s.*

PRINTED FOR THE
TRUSTEES OF THE SOUTH AFRICAN MUSEUM
BY THE RUSTICA PRESS (PTY.) LIMITED, COURT ROAD, WYNBERG, CAPE

7. *South African Pycnogonida.* By K. H. Barnard, D.Sc., F.L.S. (With 34 text-figures.)

This paper is the result of an examination of the South African Museum material comprising mainly the collection made by the Cape Government trawler s.s. *Pieter Faure*, together with a moderate number of specimens obtained from time to time by shore-collecting.

The history of our knowledge of South African Pycnogonids has been given by Flynn (1928). Gordon (1932) has redescribed three species from the type material. Since then Helfer (1937), Barnard (1946) and Stock (1951) have described material from South Africa south of lat. 15° S.

Flynn (1928) gave a list of the then-known South African species, including a Mozambique record. The list omits *Parapallene nierstraszi* which Flynn himself records in his paper; but on the other hand it includes *Pallenopsis crosslandi* which neither Flynn nor any other author has recorded from South Africa. Not counting '*Pallenopsis sp. Loman*' (1923) the list contains thirty-six species.

A second paper by Loman, also published in 1923, and containing two new records (one from Angola), was not mentioned by Flynn. In 1937 Helfer described three new genera and species; in 1946 Barnard one new genus and ten new species; and in 1951 Stock one new genus and two new species. In the present paper three of Loman's species and records, one of Flynn's species, and one of Helfer's are regarded as synonyms. The list is appreciably longer than Flynn's, and contains fifty-three species.

All the accepted families are represented in the fauna. Of the newly recorded constituents it is interesting to note the occurrence of the genera *Pipetta* and *Austroraptus*. The genus *Queubus* Brnrd., of uncertain affinities, is placed near but not in the family *Pycnogonidae*.

No examples of 'extra-legged' (10 or 12 pairs) species have been found in South African waters. These remarkable Pycnogonids are mostly inhabitants of the Antarctic, though examples have also been found in the Caribbean Sea (see: Hedgpeth, 1947, *Smiths. Misc. Coll.*, cvi, pp. 9 sqq.).

The early stages of some species are parasitic in the zooids of Hydroids, causing the formation of galls. An example from South Africa has been noted by Warren (1908, *Ann. Natal Mus.*, i, p. 293) and referred to by Flynn (1928, p. 5).

Collectors and others should be warned against the use of cotton wool as a plug in tubes or bottles to prevent shaking while in transit, because no other animals, not even Crustacea, seem to get their claws so inextricably entangled

in it. A plug of soft paper should be interposed between the animals and the cotton-wool plug in a tube.

List of South African Species

Colossendeidae

Colossendeis colossea Wilson
„ *macerrima* Wilson
Pipetta capensis Brnrd.
Rhopalorhynchus kröyeri Wood-Mason

Nymphonidae

Nymphon capense Hodgson ? = *phasmatodes* Böhm
„ *australe* Hodgson
„ *signatum* Möbius
„ *distensum* Möbius
„ *pilosum* Möbius syn. *bipunctatum* Flynn
„ *comes* Flynn
„ *affinis* Stock
„ *natalense* Flynn
„ *microctenatus* Brnrd.
„ *crenatiunguis* Brnrd.
„ *setimanus* Brnrd.

Pallenidae

Callipallene sp.
Pseudopallene gilchristi Flynn
Parapallene spinosus (Möbius)
„ *nierstraszi* Loman
„ *calmani* Flynn
„ *hodgsoni* Brnrd.
„ *algoae* Brnrd.
Metapallene dubitans (Hodgson) syn. *Procidella gibber* Helfer
Pallenoides magnicollis Stock
Pallenopsis oscitans (Hoek)
„ *brevidigitata* Möbius
„ *intermedia* Flynn syn. *Pallenopsis* sp. Loman, 1923, *P. fluminensis* Loman, 1923, non Kröyer
„ *capensis* Brnrd.
„ (*Rigona*) *crosslandi* Carp.*
„ „ *ovalis* Loman
Hannonia typica Hoek

* See p. 116.

Phoxochilidiidae

Phoxochilidium capense Flynn
Anoplodactylus aculeatus Möbius
„ *pelagicus* Flynn
'*Pallene*' *lappa* Böhm

Endeidae

Endeis clipeatus (Möbius)
„ *mollis* (Carp.)

Ammotheidae

Böhmia chelata (Böhm)
„ *tuberosa* Möbius
Achelia quadridentata (Hodgson)
„ *brevicauda* (Loman)
Nymphopsis cuspidata (Hodgson) syn. *abstrusus* Loman
Kyphomia setacea Helfer ? *Ammothella setacea*
Ascorhynchus ornatum (Helfer)
Austroraptus thermophilus Brnrd.

Tanystylidae

Tanystylum ornatum Flynn
Discoarachne brevipes Hoek

Pycnogonidae

Pycnogonum cataphractum Möbius
„ *forte* Flynn
„ *microps* Loman
„ *portus* Brnrd.
„ *pusillum* Dohrn

Incertae sedis

Queubus jamesanus Brnrd.

Key to the South African Families

I. Body extended, crurigers distinctly separated (except *Pallenopsis* subg. *Rigona*, where they are contiguous). Proboscis directed forward (except *Hannonia*).
  A. No chelifers (in adult). No auxiliary claws. — *Colossendeidae*
  B. Chelifers present.
    1. Ovigers present in both sexes, with compound spines (fig. 3*d*). Ocular tubercle not, or not far, in front of 1st crurigers.
      a. Palps present, 5-jointed. — *Nymphonidae*
      b. Palps absent, or knob-like, or 3-4-jointed. — *Pallenidae*
    2. Ovigers present in ♂ only, with simple spines. — *Phoxochilidiidae*
  C. Chelifers and palps absent. Auxiliary claws present. — *Endeidae*

II. Body more or less compact, segmented or the segmentation suppressed, crurigers usually narrowly separated. Proboscis directed forwards, or more or less downwards, or bent under body.

A. Palps present. Ovigers present in both sexes, without apical claw.
   1. Palps 6-10-jointed. *Ammotheidae*
   2. Palps 4-6-jointed *Tanystylidae*
B. Palps absent. Ovigers sometimes present in ♂ only, with apical claw *Pycnogonidae*

Fam. Colossendeidae

1908. Loman, *Siboga Exp. monogr.*, xl, p. 21 and conspectus facing p. 19 (subfam. *Colossendeinae.*)
1913. Schimkewitsch, *Zool. Anz.*, xli, p. 614.
1913. Bouvier, *2me Exp. Antarct. Franc.*, p. 37.
1933. Calman and Gordon, *Proc. Roy. Soc. Lond.*, B, cxiii, p. 113.

Legs 8-12. Body of 4-6 segments, fused or free. Proboscis large, immovable. Chelifers absent (usually) in adult. Palps long, usually 8-10-jointed, arising from knob-like processes. Ovigers in both sexes, arising from knob-like processes, 10-jointed, with apical claw, last 4 joints with non-serrate (usually) spines. Bases of palps and ovigers approximate or contiguous. Legs long, tarsus usually of fair length, tarsus and propodus unarmed or not armed with strong spines, without auxiliary claws. Genital apertures on all legs (2nd coxal joint) in both sexes.

Key to the South African Genera

Octopodous

1. Body segments fused. Crurigers not widely separated. Very large species. *Colossendeis*
2. Body segmented. Crurigers widely separated.
   a. Abdomen elongate. 2nd coxa longer than 1st or 3rd. *Pipetta*
   b. Abdomen minute. All three coxae subequal *Rhopalorhynchus*

Gen. *Colossendeis* Jarzinsky

1881. Hoek, *Rep. H.M.S. 'Challenger'*, iii, pp. 28, 61.
1913. Bouvier, loc. cit., p. 53.
1917. id., *Res. Sci. Camp. Monaco*, fasc. 51, p. 7.
1932. Gordon, *'Discovery' Rep.*, vi, p. 11.
1938. id., *Austral. Antarct. Exp.*, C. II, 8, p. 7.
1944. id., *B.A.N.Z. Antarct. Exp.*, B, v, pt. 1, p. 9.

Octopodous. Proboscis more or less evenly cylindrical, or constricted basally.

Key to the South African Species

Last 3 joints of the legs together much shorter than two-thirds length of 2nd tibial joint (brevitarsal group).

1. Proboscis stout, constricted basally. Palps much longer than proboscis, 4th joint shorter than 2nd. *colossea*
2. Proboscis slender, evenly cylindrical. Palps a little longer than proboscis, 4th joint longer than 2nd. *macerrima*

Colossendeis colossea Wilson

1881. Wilson, *Bull. Mus. Comp. Zool. Harv.*, viii, p. 244, pl. 1, fig. 1., pl. 3, figs. 5-7.
1881. Hoek, loc. cit., pp. 61, 147, pl. 8, figs. 1, 2, pl. 10, figs. 1-5 (*gigas*).
1917. Bouvier, loc. cit., p. 13, pl. 1, fig. 2, pl. 2, fig. 1 (coloured) (references).
1923. Calman, *Rec. Ind. Mus.*, xxv, p. 266.
1928. Flynn, *Fish. Mar. Biol. Surv. Rep.*, vi, Spec. Rep. 1, p. 7.
1944. Gordon, loc. cit, p. 11.
1953. Stock, *Temminckia*, ix, p. 311.

Proboscis stout, constricted in basal third. Palp much longer than proboscis, 4th joint shorter than 2nd, 6th about twice as long as 5th; 7th, 8th and 9th subequal. Femur of legs subequal to 1st tibia, much longer than 2nd tibia.

Length of body (excl. proboscis) 21 mm., proboscis 33 mm., legs 240 mm. (Hoek: 32·5, 47·5 and 301 mm. resp.). Reddish (see Bouvier's coloured figure).

Localities: off Cape Point, 660-755 fathoms (Flynn); off Cape Point, 650-1,000 fath. (S. Afr. Mus.); off Gneka River, 43 fath., and 29° 44′ S. 31° 20′ E., 46 fath. (Flynn).

Distribution. Southern Indian Ocean, East Indian Sea, off west coast of South America, Japan, North and Central Atlantic.

Colossendeis macerrima Wilson

1881. Wilson, loc. cit., p. 246, pl. 1, fig. 2, pl. 3, figs. 9-12, pl. 5, fig. 32.
1881. Hoek, loc. cit., pp. 64, 147, pl. 8, figs. 3-7 (*leptorhynchus*)
1917. Bouvier, loc. cit., p. 10, pl. 1, fig. 1 (coloured), pl. 3, figs. 1, 2.
1923. Calman, loc. cit., p. 267.
1928. Flynn, loc. cit., p. 7 (*macerrime*, and p. 6 *macerriama*, typ. err.).
1953. Stock, *Temminckia*, ix, p. 307, fig 17 *e-h*.

Proboscis slender, nearly evenly cylindrical, often slightly upturned in distal third. Palps only a little longer than proboscis, 4th joint much longer than 2nd, 5th and 6th subequal, 7th and 8th subequal, 9th usually a little longer than 8th. Femur of legs subequal to 1st tibia, much longer than 2nd tibia.

Length: body 17 mm., proboscis 34 mm., legs 155 mm. Reddish.

Localities: off Cape Point, 660 fath. (Flynn); off Cape Point, 700-800 fath. (S. Afr. Mus.); off Gneka River, 43 fath. (Flynn).

Distribution. As for *colossea*.

Remarks. Much less abundant than *colossea* in Cape waters.

Flynn has remarked that the shallow-water records of both species need confirmation. Gneka* River is about midway between Keiskamma Point and East London.

* Spelt Nieca in the s.s. *Pieter Faure* log-books and Rep. Gov. Biologist 1901 chart; Ncera on sheet 5 of the topographical map issued by the Irrigation Dept. 1939; also sheet SE 35/24 Port Elizabeth, 1:500,000. 1950.

Gen. *Pipetta* Loman

1904. Loman, *Tijdschr. Ned. Dierk. Ver.* (2) viii, p. 264.
1908. id., loc. cit., p. 27.
1914. Hodgson, *Zool. Anz.*, xlv, p. 159.
1915. id., *Ann. Mag. Nat. Hist.* (8) xv, p. 141 (English version of 1914 paper).
1927. id., *D. Südpol. Exp.*, xix (zool. xi), p. 314.

Octopodous. Body segmented, very slender. Crurigers slender, very widely separated. Ocular tubercle conical, no eyes. Proboscis elongate, very slender. Abdomen elongate, slender. Palps slender, 8-jointed. Ovigers 10-jointed, with small apical claw. Legs slender, no auxiliary claws.

Two species hitherto known: *P. weberi* Loman 1904 from the East Indies, 2,081 metres; and *P. australis* Hodgson 1914 from the Antarctic ('Gauss' winter quarters), 2,450 metres.

Calman and Gordon (1933, loc. cit., p. 114) exclude this genus from the *Colossendeidae*; Hedgpeth (1947, *Smiths. Misc. Coll.*, cvi, p. 5) includes it with a question mark.

Pipetta capensis Brnrd.

Fig. 1

1946. Barnard, *Ann. Mag. Nat. Hist.* (xi) 13, p. 60.

Body rod-like, slender, with scattered microscopic granules. Crurigers separated by increasingly wide intervals, the 2nd pair slightly the longest, 4th pair shortest; 1st with a low conical elevation on dorsal apex, 2nd-4th each with a strong upstanding spiniform process. Ocular tubercle high, slender, conical, no eyes. Proboscis proximally slightly swollen, distally very slender. Palps slightly longer than proboscis, 1st joint short, swollen, 2nd longest, apically swollen, with a few setae, 4th long, about two-thirds length of 2nd, with a few setae, 3 spine-setae and a longer one on apex, 5th-8th joints short, sparsely setose. Oviger 1st joint short, swollen, 2nd a little more than twice the 3rd, 4th one and a half times the 2nd, 5th short, 6th longest, apically clavate, 7th-10th joints short, more or less swollen, each with a few (2-4) blunt denticles on inner margins, apical claw small.

Legs very slender, 3rd coxa with a strong upstanding slender spiniform process; femur with a few long setae and a spine-seta on dorsal apex; 1st tibia slightly shorter than femur, 2nd tibia slightly shorter than 1st tibia, both with scattered setae; tarsus about half length of propodus, the latter slender, slightly curved, with fine setae on lower margin, claw feebly denticulate on lower margin.

Body, tip of proboscis to tip of abdomen, about 7·5 mm. (specimen broken in half); proboscis 3·5 mm., abdomen 1·75 mm., femur 2 mm., 1st tibia 1·75 mm., 2nd tibia 1·5 mm.

Locality: off Cape Point, N. 81° E. 32 miles, 460 fath. 1 specimen (S. Afr. Mus.).

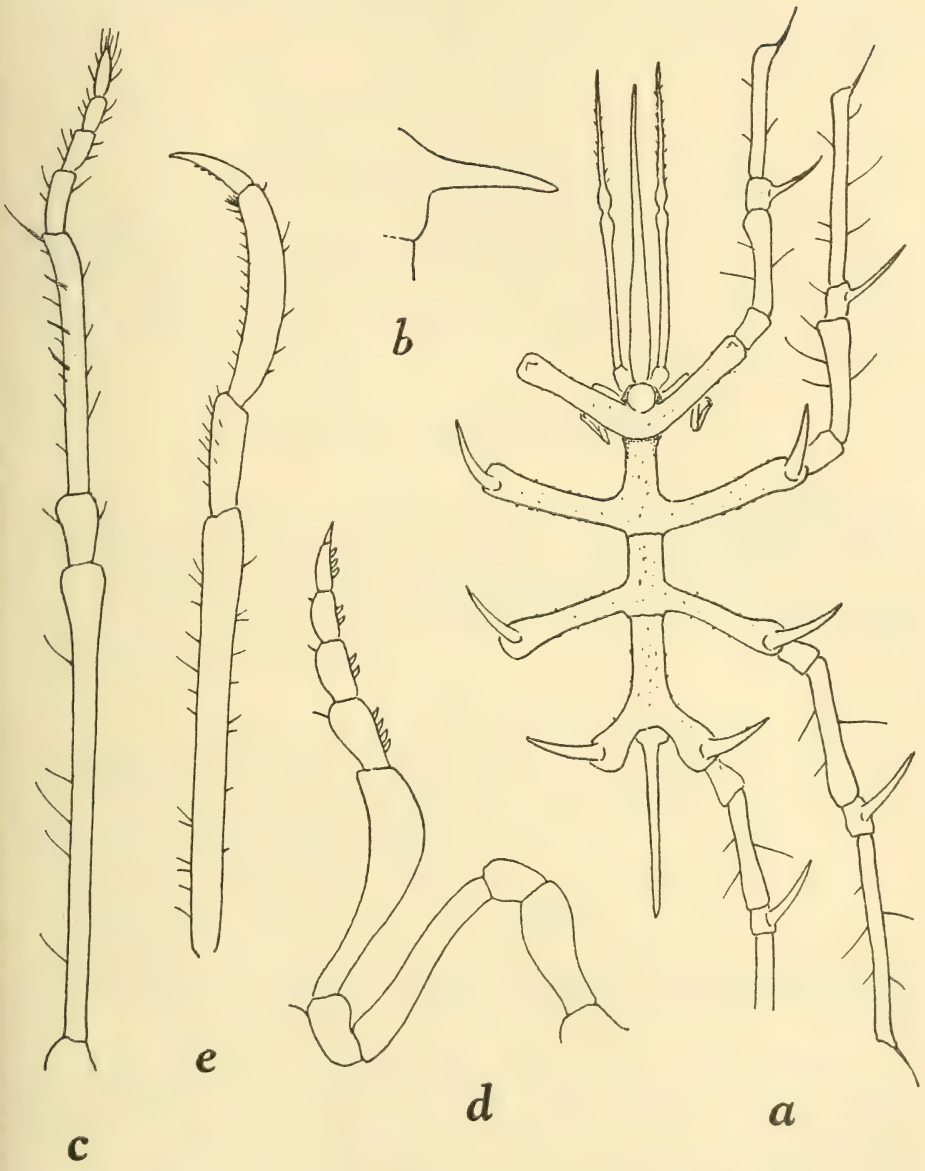


Fig. 1. *Pipetta capensis* Brnrd. *a*. dorsal view. *b*. lateral view of ocular tubercle, from left side. *c*. palp. *d*. oviger. *e*. 2nd tibia, tarsus and propodus of leg.

Remarks. Resembles *weberi* in having the tarsi long proportionately to the propodi (not very short as in *australis*), but differing from both species in having spiniform processes on the 2nd-4th crurigers.

Gen. *Rhopalorhynchus* Wood-Mason

1873. Wood-Mason, *J. Asiat. Soc. Beng.*, xlii, p. 171.
1908. Loman, loc. cit., p. 23.

Octopodous. Body segmented, slender, rod-like. Crurigers short, stout, widely separated. Ocular tubercle short, conical, eyes present. Proboscis elongate, fusiform. Abdomen very short. Palps slender, 9-jointed. Ovigers slender, 10-jointed, with small but stout unguiform apical claw. Legs slender, without auxiliary claws.

Rhopalorhynchus kröyeri Wood-Mason

Fig. 2

1873. Wood-Mason, loc. cit., p. 171, pl. 13.
1923. Calman, *Rec. Ind. Mus.*, xxv, p. 268, fig. 1 (references and synonymy; the date of publication of Haswell's *tenuissima* is 1885).
1953. Stock, *Temminckia*, ix, pp. 279, 280, fig. 1*b* (chart).

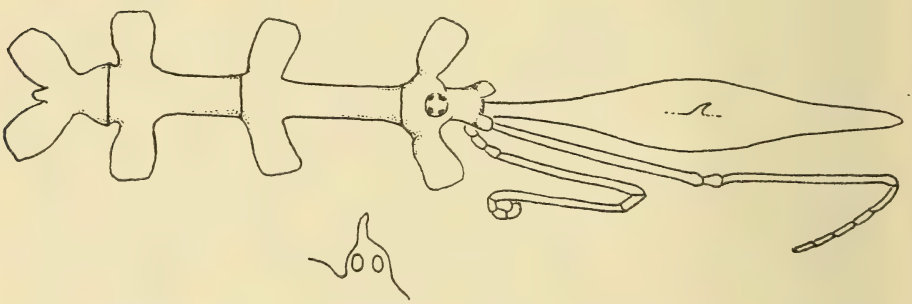


Fig. 2. *Rhopalorhynchus kröyeri* Wood-Mason. Dorsal view, with lateral view of ocular tubercle from right side.

Proboscis with a sharp denticle medio-dorsally at about the middle of its length. Ocular tubercle rather abruptly constricted above the eyes (cf. Carpenter, 1907, fig. 28). Oviger inner margins of 7th-10th joints with numerous feebly biserrate spines (in several rows), 10th joint in addition with a stout spine distally opposing the small unguiform claw (as in Calman's figure; apparently overlooked by Loman, 1908, pl. 15, fig. 216). Legs with coxal joints subequal, femur distally clavate in ♀, in ♂ more slender and less conspicuously clavate, 1st tibia slightly shorter than femur, 2nd tibia slightly shorter than 1st, tarsus about two-thirds propodus, claw strong, shorter than tarsus (cf. Loman, pl. 15, fig. 220).

Proboscis 7·5, femur 9, 1st tibia 8·5, 2nd tibia 7·5 mm.

Localities: off Hood Point, near East London, 42 fath.; off Port Shepstone, Natal, 24 fath.; and off Cape Natal (Durban), 85 fath. 3♀♀ (S. Afr. Mus.).

Distribution. Maldive Is., Ceylon, Indian Seas, Andaman Is., East Indies, Torres Straits, Queensland.

Remarks. The position of the denticle on the proboscis corresponds with Loman's fig. 215, not with Calman's fig. 1 *a*, *b*. Calman refers to the variation in the claw of the legs, but does not suggest that slender and strong claws are characteristic of the ♂ and ♀ respectively.

Fam. Nymphonidae

1913. Schimkewitsch, *Zool. Anz.*, xli, p. 607.
1913. Bouvier, *2me Exp. Antarct. Franc.*, p. 65.
1932. Gordon, '*Discovery*' *Rep*, vi, p. 24.

Legs 8 or 10. Body segmented. Proboscis immovable. Chelifers well developed, usually conspicuously chelate. Palps 5-jointed (7-jointed in *Paranymphon* Caullery). Ovigers in both sexes, 10-jointed, with apical claw, last 4 joints usually with denticulate spines (8-jointed, without denticulate spines in *Paranymphon*). Legs with or without auxiliary claws. Genital apertures on all legs in ♀, on last 3 in ♂.

Gen. *Nymphon* Fabr.

1794. Fabricius, *Ent. Syst.*, iv, p. 417.
1888. Sars, *Arch. Naturv. Christ.*, xii, p. 352 (*Chaetonymphon*).
1908. Loman, *Siboga Exp.*, monogr., xl, p. 37.
1915. Calman, *Brit. Antarct.* (*Terra Nova*) *Exp.*, zool. III, p. 28.
1923. Loman, *Swed. Antarct. Exp.*, I, 2, p. 10.
1932. Gordon, loc. cit., p. 26 (revision of Antarctic species).
1937. Giltay, *Mem. Mus. Roy. Hist. Nat. Belge.* (2) fasc. 9, p. 83 (key to 7 species on west coast of Africa, Morocco to Cape of Good Hope).
1944. Gordon, *B.A.N.Z. Antarct. Res. Exp.*, B, v, pt. 1, p. 17 (key to Antarctic and Subantarctic species).
1951. Stock, *Mem. Inst. Roy. Sci. Nat. Belge.* (2) fasc. 43, p. 5.
1953. id., *Temminckia*, ix, p. 282.

Octopodous. Proboscis subcylindrical. Ocular tubercle at base of neck, never in front of bases of ovigers, eyes usually present. Finger and thumb of chelifer with more or less slender spiniform denticles. Oviger with apical claw, last 4 joints with denticulate spines. Legs with or without auxiliary claws.

Remarks. A large genus, the Antarctic and Subantarctic species of which have been usefully analysed by Gordon.

Key to the South African Species

I. Auxiliary claws vestigial or absent.
  A. Auxiliary claws vestigial. Main claw slender. Oviger modified; denticulate spines on last 4 joints 23-37. *australe*
  B. Auxiliary claws absent.
    1. Finger and thumb of chelifer apically crossing, each with 50-65 spines. Palp 2nd joint longest.
      a. Neck short, crurigers narrowly separated.
        i. Crurigers less than half their own width apart. ♂ oviger modified, spines 48-50. *capense*
        ii. Crurigers about their own width apart. ♂ oviger not modified.
          α. Spines on oviger 54-63(66). *comes*
          β. Spines on oviger 44. *affinis*
      b. Neck long, crurigers widely separated. Spines on oviger 25. *natalense*
    2. Finger and thumb of chelifer not crossing, with very numerous and fine spines (300 +). 2nd, 3rd and 4th joints of palp subequal. Spines on oviger 46. *microctenatus*

II. Auxiliary claws well developed.
  A. Tarsus at least half length of propodus, sometimes a little longer than propodus.
    1. Finger and thumb of chelifer apically crossing; former with many more (twice as many) spines than latter.
      a. Legs feebly setose.
        i. Neck short. Tarsus shorter than propodus. Oviger with 36-38 denticulate spines. *signatum*
        ii. Neck long. Tarsus longer than propodus. Oviger with 40-42 denticulate spines *distensum*
      b. Legs strongly setose. Neck short. Tarsus shorter than propodus. Oviger with 23-26 spines. *pilosum*
    2. Finger and thumb not crossing, an approximately equal number of spines on both.
      a. Finger and thumb each with less than 25 spines. Oviger with 34-36 spines. *crenatiunguis*
      b. Finger and thumb each with 45 or more spines. Oviger with 39 spines. *angolense*
  B. Tarsus only one-third length of propodus. Finger and thumb of chelifer with an equal and moderate number of long spines, and long curved setae on the setose pad. Oviger with 51-55 spines. *setimanus*

Nymphon australe Hodgson

1902. Hodgson, *Br. Mus. Rep.* '*Southern Cross*' *Crust.*, p. 257, pl. 40.
1902. Möbius, *D. Tiefsee Exp.* iii, p. 181, pl. 26, figs. 1-6. (*Chaetonymphon altioculum.*)
1913. Bouvier, loc. cit., p. 73, figs. 25-31 (*stylops*).
1915. Calman, loc. cit., p. 36 (synonymy).
1928. Flynn, loc. cit., p. 16.
1932. Gordon, loc. cit., p. 59, figs. 25 *d*, 26 *b*.
1938. id., *Austral. Antarct. Exp.*, C, II, 8, p. 13.
1944. id., loc. cit., p. 24 and var. *caecum*, p. 25, fig. 5 *a-d*.

Body compact, neck short, crurigers separated by a distance varying from a quarter to equality with their own width. Proboscis subcylindrical. Ocular

tubercle high, conical, eyes subterminal. Abdomen reaching to end of 1st coxa of last leg, clavate or pyriform. Sparsely setose on cephalic lobe and crurigers.

Chelifer scape longer than proboscis, hand subequal to scape, finger and thumb longer than palm, nearly straight, apically curved and crossing, each with 38-46 closely set spines. Palp with 2nd joint longest, 4th and 5th joints subequal. Oviger in ♂ modified, 5th joint longest, distal half strongly expanded, 6th joint also swollen, last 4 joints with 23-37 denticulate spines. Legs rather short, setose, 2nd coxa slightly longer than 1st + 3rd, femur shorter than either tibia, 1st tibia longer than 2nd, tarsus longer than propodus, claw slender, half length of propodus, auxiliary claws vestigial.

Body including abdomen 7-8 mm.

Locality: off Cape Point, 1,190 fath. (Flynn). The locality of another specimen, from a depth of only 46 fathoms, is regarded by Flynn as doubtful.

Distribution. Circumpolar (antarctic), nearest locality to South Africa: Bouvet Island.

Remarks. The s.s. *Pieter Faure* obtained no specimens referable to this species.

Nymphon capense Hodgson

? 1879. Böhm, *MB. Ak. Wiss. Berlin*, p. 173 (*phasmatodes*).
1908. Hodgson, *Tr. Roy. Soc. Edinb.*, xlvi, p. 169, pl. 1, figs. 2, 2*a*.
1928. Flynn, loc. cit., p. 4 (remarks on synonymy).
1932. Gordon, *Ann. Mag. Nat. Hist.* (10), ix, p. 117, figs. 11, 12 (redescription).
1932. id., loc. cit., pp. 27-32, 34 (in key), 62.

Body stout, neck short, base of oviger large, occupying most of the space between 1st cruriger and anterior cephalic expansion. Crurigers distinctly but narrowly separated. Ocular tubercle stout, low, rounded, eyes distinct. Proboscis bottle-shaped, apically rounded. Abdomen slightly longer than last crurigers, oblique (at about 45°).

Chelifer scape a little longer than proboscis, hand longer than scape, finger and thumb apically curved and crossing, with 60-65 closely set spines, in 2 or 3 alternating sizes. Palp with 2nd joint longest, 3rd, 4th and 5th progressively shorter. Oviger ♂ with 3rd joint inflated, 4th and 5th subequal, rather short and stout, 5th apically dilated, 6th deeply excavate on one side with long setae protruding from the cavity, last 4 joints with 48-50 denticulate spines (Hodgson: 15, 12, 11, 12; Gordon: 12, 12, 11, 13), claw with 13-15 spinules. In ♀ normal (see: *comes*). Legs slender, feebly setose, 2nd coxa equal to 1st + 3rd, femur shorter than 1st tibia, 2nd tibia longer than 1st (7, 8 and 10·7), tarsus and propodus equal or latter a little longer, claw two-thirds to three-quarters the length of propodus, no auxiliary claws.

Body (♂ ♀) 2·7-2·8, proboscis 1·3-1·6, 3rd leg femur 2·6-3, 1st tibia 3·4-4, 2nd tibia 4-4·6 mm. (Gordon).

Locality: off Dassen Island, 35 fath. ♀♀ and ovig. ♂♂ (Hodgson). South-west of Cape of Good Hope, 50 fath. (Böhm).

Remarks. Flynn thought that Hodgson's species was synonymous with Böhm's. Böhm's specimen was a ♀ with possibly abnormal ovigers. Hodgson's description was based on ovigerous ♂♂ as well as ♀♀, and the type material has been re-examined and figured by Gordon, who does not, however, discuss the possible synonymy. Giltay (1937) and Stock (1951) both accept the synonymy.

The species is a small one.

Nymphon comes Flynn

Figs. 3, 5*c*

1929. Flynn, loc. cit., p. 14, figs. 4-6.

Body stout, neck well marked, of medium length, cephalic segment subequal to rest of body (incl. abdomen). Crurigers separated by distances not quite equal to their own width, their length subequal to median width of segments. Ocular tubercle shortly conical, in juvenile (body 5 mm.) with 2 apical points (as seen from in front) which gradually disappear leaving a blunt point in adult, eyes distinct. Proboscis stout, expanded in middle, apically rounded. Abdomen about as long as last crurigers, slightly clavate, horizontal. A few minute setules on hind margins of segments, and on crurigers.

Chelifer scape slightly longer than proboscis, hand about equal to scape, finger and thumb longer than palm, apices curved and crossing, inner margins with more or less regularly alternating long and short spine-teeth, about 50 in number. Palp rather stout, 2nd joint longest, 3rd, 4th and 5th progressively shorter. Oviger in ♂ 4th joint slightly longer than 5th, slightly curved, 5th slightly curved at base, apically expanded on ventral surface with a semicirclet of strong spines, last 4 joints with 54-63 (66) denticulate spines resp. 17-21, 14-16, 11-12 (Flynn: 15), and 12-14. In ♀ 4th joint slightly longer than 5th, both nearly straight. Legs moderately slender, 1st tibia a little longer than femur, 2nd tibia one and a half to one and a third times as long as femur (Flynn says 2nd tibia is twice the femur and one and a half times 1st tibia, his measurements are nearly in agreement, but his figures are not), tarsus subequal to, or slightly shorter than propodus, claw half to two-thirds as long as propodus, no auxiliary claws. Femur and 1st tibia in ♂ not appreciably swollen distally. Femoral cement glands in ♂ (ventral) minute, very numerous, at least 70. Feebly setulose, more numerous setae on 1st and 2nd tibiae.

Body ♀ incl. abdomen 12, abdomen 1·5, proboscis 6, 2nd leg 67 mm. (femur 15, 1st tibia 17, 2nd tibia 20 mm.). Body ♂ incl. abdomen 10·5, abdomen 1·5, proboscis 5, 2nd leg 59 mm. (femur 12, 1st tibia 14·5, 2nd tibia 18 mm.).

Localities: False Bay, 22 fath. 1 ♂ (Flynn); off Cape Infanta, 46 fath. 4 ♀♀ 2 non-ovig ♂♂; off Cape Seal, 80 fath. 1 juv.; off Cove Rock (East London), 43 fath. 1 non-ovig ♂ (S. Afr. Mus.).

Remarks. In addition to the discrepancy in the leg shown in fig. 6, Flynn figures the oviger as 9-jointed (fig. 5).

Although reaching a larger size than Flynn's ♂ specimen (the East London ♂ is approximately the same size as the type), these specimens seem to belong to *comes*. There is one point of difference: the length of the claw of the legs.

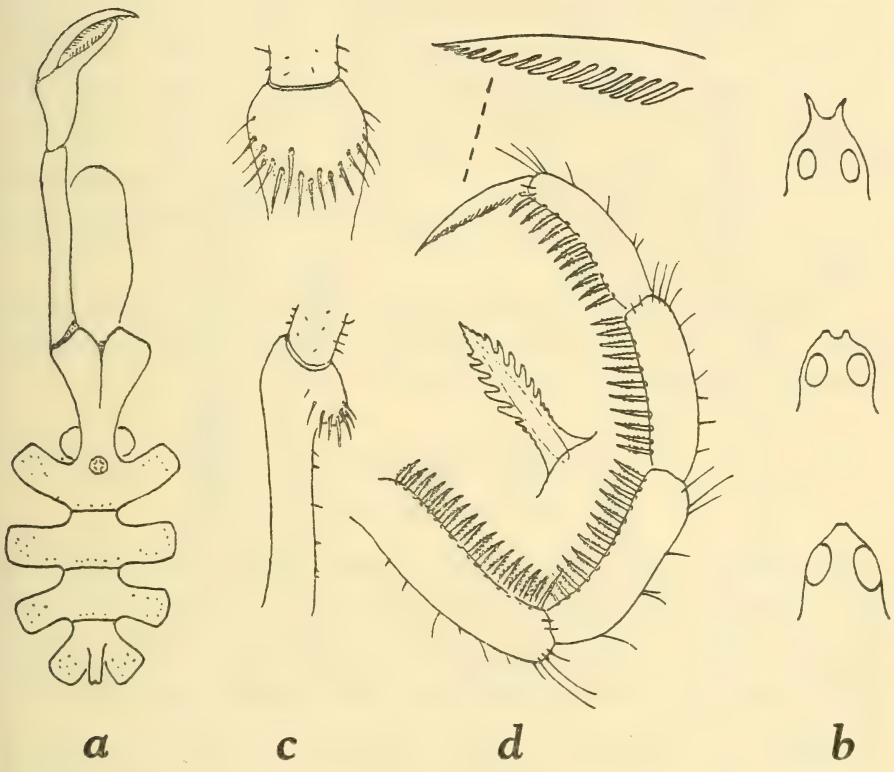


Fig. 3. *Nymphon comes* Flynn. *a.* dorsal view. *b.* front views of ocular tubercle of juvenile, 5 mm. in length (top), intermediate stage, and adult (bottom). *c.* oviger ♂ 5th joint, ventral view above, external view below. *d.* oviger ♂ distal joints with spine and claw further enlarged.

In the type it is about one-third the propodus, but in all the present specimens, including the juvenile, it is at least a half, usually two-thirds the propodus.

This is a much larger species than *capense* (*phasmatodes*), even the type being nearly three times as big; but it is difficult to find (from Hodgson's description) morphological differences. The denticulate spines on the last 4 joints of the oviger are given by Hodgson as resp. 15, 12, 11, 12 in number; and he describes the teeth on the finger and thumb of the chelifer as being of *three* sizes.

Nymphon affinis Stock

1951. Stock, loc. cit., p. 5, figs. 1-6.

This species, described from a single ♀ 5·8 mm. in length, is very close to *comes*, and Stock himself suggests that it may be the ♀ of the latter species of which only the ♂ has hitherto been known.

Stock relies on the following differences in establishing a separate species. Finger and thumb of chelifer with alternating larger and smaller spines; Stock considers that Flynn would certainly have mentioned this feature if it had been present in *comes*. The 5th joint of palp is relatively longer: five-sevenths the length of 4th, instead of half. The different number of spines on the oviger: 15, 11, 10, 8 = 44, as against 66.

Little reliance can be placed on the first difference, as Flynn's descriptions are not always very detailed. Variation would probably be found in the relative lengths of the joints of the palp and legs if a large number of specimens of different sizes were available.

For the present, *affinis* may stand, characterized by the 44 spines on the oviger. The 5 mm. juvenile specimen of *comes* has 54 spines on the oviger.

Locality: Lüderitzbucht, 8 fath. (Stock).

Nymphon natalense Flynn

1928 Flynn, loc. cit., p. 11, fig. 3.

Body slender, neck long and narrow, cephalic segment a little longer than rest of body (incl. abdomen). Crurigers separated by distances about twice their own width, their length considerably greater than median width of segments. Ocular tubercle shortly conical, eyes distinct. Proboscis rather stout, expanded in middle, apically rounded. Abdomen shorter than last crurigers.

Chelifer scape slightly shorter than proboscis, hand longer than scape by nearly one-third (details of finger and thumb not given). Palp 2nd joint longest, 3rd, 4th and 5th progressively decreasing. Oviger 5th joint longest, apically expanded in ♂, denticulate spines on last 4 joints resp. 9, 6, 5, 5. Legs long and slender, 2nd coxa very long, a little more than twice as long as 1st and about half the length of 1st tibia, 1st and 2nd tibiae subequal, tarsus shorter than propodus, claw about three-quarters the length of propodus, no auxiliary claws. Feebly setose.

Body 3·6, proboscis 1·2, leg 18·7 mm. (femur 3·2, 1st and 2nd tibiae 4 mm.).

Locality: off Port Natal (Durban), pelagic, 1 damaged ♂ (Flynn).

Remarks. There are several discrepancies between the description of the legs, the measurements, and the figure.

I have seen no specimens.

Nymphon microctenatus Brnrd.

Fig. 4

1946. Barnard, *Ann. Mag. Nat. Hist.*, (xi), 13, p. 60.

♀—Body moderately stout, neck moderate, base of oviger separated from 1st cruriger and occupying the whole of the rest of the neck behind the anterior cephalic expansion. Crurigers separated by about their own width, or rather less, their length subequal to median width of segments. Proboscis very stout,

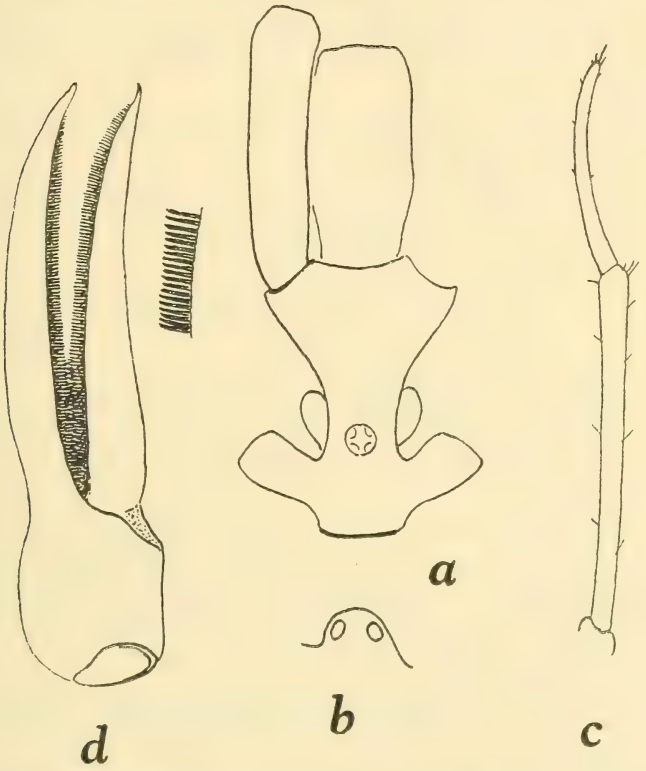


Fig. 4. *Nymphon microctenatus* Brnrd. *a.* dorsal view of cephalic segment with proboscis and basal joint of chelifer. *b.* lateral view of ocular tubercle. *c.* 4th and 5th joints of palp. *d.* inner view of chela (spines much more numerous than shown).

nearly evenly cylindrical, apex truncate. Ocular tubercle low and rounded, eyes distinct. Abdomen not extending beyond last crurigers, clavate, horizontal. Glabrous.

Chelifers widely separated at base, scape slightly longer than proboscis, hand about as long as scape, palm short, finger and thumb both slightly curved downwards, their apices following the same curve, i.e. not crossing, margins with an enormous number (estimated at 300-400) of slender closely set spinules

like a very fine comb. Palp long and very slender, almost glabrous, 2nd, 3rd and 4th joints subequal, 5th a little more than half 4th joint, gently curved. Oviger 5th joint longer than 4th (subequal to 3rd + 4th), 4th with slight swelling proximally on inner side, 5th straight, 6th with a rather prominent spine on inner apex, last 4 joints with 46 denticulate spines (14, 11, 10, 11) on inner margin, spines with 6 (4 major) denticulations, claw with 18-19 spines. Legs, coxae and femur moderately stout, tibiae distinctly more slender, 2nd coxa a little longer than 1st + 3rd, femur a little shorter than 1st tibia, 2nd tibia considerably longer than 1st, tarsus distinctly but not much shorter than propodus, claw about half the length of propodus, no auxiliary claws. Coxae and femur glabrous, 1st tibia very sparsely setose, 2nd tibia sparsely and finely setulose.

Body incl. abdomen 7·5, abdomen 1, proboscis 3, 2nd leg coxa 3·5, femur 10, 1st tibia 11·5, 2nd tibia 20 mm.

Locality: off Buffalo River (East London), 195 fath. 1 ♀ (S. Afr. Mus.).

Remarks. The specimen is broken in pieces, but all essential parts are present.

Nymphon signatum Möbius

Fig. 5*a*

1902. Möbius, *D. Tiefsee Exp.*, iii, p. 178, pl. 24, figs. 1-7.
1932. Gordon, *Ann. Mag. Nat. Hist.* (10) ix, p. 104, fig. 5 (redescribed).
1932. id., loc. cit., pp. 28-9 (in Table iii), 35 (in key).

Body moderately stout, neck stout and moderately long, base of oviger occupying two-thirds of its length, cephalic segment widely expanded. Crurigers separated by about half their own width, their length less than median width of segments. Proboscis stout. Ocular tubercle higher than wide, apex bluntly pointed or feebly bifid. Abdomen extending slightly beyond last crurigers, horizontal or slightly oblique. Glabrous.

Chelifer with a few setae dorsally and apically, chela at least as long as scape, finger and thumb apically curved and crossing, former with 60-64 spines, latter with about 35 longer spines, the two series of spines approximately the same length. Palp 2nd joint longest, 3rd-5th progressively shorter, 4th + 5th subequal to 3rd. Oviger in ♂ 4th joint slightly shorter than 5th, both curved, 5th with apical lobe bearing a semicirclet of spines (cf. *comes*); in ♀ 4th joint longest, 4th and 5th joints straight; last 4 joints with 36-38 (11-13, 9-11, 7-9 and 8-10) denticulate spines, each with 5 major denticulations, claw two-thirds 10th joint, with 10 spinules.

Legs moderately long and slender, femur and 1st tibia distally swollen in ♂, femur shorter than 1st tibia, 2nd tibia longer than 1st tibia, with spines on its apex, tarsus nearly as long as propodus, latter with numerous spines on lower margin, claw nearly half length of propodus, auxiliary claws well developed. Feebly setose, especially in ♀, scattered setae on femur, more numerous on 1st

and 2nd tibiae. Femoral cement glands in ♂ (ventral) 17-20, the distal ones much smaller than the proximal ones.

Body incl. abdomen 8·5, proboscis 4·5, abdomen 1·5, 2nd leg femur 9, 1st tibia 11, 2nd tibia 15 mm.

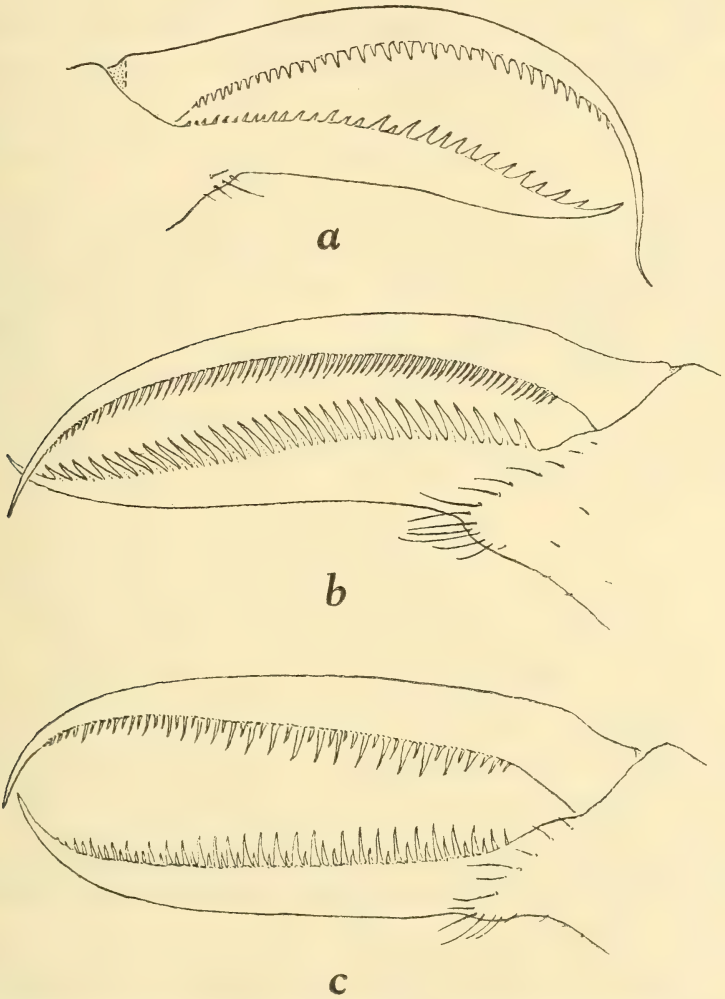


Fig. 5. Chela of: *a. Nymphon signatum* Möbius, juv. *b. Nymphon distensum* Möbius. *c. Nymphon comes* Flynn.

Localities: Agulhas Bank, 100 metres (Möbius); False Bay, 19-27 fath. 1 ovig. ♂; 10 miles off Cape St. Blaize, 1 ♀; off Gt. Fish Point, 49 fath. 3 ovig. ♂♂, 1 non-ovig ♂, 1 immature ♂; off Glendower Beacon (Port Alfred), 66 fath. 1 non-ovig. ♂ (S. Afr. Mus.).

Remarks. With the holotypes of this species and *distensum* before her, Gordon pointed out certain small differences, but remarked that intermediate forms

might be found to unite them. The small amount of material in my hands does not confirm this, although two of the differential characters mentioned by Gordon must be discarded. Spines are present in all cases on the apex of 2nd tibia; evidently in the holotype they had been rubbed off. Differences in the number of spines on ventral margin of propodus are not reliable.

The two species are distinguished by their build, length of neck, and relative lengths of tarsus and propodus (tarsus < propodus in *signatum*, tarsus > propodus in *distensum*).

The ♂ from False Bay is particularly heavily built, spines on finger and thumb of chelifer resp. 50 and 30, denticulate spines on oviger (only one is complete) 45.

A small specimen, body incl. abdomen 2·75 mm., from off Umhlangakulu River (Natal), 50 fath., may belong to this species. The neck and distance separating the crurigers as in *signatum*, but abdomen oblique, ocular tubercle rather high and distinctly bifid apically. Second coxa a little longer than 1st + 3rd, distinctly swollen apically. Oviger with 32 denticulate spines (10, 8, 6, 8). Chelifer hand with finger strongly curved, with fine apical point curving in the opposite direction, with 38 spines, thumb with 28 spines. Tarsus shorter than propodus, claw scarcely one-third length of propodus, auxiliary claws two-thirds main claw.

Nymphon distensum Möbius
Fig. 5*b*

1902. Möbius, loc. cit., p. 179, pl. 25, figs. 1-6.
1928. Flynn, loc. cit., p. 10.
1932. Gordon, loc. cit., p. 105, fig. 6 (redescribed).
1932. id., loc. cit., pp. 28-9 (in Table iii), 35 (in key).

Body rather slender, neck slender and rather long, base of oviger occupying less than half its length, cephalic segment not widely expanded. Crurigers separated by distances less than their own width (except the last 2 pairs), their length subequal to median width of segments. Proboscis stout. Ocular tubercle rather high, conical, more or less constricted above eyes, apex more or less distinctly bifid. Abdomen very slightly longer than last cruriger, clavate, horizontal. Glabrous.

Chelifer scape subequal to proboscis, hand as long as scape, finger and thumb apically curved and crossing, former with 60-70 (holotype ♀, *fide* Gordon: 60-64), latter with 30-33 longer spines, the two series of spines of approximately equal length. Palp 2nd joint longest, 3rd-5th progressively shorter, 4th + 5th subequal to 3rd. Oviger in ♂ 4th and 5th joints subequal, both curved, 5th with apical lobe bearing semicirclet of strong spines (cf. *comes*); in ♀ 4th and 5th joints subequal, both straight; last 4 joints with 40-42 (13-16, 9-11, 8-9 and 9-10) denticulate spines, each with 5 major denticulations, claw two-thirds to three-quarters length of 10th joint, with about 15 spines.

Legs long and slender, femur and 1st tibia distally swollen in ♂, 2nd coxa equal to or a little longer than 1st + 3rd, femur shorter than 1st tibia, 2nd tibia much longer than (one and one-third) 1st tibia, apex with spines, tarsus a little longer than propodus (Gordon: tarsus three-quarter length of propodus in 4th leg, but figure of 1st leg shows tarsus a trifle longer than propodus), claw about half length of propodus, auxiliary claws one-third, or a little more, main claw. Feebly setose, especially in ♀, a few scattered setae on 1st and 2nd tibiae. Femoral cement glands in ♂ (ventral) 12-15.

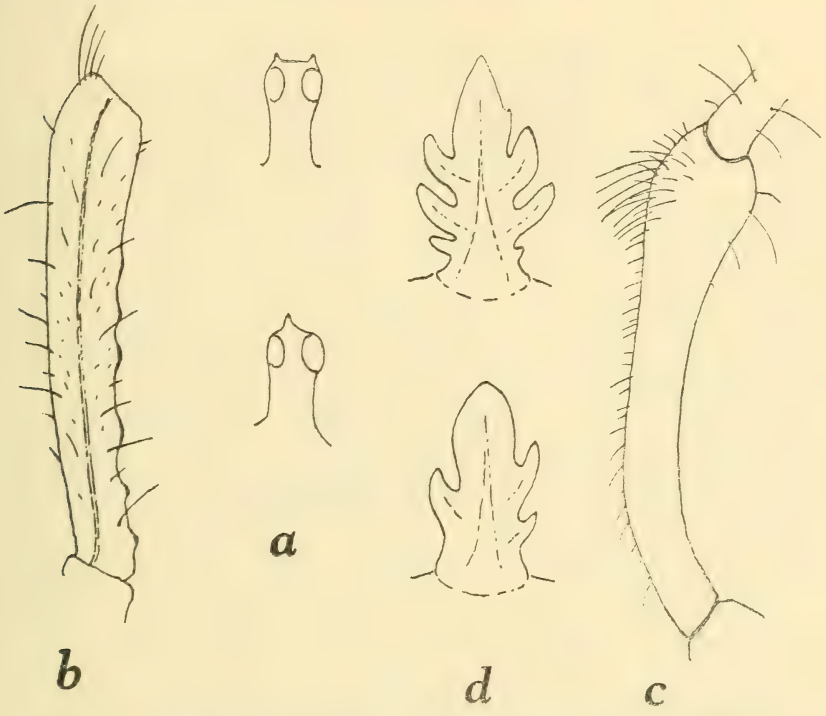


Fig. 6. *Nymphon pilosum* Möbius. *a*. ocular tubercle, front (above) and lateral (below) views. *b*. femur ♂. *c*. oviger ♂ 5th joint. *d*. spines from distal joints of oviger, normal and abnormal (or worn).

Body incl. abdomen ovig. ♂ 11, ♀ 13·5, abdomen ♂ 1·5, ♀ 2, proboscis ♂ 5, ♀ 6, 2nd leg ♂ 64, ♀ 92 mm. (femur ♂ 11·5, ♀ 20, 1st tibia ♂ 16, ♀ 23, 2nd tibia ♂ 25·5, ♀ 37·5 mm.).

Localities: Agulhas Bank, 154 metres, 1 ♀ (Möbius); off Gneka River, 43 fath. 1 ♀ (Flynn); off Buffalo River (East London), 195 fath. 3 ♂♂ (1 ovig.), 1 ♀; off Cape Morgan, 87 fath. 1 ♀; off Cape Seal, 37 miles, 80 fath. 1 juv.; Cape Point N. 71° E. 18 miles, 230 fath. 1 ♀ (S. Afr. Mus.).

Remarks. Holotype ♀ redescribed by Gordon. The few specimens I have examined all agree with *distensum* as described by Gordon, and for the present this species may be retained as distinct from *signatum*.

The largest ♀, whose measurements are given above, came from the Cape Point locality.

Flynn's specimen appears to be aberrant in having the tarsus shorter than propodus (cf. *signatum*) as in Möbius's figure, which, as Flynn says, cannot be relied upon for strict accuracy.

N. arabicum Calman 1938 seems to be very similar to *distensum*.

Nymphon pilosum Möbius
Fig. 6

1902. Möbius, loc. cit., p. 179, pl. 24, figs. 8-12.
1928. Flynn, loc. cit., p. 8, figs. 1, 2 (*bipunctatum*).

Body moderately stout, neck short and stout, base of oviger occupying whole space between 1st cruriger and cephalic expansion. Crurigers separated by about their own width or rather less, their length a little less than median width of segments. Proboscis moderately stout, usually widest in proximal half and slightly tapering to a rounded apex. Ocular tubercle rather high, columnar, slightly expanded above owing to the large eyes, surmounted by a transverse ridge which usually shows two little points. Abdomen distinctly longer than last crurigers, cylindrical or slightly clavate, horizontal. A few setae on hind margins of cephalic and following two segments.

Chelifer sparsely setose, subequal to or slightly longer than proboscis, hand subequal to scape, finger and thumb apically curved and crossing, former with about 40 spines, latter with about 26 larger spines, the two series of spines of approximately equal length. Palp 2nd joint longest, 4th and 5th subequal or the latter slightly the shorter, 4th + 5th subequal to 3rd. Oviger in ♂ 4th joint slightly curved, with slight swelling proximally on inner side, 5th slightly longer than 4th, curved, apically swollen, setose, especially on apex ventrally; in ♀ 4th and 5th joints subequal, straight; last 4 joints with 23-26 (9, 5-6, 4-5 and 5-6) (one specimen with 10, 6, 5, 6 = 27), stout and strongly denticulate spines, with 3 major denticulations, claw with 6-7 spines.

Legs moderately stout, femora and 1st tibiae not distally swollen in ♂, 2nd coxa subequal to, or in the juv., slightly longer than, 1st + 3rd coxae, femur shorter than 1st tibia, which is shorter than 2nd, tarsus distinctly though not much shorter than propodus, claw not quite half length of propodus, auxiliary claws about half length of main claw. A few setae on the coxae, femur with short and longer outstanding setae, tibiae with numerous long outstanding setae. Femoral cement glands in ♂ large, about 5 or 6 (4-7) on low knobs or ridges on ventral surface.

Body incl. abdomen 7, abdomen 1·75, proboscis 3, 2nd leg 38 mm. (femur 6, 1st tibia 7, 2nd tibia 9·5 mm.). The non-ovigerous ♂♂ are a little smaller than the largest ♀.

Localities: Agulhas Bank, 154 metres 1 ♀ (Möbius); off Port Natal (Durban), tow-net, 5 ♂♂, 4 ♀♀ (Flynn); off Cape St. Blaize, 85-90 fath., 4 non-ovig. ♂♂,

6 ♀♀; off Cape Seal, 80 fath. 1 ♀; off Cape St. Francis, 75 fath. 1 non-ovig. ♂; 36° 40′ S. 21° 26′ E., 200 fath. 1♀ (S. Afr. Mus.); 29° 56′ S. 31° 11′ E., 333 metres (Fisheries Survey, 1948).

Remarks. There would seem to be little doubt that *bipunctatum* is synonymous; at least it is strange that Flynn did not compare his specimens with *pilosum*; possibly being taken in a tow-net and therefore *presumed* to be pelagic unconsciously created an impression of specific distinctness.

The ocular tubercle is characteristic. The stout spines on the last joints of the oviger are also very striking.

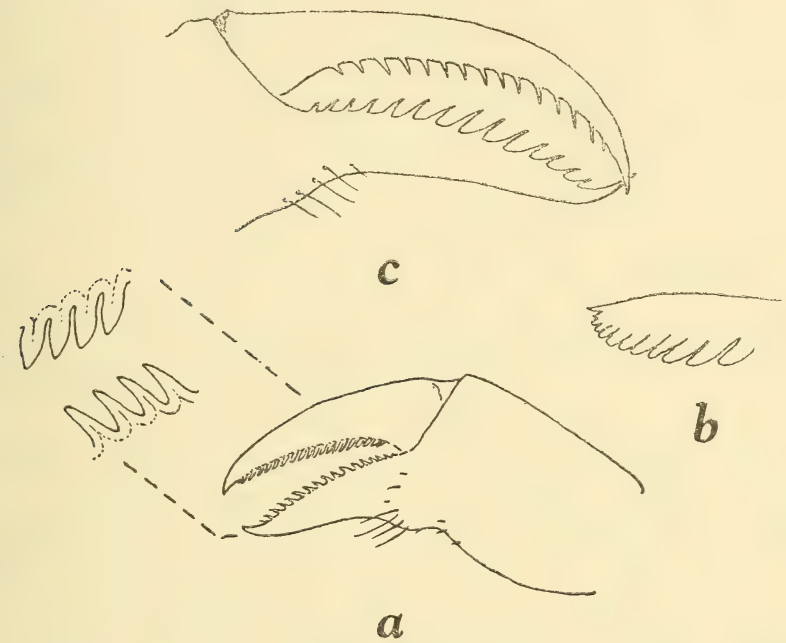


Fig. 7. *Nymphon crenatiunguis* Brnrd. *a.* chela with denticles further enlarged. *b.* apex of claw of oviger ♂♀. *c.* chela of a ♂ 2·25 mm. in length.

Owing to their pilosity the legs are often much obscured by foreign matter; some of the specimens have examples of the stalked barnacle *Scalpellum agulhense* Brnrd. attached to the legs; and one specimen has one of the barnacles standing upright immediately behind the ocular tubercle.

Nymphon crenatiunguis Brnrd.

Fig. 7

1946. Barnard, loc. cit., p. 60.

Body moderately stout, neck short, base of oviger contiguous with first cruriger and extending nearly to beginning of cephalic expansion. Crurigers separated by less than their own width, their length subequal to (a trifle

shorter than) median width of segments. Proboscis nearly cylindrical, apex rounded. Ocular tubercle rather low, conical, in front view with 2 little points surmounting the eyes. Abdomen slightly longer than last crurigers, clavate, oblique (at about 45°). Glabrous.

Chelifer scape subequal to proboscis, hand shorter than scape, palm oblong, widening slightly distally, finger and thumb relatively short and stout, former subequal to palm, apices not crossing, finger with 20(♀)-22(♂) closely set spiniform denticles, thumb with 18(♀)-17(♂) more slender and slightly more widely spaced denticles. Palp 2nd joint longest, 4th + 5th joints a little longer than 3rd, 5th longer than 4th. Oviger in ♂ 5th joint longer than 4th, gently curved, with apical lobe bearing strong recurved spines; in ♀ 4th and 5th subequal; last 4 joints with 34-36 denticulate spines (♂ 13, 7, 7, 7; ♀ 14, 9, 6, 6 and 13, 9, 7, 7), spines stout with 3 major denticulations. Claw with about 15 denticles, which distally become successively shorter and form a rounded and minutely crenulate (apparent) apex, the true apex being acute and minute. This form is found on both ovigers of the ♂ and of the ♀, though in one oviger of the latter the distal denticles are sharper and more prominent than in the figure (the apex thus appears more serrate than crenulate).

Legs moderately stout, 2nd coxa subequal to 1st + 3rd, femur shorter than 1st tibia, 2nd tibia longer than 1st, tarsus and propodus subequal, claws about one-third propodus, auxiliary claws strong, at least half main claw. Glabrous except the 2nd tibia which is sparsely and minutely setulose. Femoral cement glands in ♂ 4-5 low knobs or tubercles on ventral surface.

Body incl. abdomen ♂ 4, ♀ 3, abdomen ♂ ·75, ♀ ·5, proboscis ♂ 1·75, ♀ 1·5, leg femur ♂ 4·5, ♀ 4, 1st tibia ♂ 5, ♀ 5, 2nd tibia ♂ 7·5, ♀ 6·5 mm.

Locality: off East London, 85 fath. 1 non-ovig, ♂, 1 ♀ (S. Afr. Mus.).

Remarks. Distinguished by the hand of chelifer, which resembles in general that of *grossipes* Hoek 1881 and *multidens* Gordon 1932. As in these two species the 5th joint of the palp is longer than 4th; but the tarsus and propodus of the legs are subequal, and the spines on the last joints of oviger are different (in shape from those of *grossipes*, and in number from those of *multidens*). The apex of claw of oviger seems to be unusual if not peculiar.

One non-ovigerous ♂, body incl. abdomen 2·25 mm., from off Durnford Point, Zululand, 90 fath., agrees with the above described specimens in most characters, including the peculiar claw of the oviger, but has the hand of the chelifer slightly different. The finger is subequal to palm, but both it and the thumb are more slender, the former with 15, the latter with 14 denticles (fig. 7*c*). The femur has only 3, but very distinct, cement gland knobs. The 5th joint of oviger has the apical lobe with recurved spines, and the denticulate spines on last 4 joints number 12, 9, 7, 6.

Nymphon angolense Gordon

? 1923. Loman, *Goteb. K. Vet. Samh. Handl.*, xxvi 6 (Medd. Goteb. Mus. Zool. Avd. no. 22), p. 5. (*N. gracillimum*, non Calman.)

1932. Gordon, loc. cit., p. 77, figs. 36, 37.
1937. Giltay, loc. cit., p. 88.
1951. Stock, loc. cit., p. 7.

Neck long and slender, base of oviger contiguous with 1st cruriger. Crurigers separated by more than their own width, their length greater than median width of segments. Proboscis cylindrical, apex rounded. Ocular tubercle low, rounded. Abdomen slightly longer than last crurigers, elevated at about 45°.

Chelifer scape subequal to proboscis, hand slightly longer than scape, palm slender, finger and thumb slightly longer than palm, slender, apices crossed, about 55 spines on finger, 45 on thumb. Palp 2nd joint longest, 3rd three-fifths 2nd, 4th half 3rd and 5th slightly longer than 4th. Oviger in ♂ slender, 5th joint longer than 4th, straight, with a few hook-like spines on apex; in ♀ 4th and 5th joints relatively short; last 4 joints with 39 denticulate spines (13, 10, 8, 8) (Stock: ♂ 13, 9, 7, 7). Claw with 14 spinules.

Legs slender, 2nd coxa slightly longer than 1st + 3rd, femur shorter than 1st tibia, 2nd tibia longer than 1st, propodus slightly longer than tarsus, auxiliary claws at least two-thirds length of main claw.

Body incl. abdomen 7, proboscis 1·8-1·9, femur ♂ 6·8, ♀ 7, 1st tibia ♂ 9·2, ♀ 8·4, 2nd tibia 12 mm.

Localities: off Elephant Bay, Angola (approx. 13° 10′ S. 12° 45′ E.), 73-91 metres (Gordon); Tiger Bay, and Elephant Bay, 100-110 metres (Stock); off Port Alexander, 60 fath. (Loman).

Remarks. Gordon set out several differences between *angolense* and the holotype of *gracillimum*, but not the number of spines on the oviger. This is not included in Calman's original description but is given, on Calman's authority, by Loman (loc. cit., p. 5, footnote) as 33 (12, 8, 6, 7) and 30 (12, 7, 5, 6). Loman's specimens showed 31 (11, 6, 6, 8) and 28 (10, 7, 5, 6). All these numbers are less than those in *angolense*.

Gordon made no comment on Loman's record, but it seems more probable that the Port Alexander specimen ('verstümmelten', Loman) should be identified with *angolense* than with an Antarctic species, in spite of the difference in number of the spines on the oviger.

Port Alexander lies between the two localities recorded by Stock.

Nymphon setimanus Brnrd.

Fig. 8

1946. Barnard, loc. cit., p. 61.

Body moderately stout, neck long (cf. *distensum*), base of oviger contiguous with first cruriger and occupying one-third to nearly one-half of neck. Crurigers separated by rather less than their own width, their length subequal to median width of segments. Proboscis stout, nearly cylindrical, apex rounded-truncate. Ocular tubercle low, scarcely if at all higher than basal width, in lateral view

conical, in front view apically truncate, with two minute points above the eyes. Abdomen extending a little beyond last crurigers, somewhat elongate, oblique (at about 45°). Glabrous.

Chelifer scape a little shorter than (or scarcely as long as) proboscis, hand subequal to scape, finger and thumb much longer than palm, slender, curved, apically crossing, each with 13-15 equally long spines, setose pad well developed with numerous very long, almost spiniform setae on inner surface. Palp 2nd and 3rd joints subequal, or the latter a trifle the longer, 5th shorter than 4th, 4th + 5th longer than 3rd. Oviger 4th and 5th joints subequal, last 4 joints

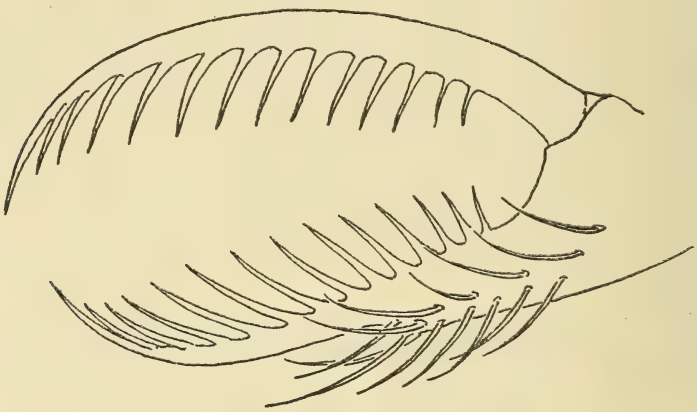


Fig. 8. *Nymphon setimanus* Brnrd. Inner view of chela ♀.

with 51-55 denticulate spines (15, 13, 12, 11 or 18, 12, 12, 11 or 19, 12, 11, 13), each with about 6 major denticulations, claw with about 13 denticles, the distal ones separated by crenulations, the apical point scarcely extending beyond last denticle (cf. *crenatiunguis*).

Legs moderately stout, 2nd coxa equal to or a trifle longer than 1st + 3rd coxae, femur only a little shorter than 1st tibia, 2nd tibia not much longer than 1st, tarsus short, about one-third propodus, claw short, subequal to tarsus, auxiliary claws two-thirds main claw. Almost glabrous, even on 2nd tibia only a few minute and scattered setules.

Body incl. abdomen 6, proboscis 2, abdomen 1·25, 2nd leg 2nd coxa 2·5, 1st + 3rd coxae together 5, femur 6, 1st tibia 6·5, 2nd tibia 7 mm. Pinkish, the palps and ovigers and a band around apex of femur pale whitish (Pt. Elizabeth Mus. and U.C.T. specimens).

Localities: Bird Island Passage (Algoa Bay), 10-16 fath. 1 ♀; off East London, 32 fath. 1 ♀; off Port Shepstone (Natal), 24 fath. 1 ♀ (S. Afr. Mus.); shelly beach, Cape Recife (Port Elizabeth Mus.); main channel, Knysna harbour; Bushmans River mouth (Algoa Bay) (Univ. Cape Town Ecol. Surv. 1947 and 1950).

Remarks. Distinguished from all the other South African species by the short tarsus.

Neck shorter than in *andamanense* Calman 1923. The hand of chelifer bears some resemblance to that of *maculatum* Carp. 1910.

Fam. Pallenidae

1908. Loman, *Siboga Exp. monogr.*, xl, p. 40, and conspectus facing p. 19 (subfam. *Palleninae*).
1909. Schimkewitsch, *Zool. Anz.*, xxxiv, p. 6.
1913. id., ibid., xli, p. 610.
1944. Gordon, *B.A.N.Z. Antarct. Res. Exp.*, B, v, pt. 1, p. 36.
1947. Hedgpeth, *Smiths. Misc. Coll.*, cvi, p. 4.

Octopodous. Body segmented (or last two segments fused). Proboscis immovable. Chelifers present, chelate. Palps absent, or represented in ♂ by a 1-4-jointed rudiment. Ovigers in both sexes, 10-jointed, with or without apical claw, distal joints with a single row of serrate, acute, or oval spines. Legs with or without auxiliary claws. Genital pores on all legs in ♀, on last two legs in ♂. Eggs in several masses.

Key to the South African Genera

I. Ocular tubercle at hinder end of cephalic segment.
  A. Legs with auxiliary claws. Palps absent.
    1. Oviger without apical claw. Finger and thumb of chelifer serrate or spinose. *Callipallene*
    2. Oviger with apical claw. Finger and thumb of chelifer smooth, with small dentiform lobe. *Pseudopallene**
  B. Legs without auxiliary claws.
    1. Oviger with apical claw. Palps absent. *Parapallene*
    2. Oviger without apical claw.
      a. Palps reduced to a single knob-like joint. *Metapallene*
      b. Palps absent. *Pallenoides*

II. Ocular tubercle at front end of cephalic segment. Palps absent or reduced to tubercles.
  A. Legs with auxiliary claws. Oviger without apical claw. *Pallenopsis*
  B. Legs without auxiliary claws. Oviger with apical claw. *Hannonia*

Gen. *Callipallene* Flynn

1836. Johnston, *Mag. Zool. Bot.*, i (4), p. 380. (*Pallene*; nom. preocc. Megerle, 1823.)
1908. Loman, loc. cit., p. 42. (*Pallene.*)
1929. Flynn, *Mem. Queensl. Mus.*, ix, p. 252, footnote.
1948. Correa, *Pap. Avulsos Dept. Zool. S. Paulo*, ix, 1, p. 1 (key to species).

*The presence or absence of auxiliary claws is not specifically mentioned in the single South African species referred to this genus. See p. 107.

1952. Stock, *Beaufortia*, no. 13, pp. 1-14, figs. 1-27. (European species.)
1953. id., *Boll. Mus. Civ. Venezia*, vi, 2, p. 179.

Cephalic segment with neck. Last 2 body segments often fused. Proboscis short, without setae around mouth. No trace of palps. Chelifer scape 1-jointed, finger and thumb finely denticulate. Oviger 10-jointed, without (usually) apical claw, spines on distal joints oval or round (not pointed), smooth or finely serrated, 5th joint in ♂ with apical process. Legs with auxiliary claws.

Callipallene sp.

Fig. 9

General appearance, length and shape of neck similar to fig. 7 of Stock 1952; all sutures between body segments distinct. Crurigers separated by

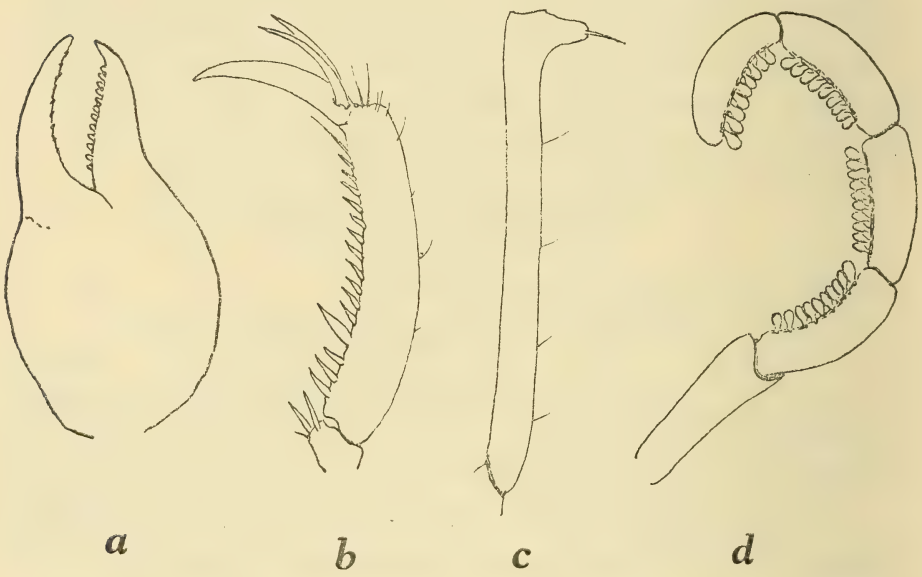


Fig. 9. *Callipallene* sp. *a.* hand of chelifer. *b.* propodus and claw of leg. *c.* 5th joint of oviger ♂. *d.* distal joints of oviger ♂.

intervals subequal to their own width; length slightly less than median width of segments. Ocular tubercle conical. Abdomen obliquely upturned at 45-60°. Body and crurigers glabrous.

Chelifer scape stout, hand turned downwards, inner margin of finger minutely and indistinctly serrulate, of thumb with about 10 conspicuous blunt spiniform teeth. Oviger 5th joint longest, in ♂ with outstanding apical process bearing a seta, the 4 distal joints with 38-46 (10, 10, 9, 9,—12, 12, 10, 12) bluntly rounded spines, the margins of which appear to be quite smooth, no apical claw.

Legs, femur in ♀ swollen, 1st tibia shorter than femur and shorter than 2nd tibia, which is slightly longer than femur, propodus gently curved, with 4 large spines proximally, auxiliary claws strong, two-thirds length of claw, simple (not pectinate at base); glabrous except for one or two fine setae on each joint.

Body incl. abdomen 1·5, 2nd leg 7·5 mm.

Localities: off Walker Point, 47 fath., and off Cape St. Blaize, 40 fath. (S. Afr. Mus.). Three specimens (2 ♂♂, 1 mutilated ♀ with developing ova).

Remarks. As these specimens show no outstanding features by which they can be separated from the other species of the genus, I think no specific name should be given to them until further material is available.

Gen. *Pseudopallene* Wilson

1804. Latreille, *Nouv. Dict. Hist. Nat.*, xxiv, p. 137. (*Phoxichilus*.)
1878. Wilson, *Trans. Connect. Ac.*, v.
1902. Stebbing, *Knowledge*, xxv, p. 187. (*Phoxichilus*, non. Latr.)
1909. Schimkewitsch, loc. cit., pp. 6, 7, 8.
1910. Hodgson, *Schultze Reise*, iv, p. 225 (in key).
1917. Bouvier, *Res. Sci. Camp. Monaco*, li, p. 28.
1928. Flynn, loc. cit., p. 23.
1951. Hedgpeth, *Smiths. Misc. Coll.*, cvi, p. 4.
1953. Stock, *Temminckia*, ix, p. 294.
[not *Pseudopallene* Bouvier 1913 = *Austropallene* Hodgson 1914]

Proboscis with setae around mouth. No trace of palps. Chelifer scape 1-jointed, hand short and swollen, finger and thumb not serrated or spinose, but with dentiform projections. Oviger 10-jointed, with serrated apical claw, 5th joint in ♂ with apical projection. Legs without auxiliary claws.

Remarks. After considerable argument as to the validity of Latreille's name, the name *Pseudopallene* seems to have been generally accepted.

Pseudopallene gilchristi Flynn

1928. Flynn, loc. cit., p. 23, fig. 13.

Body slender, segmented. Crurigers widely separated. Neck elongate. Ocular tubercle low, rounded. Abdomen shorter than last crurigers.

Chelifer scape shorter than proboscis, opposable margins of finger and thumb each with a small rounded lobe.

Legs slender, elongate, minute spines on 1st and 2nd tibiae, claw more than half length of propodus (no auxiliary claws?).

Body 3·6-3·9, femur 3·8-4·8, 1st tibia 4·5-5·6, 2nd tibia 6-6·8 mm.

Locality: off Port Natal (Durban), surface (tow-net) (Flynn).

Remarks. Flynn makes no mention of auxiliary claws; presumably they are absent, in conflict with the generic definition.

No examples of this species are in the South African Museum collection.

Gen. *Parapallene* Carp.

1892. Carpenter, *Sc. Proc. R. Dublin Soc.*, n.s., vii, p. 553.
1908. Loman, loc. cit., pp. 40, 42.
1909. Schimkewitsch, loc. cit., pp. 7, 9.
1929. Flynn, *Mem. Queensl. Mus.*, ix, p. 258.
1937. Calman, *Ann. Mag. Nat. His.* (10), xx, p. 530.
1938. id., *John Murray Exp.*, v, p. 156.
1953. Stock, *Temminckia*, ix, pp. 282, 297, fig. 2*b* (chart).

Body segmented. Proboscis constricted in middle. Chelifer scape 1-jointed, hand swollen, finger and thumb fitting closely together when closed, margins not denticulate. Palps completely absent. Oviger 10-jointed, in ♀ 4th joint longest and 5th without apical process, in ♂ 5th longest and with or without apical process, distal 3 or 4 joints with a row of biserrate (usually, sometimes obscurely serrate or simple) spines, with apical claw. Legs without auxiliary claws (except in *challengeri*). Genital pores on last 2 legs in ♂, on all legs in ♀.

Key to the South African Species

1. Each cruriger with conspicuous pointed process dorsally.
   a. 3rd coxa with conical process of ventral apex. *spinosus*
   b. 3rd coxa with semicirclet of strong spines on ventral apex. *calmani*
2. Crurigers without processes (or only a minute tubercle on each).
   a. Neck long.
      i. 3rd coxa with a single spine on ventral apex. Feebly serrate spines on 7th-10th joints of oviger 19, 16, 16, 16. *algoae*
      ii. Strongly serrate spines on 7th-10th joints of oviger 10, 9, 7, 9. *nierstrazi*
   b. Neck short. 3rd coxa with semicirclet of fine spinules on ventral apex. Feebly serrate spines on 7th-10th joints of oviger 8-9, 8-9, 7, 7-6. *hodgsoni*

Parapallene spinosus (Möbius)
Fig. 10

1902. Möbius, *D. Tiefsee Exp.*, iii, p. 188, pl. 28, figs. 8-12. (*Anoplodactylus s.*)

Crurigers well separated by about their own width, length subequal to or slightly longer than median width of segments; each with an upstanding conical process on dorsal apex. Neck moderately constricted, not defined by a collar at base. Proboscis cylindrical, apically truncate. Ocular tubercle high, conical, apex recurved and shortly bifid or narrowly truncate (acute in juv. with body length 7-8 mm.), eyes of uniform size. Abdomen in ♀ not longer than last crurigers, in ♂ slightly longer, rather stout, nearly erect. Glabrous.

Chelifer scape stout, with a spine on upper apex and a fringe of spine-setae on inner surface, hand curved downwards and inwards so that finger lies ventral to thumb, palm subglobular, setose on inner surface around base of finger and thumb, finger longer than thumb, inner margins of both entire. Oviger 4th joint longest, in ♀ 8th-10th joints with 7, 4-6, and 6 spines on inner margin, spines moderate, simple or sometimes obscurely notched, or apically somewhat hooked, claw with a few (8-9) spines on inner margin and 3 on both

inner and outer margins apically, the last pair adpressed to base of spiniform apex (but these somewhat variable); in ♂ 7th-10th joints with the spines slightly stronger than in ♀ but not stout (claw missing in the only adult ♂ specimen).

Legs rather stout, 3rd coxa with a conspicuous conical process on ventral apex, femur about one and a half times 1st tibia, with 3 conical tubercles on dorsal apex, the medio-dorsal one much larger than the dorso-lateral ones, 1st tibia with 4 conical tubercles on dorsal apex, the dorsal pair larger than the

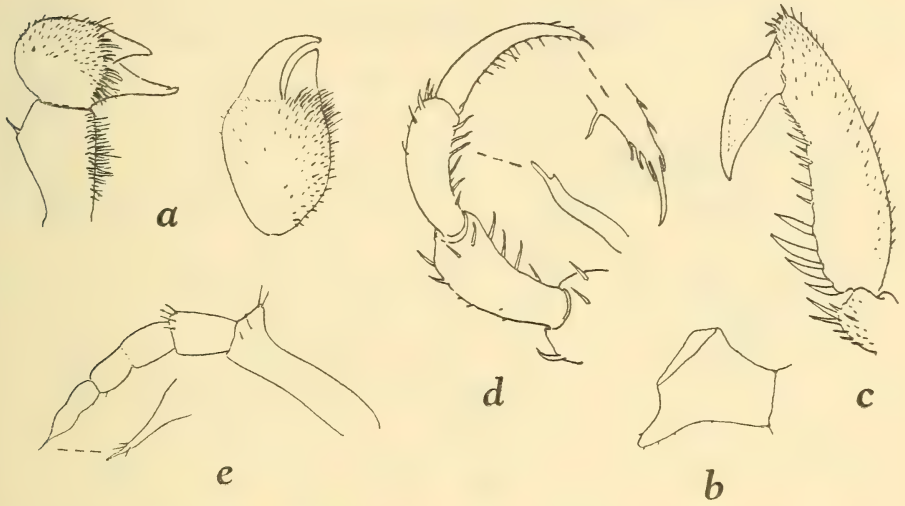


Fig. 10. *Parapallene spinosus* (Möbius). *a.* inner and front views of left chela. *b.* lateral view of 3rd coxa of leg. *c.* propodus and claw of leg. *d.* 9th and 10th joints with claw of oviger ♀. *e.* oviger of juvenile, body length 8 mm.

lateral ones (but not as large as the medio-dorsal one on femur), also a small medio-dorsal tubercle near base, and one near middle on each lateral surface; 2nd tibia a little longer than femur; propodus without heel, with 4 strong spines proximally on lower margin, followed by smaller ones, upper apex projecting over base of the stout claw. Very short and fine spinules ventrally on apices of 2nd and 3rd coxae; on the other joints in these spinules become more numerous distally, especially on 2nd tibia, but to the naked eye the legs appear glabrous or the tibiae very finely hispid; in ♂ however there are a few distinct but slender spines on femur, several on 1st tibia, and more on 2nd tibia.

Base of chelifers to base of abdomen ♀ 10, abdomen 2-2·25, proboscis 3, 2nd leg 38 mm. (femur 10·5, 1st tibia 6·5, 2nd tibia 12).

Localities: St. Francis Bay, Agulhas Bank, 10 metres (Möbius); off East London, 52 fath. 1 ♀, 1 juv.; off Glendower Beacon (Port Alfred), 66 fath. 1 not quite adult ♂; False Bay, 17-33 fath. 2 ♀♀, 2 juv.; Table Bay, 22 fath. 1 ♂ (S. Afr. Mus.).

Remarks. The conical process of the 3rd coxa is very conspicuous and forms an easy mark of identification. See further under *calmani*.

Loman (1908, loc. cit., p. 64) suspected that this species should not be included in *Anoplodactylus* on account of the number (9) of joints in the oviger. The South African Museum specimens confirm this. They are obviously examples of *spinosus*, although Möbius seems to have ignored the position of

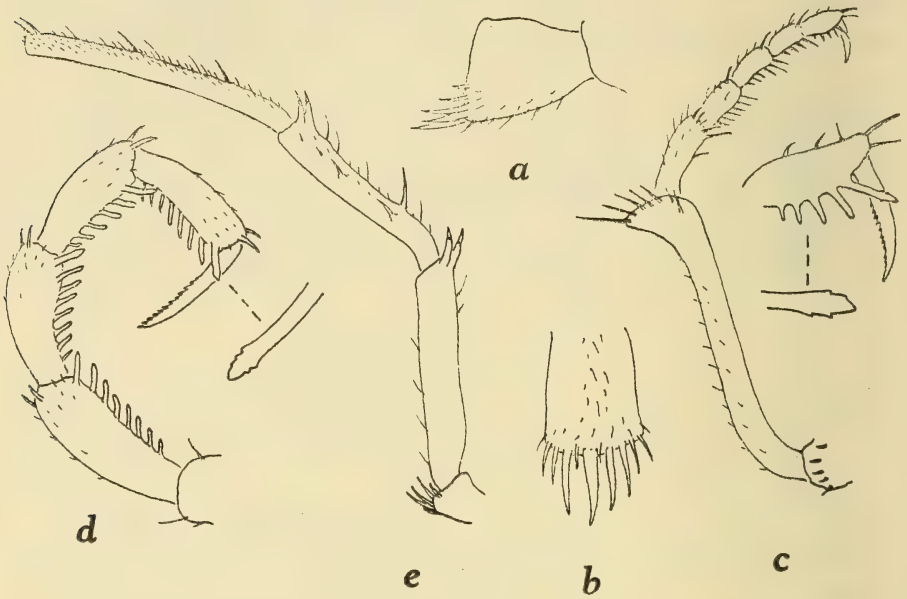


Fig. 11. *Parapallene calmani* Flynn. *a, b.* lateral and ventral views of 3rd coxa of leg. *c.* distal joints of oviger ♂ with 10th joint and claw further enlarged. *d.* distal joints of oviger ♀. *e.* femur and 1st and 2nd tibiae of leg ♂.

the ocular tubercle and makes no mention of it as he does in the case of *Anoplodactylus aculeatus*. He had only one specimen and rashly assumed that the ♀ would be without ovigers.

One of the South African Museum specimens (body length 8 mm.) is particularly interesting because it has an oviger closely resembling Möbius's figure 12; a figure is given here showing that it is not quite fully developed, with the distal joints not completely demarcated and without spines on inner margins.

P. spinosus is a larger species than *calmani*.

Parapallene calmani Flynn
Fig. 11

1928. Flynn, loc. cit., p. 16, figs. 7, 8.

In general the description given for *spinosus* will apply to *calmani*. Chelifer with spine on upper apex. The 3rd coxa is not conically produced, but has a

semicirclet of about 8-9 strong spines on ventral distal margin. The oviger, both in ♂ and ♀, has stronger spines on the inner margins of 7th-10th joints.

Localities: off East London, 47 fath. (Flynn); Algoa Bay, 10-17 fath. 3 non-ovig. ♂♂, 1 ♀; off Glendower Beacon (Port Alfred), 66 fath., 1 non-ovig. ♂ (S. Afr. Mus.).

Remarks. The presence in South African waters of two species both with conical projections on the crurigers makes the identification of Flynn's species a little doubtful. Flynn might have overlooked the apical spines on the 3rd coxa, and his fig. 8 gives no indication of them; on the other hand he could scarcely have overlooked conspicuous conical processes and his figure, from the viewpoint from which it is drawn, would surely have given *some* indication

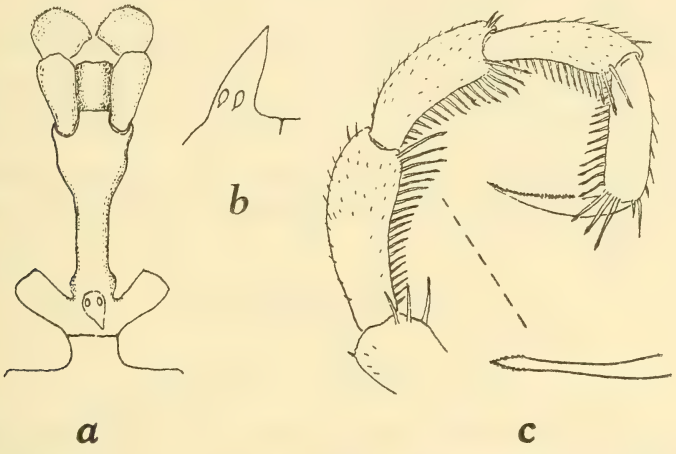


Fig. 12. *Parapallene algoae* Brnrd. *a*. cephalic segment with chelifers. *b*. lateral view of ocular tubercle. *c*. distal joints of oviger ♀.

of projections if they had been present. I therefore assign the specimens with a semicirclet of spines on 3rd coxa to *calmani*; and the species with conical processes on 3rd coxa is obviously *spinosus* (Möbius).

Flynn says the 4th joint of the 10-jointed oviger is the longest; his fig. 7 shows *seven* joints beyond the longest joint, making an 11-jointed oviger. This is probably a draughtsman's error.

Parapallene algoae Brnrd.
Fig. 12

1946. Barnard, loc. cit., p. 61.

Body rather slender. Crurigers without processes, well separated by at least their own width, length greater than median width of segments. Neck well marked, only half as wide as apical width of cephalon, not defined by a

collar. Proboscis cylindrical, apically truncate. Ocular tubercle high, conical, apex, acute, eyes of uniform size. Abdomen shorter than last crurigers, nearly vertical. Body and crurigers microscopically hispid.

Chelifer as in *calmani*, but without spine on upper apex of scape. Oviger (♀) 4th joint longest, 7th-10th joints with numerous spines: 19, 16, 16, 16, spines biserrate apically, claw finely serrate on inner margin except at base.

Legs (♀) 3rd coxa with a single short but prominent spine on ventral apex, dorsal apex of femur and 1st tibia each with a semicirclet of 4-6 spines, 1st tibia distinctly shorter than femur, 2nd tibia one and a half to one and three-quarter times as long as 1st tibia, propodus as in *calmani* but lower margin with 7-8 large spines, 3 or 4 of the proximal ones being the largest, claw relatively longer than in *calmani*. Femur minutely hispid, 1st tibia finely spinulose-setose, 2nd tibia more strongly so, the longest (but none as long as width of tibia) spine-setae forming a row or fringe along each side.

Base of chelifers to base of abdomen 15, abdomen 2, proboscis 4·5 mm.; in S. Afr. Mus. specimens all legs severed from bodies, longest 80 mm. (femur 19·5, 1st tibia 14, 2nd tibia 29).

Localities: Algoa Bay, off Gt. Fish Point, and off Cape Morgan, 32-87 fath. 4 ♀♀ (S. Afr. Mus.); Plettenberg Bay, 30 fath. (Port Elizabeth Mus.).

Parapallene hodgsoni Brnrd.

Fig. 13

1946. Barnard, loc. cit., p. 61.

Crurigers well separated by about their own width, length subequal to median width of segments, each with a very small tubercle on upper surface near apex. Neck constricted, but short, without collar at base. Proboscis cylindrical, apically truncate. Ocular tubercle high, conical apex acute or bifid, eyes of uniform size. Abdomen as long as last crurigers, oblique. Body and crurigers glabrous.

Chelifer as in *calmani* but without spine on apex of scape. Oviger (♀) 4th joint longest, 7th-10th joints with rather stout spines resp. 8-9, 8-9, 7, 7-6, spines simple or feebly serrate subapically, claw very feebly serrulate on inner margin.

Legs (♀) 3rd coxa with semicirclet of fine spinules on ventral apical margin, femur longer than 1st tibia, 2nd tibia longer (about one and one-third) than femur, propodus as in *calmani* but spines on distal part of lower margin stronger. Femur slightly hispid, 1st and 2nd tibiae more conspicuously so, 2 (or 3) small spiniform tubercles on upper apex of femur and 1st tibia.

Base of chelifers to base of abdomen 8·5, abdomen 1·5, proboscis 3 mm.; 2nd leg 48 mm. (femur 12, 1st tibia 10, 2nd tibia 16·5 mm.).

Localities: off East London and Hood Point, 47-52 fath. 3 ♀♀, 1 juv. (S. Afr. Mus.).

Remarks. The feebly serrate or simple spines on 7th-10th joints of oviger prevent these specimens from being identified with *nierstraszi*; also the neck is shorter.

Parapallene nierstraszi Loman

1908. Loman, loc. cit., p. 44, pl. 9, figs. 122-127.
1928. Flynn, loc. cit., p. 18.
1938. Calman, loc cit., p. 158, fig. 7.
1953. Stock, loc. cit., pp. 297, 299, fig. 3 *a* (chart).

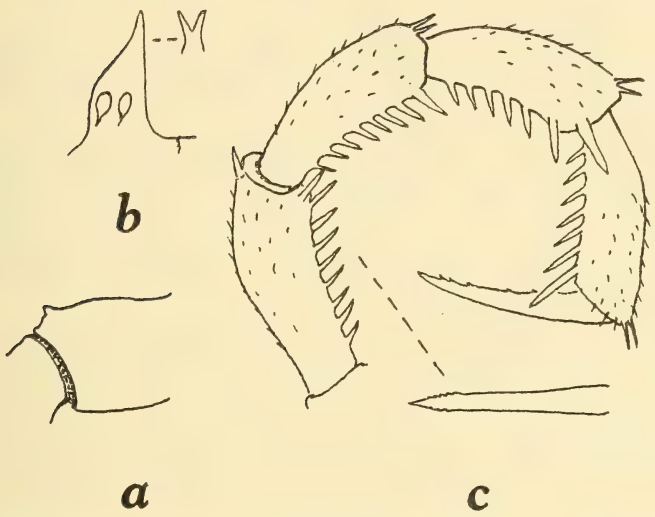


Fig. 13. *Parapallene hodgsoni* Brnrd. *a.* posterior view of cruriger. *b.* lateral view of ocular tubercle, with hind view of apex. *c.* distal joints of oviger ♀.

Locality: 29° 35′ S., 31° 14′ E. (Natal), 25 fath. (Flynn).
Distribution. East Indies.
Remarks. Calman examined a syntype which had the ocular tubercle truncate with 2 points (fig. 7 A); this might be regarded as a malformation. He also described the spines on the coxae and following joints but without stating whether they were dorsal or ventral; presumably they were dorsal.
The spines on 7th-10th joints of oviger are strongly serrate (Loman, fig. 124).

Gen. *Metapallene* Schimk.

1909. Schimkewitsch, loc. cit., pp. 7, 11, and table I.
1910. Hodgson, loc. cit., p. 235 (*Heteropallene*).
1938. Helfer, *SB. Ges. naturf. Fr. Berlin*, 1937, p. 172 (*Procidella*).
1952. Stock, *Bull. Inst. Roy. Sci. Nat. Belge*, xxviii, 14, p. 4 (remarks on *Procidella*).
1953. id., *Beaufortia*, IV, No. 35, p. 38 (remarks on *Procidella*).

Body robust, segmented, crurigers not widely separated. Cephalic segment broad, distally expanded, neck short. Proboscis short, without setae around mouth. Abdomen short. Ocular tubercle at base of neck. Chelifer scape 1-jointed. Palp reduced to a single joint. Oviger 10-jointed, 5th joint with or without apical process in ♂, distal joints with a single row of denticulate spines, no apical claw. Legs without auxiliary claws.

Remarks. At Lüderitzbucht, S.W.A., three specimens of a small Pycnogonid have been collected and each has been made the type of a new species by three separate authors. Although one suspects that these three specimens all belong to one and the same species, the question is into what genus this species should be put. Two new genera have been proposed.

Heteropallene Hodgson must fall into synonymy, because both Hodgson and, a year earlier, Schimkewitsch named *Pallene languida* Hoek (1881, p. 79, pl. 12, figs. 1-5) as the genotype of their genera.

M. languida is based on a ♂ with the palps reduced to mere knobs; Hodgson's specimen, sex not stated, had rudiments of palps 'each a slightly curved joint'; in *Procidella* based on a ♀ Helfer said each palp was reduced to a single conical joint, but this is really the undeveloped oviger (see his figure) which he stated was absent. In Hodgson's specimen the 5th joint of the oviger ♂ has no apical process, whereas in *M. languida* it has.

In view of these ambiguities, the two earlier Lüderitzbucht specimens can be only provisionally included in *Metapallene*, with *Procidella* as a synonym. The third specimen has recently been adequately described as *Pallenoides magnicollis* (see *infra*).

Stock (1953) considers that *Procidella gibber* may be identical with *M. dubitans*, but that as it was founded on a juvenile specimen it should be ignored.

Metapallene dubitans (Hodgson)

Fig. 14*a*

1910. Hodgson, loc. cit., p. 226, fig. 4 (distal joints of oviger) (*Heteropallene d.*).
1938. Helfer, loc. cit., p. 172, fig. 5 (*Procidella gibber*).
1953. Stock, loc. cit., p. 38, fig. 3 (*Procidella gibber*).

Body very robust, crurigers narrowly separated, with a few small setae distally, the posterior pair very short and almost completely fused, with the short abdomen embedded between them (Hodgson) or freely projecting (Helfer's figure). Ocular tubercle low, broad, near hind margin of cephalic segment (Helfer's figure); eyes small (Hodgson), without pigment (Helfer).

Chelifer stout, scape and hand setose, finger and thumb denticulate. Oviger 4th and 5th joints longest, 5th without apical process (Hodgson's figure), 7th-10th joints with 45 (12, 10, 11, 12 in Hodgson's figure) serrate spines; no apical claw.

Legs sparsely setose; propodus with 2 large spines proximally, claw very stout, no auxiliary claws.

Length 1·5 mm. (Hodgson), 4·4 mm. (Helfer).

Locality: Lüderitzbucht (Hodgson, Helfer). Hodgson's specimen was collected by Dr. L. Schultze; Helfer's specimen was collected 18 Dec. 1903, therefore presumably also by Dr. Schultze who was in Lüderitzbucht in December 1903 (1908. Schultze, *Reise*, i, Introduction, p. vi).

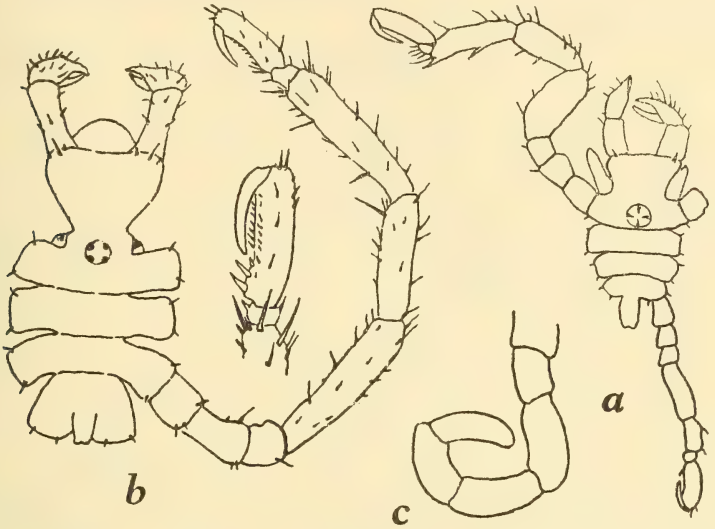


Fig. 14. *a. Procidella gibber* Helfer ♀ (after Helfer). *b, c. Pallenoides magnicollis* Stock, ♂ with propodus of leg and distal joints of oviger (spines omitted) further enlarged (after Stock).

Gen. *Pallenoides* Stock

1951. Stock, *Mem. Inst. Roy. Sci. Nat. Belge*, (2) fasc. 43, p. 8.

1952. id., *Bull. Inst. Roy. Sci. Nat. Belge*, xxviii, 14, p. 4.

Differs from *Metapallene* in having no trace of palps. Oviger without apical process on 5th joint ♂. Proboscis with a constriction near base, and setae around mouth.

Pallenoides magnicollis Stock

Fig. 14*b*, *c*

1951. Stock, loc. cit., p. 11, figs. 7-13.

Compared with *Metapallene dubitans* the following points may be noted.

Abdomen short, embedded between the last crurigers as in Hodgson's description (thus differing from Helfer's *Procidella*). Ocular tubercle farther forward than in Helfer's figure; eyes distinct. Oviger with 48 (14, 11, 10, 13) serrate spines on 7th-10th joints.

Length 1·75 mm. (♂).

Locality: Lüderitzbucht, 8 fathoms. 'Mercator' (Stock).

Remarks. The locality and the close resemblance of this specimen to the specimens described by Hodgson and Helfer, lead one to suspect that all three specimens belong to one species. However, Stock has given a good recognizable description of a species, whereas it must be admitted that *dubitans* is a *species inquirenda*. Provisionally therefore I follow Stock. Re-examination of Hodgson's and Helfer's specimens may help, but abundant fresh material is really required to solve the problem satisfactorily.

Gen. *Pallenopsis* Wilson

1881. Wilson, *Bull. Mus. Comp. Zool. Harv.*, viii, p. 250.
1902. Möbius, *D. Tiefsee Exp.*, iii, p. 184.
1908. Loman, loc. cit, p. 65.
1913. Bouvier, *2me Exp. Antarct. Fr.*, p. 107.
1915. Calman, *Terra Nova Exp.*, iii, p. 41.
1916. Loman, *Zool. Med.*, ii, p. 15.
1923. Calman, *Rec. Ind. Mus.*, xxv, p. 279.
1927. Hodgson, *D. Südpol Exp.*, xix, p. 334.
1932. Gordon, '*Discovery*' *Rep.*, vi, p. 87.
1933. Stephensen, *Medd. om Gronland*, lxxix, 6, p. 21.
1947. Hedgpeth, *Smiths. Misc. Coll.*, cvi, pp. 3, 4, 6.
1953. Stock, *Temminckia*, ix, pp. 281, 288, fig. 4 (chart).

Body segmented, or segments fused. Ocular tubercle on front margin of cephalic segment overhanging base of proboscis. Chelifer with scape 2-jointed, or undivided, finger and thumb moderate, when closed meeting or gaping. Palps reduced to tubercles. Oviger 10-jointed in ♂, in ♀ rudimentary, some of the joints sometimes fused; apical joint with numerous spine-setae, or a single row of non-serrate spines, no apical claw. Legs with auxiliary claws large or small, occasionally absent. Genital pores on last two legs in ♂, on all legs in ♀.

Key to the South African Species

A. Finger and thumb of chelifer meeting when closed.
  1. Body segmented.
    a. Auxiliary claws strong.
      i. 2nd tibia one and one-sixth to one and a quarter as long as 1st tibia. Legs (at least in ♂) conspicuously setose. *intermedia*
      ii. 2nd tibia one and one-third to one and a half as long as 1st tibia. Legs not conspicuously setose. *capensis*
    b. Auxiliary claws weak. *brevidigitata*
  2. Body unsegmented or partly segmented (*Rigona*).
    a. All segments fused. 1st tibia with a few spine-setae, some arising from small tubercles. *ovalis*
    b. 3rd and 4th segments fused. 1st tibia with numerous digitiform processes bearing spine-setae. [*crosslandi*]*
B. Finger and thumb of chelifer slender, curved, gaping when closed. *oscitans*

* *P. crosslandi* Carpenter (1910. *J. Linn. Soc. Lond.*, xxi, p. 257, pl. 27, figs. 10-20. Sudanese Red Sea) is included because it was listed by Flynn (1928, p. 6), although neither Flynn nor, so far as I can discover, any other author has recorded it from South African waters.

Pallenopsis intermedia Flynn
Figs. 15*a*, 16

? 1923. Loman, *Ark. Zool.*, xv, 9, p. 10. (*Pallenopsis* sp.)
1923. id., *Medd. Goteb. Mus.*, no. 22 (Goteb. K. Vet. Handl., xxvi), p. 3 (*fluminensis*, non Kröyer).
1928. Flynn, loc. cit., p. 20, figs. 10-12.

Body segmented. Crurigers well separated, but by spaces less than their own width. Ocular tubercle conical, ending in a sharp point, anterior eyes

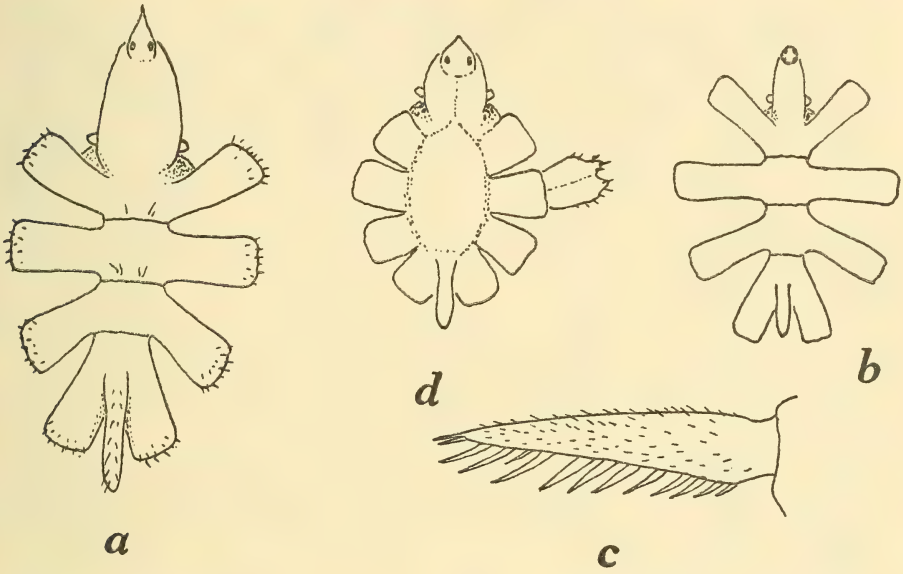


Fig. 15. *a. Pallenopsis intermedia* Flynn. *b, c. Pallenopsis brevidigitata* Möbius, with 10th joint of oviger. *d. Pallenopsis ovalis* Loman.

larger than posterior pair. Proboscis cylindrical, apically rounded. Abdomen directed more or less obliquely upwards. Spiniform setae on dorsal surface of body, scattered or more or less in paired groups of 1 or 2 on each segment, shorter and more numerous along ends of crurigers, ♀ usually less setose than ♂; abdomen with 2 rows of spines (often rubbed off).

Chelifer scape divided into 2 subequal portions, with spiniform setae on distal margin of each; finger and thumb simple, closely fitting, finger longer than thumb, glabrous (without spinose pad). Palpal tubercles distinct. Oviger 10th joint as long as 9th, oval, apically blunt, with numerous spine-setae; in ♂ 5th joint distinctly longer than 4th, and 6th conspicuously swollen.

Legs 2nd coxa subequal to 1st + 3rd, femur and 1st tibia subequal or the latter slightly the shorter, 2nd tibia slightly longer than femur; propodus cylindrical, without heel and not projecting over base of claw; auxiliary claws large, at least half length of main claw; short spiniform setae on all

joints, longer setae on 1st and 2nd tibiae arranged chiefly in 3 fringes (one mid-dorsal and one along each side), some of the longest setae slightly pinnate, ♂ more conspicuously setose than ♀. Cement duct on ventral surface of femur short but distinct in ovig. ♂.

Body incl. abdomen ♂ 13, ♀ 15, proboscis ♂ 5, ♀ 6, 2nd leg ♂ 56 (femur 13, 1st tibia 12, 2nd tibia 14), ♀ 67 mm. (resp. 17, 15, 18). Amber-coloured, darker lines on sides of legs.

Localities: Sebastian Bay, Walker Bay, Cape Barracouta and Cape Infanta, 24-40 fath. (Loman); False Bay, off Cape Infanta, and off Gneka River (see footnote, p. 85), 23-43 fath. (Flynn); False Bay and Agulhas Bank as far east as Cape St. Francis, and in the East London area, 20-90 fath. (S. Afr. Mus.).

Remarks. In the s.s. *Pieter Faure* collection there are no specimens from the area between Cape St. Francis and the East London area (of which the most westerly locality is Gneka River mouth) in spite of the very considerable amount of trawling done in and around Algoa Bay. On the trawling grounds on the Agulhas Bank between Cape Infanta and Cape St. Francis this is the commonest Pycnogonid. For this reason it seems certain that the specimens identified as *fluminensis* Kröyer (a Brazilian species) by Loman (1923) should really be assigned to *intermedia*.

Ovigerous ♂♂ were found in September, October, December, February, April, May and July; thus breeding probably occurs throughout the year.

Apparently very like *vanhöffeni* Hodgson (1927. loc. cit., p. 336, fig. 9) from the Antarctic, but the latter has a slender proboscis.

Loman (1923. *Ark. Zool.*) did not give the size of his specimen from Cape Point Lighthouse; presumably it was collected in the littoral zone like *Discoarachne brevipes* and *Nymphopsis abstrusus* (= *cuspidata*). It may perhaps be a specimen of this species.

Pallenopsis capensis Brnrd.

1946. Barnard, loc. cit., p. 62.

Body segmented. Crurigers widely separated (cf. *brevidigitata*, fig. 15*b*), each longer than median width of segment and about one and a half times as long as their own width. Ocular tubercle high, bluntly conical, anterior eyes slightly larger than posterior pair. Proboscis cylindrical, apically rounded. Abdomen horizontal or slightly oblique, about as long as last cruriger. Body with 1 or 2 short spine-setae in middle of each segment, and a few similar ones on ends of crurigers.

Chelifer scape longer than proboscis, divided into 2 subequal portions, hand as in *intermedia*, finger glabrous. Palpal tubercles conspicuous. Oviger as in *intermedia*, in ♂ 5th joint only slightly longer than 4th, 6th conspicuously swollen.

Legs 2nd coxa subequal to 1st + 3rd, femur longer than 1st tibia, 2nd tibia longer than femur, propodus without heel and not projecting over base of

claw, lower margin with 4 or 5 large spines proximally and 4-6 shorter ones distally, auxiliary claws strong, half length of main claw. Fine and short spine-setae on apices of coxal joints, scattered over femur and 1st tibia, more numerous on 2nd tibia. Cement duct on ventral surface of femur inconspicuous in ovig. ♂.

Body incl. abdomen ♂ 18, ♀ 16, proboscis ♂ 6·5, ♀ 6, 2nd leg ♂ 98 (2nd coxa 9, femur 25, 1st tibia 23, 2nd tibia 33), ♀ 75 mm. (resp. 7·5, 19, 17, 23).

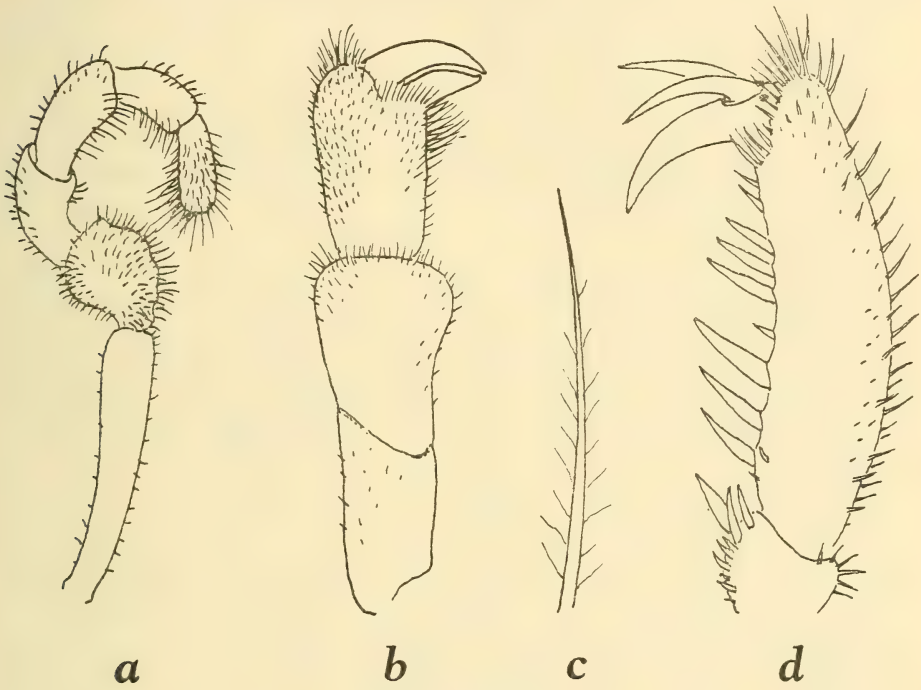


Fig. 16. *Pallenopsis intermedia* Flynn. *a.* distal joints of oviger ♂. *b.* chelifer. *c.* one of the longest tibial setae. *d.* propodus and claws of leg.

Localities: Table Mountain S. × E¾E., 58 miles, 190 fath. 1 ovig. ♂; Cape Point N. 16° E. 10 miles, 85 fath. 1 ♀; Cape St. Blaize N. × E. 73 miles, 125 fath. 1 non-ovig. ♂ (2nd leg 84 mm.). (S. Afr. Mus.)

Remarks. A ♀ specimen, off Tugela River mouth, 200 fath., resembles the above specimens in all characters mentioned, but is much more slender, resembling in fact the ♀ *brevidigitata* with which it was taken. Body incl. abdomen 10·5, 2nd leg 72 mm. (femur 17, 1st tibia 17, 2nd tibia 21); width of femur and 2nd tibia resp. 1 and ·75 mm., as compared with 2 and 1·5 mm. in the above ♀ *capensis*. Except for the auxiliary claws and the terminal joint of oviger the specimen would be identified as *brevidigitata*.

Pallenopsis brevidigitata Möbius

Fig. 15*b*, *c*

1902. Möbius, loc. cit., p. 185, pl. 27, figs. 7-13.
1928. Flynn, loc. cit., p. 19, fig. 9.
1938. Calman, *John Murray Exp.*, v, p. 160.

Body segmented. Crurigers widely separated, at least twice as long as their own width, width across 2nd pair subequal to body length (excl. abdomen). Ocular tubercle short, conical, on extreme front of cephalon. Proboscis cylindrical, apically rounded. Abdomen horizontal, not extending as far as end of last crurigers. Dorsal surface glabrous.

Chelifer scape divided, 1st portion longer than (but not 'nearly twice as long as') 2nd, hand as in *intermedia*, finger glabrous. Palpal tubercles small. Oviger in ♀ 4th and 5th joints subequal, 6th slightly expanded, more so in ♂, 10th joint slender, apically tapering, with a single row of large spines on lower margin.

Legs 2nd coxa at least twice as long as 3rd, femur and 1st tibia subequal, 2nd tibia longer, propodus without heel and not projecting over base of claw, with large spines proximally on lower margin, followed by a comb-like series of smaller spines, claw three-quarters length of propodus, slender, auxiliary claws very short. Fine and short spine-setae, chiefly in 3 rows, on femur, 1st and 2nd tibiae. Cement duct on ventral surface of femur inconspicuous in ovigerous ♂.

Body incl. abdomen ♀ 9·5, proboscis 5, 2nd coxa 5, femur 16, 1st tibia 15, 2nd tibia 18 mm.

Localities: 29° 44′ S. 31° 20′ E. (off Durban), 46 fath. (Flynn); off Gwayang River, Mossel Bay, 31 fath. 1 damaged ♀; off Tugela River mouth, 200 fath. 1 damaged ♀; off Cape Natal, 54 fath. 2 ovig. ♂♂, 2 ♀♀ (S. Afr. Mus.).

Distribution. Off Dar-es-Salaam, 404 metres; Zanzibar area, 421-457 metres.

Remarks. All the South African Museum specimens are more or less damaged.

Calman refers to several discrepancies in Möbius's figures. Another inaccuracy occurs in fig. 7 which shows an extra (tibial) joint in the 2nd legs.

Pallenopsis (*Rigona*) *ovalis* Loman

Fig. 15*d*

1908. Loman, loc. cit., p. 68, pl. 10, figs. 137, 138.
1923. Calman, loc. cit., p. 284, fig. 11.
1928. Flynn, loc. cit., p. 23.
1953. Stock, loc. cit., fig. 3 *a* (chart).

Body unsegmented. Crurigers contiguous at their bases. A more or less distinct median longitudinal rib on cephalon. Ocular tubercle short, conical,

anterior eyes scarcely larger than posterior pair. Proboscis cylindrical. Abdomen pointing obliquely upwards or nearly vertical. Dorsal surface glabrous.

Chelifer with scape undivided, hand as in *intermedia*, finger with a spinose pad on basal half (cf. *alcocki* Calman, loc. cit., fig. 9 *c*). Palpal tubercles distinct. Oviger in ♂ 5th joint slightly shorter than 4th, 6th slightly swollen, 10th joint as in *intermedia*.

Legs 1st coxa with 2 small spiniferous projections on upper apex, 2nd coxa distinctly longer than 3rd, femur and 1st tibia subequal or the latter slightly

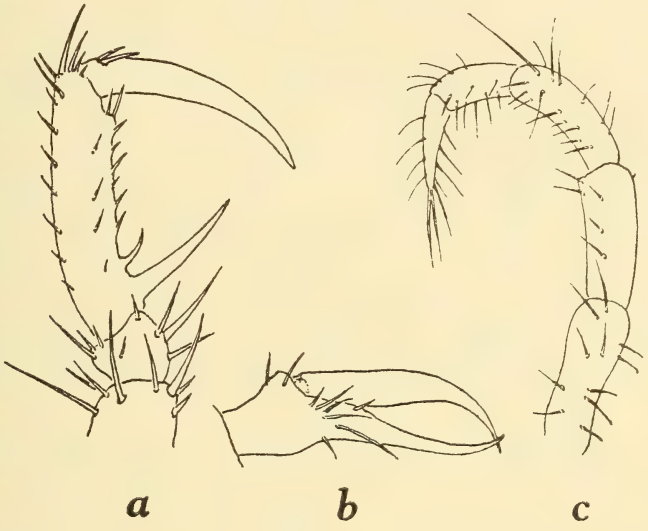


Fig. 17. *Pallenopsis oscitans* (Hoek). *a*. tarsus, propodus and claw of leg. *b*. hand of chelifer. *c*. distal joints of oviger ♀.

shorter, both with a small spiniferous process on upper apex, 2nd tibia longer than femur or 1st tibia and more slender; propodus, claw and auxiliary claws as in *intermedia*. Numerous short spine-setae on joints, and some longer ones arising from small tubercles on ventral surface of femur conspicuous in ovigerous ♂.

Body incl. abdomen 6, proboscis 3, femur 5·5, 1st tibia 5, 2nd tibia 6 mm. Another specimen, of which the body is damaged, has femur 7·5, 1st tibia 7, and 2nd tibia 8 mm.

Localities: 10 miles SE. of East London, 47 fath. 1 ovig. ♂; Algoa Bay, 25 fath. 1 ? ♂ (S. Afr. Mus.).

Distribution. East Indies, Andaman Is., Ceylon.

Pallenopsis oscitans (Hoek)

Fig. 17

1881. Hoek, *Rep. H.M.S.* '*Challenger*', iii, p. 89, pl. 13, figs. 1-5. (*Phoxichilidium o.*)

Body segmented. Crurigers well separated (by about their own width), each slightly longer than median width of body. Ocular tubercle low and rounded, eyes not traceable. Proboscis cylindrical, slightly tapering distally, apically rounded. Abdomen elongate, slender, slightly clavate, oblique. A few fine and rather long setae on the crurigers and abdomen.

Chelifer with scape a little longer than proboscis, 2nd joint slightly shorter than 1st, hand nearly as long as 2nd joint, palm short, finger and thumb distally slender, curved, when closed gaping, apices crossed. Palpal tubercles moderately large but inconspicuous. Oviger in ♀ 5th joint a little longer than 4th, 6th not swollen, apical joint slender, with long fine setae.

Legs 2nd coxa subequal to 1st + 3rd, femur very slightly longer than 1st tibia, 2nd tibia longer than femur, propodus without heel but with a very large spine basally, followed by smaller ones on lower margin, apex not projecting over claw, claw strong, reaching almost to base of propodus and forming with the large spine on the latter a prehensile 'chela', auxiliary claws short and weak. Fine setae on all joints, becoming more numerous on femur and 1st and 2nd tibiae but not forming dense fringes as in *intermedia*, nor a thick fur.

Body incl. abdomen 11·5, abdomen 4·75, proboscis 5, 2nd leg 47 mm. (2nd coxa 4, femur 11, 1st tibia 10, 2nd tibia 14 mm.).

Locality: off Cape Point, N. 86° E., 43 miles, 900-1,000 fath. 1 ♀ (S. Afr. Mus.).

Distribution. 38° 25′ N., 35° 80′ W. (Azores), 1,675 fath.

Remarks. Although the proboscis is more like that of *pilosa* as described by Hoek, and the legs are somewhat more hairy, there is little doubt that this specimen should be identified as *oscitans*; the apical joint of the oviger and the propodus of the legs, with its enormous basal spine, correspond with Hoek's figures. The ocular tubercle shows no trace of eyes, but the specimen has suffered desiccation.

Differs from *longirostris* Wilson in the apical joint of the oviger, and propodus; and from *tritonis* Hoek (syn. *holti* Carp.) in the same features and also in the relative lengths of palm and fingers of chelifer (see: Carpenter, *Fish. Irel. Sci. Invest.*, 1905, pl. 1, figs. 3, 4, 6, *holti*; I have not seen Hoek's 1883 paper).

P. calcanea Steph. 1933 differs in having the ovigers closer together, a much larger ocular tubercle, a shorter abdomen, a different apical joint on the oviger, propodus of legs with 2 moderate-sized basal spines on a distinct heel, and no auxiliary claws.

Pallenopsis sp. Gordon

1932. Gordon, loc. cit., p. 91, fig. 45.

A young specimen from 35° 14′ S., 6° 49′ E., pelagic, which Stephensen (loc. cit., p. 24) suggests may be the same as his *calcanea* (loc. cit., p. 21, fig. 5) from Greenland. Gordon's record scarcely comes within the South African area.

Gen. *Hannonia* Hoek

1881. Hoek, *Rep. H.M.S.* '*Challenger*', iii, p. 92.
1891. Sars, *Norw. N. Atl. Exp. Pycnogonida*, p. 6.
1902. Pocock in Lankester, *Encycl. Brit.*, 10th ed. Arachnida (type of a separate family).
1904. id., *Q. J. Micr. Sci.*, n.s. xlviii, p. 225 (reprint of 1902 article).
1904. Loman, *Zool. Jahrb. Abt. Syst.*, xx, p. 385 (systematic position).
1905. Cole, *Ann. Mag. Nat. Hist.*, (7) xv, pp. 408, 410 (systematic position).
1908. Loman, loc. cit., pp. 15, 16, synopsis facing p. 19 (systematic position).
1909. Thompson, *Cambr. Nat. Hist.*, iv, p. 533 (systematic position).
1927. Calman, *Trans. Zool. Soc. Lond.*, xxii, p. 410 (systematic position).
1947. Hedgpeth, *Smiths. Misc. Coll.*, cvi, p. 4.

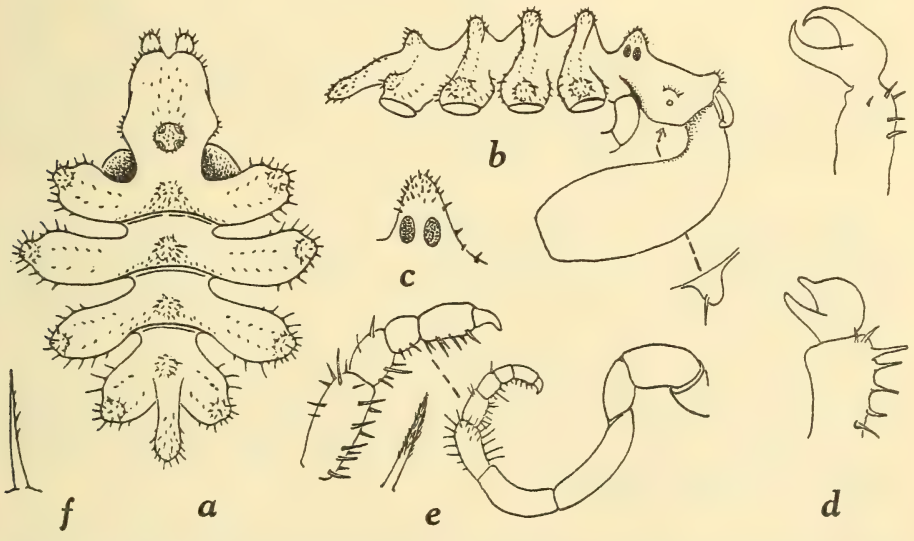


Fig. 18. *Hannonia typica* Hoek. *a.* dorsal view. *b.* lateral view, with tubercle (? vestigial palp) further enlarged. *c.* ocular tubercle of adult, from right side. *d.* chelifer of juvenile (above) and adult (below). *e.* oviger ♂ with distal joints further enlarged. *f.* spine from leg.

Body stout, segmented, crurigers narrowly separated. Proboscis on narrow stalk, swollen (sac-like), deflexed and bent beneath body. Chelifers rudimentary, 2-jointed, more or less chelate. Palps absent (see remarks). Ovigers

in both sexes, 10-jointed, not modified in ♂, with apical claw. Legs stout, tarsus very short, no auxiliary claws. Genital pores on last 2 legs in ♂, on all legs in ♀. Eggs in a single cake-like mass held by both ovigers. Femoral cement glands ♂ seemingly absent.

Remarks. An endemic South African genus with one species, whose systematic position has been the subject of much discussion.

The presence of the minute papilla, between the bases of the chelifers and ovigers, discovered by Calman (1927) is herewith confirmed. I have not, however, seen any indication in my specimens of its being 2-jointed. It is present in both sexes, lies just below a small spiniferous process on the side of the cephalic segment, and has a subapical spinule. It occurs in a juvenile specimen, 2·5 mm. body length (as measured below), but is neither more nor less feebly developed than in adults.

Calman's suggestion that this papilla represents the last vestige of a palp would seem to bring the genus into an intermediate position in the series *Böhmia-Rhynchothorax-Pycnogonum*, where Loman in his conspectus (1908) placed it. Calman did not accept Bouvier's suggestion that *Hannonia* was an Ammotheid. Hedgpeth (1947) places it in the *Pallenidae*.

Hannonia typica Hoek

Fig. 18

1881. Hoek, loc. cit., p. 92, pl. 14, figs. 8-11.
1904. Loman, loc. cit., p. 383, pl. 14, figs. 12-15.
1910. Hodgson, *Schultze. Reise*, iv, p. 227.
1923. Loman, *Ark. Zool.*, xv, 9, p. 7.
1927. Calman, loc. cit., p. 410.

Body compact, the posterior margins of the segments forming transverse arched ridges, each with a median boss. Crurigers separated by less than half their own width, their length subequal to or a little longer than median width of segments, each with a knob on dorsal apex. Ocular tubercle moderately high, bluntly conical, eyes distinct. Proboscis very much swollen beyond the comparatively narrow basal stalk. Abdomen extending beyond last crurigers, clavate, bent slightly downwards. Short spinules on the transverse ridges and bosses, crurigers, abdomen, top of ocular tubercle, and front and sides of cephalic segment.

Chelifers never quite vestigial, but variable, the chela sometimes well developed and apparently with mobile finger. Ovigers similar in both sexes, but in ♂ the distal joints rather stouter and more spinose, the spines minutely setulose.

Legs stout, 2nd coxa slightly longer than either 1st or 3rd, on last 2 legs in ♂ with a process on ventral apex, more conspicuous on 3rd than on 4th leg, femur slightly longer than either of the tibiae, which are subequal, tarsus narrower than 2nd tibia, propodus without heel, with numerous small but no

strong spines on lower margin, claw about one-third, or a little less, length of propodus. Numerous spines on the joints, arising from slightly raised tubercles, particularly distinct on dorsal surface of 2nd tibia, and especially in juveniles. Femoral cement glands ♂ seem to be absent; neither Loman (1904, p. 384) nor myself have found any.

Body (base of chelifers to base of abdomen) 5, proboscis 4, abdomen 2, 2nd leg femur 2·5, 1st and 2nd tibiae 2 mm.

Localities: Cape Town (Hoek, Loman); Lüderitzbucht (Hodgson); Port Natal (Durban) (Loman); Saldanha Bay and Melkbos Strand (Table Bay) littoral, Mossel Bay, 20 fath. (S. Afr. Mus.).

Remarks. Not nearly so common as *Discoarachne brevipes*; in the course of a considerable amount of shore-collecting at Sea Point (Table Bay) I have never found a specimen there, although on the other side of Table Bay (Melkbos Strand) it is moderately common.

Two ovigerous ♂♂ were collected at Saldanha Bay in September.

Fam. Phoxichilidiidae

1908. Loman, *Siboga Exp.* monogr., xl, p. 62, conspectus facing p. 19. (*Phoxichilidae.*)
1913. Schimkewitsch, *Zool. Anz.*, xli, p. 611.
1947. Hedgpeth, *Smiths. Misc. Coll.*, cvi, p. 4.

Octopodous. Body segments free or fused. Chelifers well developed, chelate. Palps rudimentary, reduced to tubercules or absent. Ovigers in ♂ only, 5-9-jointed, with simple spines. Legs usually with auxiliary claws.

Key to South African Genera

1. Cephalic segment short, without neck. Oviger 5-jointed. *Phoxichilidium*
2. Cephalic segment with distinct neck; ocular tubercle near front margin. Oviger 6-jointed. *Anoplodactylus*

Gen. *Phoxichilidium* M.-Edw.

1836. Johnston, *Miscell. Zool.*, i, Mag. Zool. & Bot., i, p. 378. (*Orithyia*, preocc. Fabr. 1798.)
1840. Milne-Edwards, *Hist. Nat. Crust.*, (Roret's Suite à Buffon. Crust.), iii, p. 535.
1881. Hoek, *Rep. H.M.S.* '*Challenger*', iii, p. 31 (part).
1908. Loman, *Siboga Exp.* monogr., xl. pp. 63, 64.

Body segments free. Ocular tubercle on anterior portion of cephalic segment, in advance of 1st crurigers. Chelifers with scape undivided, finger and thumb gaping when closed. Palps completely absent. Ovigers (♂ only) 5-jointed. Legs with minute auxiliary claws. Genital pores on last 2 legs in ♂, on all legs in ♀.

Phoxichilidium capense Flynn.

1928. Flynn, loc. cit., p. 27, figs. 15, 16.

Body stout, especially the cephalic segment and 1st pair of crurigers. Crurigers narrowly separated (the 3rd and 4th pairs more widely separated). Ocular tubercle obtusely conical, eyes distinct. Abdomen rather short and stout, erect. Proboscis stout, apically truncate.

Chelifer rather stout, as long as proboscis, hand (palm) longer than broad, finger and thumb curved, inner margins entire.

Legs (♀) stout, 2nd coxa with strong conical projection (bearing the genital pores) on ventral apex, femur longer than either of the tibiae, which are subequal (text; according to the measurements and figure the 1st tibia is slightly the longer), propodus with strong spines on heel, lower margin with about 12 spines, claw strong, auxiliary claws minute.

Body 3·75, proboscis 3·18, femur 5·17, 1st tibia 4·31, 2nd tibia 3·75 mm. (Flynn).

Locality: Hout Bay, west coast of Cape Peninsula, depth not given (Flynn). Known from a single ♀.

Gen. *Anoplodactylus* Wilson

1821. Say, *J. Ac. Nat. Sci. Philad.*, ii, p. 59. (*Anaphia.*)
1878. Wilson, *Amer. J. Sci.* (3), xv, p. 200.
1908. Loman, loc. cit., p. 71.
1908. Norman, *J. Linn. Soc. Lond.*, xxx, p. 202. (*Anaphia.*)
1912. Loman, *Bull. Inst. ocean. Monaco*, no. 238, p. 7. (subgen. *Halosoma* Cole).
1923. Calman, *Rec. Ind. Mus.*, xxv, p. 285.
1927. id., *Trans. Zool. Soc. Lond.*, xxii, pp. 405, 407.

Body segments free. Ocular tubercle on front margin of cephalic segment overhanging base of proboscis. Chelifer with scape undivided, finger and thumb either stout and meeting when closed, or slender and gaping. Palps completely absent. Oviger 6-jointed, ultimate and penultimate joints feebly developed, without strong spines, no apical claw. Legs with or without auxiliary claws. Genital pores on last 2 legs in ♂, on all legs in ♀ (but see Calman, 1927). Femoral cement glands ♂ on femur usually single, tubular (numerous and cribriform in *cribellatus* Calman, 1923).

Remarks. Wilson's genus is said to be the same as *Anaphia* Say, but this synonymy has not been generally adopted.

Möbius's South African species *spinosus* has been transferred to *Parapellene*.

Key to the South African Species

1. Hand of chelifer stout, finger and thumb short, meeting when closed. ***aculeatus***
2. Hand of chelifer slender, finger and thumb long, slender, gaping when closed. ***pelagicus***

Anoplodactylus aculeatus Möbius

1902. Möbius, *D. Tiefsee Exp.*, iii, p. 188, pl. 28, figs. 1-7.

Body slender. Crurigers separated by intervals not greater than their width, their length subequal to median width of segments. Ocular tubercle conical, sharply pointed, eyes distinct. Abdomen short, vertical.

Chelifer scape stout, longer than proboscis, with conical process on dorsal apex, hand stout, finger and thumb short, stout, meeting when closed.

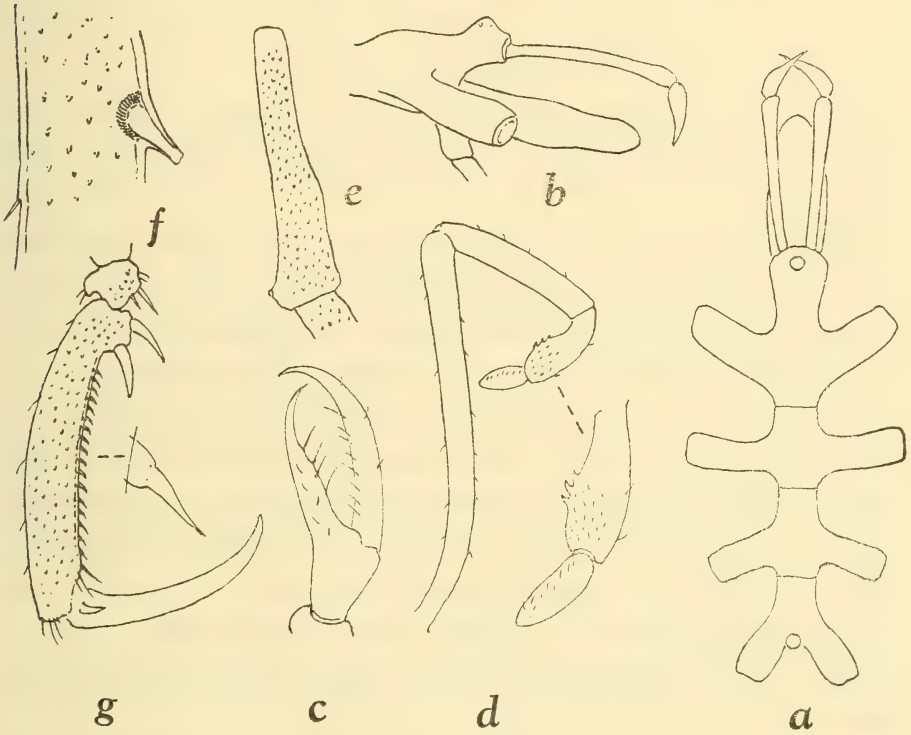


Fig. 19. *Anoplodactylus pelagicus* Flynn. *a.* dorsal view. *b.* lateral view of cephalic segment. *c.* hand of chelifer. *d.* 3rd–6th joints of oviger ♂ with 5th and 6th joints further enlarged. *e.* 2nd coxa of leg with genital pore. *f.* cement gland on femur. *g.* tarsus, propodus and claw of leg.

Legs long, 2nd and 3rd coxae with a spiniform process on ventral apex, femur longer than 1st tibia, both joints with a spiniform process on dorsal apex, 1st tibia also with a spine at end of basal third of its length, 2nd tibia longer than femur (subequal in fig. 1), sparsely setose, propodus with 4 large spines on basal heel and 8 smaller ones on lower margin, claw strong, no auxiliary claws.

Body, excl. abdomen, about 8 mm. (according to Möbius's fig. 1).

Locality: Agulhas Bank, 126 metres, 2 ♀♀ (Möbius).

Remarks. This species, based on the female only, is very like *insignis* (Hoek) 1881, based on the ♂, from Bahia, S. America. Both have projections on the chelifer scape, 2nd and 3rd coxae, femur and 1st tibia; but *insignis* has also a process on the 1st coxa, and the crurigers are a little more widely separated. Cf. also *insignis* subsp. *bermudensis* Cole (1904. *Proc. Boston. Soc. Nat. Hist.*, xxxi, p. 325, pl. 20, and pl. 22, figs. 21-29).

Anoplodactylus pelagicus Flynn

Fig. 19

1928. Flynn, loc. cit., p. 25, fig. 14.

Body slender. Crurigers separated by intervals greater than their width, their length greater than median width of segments. Ocular tubercle low and flattened or rounded on top, eyes small, unpigmented. Abdomen not very long, erect.

Chelifer scape slender, extending a little beyond tip of proboscis, hand with long slender finger and thumb, curved and gaping when closed, inner margins with a few spine-setae. Oviger 3rd joint longer than 2nd, both elongate, 5th somewhat swollen, with a patch of setae distally and 3 small recurved denticles on inner margin, 6th shorter than 5th, ovate, setose on inner margin.

Legs long, slender, ventral apex (with genital pore) of 2nd coxa of last 2 legs ♂ slightly more prominent than on first 2 legs; femur and 1st and 2nd tibiae subequal, 2nd tibia in the S.A.M. specimen not so much more slender than 1st tibia as is shown in Flynn's figure, and the propodus not so noticeably thicker, 2 strong spines on basal heel and about 18 small spines on inner margin, claw strong, auxiliary claws very small (scarcely visible except when claw is seen in dorsal or ventral view); tibiae finely and sparsely setose. Cement gland on dorsal surface of femur tubular, not very long.

Body, excl. abdomen, ♂ 2·5, proboscis 1·5, femur (also 1st and 2nd tibiae) 2·75 mm. Flynn's measurements are slightly greater, except the leg measurements of ♂.

Localities: off Port Natal (Durban), pelagic (Flynn); Cape Point NE. × E ¾ E. 28 miles, 300 fath. 1 ♂ (S. Afr. Mus.).

Remarks. Flynn refers (loc. cit., p. 3) to the capture of 7 specimens in a tow-net, but in the absence of further data it does not follow that they were from the surface or even pelagic: the tow-net may have been attached to the beam of the trawl. The single specimen in the South African Museum was taken together with 'Alcyonarians' (s.s. *Pieter Faure* log-book, P.F. no. 18159).

'*Pallene*' *lappa* Böhm

1879. Böhm, *MB. K. Ak. Wiss. Berlin*, p. 182. Ibo, Mozambique.
1881. Hoek, loc. cit, p. 31.

1910. Hodgson, loc. cit., p. 225.
1912. Loman, *Bull. Inst. ocean. Monaco*, no. 238, p. 6.
1928. Flynn, loc. cit. p. 4.

Hoek and Hodgson considered that Böhm's specimen was immature, with not fully developed ovigers. Loman, with whom Flynn agrees, included it in *Halosoma*, a subgenus of *Anoplodactylus*. Loman gives as one of the characters of *Halosoma*: ovigers 6-jointed; but Flynn says Böhm's specimen has 7-jointed ovigers.

The locality is, strictly speaking, outside (12° S.) the South African area, but the record is included here as Flynn has referred to it.

Fam. Endeidae

1908. Norman, *J. Linn. Soc. Lond.*, xxx, p. 231.
1932. Gordon, '*Discovery*' *Rep.*, iii, p. 93.

See generic characters.

Gen. *Endeis* Phil.

1843. Philippi, *Arch. Naturg. Jahrg.*, ix, p. 175.
1902. Möbius, *D. Tiefsee Exp.*, iii, p. 195. (*Phoxichilus*, non Latr.)
1902. Stebbing, *Knowledge*, xxv, p. 187. (*Chilophoxus*.)
1908. Loman, *Siboga Exp.* monogr., xl, p. 77. (*Phoxichilus*, non Latr.)
1908. Norman, loc. cit., p. 231.
1915. Calman, '*Terra Nova*' *Exp. Rep.*, iii, p. 48.
1923. id., *Rec. Ind. Mus.*, xxv, p. 290.

Octopodous. Body segmented. No chelifers. No palps. Ovigers only in ♂, 7-8-jointed, without apical claw, with simple spines. Legs with auxiliary claws.

Key to the South African Species

1. Crurigers narrowly separated. Propodus of legs apically produced over base of claw. *clipeatus*
2. Crurigers well separated. Propodus of legs not apically produced. *mollis*

Endeis clipeatus (Möbius)
Fig. 20

1902. Möbius, loc. cit., p. 196, pl. 30, figs. 6-10. (*Phoxichilus clipeatus* [*sic*]; *clypeatus* on plate.)
1928. Flynn, loc. cit., p. 29.

Body rather stout, cephalic segment with front margin feebly bilobed, with a minute chitinous point on each lobe in the ♂ specimen (possibly representing the remnants of the chelifers). Crurigers narrowly separated, about as long as median width of segments. Ocular tubercle short, conical. Abdomen about as long as last crurigers, apically notched. Proboscis stout, swollen in middle, apex truncate. Body and crurigers glabrous. Whole surface of body and appendages closely and minutely 'pitted' (? glandular).

Oviger 8-jointed, but articulation between 7th and 8th joints obscure, 6th joint with a variable number of more or less recurved spines on inner margin.

Legs, femur and 2nd tibia subequal, 1st tibia slightly shorter, propodus apically produced in a cylindrical process over base of the claw, claw and auxiliary claws strong. Glabrous. Femoral cement glands about 40 in a single row.

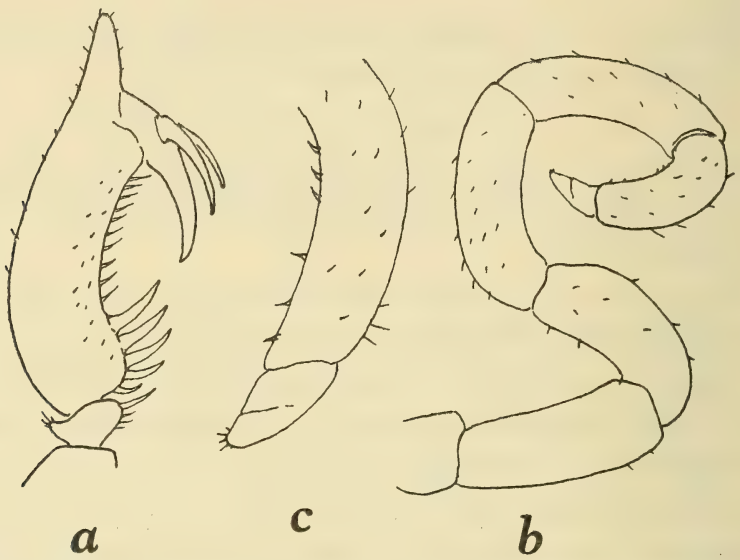


Fig. 20. *Endeis clipeatus* (Möbius). *a.* tarsus, propodus and claw of leg. *b.* oviger ♂. *c.* 6th and 7th–8th joints of same further enlarged.

Body (♂) incl. abdomen 4, proboscis 3, 2nd leg 20 mm. (femur 5, 1st tibia 4·25, 2nd tibia 5·25 mm.). Yellowish, a red line down middle of body and red longitudinal lines on legs.

Localities: St. Francis Bay, shallow water (Möbius); off west coast of Cape Peninsula (Flynn); St. James, False Bay, littoral. 1 juv.; west coast of Cape Peninsula, littoral; False Bay, 10 fath. and Algoa Bay, 52-63 fath. 2 ♀♀, 1 ♂ (S. Afr. Mus.).

Endeis mollis (Carp.)

Fig. 21

1894. Carpenter in Herdman's *Ceylon Pearl Fish. Rep. Suppl. Rep.*, xiii, p. 182, pl. figs. 1-7.
1907. id., *Trans. Linn. Soc. Lond.* (2) zool. xii, p. 98.
1923. Calman, loc. cit., p. 293, fig. 16.
1927. id., *Trans. Zool. Soc. Lond.*, xxii, p. 408.
1938. id., *John Murray Exp.*, v. p, 160.
1951. Stock, *Mem. Inst. Roy. Sci. Nat. Belge.* (2) fasc. 43, p. 17, figs. 23, 24.

Body rather slender, cephalic segment with 2 rounded lobes in front over base of proboscis (possibly representing the chelifers). Crurigers separated by more than their own width, slightly longer than median width of segments. Ocular tubercle short, conical. Abdomen slightly longer than last crurigers, oblique. Proboscis stout, swollen in middle, apex truncate. Body and crurigers glabrous. Whole surface of body and appendages closely 'pitted' (? glandular).

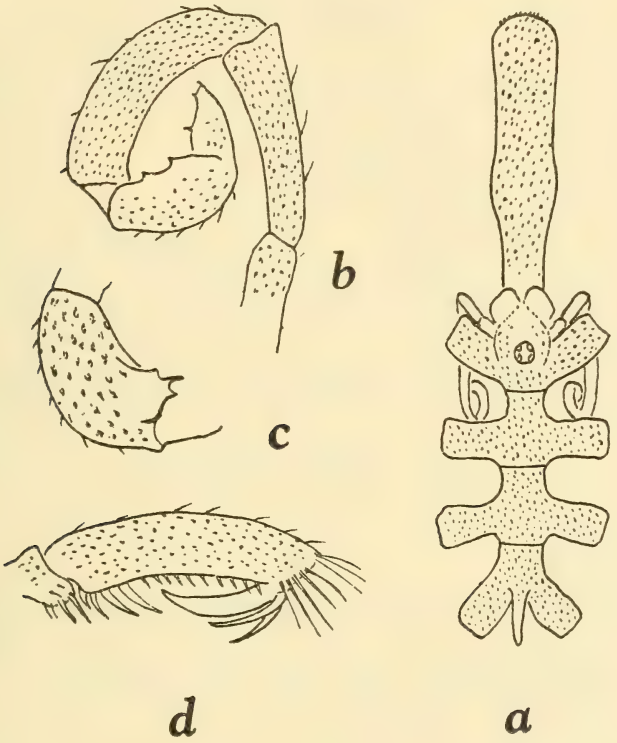


Fig. 21. *Endeis mollis* (Carp.). *a*. dorsal view. *b*. inner view of 4th–7th joints of oviger ♂. *c*. outer view of 6th joint of same. *d*. propodus and claw of leg.

Oviger 7-jointed, on a basal knob, penultimate joint swollen, inner margin on inner side (as coiled up *in situ*) with 2 recurved spinules, outer surface with a broad lobe bearing 3 spinules, apical joint with 1 spinule on inner margin and 2-3 on apex.

Legs, femur slightly longer than 1st tibia, smooth, cylindrical, with one fairly strong spine-seta and 2 smaller setae on dorsal apex, 2nd tibia slightly longer than femur, 1st and 2nd tibiae with a few scattered setae, propodus apically truncate, not produced over base of claw. Femoral cement glands about 23, in a single row.

Body (tip of proboscis to tip of abdomen) ♂ 7·5, 2nd leg 18 mm. (femur 4·5, 1st tibia 4, 2nd tibia 4·75 mm.).

Locality: off Durnford Point, Zululand, 13 fath. 1 non-ovig. ♂, 1 ♀ (S. Afr. Mus.).

Distribution. Ceylon, Maldives, Arabian coast, Indian coasts, Nicobars, Christmas Island, Tonga Is.

Remarks. Apparently resembles the typical form. Calman records some variations in the shape of the femur, number of cement glands, etc.

Fam. Ammotheidae

1908. Loman, *Siboga Exp.* monogr., xl, conspectus facing p. 19 and p. 49.
1909. Thompson, *Cambr. Nat. Hist.*, iv, p. 534.
1913. Schimkewitsch, *Zool. Anz.*, xli, p. 612.
1947. Hedgpeth, *Smiths. Misc. Coll.*, cvi, p. 4.

Octopodous. Body extended or compact, segmented or the segmentation more or less obsolete. Proboscis more or less movable, directed forwards or downwards. Chelifers reduced, chelate in juvenile, but rudimentary in adult. Palps 6-10-jointed (*Nymphonella* 17-20). Ovigers in both sexes, (9)-10-jointed, with or without apical claw, with simple or serrate spines. Legs usually with auxiliary claws. Genital pores on all legs in ♀, on last 2 legs in ♂. Eggs in several masses.

Key to the South African Genera

I. Proboscis fusiform or subcylindrical, directed forwards or downwards.
  A. Palp 7-jointed. — *Böhmia*
  B. Palp 8-jointed. — *Achelia*
  C. Palp 9-jointed.
    1. All body segments fused. Crurigers narrowly separated. — *Nymphopsis*
    2. Body segments, at least the anterior ones, distinct. Crurigers widely separated.
      a. Legs with auxiliary claws. Ocular tubercle very elongate. — *Kyphomia*
      b. Legs without auxiliary claws. — *Ainigma*
II. Proboscis flask-shaped, curving downwards. — *Austroraptus*

Gen. *Böhmia* Hoek

1881. Hoek, *Rep. H.M.S.* '*Challenger*', iii, p. 24.
1902. Möbius, *D. Tiefsee Exp.*, iii, p. 189.
1908. Loman, loc. cit., conspectus facing p. 19.
1947. Hedgpeth, loc. cit., p. 4 (in list of genera).

Body stout, segmented, arched. Crurigers narrowly separated. Proboscis elongate, conical, inserted ventrally and bent under cephalic segment. Chelifers rudimentary, 2-jointed, chelate, inserted ventrally and invisible from above. Palps 7-jointed. Ovigers 10-jointed, with apical claw, not modified in ♂. Legs stout, tarsus very short, no auxiliary claws. Genital pores on all legs in ♀, on last leg in ♂. Pale non-spinose (or almost so) areas on dorsal surface of all femora in ♂. Eggs carried in a single cake-like mass.

Remarks. An endemic South African genus, with two species.

Flynn (loc. cit.) claimed to have found genital pores on the *dorsal* surface of the 2nd coxa of all the legs; this position would be distinctly unusual, in fact unique, if it were correct. My own observations disprove this; the genital pores are in the normal ventral position, and on the last leg only (as in *Pycnogonum*).

Key to the South African Species

1. Smaller species. Legs not more than twice as long as body. Tubercles distinct, but moderate. Cephalic segment parallel-sided or widening in front. Femur 2 (♀) or 3 (♂) times as long as wide. *chelata*
2. Larger species. Legs about four times as long as body. Cephalic segment narrowing in front. Femur (♂) four and a half to five times as long as broad. *tuberosa*

Böhmia chelata (Böhm)
Fig. 22

1879. Böhm, *MB. Ak. Wiss. Berlin*, p. 192, pl. 2, figs. 5-5*d*. (*Pycnogonum c.*)
1881. Hoek, loc. cit., p. 24.
1902. Möbius, loc. cit., p. 189, pl. 28, fig. 15 (front of cephalic segment).
1909. Schimkewitsch, *Zool. Anz.*, xxxiv, p. 3, fig. 1 A and C (chelifer and palp).
1915. Calman. '*Terra Nova*' *Exp. Rep. Zool.*, iii, p. 13 (oviger mentioned).
1928. Flynn, loc. cit., p. 30, fig. 17.

Body strongly arched, median portion of each segment raised into a rounded boss, similar to the ocular tubercle, the boss on 4th segment smaller than the others, all sharper and more pronounced in ♂ than ♀; cephalic segment nearly parallel-sided in ♀ with somewhat prominent rounded antero-lateral corners, in ♂ sides diverging forwards, antero-lateral corners prominently and subacutely produced. Crurigers narrowly separated, the last pair a little more widely separated; dorsal apices tending, especially in ♂, to form small nodiform bosses. Ocular tubercle conical apically rounded in ♀, subacute in ♂, eyes not conspicuous. Proboscis inserted ventrally, base wide, quickly tapering to a subacute apex, projecting downwards or bent under cephalic segment. Abdomen projecting beyond last crurigers, clavate, deflexed. Whole surface reticulate, with short spinules arising from conical bases, including ocular tubercle.

Chelifer scape stout, spinose, chela rather slender, but well developed and apparently functional (finger mobile). Palp 4th joint much the longest, 5th small, 6th and 7th rather slender, more so in ♂ than ♀, spinose.

Oviger 5th joint longer than 4th, last 4 joints with rather strong spines on inner margins, mostly in pairs, resp. about 8, 5, 4, 5 pairs, sometimes fewer in ♂, inner apex of 10th joint in ♂ with a single unguiform process resembling but smaller than the apical claw; alike in both sexes except for this latter feature.

Legs stout, stouter in ♀ than ♂, decreasing in length backwards, the 3 coxae subequal in length, but 2nd somewhat stouter in ♀ owing to the genital pores,

on last leg in ♂ a little longer than either of the other two; femur longer than 1st tibia on all legs in ♀, subequal to it in ♂ or on the 1st leg slightly shorter, about twice as long as wide in ♀, about 3 times in ♂, 2nd tibia subequal to femur in ♀, slightly longer in ♂, tarsus and propodus together a little shorter than 1st tibia, propodus without heel, with several short but stout spines along lower margin, claw about half length of propodus. Surface reticulate like that of the body, and spinulose. At dorsal apex of 2nd coxa of all legs in *both sexes*

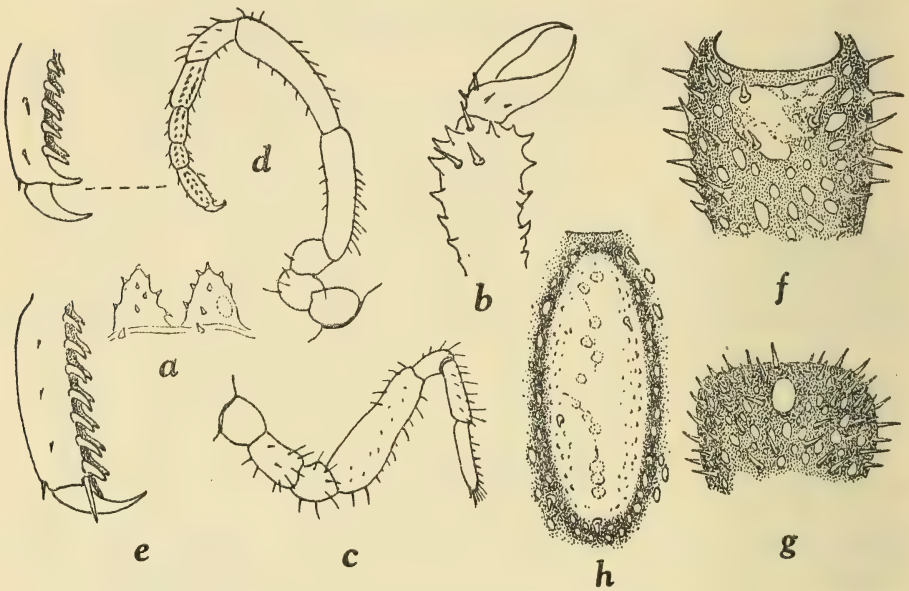


Fig. 22. *Böhmia chelata* (Böhm). *a.* abnormal double ocular tubercle. *b.* chelifer. *c.* palp. *d.* oviger ♂ with apex of 10th joint and claw further enlarged. *e.* apex of 10th joint and claw of oviger ♀ *f.* dorsal apex of 2nd coxa (♂♀) of leg. *g.* ventral apex of 2nd coxa of last leg ♂. *h.* dorsal surface of femur of ♂ with pale patch ('cement gland').

a small pale spot. Femoral cement gland in ♂ an elongate oval pale spot on dorsal surface on each leg.

Eggs in a single cake-like mass.

Body (from front margin of cephalic segment to base of abdomen) ♂♀ 5·5, proboscis 2·5, abdomen ♂ 2, ♀ 1·5, 1st leg (without claw) approx. ♂ 10, ♀ 8·5 mm. Amber-coloured, or reddish-brown, sometimes bicoloured dark and light, with dark bands on legs (see under Remarks).

Localities: (loc. ? Böhm); St. Francis Bay, shallow water (Möbius); off Ball Point, Cape Town (Flynn); False Bay, littoral to 12 fath.; off Cape St. Blaize, off Knysna, and off Cape St. Francis, 25-70 fath; off Gt. Fish Point, Keiskamma, East London and Cape Morgan, 33-77 fath.; off Umtwalumi and Umhloti River mouths (Natal), 25-40 fath.; off Tugela River and Durnford Point (Zululand), 13-47 fath. ♂♂, ♀♀, juv. (S. Afr. Mus.).

Remarks. On two points my observations differ from those of Flynn. The more important is the position of the ♂ genital pores. Although Flynn had both ♂♂ and ♀♀ he did not notice that the pale spot on *dorsal* apex of 2nd coxa occurred in both sexes. It is obviously not a genital pore. When the integument of this joint is treated with a clearing reagent the pale spot is seen to be due to feeble chitinization; elsewhere the integument is strongly but not uniformly chitinized, producing a reticulate pattern (fig. 22*f*). Further proof that these pale spots are not openings is shown by the fact that spines may be present on them as elsewhere on the integument.

The true genital pore in ♂ is a very definite opening, in the normal position on the *ventral* surface of the 2nd coxa, and it occurs only on the last leg.

On the upper surface of the femur of all the legs is another pale patch, oval in shape and very conspicuous, but which occurs only in the ♂. Flynn calls this the cement gland, and it probably is; but I have failed to find the longitudinal slit-like opening described by him (cf. also under *tuberosa*). The paleness of the patch is due to lack of chitinization, as in the case of the spot on 2nd coxa; and there are minute spinules and even a few spines on its surface, if not centrally at least marginally. Some small circular structures (fig. 22*h*) may be the actual cement glands, but I cannot detect any individual or communal pores.

The chelate termination of the oviger was mentioned incidentally by Calman (1915), but he did not state that it is found in the male only.

This species is common on branching Alcyonarians (*Gorgonia*, *Melitodes*, *Spongioderma*, *Villogorgia*, *Wrightella*, etc.) but I have also found it in the littoral zone among Hydroids and Polyzoa.

With such a typically warm-water distribution (Zululand southwards), Flynn's record 'Ball Point, Cape Town' is a little surprising, if this locality really is in Table Bay. I have not been able to trace Ball Point on any chart. I have not taken *Böhmia chelata* either at Sea Point or at Melkbos Strand (both in Table Bay), but it is fairly common at low tide at St. James, False Bay. It is, however, a more frequent inhabitant of Alcyonarians, and nearly every piece of 'Fan-coral' (*Gorgonia flammea*) which I have examined in a fresh state, has one or more of these little Pycnogonids clasping its branches.

Coloration. As a rule the animal is uniformly coloured, irrespective of the colour (white, yellow, pink, red) of the Alcyonarian on which it is found. Two lots, however, from the Keiskamma-Cape Morgan area are bicoloured and very striking. The ground colour is the usual amber or yellowish-brown with dark umber-brown on parts of the body and legs as follows: on the body the dark colour occupies the whole upper surface except the antero-lateral corners of the cephalic segment, ocular tubercle, and a patch behind it, the 4 dorsal tubercles, and the apical bosses on the crurigers; the abdomen has a dark streak on each side; on the legs the 1st coxa is dark, dorsally only in juvenile, but also ventrally in adult. The 2nd coxa is dark dorsally with a slight suffusion ventrally in adult; the femur and 1st tibia each with a dark

band in distal half on dorsal surface only. The pale spots on the 2nd coxae (♂♀) and the cement gland (♂) remain pale.

One of these lots is recorded as being found on a 'yellow Alcyonarian', and the piece preserved with the Pycnogonid is *Wrightella fragilis*. In the preserved state this Alcyonarian is white with the nodes yellow or brownish, but whether the two colours are distinct in life is not recorded.

Aberration. One ♂ (Somerset Strand, False Bay) has the ocular tubercle divided into two tubercles placed transversely; one of the eyes seems to be

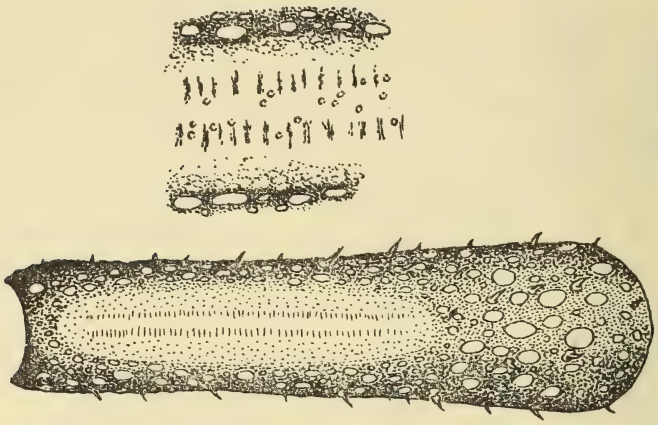


Fig. 23. *Böhmia tuberosa* Möbius. Dorsal surface of femur of ♂ showing pale patch ('cement gland'), with a portion of the latter further enlarged; semidiagrammatic, minor reticulation omitted.

present, but the others could not be traced. For rarity of abnormalities in Pycnogonids see Gordon, 1932. '*Discovery*', Rep., vi, p. 131.

Böhmia tuberosa Möbius

Fig. 23

1902. Möbius, loc. cit., p. 189, pl. 28, figs. 13, 14.

1909. Schimkewitsch, loc. cit., p. 3, fig. 1 B and D (chelifer and palp).

♂—similar to *chelata*, but the ocular tubercle, antero-lateral processes of cephalic segment, median bosses on segments and those on apices of crurigers all very prominent and sharply conical, the median boss on 4th segment lower than the others. Sides of cephalic segment somewhat convergent. Surface reticulate and spinulose as in *chelata*.

Chelifer and palp as in *chelata*, but in the latter the 7th joint is shorter than the 6th. Oviger as in *chelata*, but the pairs of spines on last 4 joints more numerous, resp. about 10, 8, 6, 9; and 10th joint without an unguiform process on lower apex.

Legs longer and more slender than in *chelata*; 2nd coxa a little longer than either 1st or 3rd, femur a little longer than 1st tibia, about five times as long as broad, 2nd tibia a little longer than femur, rather slender and tapering so that tarsus is very little narrower than its apex, tarsus and propodus two and a half to three times in length of 2nd tibia, propodus without heel, with numerous spines on lower margin, claw a little more than one-third (but not quite half) length of propodus (Möbius, fig. 14: half length of propodus). Surface reticulate and spinulose, with pale spot on dorsal apex of 2nd coxa of all legs. Femoral cement gland an elongate-oval pale patch on dorsal surface of femur in all legs. Genital pore on ventral apex of 2nd coxa of last leg only.

Body (front margin of cephalic segment to base of abdomen) 6, proboscis 4, abdomen 3, 2nd leg (without claw) approx. 23 mm. (femur 6, 1st tibia 5, 2nd tibia 7 mm.). Reddish-brown.

Localities: Agulhas Bank, 154 metres 1 ♂ (Möbius); off East London, 250-300 fath. 1 non-ovig. ♂ (S. Afr. Mus.).

Remarks. The 'Valdivia' specimen was a ♂ (dorsal patches) 7 mm. in length including abdomen. There is an obvious discrepancy in the length of the claw on the legs in Möbius's two figures; as fig. 14 shows a claw half length of propodus and therefore not so very different from that of the specimen above described, one must regard the long slender claws in the picture of the whole animal (fig. 13) as fanciful.

With a body length of 7 mm. incl. abdomen, the 2nd leg of the 'Valdivia' specimen was 13 mm. long; the present specimen measuring 9 mm. incl. abdomen has the 2nd leg 23 mm. long.

The remarks on the pale coxal spot and femoral patches and the position of the ♂ genital pore made under *chelata* apply here also. With the greater length of femur, the femoral patch is more elongate. The patch itself is paler than the rest of the integument, but there is a still paler line down the centre of it, as seen under a moderate magnification. This is not due to a slit-like opening, but to a double series of minute transverse 'marks' (fig. 23). Their real structure is doubtful, but they appear to be *in* the substance of the chitin as they are not obliterated by rubbing a needle-point over them either on the external or internal surface. (Schimkewitsch, loc. cit., p. 4, called them: Internal trabeculae.) Scattered over the pale area are a number of minute 'glands', smaller and more numerous than those in *chelata*. These can be removed by rubbing the internal surface.

Gen. *Achelia* Hodge.

? 1838. Costa, *Fauna Regn. Napoli. Arachn. Trach.*, p. 7. (*Phanodemus*.)
1864. Hodge, *Rep. Brit. Assoc.*, xxxiii, Not. misc., p. 102 and *Ann. Mag. Nat. Hist.* (3) xiii, p. 114.
1881. Hoek, *Rep. H.M.S. 'Challenger'*, iii, p. 26.
1881. Dohrn, *F. Fl. Golf. Neapel.*, iii, pp. 133, 225, 227, 228 (*Ammothea*, non Leach).

1891. Sars, *Norw. N. Atl. Exp. Pycnogonidae*, p. 120. (*Ammothea*, non Leach.)
1908. Loman, *Siboga Exp. monogr.*, xl, pp. 10, 11 and synopsis facing p. 19. (*Ammothea*, non Leach.)
1913. Bouvier, *2me Exp. Antarct. Franc.*, pp. 45, 46, 138.
1915. Calman, '*Terra Nova*' *Exp. Zool.*, iii, p. 56.
1917. Bouvier, *Res. Sci. Camp. Monaco*, li, p. 38. (*Ammothea* subg. *Achelia.*)
1927. Hodgson, *D. Südpol Exp.*, xix (zool. xi), p. 344.
1932. Gordon, '*Discovery*' *Rep.*, vi, p. 110.
1938. Calman, *John Murray Exp.*, v, p. 160.
1938. Gordon, *Austral. Antarct. Exp.*, C II, 8, p. 22.

Body compact, segmented, but segments more or less fused. Crurigers contiguous or narrowly separated. Ocular tubercle near front margin of cephalic segment. Proboscis large, fusiform, directed forwards. Chelifer with single-jointed scape, and terminal more or less bifid joint, which in juvenile forms a small but functional chela. Palp 8-jointed, more or less geniculate, 2nd and 4th joints longest. Oviger 10-jointed, in both sexes, 7th-10th joints each with 1 (or 2) pinnate or doubly-serrate spines, without apical claw.

Legs moderate, tarsus small, propodus strongly spinose on lower margin, claw strong, auxiliary claws moderate or strong. Genital pores on all legs in ♀, on last two legs in ♂, at apices of conical processes. Femoral cement gland ♂ single, opening near dorsal apex.

Remarks. Since *Leionympha* Möbius was shown to be the same as *Ammothea* Leach, the small, compact, shallow-water species formerly included in the latter genus, are now put into *Achelia.* Bouvier (1913 and 1917), however, uttered a warning against regarding this name as stable, suggesting (as did Dohrn) that *Phanodemus* was the earliest generic name for these forms.

Key to the South African Species

1. Abdomen extending beyond last crurigers. *quadridentata*
2. Abdomen not extending beyond last crurigers *brevicauda*

Achelia quadridentata (Hodgson)

Fig. 24

1910. Hodgson, *Schultze. Reise*, iv, p. 223, figs. 2, 3 (palp, oviger).

Body compact, widest in front, narrowing posteriorly, cephalic segment large, segments 3 and 4 fused, and abdomen apparently not marked off by a suture. Crurigers contiguous, each with a conical tubercle on upper apex. Proboscis as long as body with abdomen, broadly fusiform. Ocular tubercle on front margin of cephalic segment, conical, eyes distinct. Abdomen extending to end of 1st coxa of last leg.

Chelifer scape undivided, the terminal joint representing the chela feebly bifid. Palp geniculate, 2nd and 4th joints longest, distal joints setose. Oviger

5th joint longest, 7th, 8th and 9th joints each with one doubly-serrate (pinnate) spine, 10th joint with 2 similar spines, one laterally and one apical; alike in the two sexes, but that of ♂ rather stronger.

Legs without processes, 1st coxa with a small setiferous tubercle on posterior part of distal margin dorsally, with a smaller one below it, propodus with 3 strong spines proximally on lower margin, and 2 moderately strong ones distally, auxiliary claws about half length of main claw. Genital pores ♂ at apices of rounded processes on ventral apices of 2nd coxae of last 2 legs; in ♀

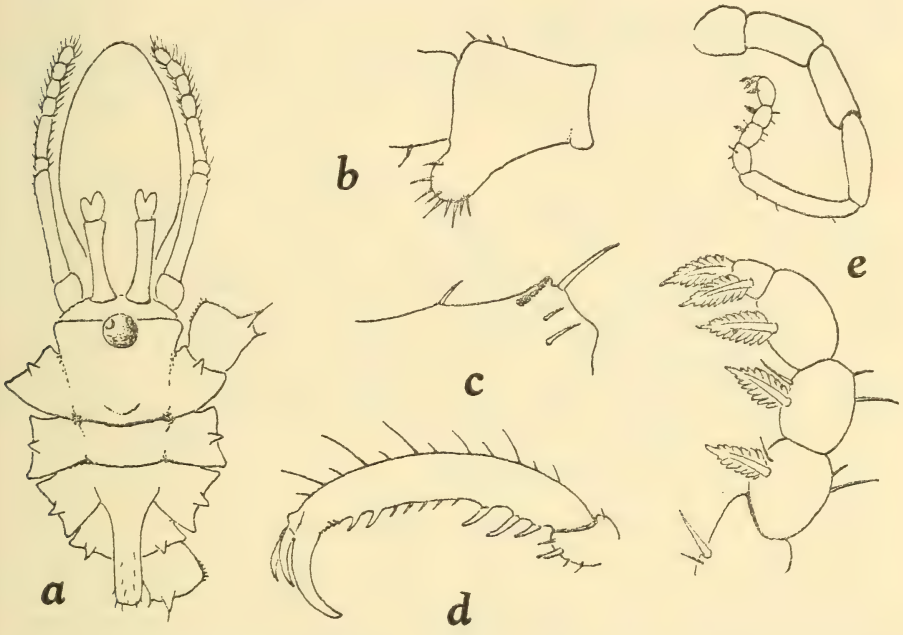


Fig. 24. *Achelia quadridentata* (Hodgson). *a.* dorsal view (4th joint of palp foreshortened). *b.* lateral view of 2nd coxa of last leg ♂. *c.* apex of femur with cement gland ♂. *d.* propodus and claws of leg. *e.* oviger ♂ with distal joints further enlarged.

on all legs, but not on projections. Femoral cement gland ♂ small, behind the dorsal apical spine.

Body incl. abdomen 1·5, proboscis 1·5 mm.

Localities: Lüderitzbucht (Hodgson); St. James, False Bay, littoral. 1 ovig. ♂, 1 ♀ (K. H. Barnard, 1912); Table Bay, 5 fath. (University Cape Town Ecol. Surv.).

Remarks. The above description of the St. James's specimens covers that given by Hodgson, and I think the identification of these specimens is correct. Hodgson's specimens had 4 proximal spines on the propodus; the present specimens have only 3.

Achelia brevicauda (Loman)

1904. Loman, *Zool. Jahrb. Abt. Syst.*, xx, p. 376, pl. 14, figs. 1-4 (♂)

Body compact, widest in front (but not so wide as in *quadridentata*), antero-lateral angles of cephalic segment subacutely angular (Loman: a strong conical tubercle), segments 3 and 4 fused, abdomen not marked off by a suture. Crurigers contiguous, a double setiferous tubercle (or two separate tubercles) at each antero-distal and postero-distal corner dorsally. Proboscis nearly as long as body, fusiform. Ocular tubercle on front margin of cephalic segment, rounded or bluntly pointed apically, eyes distinct. Abdomen short, extending to end of last crurigers.

Chelifer, palp and oviger as in *quadridentata* (cf. fig. 24). The 6th joint of oviger has a strong recurved spine proximally, as in *A. langi* Dohrn (1881. pl. 5, fig. 2).

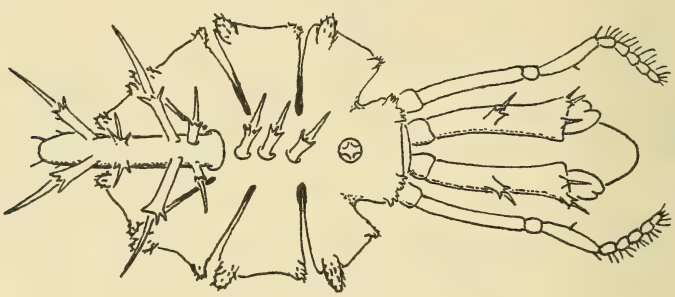


Fig. 25. *Nymphopsis cuspidata* (Hodgson).

Legs without prominent processes, 1st coxa with 2-3 setiferous conical tubercles on both antero- and postero-distal corners dorsally, distal corners of 2nd and 3rd coxae each with 1-2 much smaller and inconspicuous tubercles, femur with 2 major spines and an apical one on upper margin, propodus with 3 strong spines on lower margin proximally and 2-3 less strong ones distally, auxiliary claws about half length of main claw. Genital pores ♂ on prominent ventral processes on last 2 legs. Femoral cement gland ♂ small, opening behind the apical spine (cf. fig. 24 *c*).

Body incl. abdomen 1·25, proboscis 1, 3rd leg without claw 3·75 mm.

Localities: Port Elizabeth. 1 non-ovig. ♂ (Loman); Sea Point, Cape Town. 1 non-ovig. ♂ (K. H. Barnard, 1914).

Remarks. The pinnate spines on the distal joints of the oviger are described as 'oak-leaf spines' (Loman, et auct.) and are figured by Loman as more or less of this shape. Both in this and the previous species, however, the general outline is ovate, the basal serrations or pinnae being much longer than the distal ones. Even Dohrn's figures (1881) do not do full justice to these spines.

Gen. *Nymphopsis* Hasw.

1885. Haswell, *Proc. Linn. Soc.*, N.S.W., ix, p. 1025.
1908. Loman, loc. cit., p. 49.
1920. Flynn, *Pap. Proc. Roy. Soc. Tasman.* for 1919, p. 83.
1923. Loman, *Ark. Zool.*, xv, 9, p. 7.
1928. id., *Tijdschr. Ned. Dierk. Ver.* (3), i, Afl. 2, p. 39.
1929. Flynn, *Mem. Queensl. Mus.*, ix, p. 256.
1932. Gordon, loc. cit., p. 123.

Body compact, segments completely fused (the cephalic segment distinct in *denticulata* Gordon 1932). Crurigers separate. Ocular tubercle a short distance

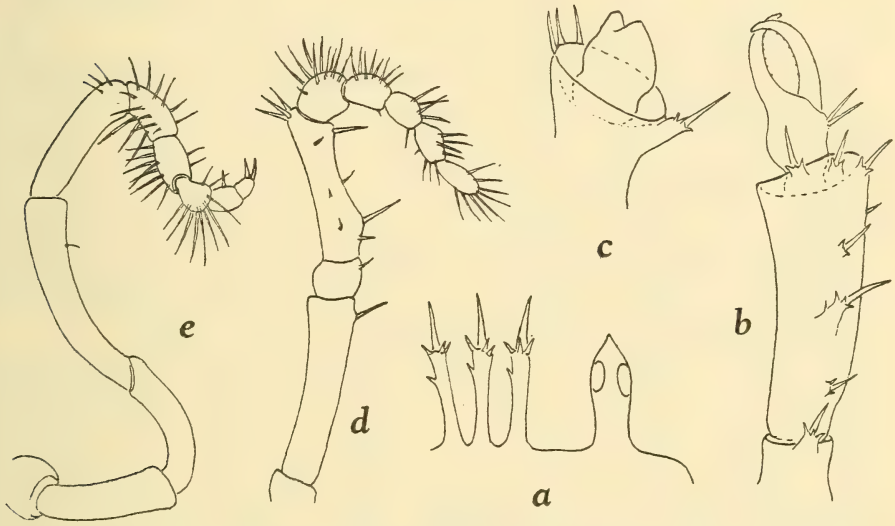


Fig. 26. *Nymphopsis cuspidata* (Hodgson). *a.* lateral view of ocular tubercle and dorsal spiniferous processes. *b.* chelifer of immature example. *c.* apex of scape and degenerate chela of adult. *d.* palp. *e.* oviger ♂.

behind front margin of cephalic segment. Proboscis large, fusiform, directed forwards. Abdomen with 2 pairs (genotype *armata*) or 4 pairs of spinose processes. Chelifer with 1-jointed (genotype *armata*) or 2-jointed scape, apex more or less cup-like, into which the small terminal joint can be withdrawn, in adult the latter is a feebly bifid joint, but in juvenile is a functional chela. Palp 9-jointed, 2nd and 4th joints longest. Oviger 10-jointed, in both sexes, distal joints with long spine-setae, but no serrate spines (except *denticulata* Gordon), without apical claw.

Legs moderate, tarsus small, propodus strongly spinose on lower margin, claw strong, auxiliary claws well developed, or feebly, or absent. Genital pores on all legs in ♀ on short projections; in ♂ on long curved processes on last

2 legs. Femoral cement gland ♂ single, opening near dorsal apex. Eggs in several packets.

Remarks. The distribution of this curious and easily recognized genus embraces Australia, East Indies, Japan, Venezuela, Falkland Islands and South Africa.

The body, abdomen, chelifers and legs are armed with spiniferous processes and/or branched or pinnate spines.

Nymphopsis cuspidata (Hodgson)

Figs. 25–27

1910. Hodgson, *Schultze. Reise*, iv, p. 221, fig. 1 (juv.). (*Ammothea c.*)
1923. Loman, loc. cit., p. 7, fig. D (♂). (*N. abstrusus.*)

Body together with the crurigers broadly oval in outline, in mid-dorsal line 3 elevated spiniferous processes. Cephalic segment with a spinose tubercle, sometimes more or less divided, on each antero-lateral corner. Crurigers longer than median width of body, contiguous, each with 2 spinose tubercles dorsally, one on antero-distal corner and a much larger and upstanding one on postero-distal corner. Proboscis shortly fusiform. Ocular tubercle high, cylindrical, tapering above the eyes to a conical point. Abdomen long, slender, with 4 pairs of spiniferous processes dorso-laterally, of which the 2nd and 4th pairs are the largest, 2 small spines on apex, and 1-2 laterally.

Chelifer scape 2-jointed, 1st joint with a spiniferous process on dorsal apex, 2nd joint with 3 such processes of which the middle one is the largest, and 2-3 on distal margin, hand of chela in juv. with 2 spines, finger and thumb curved, inner margins with minute spaced denticles, in adult chela degenerate, represented by a feebly bifid non-spinose joint. Palp with a few long spines on 4th joint, and numerous long spines on 5th-9th joints. Oviger with long spines on 6th-8th joints, 9th joint with a single spine, 10th joint with 2 spines.

Legs with spiniferous processes arranged mostly in pairs or 2 series dorso-laterally, most numerous on 1st and 2nd tibiae; 1st coxa with a stout spiniferous upstanding conical tubercle (like the postero-distal one on cruriger) medio-dorsally; 2nd coxa with ventral apex moderately protuberant on all legs in ♀, produced in a cylindrical process on first 2 legs in ♂ with long spine-setae all around its apex; produced in a long curved process on last 2 legs in ♂ with long spine-setae only on the surface facing away from the body, the apex (with genital pore) minutely spinulose; femur slightly longer than 1st tibia, and latter slightly longer than 2nd tibia; propodus slightly curved, with spaced single spines on upper margin, lower margin with stout spines of which the 3 proximal ones are very strong and prominent, claw strong, auxiliary claws stout, about half length of main claw. Femoral gland ♂ lying along dorsal surface of femur immediately under the cuticle, and opening between 2 simple spines near apex.

Body and abdomen each about 1·5, proboscis 3, leg (without claw) 7·5 mm.

Localities: Lüderitzbucht (Hodgson); Cape Point Lighthouse (Loman); Sea Point, Cape Town, littoral (K. H. Barnard, 1912, 1914, 1919); False Bay, 12 fath.; Port Elizabeth, East London (S. Afr. Mus.).

Remarks. There can be no doubt that Loman's specimen is the adult of Hodgson's species, who stated that both his specimens were immature. As Hodgson said, the spinose nature of the animal was sufficiently characteristic to justify describing a new species even on such material.

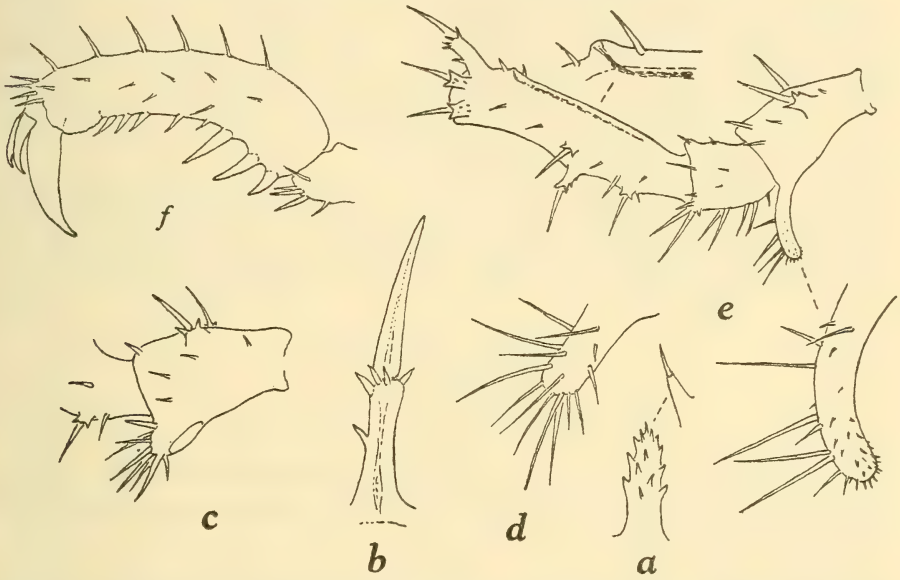


Fig. 27. *Nymphopsis cuspidata* (Hodgson). *a*. spine from cruriger and dorsal surface of 1st coxa. *b*. pedunculate spine from leg. *c*. lateral view of 2nd coxa of leg ♀. *d*. apex of 2nd coxa of 1st and 2nd legs ♂. *e*. 2nd and 3rd coxae and femur of 4th leg ♂, with apex of 2nd coxa, and femoral cement gland further enlarged. *f*. propodus and claw of leg.

He correctly remarked that the 'branched' spines were really cuticular prolongations bearing one or more movable spines. They should not be called 'compound spines' (Loman) or 'pinnate spines' (Flynn), at least not in this species; in *korotnewi* Schimk. the armature of the legs does appear (Loman, 1908. loc. cit., pl. 13, fig. 179) to be composed of pinnate spines.

The spiny armature of the animals collects much foreign matter; unencumbered specimens are rare, and dirty ones are difficult to clean.

Loman described the proboscis as 'slender', but this adjective is scarcely applicable to the present specimens.

The ♀ from False Bay has the proboscis shorter than the chelifers and quite invisible in dorsal view; also the medio-dorsal processes on the body are very much elevated, their height (excluding the apical spine) almost equal to the length of the abdomen.

Recent collecting (1946, 1947) by the Zoology Department of the University of Cape Town shows that this species is fairly common in shallow water in some places in False Bay.

Gen. *Kyphomia* Helfer

1938. Helfer, *SB. Ges. Naturf. Fr. Berlin*, 1937, p. 179.
1953. Stock, *Beaufortia*, iv, no. 35, p. 41.

Body compact, last two segments fused. Crurigers widely separated. Ocular tubercle near front margin of cephalic segment, slender, elongate. Chelifer with well-developed scape, and rudimentary 2nd joint. Palp 9-jointed, 2nd and 4th joints longest. Oviger 10-jointed, with a few serrate spines, no apical claw. Legs moderate, tarsus small, propodus spinose on lower margin, claw strong, auxiliary claws as long as main claw.

Remarks. Stock (1953) states that Helfer's types of this species have been lost, but from its likeness to an East Indian species he is convinced that Helfer's species should be included in the genus *Ammothella* (1900. Verrill, *Tr. Conn. Ac. Sci.*, x, p. 581, as subgen. of *Ammothea*: palp 10- instead of 8-jointed).

Kyphomia setacea Helfer

Fig. 28*a*

1938. Helfer, loc. cit., p. 179, fig. 9 *a-c*.

Body covered with small warts. Crurigers about equal to median width of body. Proboscis ovoid. Ocular tubercle longer in ♀ than in ♂, eyes pigmented. Abdomen slender, clavate.

Chelifer with 1-jointed scape, 2nd joint knob-like with 2 apical points. Oviger with a few setae and serrate spines on last 4 joints (2-3 serrate spines on last joint).

Legs with numerous long and short setae, femur in ♀ swollen, in ♂ nearly cylindrical, auxiliary claws as long as main claw. Femoral gland ♂ opening at apex of a slender process at end of femur.

Length 3 mm., span 6-7 mm.

Locality: Agulhas Bank, 35° 19′ S. 20° 12′ E., 126 metres (Helfer).

Gen. *Ainigma* Helfer

1938. Helfer, loc. cit., p. 181

Body compact, segmented. Crurigers widely separated. Ocular tubercle near front margin of cephalic segment, high. Chelifer with well-developed scape and rudimentary 2nd joint. Palp 9-jointed, 2nd and 4th joints longest. Oviger 10-jointed, apical joints with small serrate spines, terminal joint non-serrate. Legs moderate, tarsus one-third length of propodus, which is non-spinose, claw as long as propodus, no auxiliary claws.

Remarks. Hedgpeth (1947. *Smiths. Misc. Coll.*, cvi, p. 4) accepts and places this genus in the *Ammotheidae*. Stock (1952. *Bull. Inst. Roy. Sci. Nat. Belge*, xxviii, 14, p. 5; and 1953. loc. cit. *infra*) considers it a synonym of *Ascorhynchus*.

A species of *Ascorhynchus* (*A. glaber* Hoek, 1881) was collected by H.M.S. *Challenger* between the Cape and Kerguelen (46° 46′ S. 45° 31′ E., 1,375 fath.).

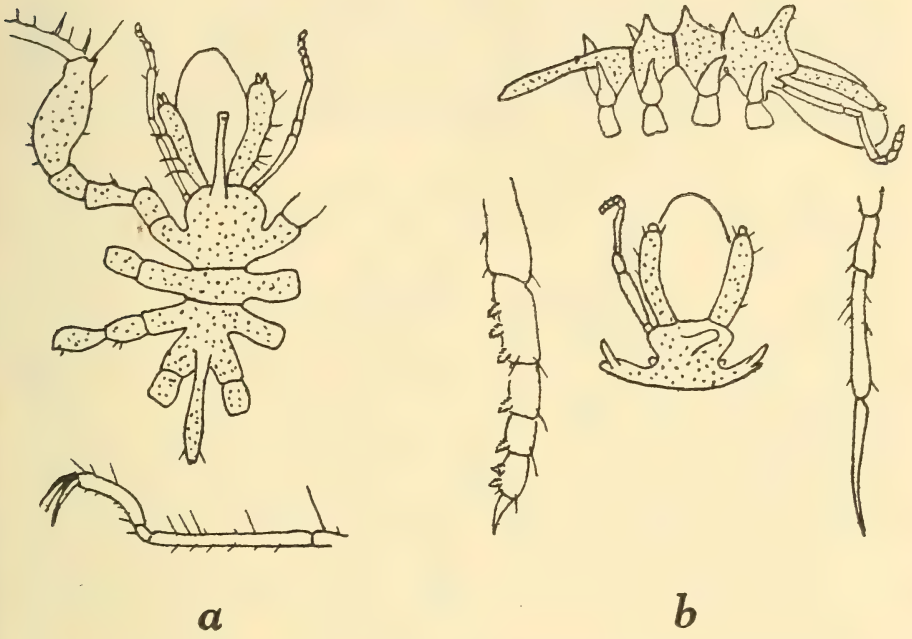


Fig. 28. *a. Kyphomia setacea* Helfer, ♀ with distal joints of leg. *b. Ainigma ornatum* Helfer, lateral view, dorsal view of cephalic segment, distal joints of oviger, and distal joints of leg. (After Helfer.)

Ainigma ornatum Helfer

Fig. 28*b*

1938. Helfer, loc. cit., p. 181, fig. 10 *a-f.*

1953. Stock, *Beaufortia*, vi, no. 35, p. 41, fig. 6. (*Ascorhynchus o.*)

1953. id., *Temminckia*, ix, p. 304 (in key to species).

Body covered with small warts, each segment with a conical medio-dorsal process. Crurigers about equal to median width of body, each with a conical upstanding process. Proboscis ovoid. Abdomen slender, clavate. Chelifer with 1-jointed scape, 2nd joint knob-like.

Length 2·88 mm.

Locality: Agulhas Bank, 35° 19′ S. 20° 12′ E., 126 metres (Helfer).

Gen. *Austroraptus* Hodgson

1907. Hodgson, *Nat. Antarct. Exp.*, iii, p. 54.
1915. Calman, '*Terra Nova*' *Exp. Rep.*, iii, p. 62.
1927. Hodgson, *D. Südpol Exp.*, xix (zool. xi), p. 349.
1932. Gordon, '*Discovery*' *Rep.*, vi, p. 114.
1944. id., *B.A.N.Z. Antarct. Res. Exp.*, v, p. 57.

Body compact, segments fused or only indistinctly demarcated. Crurigers narrowly separated or contiguous. Proboscis flask-shaped, stout at base, narrowing to a point, directed or curved downwards. Chelifers small, chelate, rudimentary. Palp 6-jointed, the apical joint inserted laterally on the 5th and

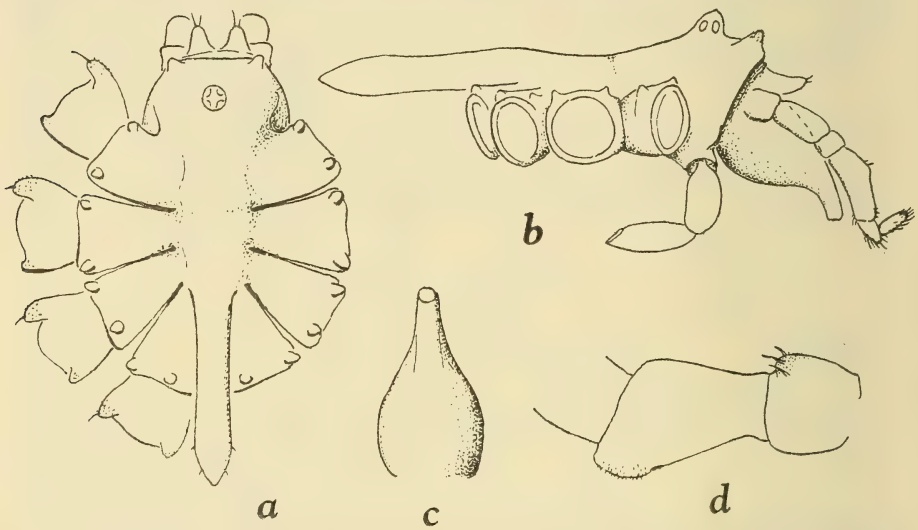


Fig. 29. *Austroraptus thermophilus* Brnrd. *a.* dorsal view (palp bent downwards). *b.* lateral view. *c.* ventral view of proboscis. *d.* 1st and 2nd coxae of 4th leg ♂.

projecting forwards or upwards (the apical joint may be tripartite). Oviger 10-jointed, in both sexes, apical joints with simple non-serrate spines, no apical claw. Legs moderate, tarsus short, auxiliary claws moderate, small, or minute.

Remarks. Previously known only from the Antarctic (3 species); the discovery of a species in the considerably warmer waters of South Africa is noteworthy.

Appears to differ from the species of *Tanystylum* with 6-jointed palps only in the shape of the proboscis.

Austroraptus thermophilus Brnrd.

Figs. 29, 30

1946. Barnard, *Ann. Mag. Nat. Hist.* (xi) 13, p. 62.

Body compact, all the segments fused, smooth; cephalic segment broad with a tubercle at each antero-lateral corner. Crurigers contiguous, their

length greater than median width of segments, each with a tubercle on antero-distal and postero-distal corners dorsally, a little more prominent in ♂ than ♀. Ocular tubercle conical, rather broad and low, eyes distinct. Proboscis markedly flask-shaped, broad proximally, rapidly narrowing to a downwardly curving apex. Abdomen elongate, extending beyond end of 1st coxa of last leg, horizontal.

Chelifers vestigial, composed of a single conical projection with 2 apical setules, less prominent in ♀ than in ♂. Palps robust, curving downwards, 4th

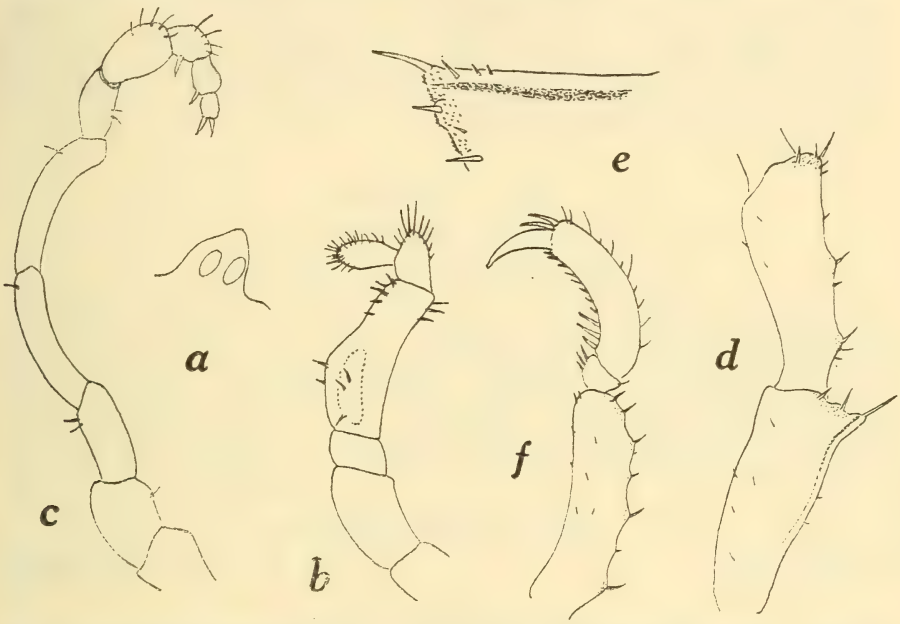


Fig. 30. *Austroraptus thermophilus* Brnrd. *a*. ocular tubercle from right side. *b*. palp. *c*. oviger ♂. *d*. femur and 1st tibia of leg ♂. *e*. apex of femur with cement gland ♂. *f*. distal joints of leg.

joint longest, angular in middle of upper margin, a pale or semitransparent oval spot indicating a gland (but orifice not traceable), 5th joint conical, setose, 6th ovate, inserted laterally on 5th and projecting forwards and upwards, setose. Oviger in ♂ with 4th and 5th joints gently curved, distal joints feebly armed, 8th and 9th each with a simple spine on inner margin, 10th joint with 2 apical spines; in ♀ similar but shorter and weaker, 4th and 5th joints straight.

Legs 1st coxa with the antero-distal and postero-distal corners produced in a tubercle, the anterior one larger than the posterior and carrying 1 or 2 spines, both tubercles are more prominent in ♂ than in ♀; 2nd coxa with lower apex slightly but not prominently gibbous, genital pores in ♀ on all legs, in ♂ only on last two; femur with upper apex produced, 1st and 2nd tibiae subequal (and subequal to femur) with low rounded spiniferous tubercles arranged more or less in 2 longitudinal dorso-lateral series; propodus with 3 large spines proximally on lower margin, auxiliary claws well developed, nearly half length of

main claw. Femoral cement gland ♂ single, elongate, lying immediately below the cuticle, opening on distal surface of the apical projection.

All the tubercles on the cephalon, crurigers and 1st coxae, and the nodulosities on the legs are microscopically hispid.

Body incl. abdomen 3 (trunk and abdomen subequal), proboscis 1·25, leg without claw 8 mm.

Localities: False Bay, 23 fath. 1 ♀; off Cape St. Blaize, 34 fath. 1 ovig. ♂; off Nanquas Peak (east of Algoa Bay), 63 fath. 2 non-ovig. ♂♂ (S. Afr. Mus.).

Remarks. Distinguished from the genotype *polaris* by the contiguous crurigers, and from all the three Antarctic species by the longer abdomen and more markedly flask-shaped proboscis, shorter ocular tubercle, shorter tubercles on 1st coxae, and the distinct though not prominent nodulosities on the tibiae; the auxiliary claws also are stronger.

Fam. Tanystylidae

1913. Schimkewitsch, *Zool. Anz.*, xli, p. 613.
1947. Hedgpeth, *Smiths. Misc. Coll.*, cvi, p. 4.

Octopodous. Body compact, segments fused or segmentation visible only laterally. Crurigers narrowly separated or contiguous, or fused. Proboscis large, fusiform, directed forwards. Chelifers absent in adult, sometimes rudiments in juvenile. Palps 4-6-jointed. Ovigers in both sexes, 10-jointed, without compound spines. Legs stout, tarsus very short, auxiliary claws present. Genital pores on all legs in ♀, on last 2 in ♂. Eggs in several masses.

Key to the South African Genera

1. Palp 6-jointed. *Tanystylum*
2. Palp 5-jointed. *Discoarachne*

Gen. *Tanystylum* Miers

1879. Miers, *Philos. Trans. Roy. Soc. Lond.*, clxviii, p. 213.
1932. Gordon, *Ann. Mag. Nat. Hist.* (10), x, p. 87.
1932. id., '*Discovery*' *Rep.*, vi, p. 117.

Body subcircular, unsegmented. Crurigers narrowly separated or contiguous, or fused. Proboscis stout, movable, directed forwards. Palp 6-jointed.

Key to the South African [incl. Tristan d'Acunha] species

1. Crurigers fused. *ornatum*
2. Crurigers separate. *[pfefferi]*

Tanystylum ornatum Flynn

1928. Flynn, loc. cit., p. 33, figs. 20, 21.

Crurigers fused, the divisions between them indicated by superficial markings; each cruriger with a pair of knobs distally on dorsal side. Ocular tubercle moderately high, rounded, surmounted by a short pointed process. Proboscis ovoid. Abdomen clavate, oblique.

Chelifers represented by a pair of small setose processes. Palp 4th joint longest, 2nd and 6th subequal. Oviger in ♂ 4th joint curved, 5th longest, 8th at right angles to 7th, 10th with 2 apical spines; in ♀ (as figured by Flynn) 4th and 5th joints subequal, 6th-9th joints each with 1 spine on outer apex, 9th also with 2-3 spines on inner apex, 10th joint with 2 apical spines.

Legs 1st coxae ending in 2 or more lobes dorsally, the three coxae subequal, femur and tibiae subequal, propodus without heel.

Body with proboscis, excl. abdomen 1·8 mm.

Locality: off west coast of Cape Peninsula, 25-30 fath. (Flynn).

Remarks. The oviger as represented in fig. 21*a* as that of a ♀ seems rather remarkable, especially as regards the 10th joint with its 2 stout opposing spines (cf. *Discoarachne brevipes* ♂). It may be noted that the latter species was taken in the same locality together with the *Tanystylum* specimens.

Gen. *Discoarachne* Hoek

1881. Hoek, *Rep. H.M.S. 'Challenger'*, iii, p. 74.
1901. Cole, *Zool. Jahrb. Abt. Syst.*, xv, pp. 243 sqq.
1904. Loman, ibid., xx, p. 383.
1908. id., *Siboga Exp. monogr.*, xl, pp. 14 sqq. and synopsis facing p. 19.

Resembling *Tanystylum* but palp 5-jointed. Genital pores in ♂ on last 2 legs, in ♀ on all legs. Femoral cement gland ♂ a single pore near dorsal apex.

Remarks. Loman (1904) erroneously stated that the crurigers were fused, and that the ♂ oviger was 9-jointed. The latter statement was corrected by him in 1923 (loc. cit. *infra*).

The genus is sometimes regarded (1909. Thompson, *Cambr. Nat. Hist.*, iv, p. 535) as a subgenus of *Tanystylum*.

Discoarachne brevipes Hoek
Fig. 31*a*, *b*

1881. Hoek, loc. cit., pp. 74, 105, pl. 7, figs. 8-12.
1901. Cole, loc. cit., p. 243, pl. 13.
1904. Loman, loc. cit., p. 379, pl. 14, figs. 7-11.
1908. id., loc. cit., p. 46 (incidentally mentions 'commensals' [? Rotifers] on the palps).
1910. Hodgson, *Schultze. Reise*, iv, p. 227.
1923. Loman, *Ark. Zool.*, xv, 9, p. 6, fig. C.
1928. Flynn, loc. cit., p. 35.
1951. Stock, *Mem. Inst. Roy. Sci. Nat. Belge* (2) fasc. 43, p. 3.

Body oval, crurigers distinct and not fused though separated only by clefts. Proboscis somewhat fusiform. Ocular tubercle low, rounded, eyes distinct. Abdomen extending to end of last crurigers, rather slender, clavate, horizontal.

Chelifers represented in young specimens by 2 small setiferous processes, sometimes 2-jointed (Loman, 1904, fig. 7*a*); in older specimens these tiny

stumps may be retained, but as often as not no trace of the chelifers is found. Palp slender, with first 2 joints short, 3rd longest, often swollen, 4th short. Oviger in ♂ with 8th joint attached at right angles to 7th, 10th with 2 apical and rather stout spines simulating a minute chela; in ♀ normal, 10th joint longer than 9th, with several apical spines.

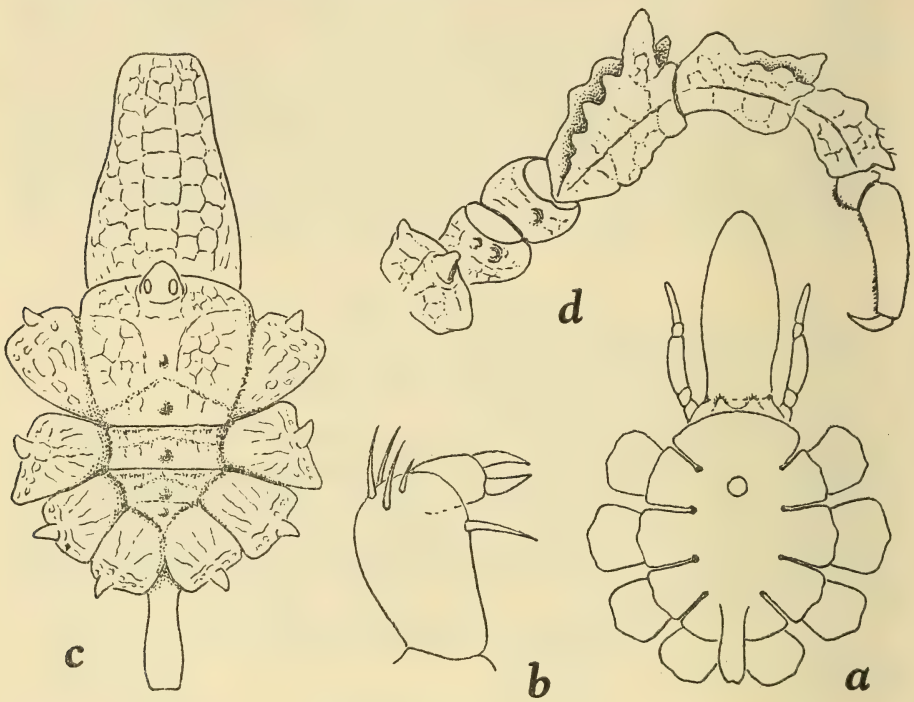


Fig. 31. *a, b. Discoarachne brevipes* Hoëk, dorsal view, and 9th and 10th joints of oviger ♂. *c, d. Pycnogonum forte* Flynn, dorsal view with 3rd right leg to same scale (coxae in dorsal view, remainder of leg in postero-lateral view).

Legs stout, the three coxae subequal, femur somewhat contorted, tarsus much narrower than 2nd tibia, propodus with 3 stout spines at base but no distinct heel. Very minutely hispid. Femoral cement gland ♂ single, near the apex on dorsal surface.

Body (tip of proboscis to tip of abdomen) 4-4·25 mm.

Localities: Cape Town, littoral (Hoek, Cole, Loman, Flynn); off west coast of Cape Peninsula, 25-30 fath. (Flynn); Cape Point Lighthouse, littoral (Loman); False Bay (probably littoral) (Hodgson); Port Natal (Durban) (Loman); Lüderitzbucht (Stock); Port Nolloth, Saldanha Bay, Table Bay, west and east coasts of Cape Peninsula, Kleinmond (mouth of the Palmiet River, Cape Province), Plettenberg Bay, East London, all littoral (S. Afr. Mus.).

Remarks. This is a very common Pycnogonid on both sides of the Cape Peninsula among weeds, Hydroids, anemones, etc., between tide marks.

Ovigerous ♂♂ have been collected in February, July and September to November; probably breeding occurs throughout the year.

Stock's record is presumably based on the 'Mercator' collections, although he makes no mention of this species in the systematic part of his paper. The specimens collected by Dr. Schultze, and recorded by Hodgson, came from False Bay, not from Lüderitzbucht.

Fam. Pycnogonidae

1908. Loman, *Siboga Exp. monogr.*, xl, conspectus facing p. 19.
1909. Thompson, *Cambr. Nat. Hist.*, iv. p. 539.
1913. Bouvier, *2me Exp. Antarct. Franc.*, pp. 46, 149.
1927. Calman, *Trans. Zool. Soc. Lond.*, xxii, pp. 408, 410.
1947. Hedgpeth, *Smiths. Misc. Coll.*, cvi, p. 5 (in list of families and genera).

Decapodous (*Pentapycnon*) or octopodous. Body segmented or the segmentation more or less suppressed. Proboscis projecting forwards or more or less bent under body. Chelifers reduced or absent, if present either chelate in adult or only in juvenile. Palps usually absent. Ovigers present in ♂ only, 6-9-jointed, with apical claw, but no spines. Legs without auxiliary claws (sometimes vestiges). Genital pores on last leg only in both sexes. Eggs in a single cake-like mass.

Remarks. Several genera which are in one respect or another aberrant have been associated with the genus *Pycnogonum* in this family.

Gen. *Pycnogonum* Brün.

1764. Brünnich, *Entomologia*, p. 84.
1881. Dohrn, *F. Fl. Golf. Neapel*, iii, p. 202.
1902. Möbius, *D. Tiefsee Exp.*, iii, p. 193.
1908. Loman, loc. cit., pp. 5-9, conspectus facing p. 19 and p. 34.
1913. Bouvier, loc. cit., pp. 150, 156.
1922. id., *Ann. Sci. Nat. Zool.* (10) v, p. 113.

Octopodous. Body with segments 3 and 4 often close together and junction difficult to trace, or fused. Crurigers separate or contiguous. Proboscis movable, stout. Chelifers absent (but see: *P* (?) *claudum* Loman, 1908). Palps absent. Ovigers in ♂ only, sometimes absent even in ovigerous specimens. Legs with auxiliary claws vestigial or absent. Genital pores on 2nd coxa of last leg in both sexes, in ♀ on dorsal surface, in ♂ on ventral surface.

Remarks. Dohrn (loc. cit., p. 203) stated that the genital pores in ♀ were dorsal, and this applies to his *pusillum*; but in his *nodulosum* he described them as being ventral, albeit near the posterior margin.

Key to the South African Species

I. No auxiliary claws.
  A. Junction of 3rd and 4th segments not evident, these two segments more or less fused. Crurigers contiguous.

1. 2nd tibia at least half length of 1st tibia. Proboscis cylindrical.
   a. 4 medio-dorsal tubercles (only 1 on cephalic segment). *cataphractum*
   b. 5 medio-dorsal tubercles (2 on cephalic segment). *forte*
2. 2nd tibia scarcely one-third length of 1st tibia. Proboscis tapering. *portus*

B. 3rd and 4th segments quite distinct, and all crurigers separate. Ocular tubercle very small. *microps*

II. Small auxiliary claws present. *pusillum*

Pycnogonum cataphractum Möbius

1902. Möbius, loc. cit., p. 194, pl. 30, fig. 11.

Integument reticulate. Body stout, cephalic segment wider than following segments, all of which are (according to the figure) distinct; 4 medio-dorsal conical tubercles, one on each segment. Crurigers contiguous, each with a conical boss or process on dorsal apex. Ocular tubercle conical, rounded, shorter than the tubercle behind it, eyes distinct. Proboscis stout, somewhat narrowed in distal half, apex truncate. Abdomen extending slightly beyond last crurigers, apically truncate.

Legs with conical or digitiform processes, one on dorsal apex of 1st coxa, 4-5 on femur, 1-2 on 1st tibia, 1 on 2nd tibia, tibiae subequal, each slightly shorter than femur, claw one-third length of propodus (drawn too long in the figure), no auxiliary claws.

Smaller specimen: body 9, proboscis 4, abdomen 1 mm.; larger (incomplete) specimen; proboscis 5 mm.

Locality: St. Francis Bay, shallow water (Möbius).

Remarks. *P. tumulosum* Loman, 1908, East Indies, has somewhat similar nodose legs, but has 2 medio-dorsal tubercles on cephalic segment and none on 4th segment.

The smaller of the 'Valdivia' specimens had eggs attached to the ventral surface but no ovigers.

Pycnogonum forte Flynn

Fig. 31*c*, *d*

1928. Flynn, loc. cit., p. 31, figs. 18, 19 (♀).

Very close to *cataphractum*. Third and 4th segments fused, last pair of crurigers fused; 5 medio-dorsal, more or less digitiform, tubercles of which 2 are on cephalic segment and one on each of the other segments. Abdomen longer, extending considerably beyond last crurigers.

Legs in holotype less conspicuously tubercular than in *cataphractum*. In the present specimen the legs *are* conspicuously tubercular; a conical tubercle on upper apex of 1st coxa, 1 or 2 low rounded tubercles dorsally on both 2nd and 3rd coxae; on femur 2 rows of rounded tubercles increasing in size distally, with a large conical tubercle between the apical pair; 1st tibia with a large tubercle near base followed by 2 rows of rounded tubercles; 2nd tibia similar, but the tubercles less prominent; propodus feebly granulose on upper surface, finely setulose on lower margin, claw about one-third length of propodus,

auxiliary claws absent. Genital pores in present specimen on *dorsal* surface of 2nd coxa of last leg.

Total length 10·5 mm., proboscis 5 mm., abdomen 2 mm. (Flynn's specimen resp. about 10·3, 3·8, 1·5).

Localities: off Gneka River*, 1 ♀ (Flynn); off Great Fish Point, 49 fath. 1 ♀ (S. Afr. Mus.).

Remarks. This species is so extraordinarily like *cataphractum* that, when more material is available, it will probably be found to be conspecific.

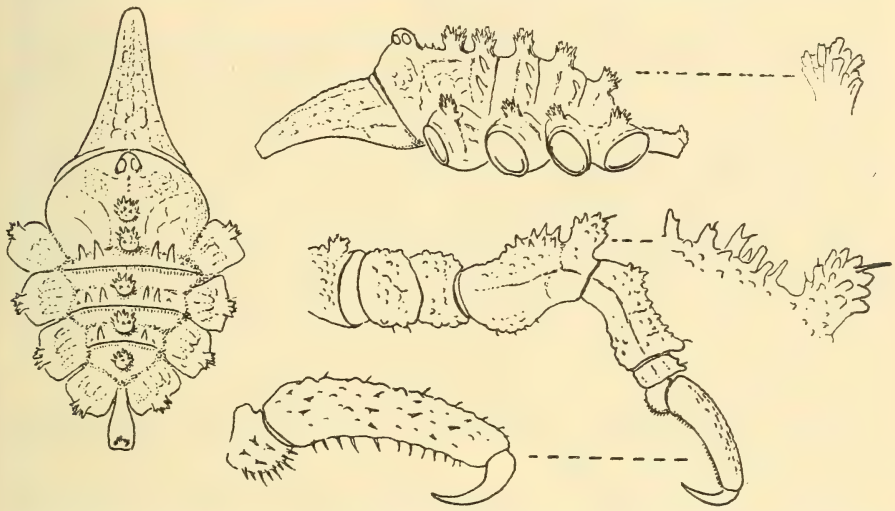


Fig. 32. *Pyncnogonum portus* Brnrd. Dorsal view; lateral view, with process further enlarged; lateral view of leg, with dorsal surface of femur, and tarsus and propodus further enlarged.

Möbius may possibly have overlooked the 2nd tubercle on the cephalic segment, but however that may be the longer abdomen in *forte* seems to be a definite differential character, unless it be sexual.

Flynn's figure gives the impression of shallow depressions between the crurigers and the body proper; in the present specimen they are much deeper. And though the 4th segment is fused with the 3rd the suture is visible dorsally.

The present specimen has a very small and indistinct granule on the hinder slope of the ocular tubercle.

Pycnogonum portus Brnrd.
Fig. 32

1946. Barnard, *Ann. Mag. Nat. Hist.*, (xi) 13, p. 62.

Integument reticulate. Body stout, cephalic segment very broad, following segments rapidly decreasing in width, junction of 3rd and 4th difficult to trace dorsally; 5 medio-dorsal tubercles, 2 on cephalic segment, one on each of the other segments, each tubercle ornamented with a number of minute conical

* See p. 85 footnote.

or digitiform processes. Near hind margin of cephalic and of 2nd segment 2 conical tubercles on either side of the medio-dorsal tubercle, and on 3rd segment one similar tubercle flanking the medio-dorsal one; several additional minute granules or projections, resembling those on the medio-dorsal tubercles, scattered over the integument. Crurigers contiguous, each with an ornamental tubercle on upper apex. Ocular tubercle rather low, rounded, eyes distinct. Proboscis stout at base, rapidly tapering to a narrowly truncate apex. Abdomen extending beyond last crurigers, ornamented like the medio-dorsal tubercles and with a small tubercle on dorsal apex.

Legs stout, nodulose and granulose with granular and digitiform outgrowths similar to those on body, 1st coxa with a tubercle on dorsal apex, femur rather strongly convex on proximal ventral surface and on distal dorsal surface, on the latter several outgrowths of various shapes, some bearing a spinule, and also a large prominent tubercle on apex, 1st tibia a little shorter than femur, with a low tubercle or boss proximally on dorsal surface, and numerous outgrowths, 2nd tibia very short, scarcely one-third length of 1st tibia, tarsus spinulose on lower surface, propodus slightly tapering, granulose, with spinules on lower margin, claw about one-third length of propodus, no auxiliary claws.

Genital pores on dorsal surface of 2nd coxa of last leg in ♀; not traceable on the ovigerous specimen which is presumably a ♂.

Total length 3·5 mm., body plus abdomen 2·75 mm.

Locality: Port Elizabeth, littoral. 1 ♀, 1 ovigerous ♂ (University of Cape Town Ecological Survey, 1936).

Remarks. The integumentary ornamentation, and the shortness of the 2nd tibia are the noteworthy features of this species.

Remarkable also is the complete absence of ovigers in the specimen which carries a flat cake-like mass of eggs. The eggs are loosely cemented to the ventral surface of the body, and the specimen is presumably a ♂, especially as no distinct and large genital pores, as are easily observed in the second specimen, can be traced.

So far as I am aware the absence of ovigers in ovigerous specimens had not been observed except by Möbius (1902, loc. cit.) in his description of *cataphractum*. Are the ovigers never developed in some species? Or does a male before he is fully developed (structurally and perhaps also sexually) have to carry as best he can the packet of eggs which a female may dump upon him?

Pycnogonum microps Loman

1904. Loman, *Zool. Jahrb. Abt. Syst.*, xx, p. 378, pl. 14, figs. 5, 6 (♀)

Integument reticulate and granulose. Body stout, the segments especially 3rd and 4th distinct, cephalic segment not greatly wider than the others; 4 medio-dorsal tubercles, two (a smaller anterior and a larger posterior one) on cephalic segment, and one on each of segments 2 and 3. Crurigers almost as long as their segments, not contiguous, each with a small tubercle near dorsal

apex. Ocular tubercle very small, eyes minute. Proboscis very stout, cylindrical, apex truncate. Abdomen extending slightly beyond ends of 1st coxae of last legs, apically truncate.

Legs stout, granulose but without tubercles or bosses; 2nd tibia nearly as long as 1st, no auxiliary claws.

Body 3, proboscis 1·5, abdomen ·5 mm.

Locality: Illovo or Isipingo (Natal), littoral. 1 ♀ (Loman).

Remarks. Quite different from the other South African species in the form of the body.

Loman's figure 6, showing the body in profile, does not seem to correspond with fig. 5, as it shows only the smaller medio-dorsal tubercle on the cephalic

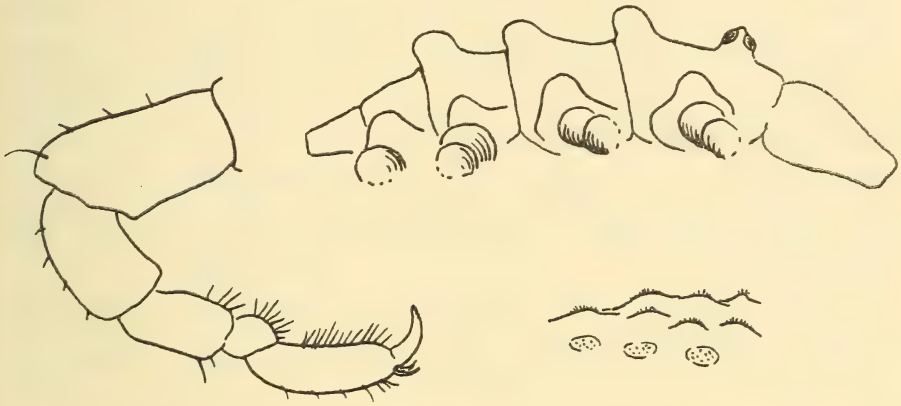


Fig. 33. *Pycnogonum pusillum* Dohrn. Lateral view; portion of integument; 1st leg.

segment, and a transverse ridge culminating in the median boss on *each* of the following segments. The intersegmental sutures seem to be wrongly indicated.

Pycnogonum pusillum Dohrn

Fig. 33

1881. Dohrn, *Fauna Flora Golf. Neapel.*, iii, p. 207, pl. 16, figs. 4-8.
1953. Stock, *Bull. Inst. Roy. Sci. Nat. Belge*, xxviii 14, pp. 1-3, and 5, fig. 1.

Integument with numerous, but scattered granules crowned with minute spinules. Body stout, segments distinct, cephalic segment not wider than the others; 3 medio-dorsal prominences, one each on the cephalic and the two following segments. Crurigers not contiguous, but angle of divergence between 2nd and 3rd greater than that between the others; each with a prominence near dorsal apex. Ocular tubercle as large as the body prominences, eyes well developed. Proboscis very stout, slightly tapering to the truncate apex. Abdomen extending slightly beyond end of 1st coxae of last legs, apically rounded. No ovigers.

Legs stout, granulose like the rest of the integument, without tubercles or bosses, but dorsal apex of femur somewhat gibbous; 2nd tibia nearly as long as 1st; auxiliary claws small but distinct. Genital pore not traceable.

Body 2, proboscis ·75, abdomen ·5 mm.

Locality: False Bay (Cape), 8 fath. (Univ. Cape Town Ecol. Surv., Aug. 1952, one specimen).

Distribution. Gulf of Naples (Dohrn); Santa Maria Bay, Angola (13° 25′ S.). (Stock.)

Remarks. After its original description seventy years elapsed before this species was rediscovered; and then far away from its previously known habitat. It is strange that a couple of years later another example should be collected, and even farther afield. That is assuming that the identification of the present specimen is correct. There is no justification for a n.sp.; the single specimen can be compared only with *pusillum*, and only one feature requires comment.

Dohrn used the words 'beträchtlicher Höcker' and 'beträchtlicher Buckel' in describing the projections on the segments and crurigers, but unfortunately omitted to indicate these projections in his figure (as Stock pointed out). I would use a similar term, boss, projection or prominence, in preference to 'tubercle' for the present specimen. Stock, however, used the word 'tubercle', and his figure gives the impression that these prominences are in fact small and well-defined tubercles.

Dr. Stock, to whom a sketch of the Cape specimen was sent, considers that it should be identified as *pusillum*; and states that the ocular tubercle and body prominences are subject to considerable variation in the genus *Pycnogonum*.

Incertae Sedis

Gen. *Queubus* Brnrd.

1946. Barnard, *Ann. Mag. Nat. Hist.* (xi) 13, p. 63.

Octopodous. Body distinctly segmented, anterior part of cephalic segment produced considerably in front of first crurigers. Proboscis movable, elongate, slender, tapering. Chelifers and palps absent. Oviger ♂ 10-jointed, with apical claw (♀ unknown). Legs strong, but of good length proportionately to body, 2nd coxa longer than either 1st or 3rd, tarsus short, propodus stout, with heel and strong spines on lower margin, claw strong, no auxiliary claws. Femoral pores on ventral apex of 2nd coxa of last 2 legs. Eggs carried in a single mass.

Remarks. Resembling *Pycnogonum* in the absence of chelifers and palps, but differing in the armature and subchelate shape of the propodus of the legs. The absence of the ♀ makes the position and relationships of the genus uncertain.

Pigrogromitus Calman, 1927, is another genus with some remarkable features and of uncertain position. The name of the present genus is taken from the same passage in Shakespear.

Queubus jamesanus Brnrd.

Fig. 34

1946. Barnard, loc. cit., p. 63.

♂ — In general resembling *Pycnogonum crassirostre*, but legs relatively longer. Integument smooth. Hind part of cephalic and 4th segments, and anterior part of 2nd and 3rd segments raised into a prominent conical boss. Crurigers

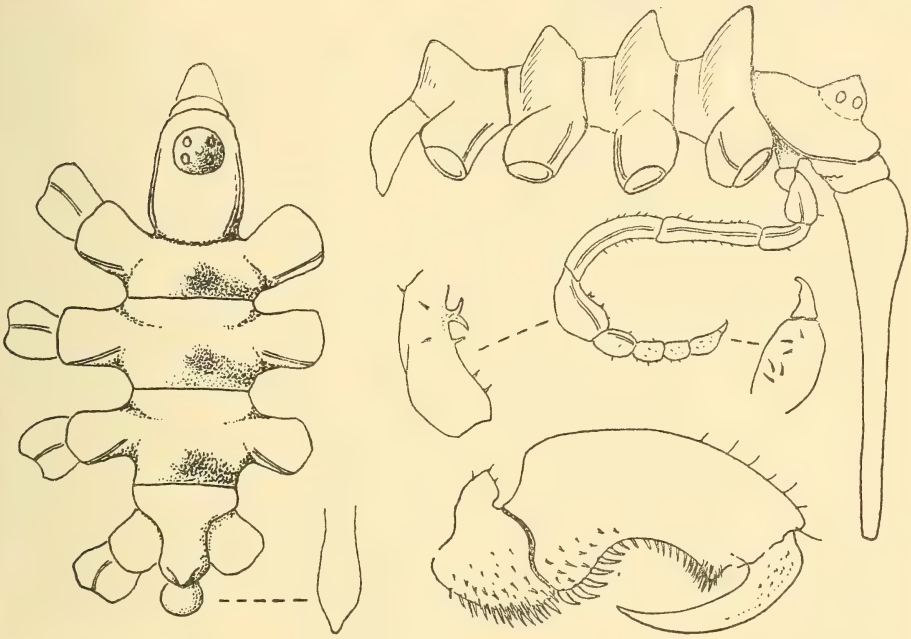


Fig. 34. *Queubus jamesanus* Brnrd. Dorsal view ♂ (gap between 3rd and 4th crurigers drawn too wide, abdomen foreshortened and drawn in true length alongside); lateral view, with oviger, 6th and 10th joints of latter further enlarged; tarsus, propodus and claw of leg.

separated by half to three-quarters their own width (gap between 3rd and 4th in the figure is too wide), their length less than median width of segments. Ocular tubercle large, conical, not very high, eyes distinct. Proboscis long, narrowing rapidly, the distal two-thirds slender, cylindrical. Abdomen deflexed, clavate, with pointed apex.

Oviger 10-jointed, 4th and 5th joints longest, 5th curved, 6th ovately expanded, inner margin with a strong bifid spine and a simple spine, 7th-10th joints with minute spinules, apical claw short.

Legs smooth, 2nd coxa longer than either 1st or 3rd, but not quite equal to the other two combined, femur subequal to the three coxae combined, 1st and 2nd tibiae subequal, each shorter than femur, tarsus strongly spinulose on

lower surface, propodus curved, with heel carrying 6-7 strong spines, with other spines on lower margin decreasing in size, lower apex angularly prominent, spinulose, claw strong, reaching to the heel on propodus, no auxiliary claws.

Base of proboscis to base of abdomen 4 mm., proboscis 3 mm., leg without claw 9 mm.

Locality: St. James, False Bay, low-tide. 1 ovig. ♂ (K. H. Barnard, 1912).

Remarks. The single mass of eggs was carried by the right oviger only, the left being folded up alongside.

The *ANNALS OF THE SOUTH AFRICAN MUSEUM* are issued in parts at irregular intervals as material becomes available. As far as possible each volume is devoted exclusively to a particular subject (Zoology, Botany, etc.). Two or more volumes may be in course of publication concurrently.

Most of the Geological and Palaeontological papers are issued in conjunction with the Geological Survey of the Union of South Africa.

Some volumes and parts are out of print, and others are only sold as parts of a set, or volume, respectively. The prices of parts published prior to 1940 have been increased.

Out of print: Vols. I, II, V (Parts 1, 2, 9), VII, VIII, IX (Part 1), XII (Part 7), XXII, XXIV (Part 2), XXXI (Parts 1, 2, 3).

Vol.			£	s.	d.
III.	1903–1905	Zoology	1	19	0
IV.	1903–1908	Palaeontology	3	7	0
V.	1906–1910	Geology, Palaeontology, Zoology, Anthropology	1	2	0
VI.	1908–1910	Zoology	3	3	6
IX.	1911–1918	Botany (excl. Part 1)	2	16	0
X.	1911–1914	Zoology	4	16	0
XI.	1911–1918	Zoology	3	1	6
XII.	1913–1924	Palaeontology and Geology (excl. Part 7)	3	13	0
XIII.	1913–1923	Archaeology and Zoology	3	10	6
XIV.	1915–1924	Zoology	3	6	6
XV.	1914–1916	Zoology	4	5	0
XVI.	1917–1933	Botany	3	11	0
XVII.	1917–1920	Zoology	3	10	0
XVIII.	1921	Zoology	4	5	6
XIX.	1924–1925	Zoology	3	7	0
XX.	1924–1926	Zoology	2	12	0
XXI.	1925–1927	Zoology	3	6	0
XXIII.	1925–1926	Zoology	1	15	0
XXIV.	1929–1938	Anthropology and Ethnology (excl. Part 2)	2	9	6
XXV.	1927–1928	Zoology	1	19	0
XXVI.	1928	Zoology	1	10	0
XXVII.	1929	Anthropology	1	10	0
XXVIII.	1929–1932	Palaeontology	2	12	0
XXIX.	1929–1931	Zoology	2	8	0
XXX.	1931–1935	Zoology	3	13	6
		INDEX of papers, authors, and subjects, published in Vols. I–XXX	0	1	6
XXXI.	1934–1950	Palaeontology (Part 4 only)	0	14	0
XXXII.	1935–1940	Zoology	3	3	6
XXXIII.	1939	Zoology	2	2	0
XXXIV.	1938	Zoology	2	8	0
XXXV.		Reserved for conclusion of monograph in Vol. XXXIV.			
XXXVI.	1942–1948	Zoology	2	11	0
XXXVII.	1947–1952	Archaeology	1	16	0
XXXVIII.	1950	Zoology	3	15	0
XXXIX.	1952	Zoology	2	14	6
XL.	1952–	Botany Part 1, 1*s.* Part 2	0	17	6
XLI.	1952–	Zoology Part 1, 7*s.* 6*d.* Part 2, 7*s.* 6*d.* Part 3	0	15	0
XLII.	1953–	Palaeontology Part 1, 12*s.* 6*d.* Part 2	0	15	0

Copies may be obtained from—

The LIBRARIAN, SOUTH AFRICAN MUSEUM, CAPE TOWN,

except the Geological and Palaeontological parts, which are obtainable from the GOVERNMENT PRINTER, PRETORIA.

ANNALS

OF THE

SOUTH AFRICAN MUSEUM

VOLUME XLI

PART IV, *containing:—*

8. *Les Paguristes des côtes occidentales et méridionales d'Afrique.* Par JACQUES FOREST. (Avec planche IV et 70 figures dans le texte.)

ISSUED JUNE 1954 *PRICE* 15*s.*

PRINTED FOR THE
TRUSTEES OF THE SOUTH AFRICAN MUSEUM
BY THE RUSTICA PRESS (PTY.) LIMITED, COURT ROAD, WYNBERG, CAPE

8. *Les Paguristes des côtes occidentales et méridionales d'Afrique.*

par Jacques Forest

Muséum National d'Histoire Naturelle, Paris

(Avec planche IV et 70 figures dans le texte)

I. Introduction

Sur les cinquante-et-une espèces ou variétés de *Paguristes* mentionnées par Alcock dans son inventaire des Pagurides du monde (1905), trois seulement appartenaient à la faune ouest-africaine et il n'y en avait qu'une qui fut signalée pour l'Afrique du Sud. Encore dans ces quatre cas, ne connaissait-on que les types! On aurait pu croire à cette époque que le genre *Paguristes*, florissant dans l'Indo-Pacifique et dans la mer des Antilles, n'était que sporadiquement et fort pauvrement représenté dans l'Atlantique africain. La description, depuis lors, de trois nouvelles espèces ne modifiait guère les conclusions précédentes: il ne s'agissait toujours que de quelques individus.

Aujourd'hui, après avoir dépouillé un matériel abondant et d'origine variée, il faut bien constater que la pauvreté de la faune ouest et sud-africaine en *Paguristes* n'était qu'apparente: il y a peut-être en certain point de ce littoral plus d'espèces et plus d'individus appartenant à ce genre qu'en aucune autre région du monde. Aux sept espèces connues, s'ajoutent maintenant neuf espèces nouvelles. *Paguristes mauritanicus* dont on ne connaissait que le type a été récolté en plus de vingt-cinq stations et les collections en renferment des centaines d'exemplaires.

La liste des espèces n'est d'ailleurs certainement pas close, car bien des régions et bien des niveaux restent inexplorés. A considérer la carte de repartition (fig. 69) il semblerait que c'est autour de Dakar que les *Paguristes* sont les plus nombreux et les plus variés; il est peu probable en effet que des dragages opérés en d'autres points puissent ramener un échantillonnage de faune pagurienne plus intéressant que celui du 18 janvier 1952, en Baie de Rufisque: les quelques centaines de Pagures récoltés—de petite taille puisqu'ils occupaient un volume total de moins d'un litre-appartenaient à quatorze espèces différentes dont quatre de *Paguristes*. On doit cependant tenir compte du fait que cette région de Dakar, depuis la côte jusqu'à une profondeur de 100 à 120 mètres, est l'une des mieux connues du littoral ouest-africain; il ne faudrait pas conclure, au vu des vastes blancs qui figurent sur notre carte de répartition, que les *Paguristes* sont totalement absents des côtes du Cameroun ou du Sud-ouest africain par exemple. Ces blancs signifient surtout que l'on se trouve en présence de zônes pratiquement inexplorées où des recherches ultérieures permettront sans doute de retrouver des espèces signalées ailleurs ou révéleront des formes nouvelles. Si on considère d'autre part que beaucoup de *Paguristes* vivent à

des profondeurs assez grandes—Alcock estimait que 30% des espèces de ce genre se trouvent à un niveau inférieur à 100 brasses (180 mètres environ)—on peut s'attendre à en découvrir de nouvelles dans l'Atlantique africain lorsqu'on aura la possibilité de draguer en-dessous de 120 mètres, limite de la plupart des récoltes effectuées à ce jour. Le matériel provenant de profondeurs plus grandes est fort peu abondant et provient pour la plus grande part des campagnes du "Travailleur" et du "Talisman".

La grande majorité des *Paguristes* intertropicaux d'Afrique occidentale ont un point commun: à l'exception de *P. oculatus* var. *rubropictus*, variété d'une espèce méditerranéenne et de *P. marocanus* qui vit à une profondeur plus grande que les autres, tous présentent une anomalie de l'appareil génital femelle; l'orifice sexuel est unique et situé sur la coxa gauche; il n'y a pas trace d'orifice droit. Dans le genre *Paguristes* nous n'avons pour l'instant retrouvé cette disposition de l'appareil génital femelle que chez des espèces de la Mer Rouge; ceci n'est pas le seul point commun entre les *Paguristes* d'Afrique occidentale et ceux de Mer Rouge dont la systématique embrouillée par Nobili est entièrement à revoir: *P. hispidus*, *P. microphthalmus* et *P. rubrodiscus*—les trois espèces aux écailles oculaires très allongées—sont plus proches de *P. jousseaumei*, décrit par Bouvier d'Aden et de Suez, que d'aucune autre espèce ouest-africaine et cette constatation s'ajoute à celles que nous avons eu l'occasion de faire à propos d'autres *Paguridae*. Certains *Diogenes* du Golfe de Guinée existent aussi en Mer Rouge, ou y sont représentés par des formes voisines (Forest, 1952*a*, p. 13).

Chez d'autres *Paguridae* appartenant ceux-là à la sous-famille des *Eupagurinae*, il n'existe aussi qu'un orifice génital femelle, situé sur la coxa de la troisième patte thoracique gauche comme chez les *Paguristes*; il s'agit des genres *Sympagurus* et *Parapagurus*. Il est intéressant de noter que dans ces deux genres, que l'on considère en général comme bien éloigné des *Paguristes*, le mâle possède également deux paires de pléopodes en général modifiés en gonopodes (voir p. 163).

Au point de vue biogéographique on remarque qu'il existe sur la côte occidentale d'Afrique, entre les Tropiques, un groupe de *Paguristes* dont on ne trouve aucun représentant ni au nord ni au sud, ni en une autre région du monde. L'examen de la carte de répartition (fig. 69) montre que le genre est représenté par dix espèces entre l'Equateur et le Tropique du Cancer. Parmi ces dix espèces il en est quatre que l'on retrouve au sud de l'Equateur, *P. oculatus* var. *rubro-pictus* (si la détermination d'Odhner est exacte), *P. mauritanicus*, *P. hispidus* et *P. virilis*. Une cinquième espèce, la seule qui serait propre à cette région, est fort proche de *P. virilis*: c'est *P. skoogi*. Ainsi, dans le cas où l'abondance et la diversité des *Paguristes* au large de Dakar ne seraient pas seulement dues à une meilleure connaissance de ce point du littoral, on pourrait admettre que la côte sénégalaise constitue le centre de dispersion des espèces intertropicales ou tout au moins la région où le genre a rencontré les conditions de vie les plus favorables.

Les *Paguristes* d'Afrique occidentale paraissent rechercher les fonds coquilliers, caillouteux ou vaseux, de préférence aux fonds de sable fin. On ne les rencontre guère dans la zône intercotidale, mais surtout à partir de quelques mètres jusqu'à cinquante mètres environ. Il semble que, pour une espèce au moins, il y ait une

relation entre la latitude et la profondeur à laquelle on la trouve: *Paguristes mauritanicus* a été capturé entre 5 et 30 mètres en A.O.F. et entre 50 et 100 mètres au Congo. *P. marocanus* qui n'appartient pas au groupe intertropical proprement dit a été dragué entre 115 en 290 mètres, mais il n'est connu que par un très petit nombre d'exemplaires et il est possible qu'on le rencontre à d'autres niveaux.

Pour l'Atlantique africain intertropical, nous avons disposé d'un matériel abondant dont la base était constituée par la collection du Muséum d'Histoire Naturelle, avec notamment les spécimens recueillis par le "Travailleur" et par le "Talisman". Nous avons également trouvé de nombreux *Paguristes* parmi les Pagures rassemblés au cours des dernières années par les zoologistes de l'Institut Français d'Afrique Noire et dans la collection qui nous a été confiée par l'Institut Royal des Sciences Naturelles de Belgique (Croisière du "Mercator" et Expédition "M'Bizi"). D'autres échantillons ont été récoltés par MM. E. Postel et R. Sourie de Dakar. La répartition géographique des espèces a été établie en tenant compte également des spécimens dragués au large de la Gold Coast par R. Bassindale, lesquels seront étudiés en détail avec les autres Pagures de même provenance.

Nous n'avons pas rencontré de difficulté particulière dans l'étude des *Paguristes* de cette région et ceci surtout parce que nous avions un assez grand nombre de spécimens de la plupart des espèces. Toutes—à l'exception de *P. difficilis* Forest qu'il est assez malaisé de distinguer de *P. mauritanicus* Bouvier sans examiner les pléopodes sexuels du mâle—sont relativement faciles à déterminer à l'aide de caractères bien apparents. Notons cependant qu'ils sont presque tous revêtus d'une abondante pilosité constituée par de longs poils plumeux; ces poils retiennent de fines particules de vase entre leurs barbules et cachent les régions du corps qui sont précisément les plus caractéristiques; aussi est-il nécessaire le plus souvent de nettoyer les spécimens à déterminer à l'aide d'une brosse fine.

Nous avons été embarrassé par le cas de *Paguristes skoogi* Odhner: c'est la seule espèce déjà décrite dont nous n'ayons pas examiné de spécimens. Le type, contrairement à ce que nous espérions, ne se trouverait ni à Stockolm ni à Göteborg. Notre *P. virilis* en est certainement fort proche, mais ne répond pas exactement à la description d'Odhner, ce qui nous interdit d'identifier les deux espèces pour l'instant.

Les *Paguristes* d'Afrique du sud—à l'exception du type de *P. gamianus* de H. Milne-Edwards conservé au Muséum de Paris—nous ont été communiqués par le Dr. K. H. Barnard, et appartiennent au South African Museum ou au Département de Zoologie de l'Université de Cape Town. Ces espèces nous réservaient des difficultés bien plus grandes que les précédentes.

Nous avons tout d'abord hésité à établir l'espèce nouvelle décrite ici sous le nom de *P. barnardi*, en raison de l'impossibilité de la distinguer du *P. gamianus* H. Milne-Edwards d'après l'aspect de la carapace et des appendices céphaliques. Cependant des différences marquées dans la pilosité et l'ornementation des pattes ambulatoires et dans la taille, ainsi que le nombre assez grand de spécimens dont

nous disposions et que l'absence de formes intermédiaires, nous ont finalement amené à penser qu'il s'agissait réellement de deux espèces distinctes.

Une seconde difficulté s'est présentée avec le spécimen décrit à la suite de *P. gamianus* sous le nom de *Paguristes* sp. C'est un individu mâle d'une taille supérieure à celle des plus grands *P. gamianus*, dont il diffère sur un certain nombre de points. Ces différences sont-elles liées à l'âge du spécimen en question? Quoi qu'il en soit il ne nous a pas paru opportun d'en faire une nouvelle espèce.

Enfin, si nous décrivons sans hésitation *P. macrotrichus* sp. nov. d'après un spécimen femelle déterminé—à tort—par Stebbing comme *P. gamianus*, nous ne sommes pas absolument certains que le *Paguristes* mâle plus petit, et d'aspect assez différent, qui figure ici sous le nom de *P. agulhasensis* sp. nov., n'appartienne pas à la même espèce.

Il subsiste ainsi, dans la systématique des *Paguristes* sud-africains, quelques points douteux, qui concernent des spécimens isolés. Ils ne seront éclaircis que lorsqu'on aura récolté un matériel plus nombreux, condition essentielle d'une systématique valable, surtout lorsqu'on a affaire à des animaux aussi variables que des *Paguridae*.

Ces espèces ne présentent guère d'affinités avec celles que l'on trouve entre les Tropiques. En ce qui concerne leur répartition géographique le fait le plus frappant qui apparaît lorsqu'on considère la figure 70, c'est la distribution des deux espèces parentes, *P. gamianus* et *P. barnardi*: la première est surtout représentée sur la côte occidentale d'Afrique du Sud où s'exerce l'influence des courants froids, alors que la seconde n'a été trouvée que sur la côte sud, baignée par le courant chaud des Aiguilles.

On possède peu de renseignements écologiques sur les espèces sud-africaines; la plupart des échantillons proviennent de la région de la zone intercotidale ou des faibles profondeurs, sauf le *P. agulhasensis* dragué par 55 mètres et le *P. macrotrichus*, ramené de 90 mètres.

En raison de l'importance que présentent—comme nous l'avons indiqué plus haut—les pléopodes sexuels mâles dans la systématique du genre *Paguristes* nous avons fait précéder l'étude proprement dite des espèces ouest-et sud africaines d'un chapitre consacré à la morphologie et à la physiologie de cet appareil génital externe que nous avons comparé à celui de quelques Anomoures. La courte diagnose du genre *Paguristes* est suivie d'un tableau de détermination valable pour les espèces qui nous intéressent. La description de chacune d'elles est suivie de quelques remarques sur sa position systématique et sur sa répartition. Elles ont été classées suivant l'ordre géographique nord-sud et ouest-est.

Les tailles minima et maxima ont été données pour chaque échantillon: nous avons choisi comme dimension la longueur de la carapace (l.c.) mesurée depuis la pointe du rostre jusqu'au bord postérieur de la carapace, ce qui permet des comparaisons beaucoup plus significatives que la longueur totale.

Les abréviations utilisées sont p. 1, p. 2, p. 3, etc. . . . pour les chélipèdes et les appendices thoraciques suivants, et pl. 1, pl. 2, pl. 3, etc. . . . pour les appendices abdominaux.

II. Les appendices sexuels des *Paguristes* mâles

L'un des caractères les plus remarquables des *Paguridae* est la régression accentuée des appendices abdominaux, uropodes exceptés. Chez la plupart cette régression se traduit par la réduction, plus forte chez les mâles que chez les femelles, des appendices situés sur le côté gauche et par la disparition complète de ceux de droite. A côté de ces formes chez lesquelles est réalisé le type pagurien parfait, il en existe d'autres qui sont encore pourvues d'une ou de deux paires d'appendices dans la région antérieure de l'abdomen. Les plus primitifs à cet égard sont des *Pagurinae*, les *Paguristes*, dont il est plus particulièrement question ici, et les *Paguropsis*. Dans ces deux genres les femelles ont conservé des pl. 1 pairs et les mâles des pl. 1 et des pl. 2 pairs. Aucun autre représentant de la sous-famille ne présente plus de pléopodes symétriques, mais chez une espèce australienne, *Trizopagurus strigimanus* (Miers) il existe, sur le deuxième somite abdominal du mâle, un petit appendice droit différant seulement du gauche par la taille plus réduite et par la plus grande variabilité de l'exopodite (Forest, 1952*c*, p. 8, fig. 8).

Chez les *Eupagurinae* la persistance d'appendices pairs sur l'abdomen peut revêtir divers aspects. Dans certains genres le mâle possède des pl. 1 pairs, alors que la femelle en est dépourvue, c'est le cas de *Tomopaguropsis*. La formule inverse est observée chez *Nematopagurus*, *Pylopagurus*, *Pagurodes*, *Ceratopagurus* chez lesquels la femelle seule a des pléopodes symétriques, ceux de la première paire. Enfin chez *Parapagurus*, *Sympagurus* et *Xylopagurus*, si la femelle n'a que des pléopodes impairs ou si même ceux-ci ont disparu, le mâle est encore pourvu de pl. 1 et de pl. 2.

Lorsque les pl. 1 subsistent seuls, que ce soit chez le mâle ou chez la femelle, ce sont des appendices d'un type assez simple et peu varié: un article basilaire assez fort, un article distal en général foliacé, bordé de longues soies; leur rôle dans la reproduction n'apparaît pas nettement, bien qu'on les désigne souvent sous le nom de pléopodes sexuels. Par contre lorsqu'il existe à la fois des pl. 1 et des pl. 2 pairs chez le mâle, il s'agit, à quelques exceptions près,[1] d'organes très différenciés constituant les éléments d'un appareil copulateur dont la structure permet d'interpréter le fonctionnement et le rôle.

Les *Paguristes*, objets de la présente étude, ont des appendices mâles bâtis sur le même type, mais cette uniformité recouvre une grande diversité dans les proportions des régions homologues et dans l'ornementation. On est ainsi amené, en systématique, à accorder aux pl. 1 et aux pl. 2 des *Paguristes* une valeur identique à celle qu'on attribue aux premiers appendices sexuels des *Brachyures*.

Morphologie et Physiologie

Nous avons choisi comme type d'appareil génital externe mâle de *Paguristes* celui de *P. oculatus* Fabricius, espèce bien connue, d'assez grande taille et tout à fait représentative du genre au point de vue qui nous intéresse maintenant (fig. 1).

[1] Quelques espèces appartenant au genre *Sympagurus* présentent une variabilité extrême des pléopodes pairs. Chez *Sympagurus bicristatus* A. Milne-Edwards par exemple en rencontre des mâles pourvus des deux pl. 2 ou du gauche seulement. D'autres n'ont plus de pl. 2, mais deux pl. 1. Les cas extrêmes sont l'absence complète de pléopodes pairs et très rarement la présence simultanée des pl. 1 et des pl 2. Ces appendices sont constitués par deux articles simples au plus, ils ne sont parfois représentés que par un bourgeon.

La première paire de pléopodes s'insère immédiatement en arrière du dernier segment thoracique. Les deux appendices sont assez rapprochés, rabattus en avant sur la région sternale thoracique, logés entre les coxae de la dernière paire de péréiopodes. Ils se composent (fig. 2) de deux articles à demi-soudés: l'article basilaire assez court à section sub-triangulaire et l'article distal foliacé, enroulé de telle façon qu'il forme une profonde gouttière ouverte vers le plan sagittal. Lorsque

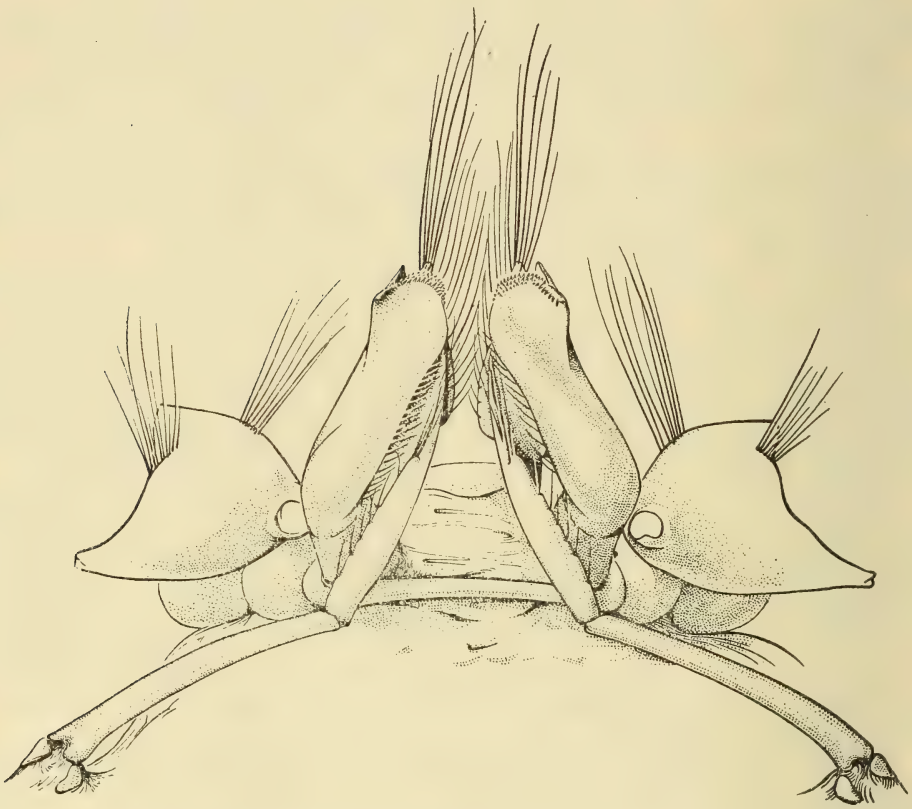


Fig. 1. *Paguristes oculatus* Fabricius: ♂ coxae des p. 5 et gonopodes.

l'animal est examiné par la face ventrale cet article distal paraît donc constitué par deux lames: l'une, que nous qualifierons d'inférieure (*l.i.*), visible en totalité au premier plan; la lame supérieure, en contact avec le thorax, est en partie cachée par la précédente. La lame inférieure est allongée, épaissie et plus fortement calcifiée dans le voisinage du bord libre qui est garni de longs poils dirigés vers l'avant, légèrement spatulée dans la région antérieure; son bord distal est armé de nombreux crochets cornés recourbés vers l'extérieur. La lame supérieure est découpée en deux lobes: un lobe distal triangulaire (*l.d.*) et un lobe interne (*l. int.*) très arrondi couvert de longs poils.

On observe chez les adultes, au moment de la reproduction, à l'intérieur même des deux appendices, de nombreuses masses arrondies qui ont l'aspect de petites oranges épluchées. Chacune de ces masses est constituée par un agrégat de cellules à gros noyaux qui représentent sans doute des glandes dont la sécrétion intervient dans la fixation des spermatophores sur la femelle.

Les pl. 2 (fig. 6) sont plus longs et plus grêles que les pl. 1; ils s'insèrent beaucoup plus loin sur l'abdomen et bien plus latéralement. Ils se composent d'un très court article basilaire (coxa rudimentaire), d'un second article long et mince, presque rectiligne, obliquement rabattu vers le plan sagittal (basis) et d'un article allongé, foliacé, enroulé sur lui-même et formant ainsi une gouttière ouverte vers l'extérieur. Cet article paraît résulter de la soudure partielle de l'endopodite proprement dit et d'une pièce homologuable à l'*appendix masculina* de *Thalassina* et peut-être à l'*appendix masculina* et au *stylamblys* des *Natantia* supérieurs (*Eucyphidea*). La région antérieure de chaque appendice a un bord libre épaissi, couvert de longs poils dirigés vers l'avant; elle est logée à l'intérieur de la gouttière du pl. 1 correspondant chez la plupart des *Paguristes* examinés.

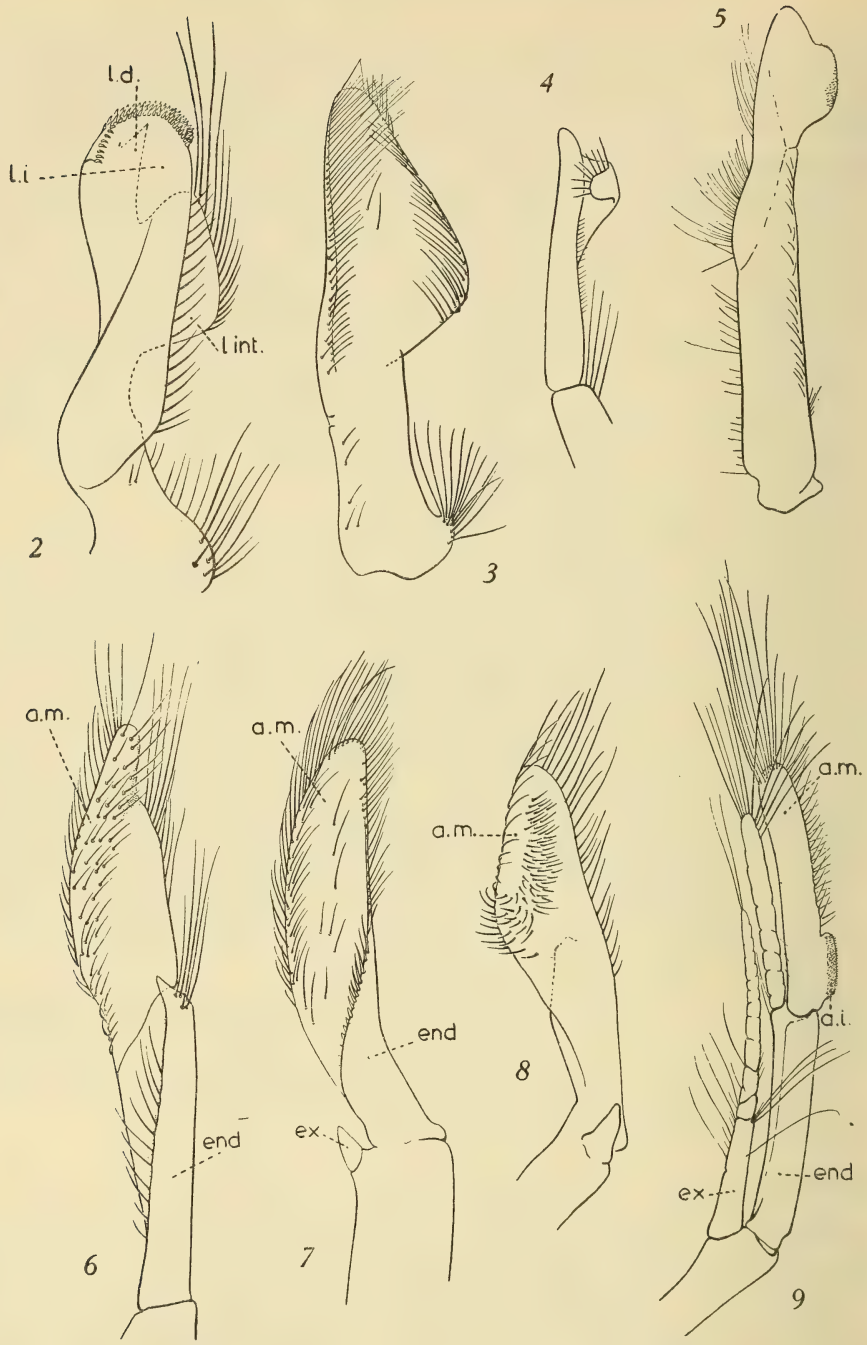
D'après la structure de ses constituants, on peut imaginer que le fonctionnement de l'appareil génital externe des *Paguristes* est le suivant: au moment de la copulation qui n'a jamais été observée dans ce genre[2] mais qui est sans doute comparable à celle des Ecrevisses, décrite par plusieurs auteurs, la face ventrale du mâle viendrait en contact avec la face ventrale de la femelle. Les premiers pléopodes du mâle s'appliquent contre les coxae de la quatrième paire de pattes thoraciques de la femelle. C'est ici qu'interviendraient les minuscules crochets qui arment le bord antérieur des premiers pléopodes sexuels: fixés aux coxae de la femelle, dont la région antérieure forme une crête anguleuse garnies de denticules, ces crochets maintiendraient les appendices mâles en position. Les spermatophores sont émis au niveau de l'ouverture postérieure de la gouttière des pl. 1; l'article distal des pl. 2, jouant le rôle de balai, les pousse à l'intérieur de la gouttière puis les expulse au niveau des orifices de la femelle où ils adhèrent aux longs poils qui couvrent les pièces sternales et la base des appendices thoraciques.

Le dispositif décrit ci-dessus est moins parfait mais comparable à celui qu'on observe chez le *Cancer pagurus* ♂ dont l'article distal des pl. 1 enroulé sur lui-même ne forme plus simplement une gouttière mais un canal complet, à l'intérieur duquel se déplace l'extrémité antérieure du second pléopode comme un piston dans un cylindre, pour reprendre la comparaison de Balss (1944).

L'appareil genital externe chez quelques Anomoures

L'anatomie comparée de l'appareil génital externe mâle ne serait pas un élément négligeable dans l'étude de l'évolution des Reptantia, mais ne permettrait pas à elle seule de situer les divers groupes les uns par rapport aux autres. Ce n'est pas dans le but de placer exactement les *Paguristes* parmi les *Paguridae*, ni les *Paguridae* parmi les Anomoures que nous allons comparer les appendices sexuels mâles de

[2] Cavolini (1787) a décrit, mais de façon extrêment peu précise, la copulation chez des Pagures qui étaient peut-être des *P. oculatus*.



Figs. 2–9. Pléopodes sexuels droits chez quelques Anomoures ♂: en haut, pl. 1, en bas, pl. 2. 2, 6, *Paguristes oculatus* Fabricius; 3, 7, *Sympagurus gracilipes* A. M.-Edw.; 4, 8, *Galathea squamifera* Leach; 5, 9, *Thalassina anomala* Herbst.
l.i., lame inférieure; l.int., lobe interne; l.d., lobe distal; ex., exopodite; end, endopodite; a.m., *appendix masculina*; a.i., *appendix interna*.

Paguristes oculatus à ceux d'autres formes. Cette comparaison montrera simplement les rapports qui existent à ce point de vue entre les *Paguristes*, les *Eupagurinae*, les *Pylochelidae* et les *Galatheidae*, et à quel point un autre Anomoure, *Thalassina*, peut-être considéré comme primitif en ce qui concerne la structure de l'appareil génital externe.

Les figures 3 et 7 représentent les pl. 1 et pl. 2 droits d'un *Eupagurinae*, *Sympagurus gracilipes* A. Milne-Edwards. Les premiers appendices se composent comme chez *P. oculatus* de deux articles. Le distal est foliacé mais ne présente qu'un léger enroulement si bien qu'il n'est plus possible de parler de lames supérieure et inférieure. Par ailleurs, les bords de l'article forment une courbe continue, si bien qu'il n'y a plus de limite précise entre les régions que nous avons désigné sous le nom de lobe distal et de lobe interne chez *Paguristes oculatus*. Quant aux pl. 2 ils sont assez trapus et formés de trois articles comme chez les *Paguristes*. On observe en plus un exopodite réduit à un bourgeon qui est d'ailleurs absent chez un autre *Eupagurinae*, *Parapagurus pilosimanus*.

Les *Pylochelidae* dont nous n'avons pas de spécimens mâles en collection semblent présenter une assez grande hétérogénéité des pléopodes pairs mâles. Les figures données par Boas (1926, fig. 12 D, E et fig. 13 D, E) montrent qu'il existe de notables différences entre les *Mixtopagurus* et les *Pylocheles*. Si les pl. 1 sont dans les deux cas assez voisins et nettement plus petits que les pl. 2, ceux-ci sont pourvu chez les premiers d'un exopodite qui manque chez les seconds. D'autre part l'article distal des pl. 2 présente chez *Pylocheles* trois lobes séparés par de profondes encoches qui paraissent correspondre à celles, moins marquées, qu'on observe sur le pourtour de l'article distal chez *P. oculatus*.

Chez *Galathea squamifera* Leach (*Galatheidae*) on retrouve l'enroulement accentué de la région distale des pl. 1 (fig. 4). Les pl. 2 (fig. 8), plus longs et plus forts que les pl. 1, ont une région distale très élargie, légèrement enroulée, et résultant aussi de la fusion partielle de deux articles. Il existe un exopodite rudimentaire comme chez *Sympagurus gracilipes*.

Si les différences les plus importantes entre les pléopodes sexuels mâles de *P. oculatus* et ceux des quelques Anomoures que nous avons jusqu'à maintenant passés en revue, concernent surtout les proportions des différentes régions des appendices, la fusion plus ou moins complète de certains lobes et la présence chez certains d'un court exopodite, dans tous les cas l'appareil destiné à faciliter la fixation des spermatophores sur la femelle fonctionne à peu près dans les mêmes conditions. Il se compose d'une partie droite et d'une partie gauche, qui interviennent sans doute simultanément mais indépendamment l'une de l'autre: les spermatophores issus de chacun des deux orifices sexuels mâle sont véhiculés par les appendices situés du côté correspondant. Chez *Thalassina anomala* (Herbst) les deux premières paires d'appendices abdominaux sont modifiés en gonopodes chez le mâle, mais on n'a plus ici un appareil double: les quatre pléopodes forment un appareil unique. Chacun des pl. 1 (fig. 5) est constitué par une pièce résultant de la cohalescence de plusieurs articles dont les limites sont encore visibles. Il comprend une lame principale bordée de longues soies sur son bord externe, un lobe distal saillant et arrondi, un

lobe antéro-interne couvert de petits poils crochus constituant un rétinacle. Les pl. 2 (fig. 9) ont une structure plus compliquée que chez les formes précédentes: l'endopodite comprend une pièce basilaire allongée, déprimée, sur laquelle s'articule, en avant, un flagelle sub-cylindrique constitué par de courts articles plus ou moins cohalescents, et une pièce de même longueur que la portion basilaire et également déprimée, que Boas désigne sous le nom d'*appendix masculina*. Un lobe interne situé dans la région proximale de l'*appendix masculina* et qui forme rétinacle serait suivant le même auteur à homologuer à l'*appendix interna* des *Eucyphidea*. L'exopodite multi-articulé est sub-cylindrique et égal aux deux tiers environs de l'endopodite; son article proximal est beaucoup plus long que les suivants. Dans leur complexité les pl. 2 de *Thalassina anomala* mâle paraissent bien plus proches de ceux de certains Astacura, *Astacus astacus* L. par exemple (voir Balss 1941, p. 172, fig. 230) que de ceux des *Paguridae*.

Nous avons dit qu'il s'agissait d'un appareil unique: en effet, au moment de la copulation, les deux pl. 1 maintenus en contact par les rétinacles forment une seule gouttière dont le bord postérieur s'ouvre au niveau des orifices sexuels qui sont très rapprochés. Les spermatophores sont poussés à l'intérieur, puis à l'extérieur de cette gouttière par les extrémités des pl. 2 accolés eux aussi l'un à l'autre par leurs rétinacles.

Utilisation des appendices sexuels mâles pour la détermination des Paguristes

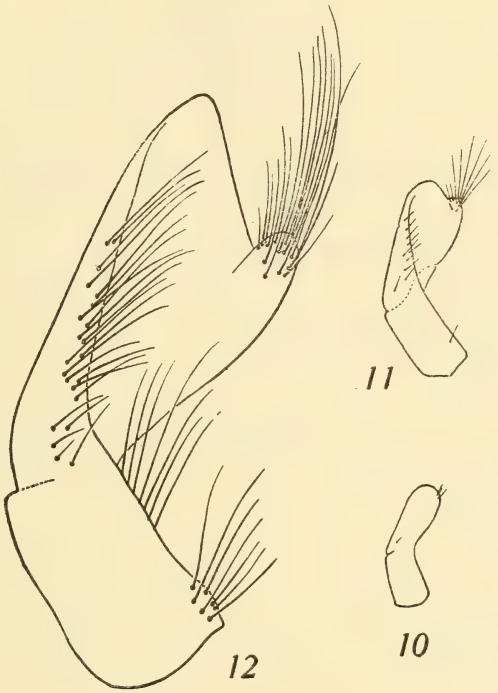
Chez les Brachyures, les premiers pléopodes des mâles adultes se sont révélés comme d'excellents caractères et permettent souvent de distinguer avec une facilité relative des espèces par ailleurs fort voisines. Nos observations nous ont montré qu'il en était de même pour les *Paguristes*: dans ce genre, les premiers et aussi les seconds appendices abdominaux présentent, d'une part, une grande constance de forme, de proportions et d'ornementation chez les mâles adultes d'une espèce donnée, et d'autre part, des différences caractéristiques d'une espèce à l'autre dans de nombreux cas.

La technique d'utilisation des pl. 1 et des pl. 2 mâles dans la systématique des *Paguristes* est très simple. Les appendices sont désarticulés à la base et détachés sous la loupe binoculaire à l'aide d'une aiguille lancéolée; ils sont ensuite immergés pendant quelques instants dans l'alcool absolu, qu'ils proviennent d'animaux conservés dans l'alcool à 70° ou dans l'eau formolée. On les monte enfin à la résine mastic dans la position qu'ils occupent sur le Pagure lorsqu'on l'examine par la face ventrale. Dans beaucoup d'espèces les pl. 1 présentent un enroulement très accentué de l'article distal si bien que la lame inférieure est entièrement par dessus et cache une partie de la lame supérieure; il est donc nécessaire de retourner la préparation pour voir la totalité du lobe distal et du lobe interne. Lorsque l'enroulement est plus faible; ce qui est le cas pour plusieurs espèces sud-africaines, l'article distal s'étale entre lame et lamelle et son contour est entièrement visible du même côté de la préparation.

Les seconds pléopodes ont également une région distale plus ou moins enroulée en hélice. Il n'est pas toujours possible d'étaler parfaitement cette région en pressant

sur la lamelle, et il arrive que les différents articles des appendices n'occupent pas une position absolument comparable d'une préparation à l'autre. Les dessins ont été exécutés avec la face la plus pileuse de la région distale par dessus.

Les figures 42 à 54 qui représentent les pl. 1 des *Paguristes* mâles des côtes occidentales et méridionales d'Afrique montrent la diversité d'aspect de ces appendices et les points sur lesquels ils diffèrent: présence ou absence de crochets sur le bord



Figs. 10–12. Trois états du développement du premier pléopode sexuel chez *Paguristes gamianus* H. Milne-Edwards: 10, jeune ♂ à carapace de 4 mm.; jeune ♂ à carapace de 5·5 mm.; 12, ♂ adulte à carapace de 12 mm.

antérieur de la lame inférieure, proportions de cette lame, forme du lobe interne. Les pl. 2 sont sans doute moins différenciés mais dans de nombreux cas la portion distale de l'endopodite a une forme caractéristique. Il faut noter que les pléopodes sexuels ne sont pas toujours de bons caractères, et que *P. gamianus* ne paraît guère pouvoir être distingué de *P. barnardi* par les pl. 1.

Pour que les comparaisons prennent toute leur valeur il est nécessaire qu'elles portent sur des appendices complètement formés; il est probable que la longueur par rapport à celle du corps, la forme et l'ornementation des pléopodes ne sont acquises qu'à la maturité sexuelle. C'est ce que montrent les figures 10 à 12 qui représentent, au même grossissement, trois états de développement du pl. 1 droit

chez *P. gamianus*. Le premier appartient à un individu à carapace de 4 mm., le second est celui d'un spécimen à carapace de 5·5 mm., le dernier enfin est celui d'un adulte à carapace de 12 mm. Entre les deux extrêmes, alors que le rapport des tailles est de 3 à 1, le rapport des longueurs des appendices est de 5 à 1.

III. Systématique

Paguridae Dana

Pagurinae Ortmann

Gen. *Paguristes* Dana

Rostre variable, parfois très réduit mais toujours présent. Ecailles oculaires bien développées, plus ou moins écartées. Ecailles antennaires fortes, denticulées. Flagelle antennaire de longueur moyenne ou court. Endopodite des maxillules avec un petit appendice latéral externe. Flagelle de l'endopodite des premiers maxillipèdes dirigé vers l'intérieur et non vers l'avant. Maxillipèdes externes rapprochés à la base. Chélipèdes de même forme, le plus souvent sub-égaux, à ongles généralement cornés, à doigts mobiles dans un plan horizontal. Dactyle des quatrième pattes thoraciques terminal, ne formant pas une pince avec le propode.

13 paires de branchies (pas de branchies sur le dernier segment thoracique).

Chez le mâle une paire de pléopodes, modifiés en gonopodes, sur chacun des deux premiers segments abdominaux. Sur chacun des trois segments suivants un seul pléopode—le gauche—dont la rame externe est bien développée et la rame interne rudimentaire.

Chez la femelle, une paire de pléopodes uniramés sur le premier segment abdominal; sur les trois segments suivants, un pléopode gauche aux deux rames bien développées, plus fort que chez le mâle; sur le cinquième segment un pléopode gauche de même type que ceux du mâle. Souvent un repli de l'abdomen prenant naissance en arrière du dernier pléopode biramé et formant chambre incubatrice.

Les *Paguristes* ont une très large répartition; on en rencontre dans la plupart des mers chaudes ou tempérées, depuis la zône littorale jusqu'à des profondeurs de plusieurs centaines de mètres.

Si les *Paguristes* d'Afrique du sud paraissent former un groupe à part, dont les représentants n'ont pas, jusqu'à présent, été signalés en d'autre régions, rien ne prouve cependant qu'il y ait un cloisonnement géographique et que certains d'entre eux ne seront pas retrouvés dans des localités beaucoup plus septentrionales. C'est la raison pour laquelle nous avons rassemblé les espèces des côtes occidentales et méridionales d'Afrique dans un tableau unique qui permettra de les distinguer les unes des autres.

Tableau de détermination des Paguristes des côtes occidentales et méridionales d'Afrique.

1. Ecailles oculaires uni—ou, rarement, bidentées .. .. 2.
   Ecailles oculaires à bord antérieur armé de 3 dents au moins. .. .. 8.
2. Flagelles antennaires de même longueur ou plus courts que les pédoncules oculaires .. 3.
   Flagelles antennaires nettement plus longs que les pédoncules oculaires .. .. .. 4.

3. Diamètres des cornées sensiblement égal à la moitié du diamètre maximum des pédoncules oculaires (fig. 25). Afrique du Sud, littoral. .. .. .. *Paguristes engyops* (p. 204).
Diamètre des cornées légèrement inférieur au diamètre maximum des pédoncules oculaires (fig. 14). Côtes du Sahara, 115–290 mètres. .. .. .. *Paguristes marocanus* (p. 175).

4. Chélipèdes paraissant finement granuleux; le gauche beaucoup plus fort que le droit. Une large tache rouge sur la face interne de la main. Maroc, A.O.F., jusqu'à 150 mètres. Angola (?). *Paguristes oculatus* var. *rubro-pictus* (p. 172).
Chélipèdes tuberculés ou épineux, sub-égaux. .. .. 5.

5. Face interne du propode des pattes ambulatoire revêtue de poils plumeux très serrés dissimulant complètement l'ornementation de cette face. Région supérieure du dactyle des mêmes appendices armée seulement de fines épines cornées, cachées sous une frange de poils extrêmement épaisse (fig. 39, et pl. IV). Afrique du Sud, littoral... .. *Paguristes barnardi* (p. 208).
Pilosité des pattes ambulatoires beaucoup moins forte, laissant apparaître l'ornementation du tégument. .. .. 6.

6. Ecailles oculaires modérément écartées. Bord supérieur du carpe, du propode et du dactyle des p. 2 avec de fortes dents à base calcifiée, à pointe cornée. Des épines cornées sur la face interne du propode de ces appendices (fig. 38, et pl. IV). Afrique du Sud, jusqu'à 24 metres. .. .. *Paguristes gamianus* (p. 200).
Ecailles oculaires très écartées. Des dents beaucoup moins fortes sur les p. 2. Pas d'épines cornées sur la face interne du propode de ces appendices. .. .. 7.

7. Ecailles antennaires avec 4 à 5 dents sur le bord interne (fig. 27). Afrique du Sud, 90 mètres. *Paguristes macrotrichus* (p. 211).
Ecailles antennaires avec une seule dent sur le bord interne (fig. 26). Afrique du Sud, 55 mètres. *Paguristes agulhasensis* (p. 205).

8. Ecailles oculaires beaucoup plus longues que larges. .. .. 9.
Ecailles oculaires sensiblement aussi longues que larges. .. .. 11.

9. Pédoncules antennulaires à peine plus longs que les pédoncules oculaires (fig. 19). Sénégal, 6–15 mètres. .. .. *Paguristes rubrodiscus* (p. 189).
Pédoncules antennulaires dépassant les yeux de la moitié de la longueur de leur dernier article au moins. .. .. 10.

10. Pédoncules antennaires à peu près de même longueur que les pédoncules oculaires (fig. 20). Guinée française, 8–10 mètres. .. ..*Paguristes microphthalmus* (p. 191).
Pédoncules antennaires dépassant les yeux de la moitié de la longueur de leur dernier article. (fig. 22). Liberia, Congo, 12–15 mètres. .. ..*Paguristes hispidus* (p. 196).

11. Ecusson céphalothoracique sensiblement aussi long que large. .. .. 12.
Ecusson céphalothoracique nettement plus long que large. .. .. 13.

12. Pédoncules antennaires et oculaires de même longueur. Angola, 72 mètres. .. .. *Paguristes skoogi* (p. 197).
Pédoncules antennaires n'atteignant pas tout à fait la base des cornées (fig. 21). Guinée française, Congo, 8–36 mètres. .. .. *Paguristes virilis* (p. 193).

13. Rostre dépassant nettement les pointes latérales (fig. 15). Sénégal, Mauritanie, 5–50 mètres. *Paguristes fagei* (p. 176).
Rostre atteignant au plus l'alignement des pointes latérales. .. .. 14.

14. Propode des p. 2 à peine deux fois plus long que haut et à bord supérieur très fortement denté (fig. 33). Sénégal, 8–40 mètres. .. .. *Paguristes oxyacanthus* (p. 186).
Propode des p. 2 au moins deux fois et demie plus long que haut et à bord supérieur armé de dents aiguës mais petites. .. .. 15.

15. Main des chélipèdes ovale, bord antérieur des pléopodes 1 du ♂ inerme (fig. 44). Mauritanie, Sénégal, Congo, 5–85 mètres. .. .. *Paguristes mauritanicus* (p. 179).
Main sub-triangulaire, bord antérieur des pléopodes 1 du ♂ armé de crochets (fig. 45). Sénégal, 8–10 mètres. .. .. *Paguristes difficilis* (p. 183).

Paguristes oculatus Fabricius

var. *rubro-pictus* A. Milne-Edwards et E. L. Bouvier

Figs. 13 et 28

Paguristes maculatus var. *rubro-picta*, A. Milne-Edwards et E. L. Bouvier, 1892, p. 207.

Paguristes oculatus var. *brunneo-pictus*, A Milne-Edwards et E. L. Bouvier, 1900, p. 165, pl. VI, fig. 1.

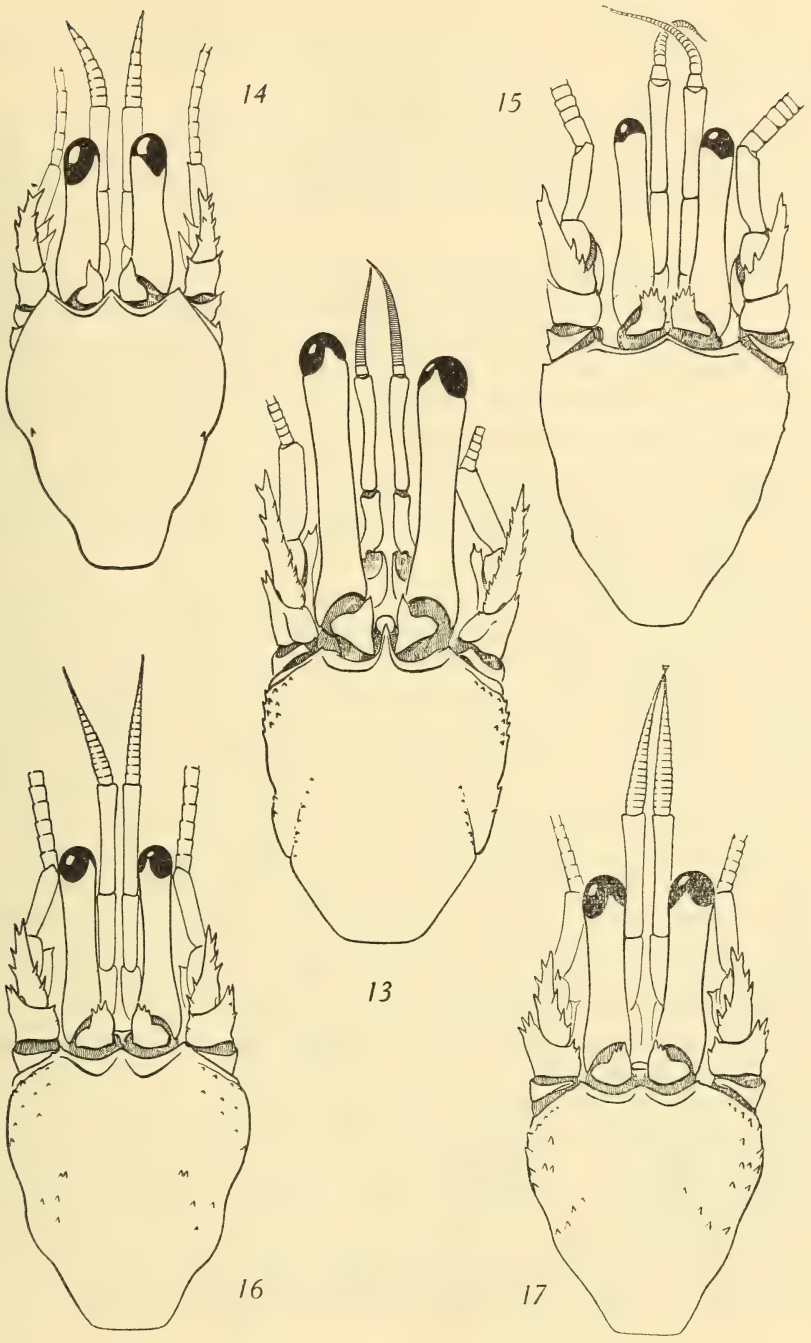
Paguristes oculatus var. *brunneo-pictus*, T. Odhner, 1923, p. 6.

Matériel examiné: 1°. Les spécimens récoltés par le "Travailleur" et par le "Talisman" et décrits par A. Milne-Edwards et E. L. Bouvier (types de la variété). 2°. 1 ♂, l.c. 13·5 mm., Cap de Naze (région de Dakar), 28–30 m., févr. 52, Cremoux coll. 3°. 1 ♀ l.c. 4 mm., Ile Bissagos, 120 m., "Président Théodore Tissier", 1936, Station 718.

Description: L'écusson céphalothoracique (fig. 13) est toujours notablement plus long que large et représente plus de la moitié de la longueur totale de la carapace. Le rostre long et aigu dépasse de beaucoup les dents latérales et atteint à peu près le milieu des écailles oculaires. Les pédoncules oculaires sont légèrement renflés à la base et au sommet; le gauche, en général un peu plus grand que le droit, a une longueur comprise entre les 3/4 et les 4/5 de celle de la région pré-cervicale. Les cornées sont échancrées postérieurement. Les écailles oculaires sont largement écartées, leur moitié distale est triangulaire, l'extrémité est acuminée et le bord antéro-latéral entier. Les pédoncules antennulaires atteignent ou dépassent légèrement le bord postérieur des cornées. Les pédoncules antennaires arrivent au tiers ou au quart distal des pédoncules oculaires; le deuxième article est armé d'une épine au bord antéro-interne et de deux longues épines à l'angle antéro-externe: le sommet bidenté de l'écaille antennaire n'atteint pas tout à fait l'extrémité distale du dernier article; son bord interne présente quatre à neuf dents acérées, et son bord externe, deux ou trois dents.

Le chélipède gauche est en général plus long et plus gros que le droit: la largeur de la main gauche est égale aux 3/4 de sa longueur environ, alors que la main droite est deux fois plus longue que large. La face supérieure du carpe, du propode et du dactyle des deux chélipèdes est couverte de nombreux petits tubercules coniques à pointe cornée, uniformément répartis, et qui, sur les bords des articles, prennent l'aspect de faibles dents cornées.

Les pattes ambulatoires dépassent légèrement les chélipèdes. Les p. 2 (fig. 28) ont un mérus à bord inférieur armé de denticules aigus; le bord supérieur du carpe est défini par une rangée de sept à neuf dents cornées, celui du propode par sept à dix dents, et celui du dactyle par une ligne des denticules dont la taille diminue régulièrement de l'arrière vers l'avant; le bord inférieur et la face interne du propode sont faiblement spinuleux et le bord inférieur du dactyle est armé de longues et fines épines cornées. Les p. 3 présentent, aux mêmes endroits que les précédentes, des dents beaucoup plus réduites.



Figs. 13–17. Région antérieure de la carapace et appendices céphaliques antérieurs: 13, *Paguristes oculatus* var. *rubro-pictus* A. M.-Edw. et E. L. Bouvier; 14, *P. marocanus* A. M.-Edw. et E. L. Bouvier; 15, *P. fagei* Forest; 16, *P. mauritanicus* Bouvier; 17, *P. difficilis* Forest.

Les femelles possèdent un orifice sexuel sur chacune des coxae des p. 3; un vaste repli de l'abdomen qui prend naissance en arrière du troisième pléopode impair, recouvre la plus grande partie de le ponte.

La lame principale des pl. 1 du mâle s'élargit distalement en spatule; son bord antérieur est armé de nombreuses et fortes épines en crochets, disposées en plusieurs rangées dans la région médiane. Le lobe interne est séparé par une profonde encoche aiguë du lobe distal qui n'atteint pas tout à fait l'apex de la lame inférieure.

La coloration des régions calcifiées est d'un blanc-rosé plus ou moins maculé de rouge. Les principales marques persistantes sont des taches d'un rouge pourpre mêlé de violet, situées sur les faces interne et externe du mérus des chélipèdes près de l'articulation du carpe; il y a aussi une large tache sur la face interne de la région palmaire, en arrière du doigt mobile. Les p. 2 et les p. 3 présentent deux larges anneaux rouge, l'un sub-distal, l'autre proximal, sur le dactyle, et un anneau proximal sur le propode.

La pilosité de cette variété est plus forte que celle de la forme typique. Les chélipèdes sont recouverts d'une pubescence qui prend l'aspect d'une courte frange sur les bords externes de la main.

Remarques: Le *Paguristes oculatus* Fabricius est avant tout une espèce méditerranéenne, mais on l'a signalé aussi dans l'Atlantique entre la côte méridionale du Portugal et le Cap Mazagan. Les spécimens récoltés au large de la côte occidentale du Maroc et du Soudan par le "Travailleur" et par le "Talisman" ont été décrits sous le nom de *P. oculatus* var. *brunneo-pictus* par A. Milne-Edwards et E. L. Bouvier, mais huit ans auparavant, dans des observations préliminaires sur ce matériel, ces auteurs avaient proposé pour la variété le nom de *rubro-picta* qui—la loi de priorité s'appliquant ici sans aucun doute—doit être substitué à celui de *brunneo-pictus*.

Un mâle, beaucoup plus grand que ceux du "Travailleur" et du "Talisman", dragué au sud de Dakar et vivement coloré, répond à la description de la variété, ainsi qu'une petite femelle capturée au large des Iles Bissagos. Ces spécimens ne présentent que peu de différences morphologiques avec ceux de Méditerranée. Les pléopodes sexuels en particulier, qui permettent de distinguer facilement des *Paguristes* fort voisins, sont ici identiques dans les deux cas. La distinction ne repose en fait que sur la pigmentation (et encore ne s'agit-il que de taches colorées supplémentaires ou plus intenses), sur la pilosité plus forte, sur la taille plus faible, et sur une gracilité plus grande des p. 2 et p. 3 dans la variété. Ces caractères sont probablement étroitement liés aux facteurs externes; profondeur, conditions physico-chimiques du milieu, etc. . . . Cependant nous n'avons pas rencontré d'intermédiaires entre la forme typique et la variété, et nous continuerons à les distinguer tout au moins provisoirement.

Si les spécimens signalés par Odhner sous le nom de *P. oculatus* var. *brunneo-pictus* appartiennent bien à cette espèce, elle s'étendrait vers le sud jusqu'à l'Angola.

Paguristes marocanus A. Milne-Edwards et E. L. Bouvier
Figs. 14, 29, 42, 55

Paguristes marocanus, A. Milne-Edwards et E. L. Bouvier, 1891, p. 152.

Paguristes marocanus, A. Milne-Edwards et E. L. Bouvier, 1892, p. 207.

Paguristes marocanus, A. Milne-Edwards et E. L. Bouvier, 1900, p. 167–70, pl. XXIII, fig. 1–6.

Matériel examiné: 1 ♂, l.c. 3·5 mm., "Talisman", 8.7.83, devant le Cap Bojador, 26° N. et 17° 8′ W., 130 m. (type dessiné). 1 ♂, l.c. 4 mm., "Talisman" 13.7.83, au nord du banc d'Arguin, 21° 51′ N. et 19° 48′ W., 115–140 m. (type). Les autres spécimens mentionnés par les auteurs ne figurent pas dans la collection.

1 ♂, l.c. 3 mm., côtes du Sahara, 1884, de Cuverville coll.

Description: L'écusson céphalothoracique (fig. 14) est très allongé et deux fois plus long que la région postérieure de la carapace; sa largeur représente les 4/5 environ de sa longueur. Le rostre aigu est aussi saillant que les dents latérales dont il est séparé par deux profondes concavités. Les pédoncules oculaires sont assez larges et renflés aux extrémités; leur longueur représente les 5/8 environ de celle de l'écusson céphalothoracique. Les cornées sont très grandes. Les écailles oculaires sont écartées, longuement lancéolées, et ne présentent aucune indentation sur le bord antéro-latéral. Les pédoncules antennulaires dépassent les yeux de la moitié de leur dernier article environ. Les pédoncules antennaires atteignent les cornées; le deuxième article est armé d'une seule épine à chacun de ses angles antérieurs. L'écaille antennaire atteint le milieu du dernier article; son extrémité est bidentée, et elle présente deux dents sur son bord interne qui est concave et trois dents sur son bord externe; le flagelle est à peine plus long que les pédoncules oculaires.

Les chélipèdes sont sub-égaux. Le carpe est aussi long que le dactyle et plus long que le bord palmaire interne. La main est deux fois plus longue que large. Les bords interne et externe de la face supérieure du carpe sont marqués, le premier par quatre dents assez fortes, le second par une rangée irrégulière de petits tubercules. Il existe aussi des tubercules sur la face supérieure de la main, très arrondis et peu nombreux dans la région médiane, un peu plus denses et un peu plus saillants sur les côtés et notamment sur le bord palmaire interne qui est armé de quatre ou cinq petites dents.

Les pattes ambulatoires p. 2 (fig. 29) et p. 3 dépassent largement les chélipèdes; elles sont grêles et leurs deux derniers articles sont peu déprimés latéralement. Les bords supérieur et inférieur du mérus des p. 2 sont spinuleux; le bord supérieur du carpe est armé de six dents acérées et celui du propode de cinq dents; le rapport des longueurs du propode et du dactyle est légèrement supérieur à 2/3. Les p. 3 sont inermes à l'exception du bord supérieur du carpe qui présente l'épine distale habituelle; la coxa est nettement plus longue et le mérus nettement plus court que pour p. 2.

L'article proximal des pléopodes 1 du mâle (fig. 42) n'est que légèrement plus court que l'article distal. La lame inférieure de ce dernier est près de quatre fois

plus longue que large, le bord antérieur est armé de huit ou neuf courts crochets; le lobe interne atteint et le lobe distal dépasse l'apex de la lame inférieure.

Nous n'avons pas pu examiner de femelle de cette espèce.

Les spécimens étudiés sont tous décolorés et d'une teinte blanchâtre uniforme. D'après A. Milne-Edwards et E. L. Bouvier "la couleur dans l'alcool tire sur le rose-chair, avec quelques taches blanchâtres".

La pilosité générale est assez faible; cependant de très longs poils garnissent le bord antérieur des écailles oculaires et l'ornementation des chélipèdes est en grande partie dissimulée par les poils qui les recouvrent et qui sont salis par la vase.

Remarques: Cette espèce au nom assez mal choisi puisque tous les spécimens connus ont été capturés bien au sud des côtes marocaines[3] ne risque d'être confondue avec aucun des autres *Paguristes* de la côte occidentale d'Afrique. La région précervicale beaucoup plus longue que la région postérieure, le bord frontal aux trois dents aiguës alignées, les écailles oculaires aiguës, à bord antérieur entier et frangé de longs poils, la brièveté des flagelles antennaires permettent de l'identifier rapidement. A en juger par les spécimens examinés, et qui sont des mâles adultes dont le plus grand a une carapace de 4 mm., c'est une espèce de petite taille, l'une des plus petites du genre. C'est aussi une espèce qui vit à une assez grande profondeur, puisque le "Talisman" l'a capturée sur des fonds de 115 à 290 m. Le fait qu'on ne l'ait signalée qu'au large des côtes du Sahara ne signifie pas que sa répartition géographique est aussi restreinte. Le matériel récolté au-delà des fonds de 120 m. est en effet pour l'instant relativement peu abondant. Le *Paguristes* qui paraît présenter le plus d'affinités avec *P. marocanus* appartient à la faune sud-africaine: c'est *P. engyops* Barnard qui vit dans la zone littorale. Nous verrons les rapports qui existent entre les deux espèces à la suite de la description de la seconde.

Paguristes fagei Forest

Figs. 15, 30, 43, 57

Paguristes fagei Forest, 1952, p. 260, fig. 3.

Matériel examiné: De nombreux individus ♂ et ♀ de 1·5 à 7 mm. (l.c.) devant Thiaroye, baie de Rufisque, dragage sur fond coquillier par 10 à 15 m., 18-1-52, Paraïso coll. (Syntypes).

2 ♂ et 3 ♀, l.c. 3·5 à 5·5 mm.: Cap Blanc, 50 m., 1907, Gruvel coll.

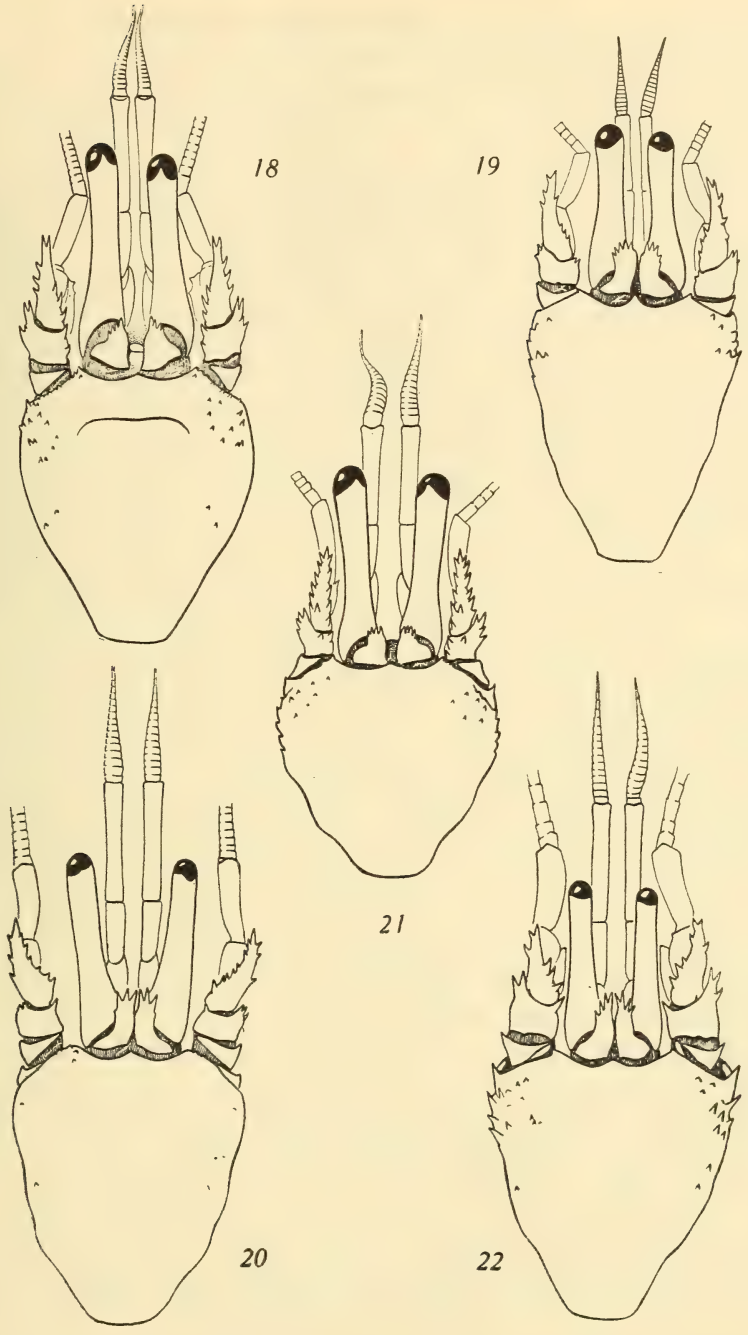
1 ♀, l.c. 1·8 mm.: chalutier "Cabellou", au large du Sénégal, 12 à 15 m., 10-1-41, Monod coll.

3 ♂ et 16 ♀, l.c. 3 à 6 mm.: chalutier "Vers l'Horizon", au large du Sénégal, 8 m., fond caillouteux à grosses Ascidies, 21-1-41, Monod coll.

6 ♂ et 2 ♀ ovigères, l.c. 2 à 5 mm.: Gorée, filets à langouste, 23, 24-8-50, Paraïso coll.

6 ♂ et ♀, M'Bao (Sénégal), dragage à un mille de la côte, 5–14 m., 7-2-51, Delais coll.

[3] Milne-Edwards et E. L. Bouvier l'ont sans doute ainsi baptisée parce que l'un des spécimens se trouvait dans une coquille de *Sinistralia marocana*.



Figs. 18–22. Région antérieure de la carapace et appendices céphaliques antérieurs: 18, *Paguristes oxyacanthus* Forest; 19, *P. rubrodiscus* Forest; 20, *P. microphthalmus* Forest; 21, *P. virilis* Forest; 22, *P. hispidus* A. M.-Edw. et E. L. Bouvier.

10 ♂ et 12 ♀ dont 8 ovigères, l.c. 2 à 7 mm., chalutier "Maid Honour", 8° 38′ N., à 8° 42′ N., 8 à 12 m., 1 au 8-3-48, Cadenat coll.

Description: Les régions pré-et post-cervicale de la carapace sont sensiblement de même longueur; la première (fig. 15) est un peu plus longue que large, le rapport de ses dimensions étant de 5/4 environ. Le rostre, large et en angle obtus, dépasse légèrement l'alignement des deux dents latérales. Les pédoncules oculaires, un peu plus courts que le bord frontal, sont renflés aux extrémités, et tout particulièrement dans la région proximale chez les jeunes individus. Les cornées atteignent le milieu du dernier article du pédoncule antennulaire et l'extrémité du pédoncule antennaire. Les écailles oculaires sont grandes, larges, très rapprochées et leur bord antérieur est armé de cinq à huit denticules. L'angle externe du deuxième article des antennes est uni-ou bidenté. Les écailles antennaires atteignent au maximum le milieu du dernier article du pédoncule; leur extrémité est plus ou moins nettement bidentée, et elles sont armées de deux ou trois épines sur le bord interne légèrement concave et d'une épine sur le bord externe. Les chélipèdes sont égaux et de même forme. Le bord inférieur du mérus forme une crête denticulée. La main est deux fois plus longue que large, le doigt mobile est un peu plus long que le bord palmaire interne. Un léger hiatus subsiste entre les doigts lorsque ceux-ci sont fermés. La face supérieure des trois derniers articles porte de nombreux tubercules coniques, peu élevés et à pointe cornée, plus aigus vers les bords latéraux. Sur la face supérieure de la main, en arrière de l'articulation du dactyle, existe une protubérance tuberculée plus ou moins développée. Les pattes ambulatoires, p. 2 et p. 3 dépassent les chélipèdes. Les p. 2 (fig. 30) ont un mérus à bord inférieur non denticulé, un carpe à bord supérieur armé d'une rangée irrégulière de dents cornées assez fortes qui se prolonge sur le propode sous la forme d'une ligne de dix à douze dents cornées plus petites. Le dactyle a une section circulaire et son diamètre à la base est compris quatre à cinq fois dans sa longueur; le bord supérieur et le bord inférieur sont marqués par une rangée d'épines minuscules largement espacées. Cet article est à peu près de même longueur que le précédent. Les p. 3 sont peu différentes des p. 2 dans leur forme générale, mais elles sont inermes à l'exception d'une épine distale sur le bord supérieur du carpe et d'une rangée de très petites épines sur le bord inférieur du dactyle.

La femelle ne possède qu'un orifice sexuel situé sur la coxa de la p. 3 gauche, et ne présente pas de repli de l'abdomen en arrière du troisième pléopode impair. Les pléopodes 1 du mâle (fig. 43) ont une lame inférieure à moitié distale élargie en spatule et bordée de fines épines recourbées vers l'extérieur. Le lobe interne est séparé du lobe distal qui dépasse l'apex de la lame inférieure par une encoche arrondie.

La coloration de fond des régions calcifiées est d'un blanc jaunâtre ou orangé. Les écailles oculaires, la base des pédoncules oculaires et une étroite région sous les cornées sont rouge-orange, alors que la partie moyenne des pédoncules oculaires, les pédoncules antennulaires et antennaires, et l'endopodite des maxillipèdes externes, sont d'un bleu plus ou moins intense. Les chélipèdes sont maculés de rouge-orange. La face interne du mérus présente une coloration constante: la région antérieure

est blanche, le reste d'un rouge-orange présentant un maximum d'intensité à la limite des deux zônes. Les deux premières paires de pattes ambulatoires présentent également de grandes zônes rouge-orange qui couvrent en particulier la moitié proximale du propode et du dactyle.

Remarques: Il n'y a pas de raisons de comparer *Paguristes fagei* à l'une plutôt qu'à l'autre des espèces de la côte occidentale d'Afrique. Il possède tout un ensemble de caractères, et notamment une pigmentation qui le distinguent de tous les autres représentants du genre. C'est ainsi que le bleu intense des pédoncules oculaires, des antennules et des antennes permet d'identifier au premier coup d'oeil les exemplaires frais, même de très petite taille. Au bout de quelques années dans l'alcool, il se produit une décoloration presque totale, mais on peut, dans la plupart des cas, reconnaître la ligne brisée qui sépare la zône foncée de la zône claire sur la face interne du mérus des chélipèdes. D'autres caractères stables et d'observation facile sont utilisables par ailleurs: la forme de la carapace et surtout celle du bord frontal avec le rostre qui dépasse légèrement les dents latérales dont il est séparé par des concavités peu profondes, les écailles oculaires courtes, larges et rapprochées, plutôt quadrangulaires que triangulaires.

Les pléopodes 1 du mâle sont aussi d'un type très particulier et ne présentent quelque ressemblance qu'avec ceux du *P. oculatus*.

P. fagei est un espèce de petite taille: les plus grands exemplaires ont une carapace de 7 mm., et chez les plus petites ♀ ovigères cette région du corps n'a pas plus de 2·5 mm. Des ♂ de 2 mm. de carapace ont déjà des pléopodes sexuels de même forme que chez les individus plus âgés. Une partie des spécimens observés étaient à l'intérieur de coquilles de Gastéropodes: *Nassa*, *Fusus*, *Turritella*, *Tritonalia*, etc. . . ., mais la plupart étaient logés à l'intérieur de colonies de Bryozoaires dont chacune présente un aspect bien particulier: la masse centrale abritant le Pagure se prolonge latéralement par deux longues cornes formant balancier et présente dorsalement une crête digitée.

La répartition géographique de la nouvelle espèce, telle qu'on peut se la représenter actuellement, s'étend du Cap Blanc (22° N. environ), au Sud de Dakar (8° 38′ N.). Elle a été récoltée principalement entre 5 et 15 m. de profondeur, mais l'échantillon du Cape Blanc a été dragué à 50 m.

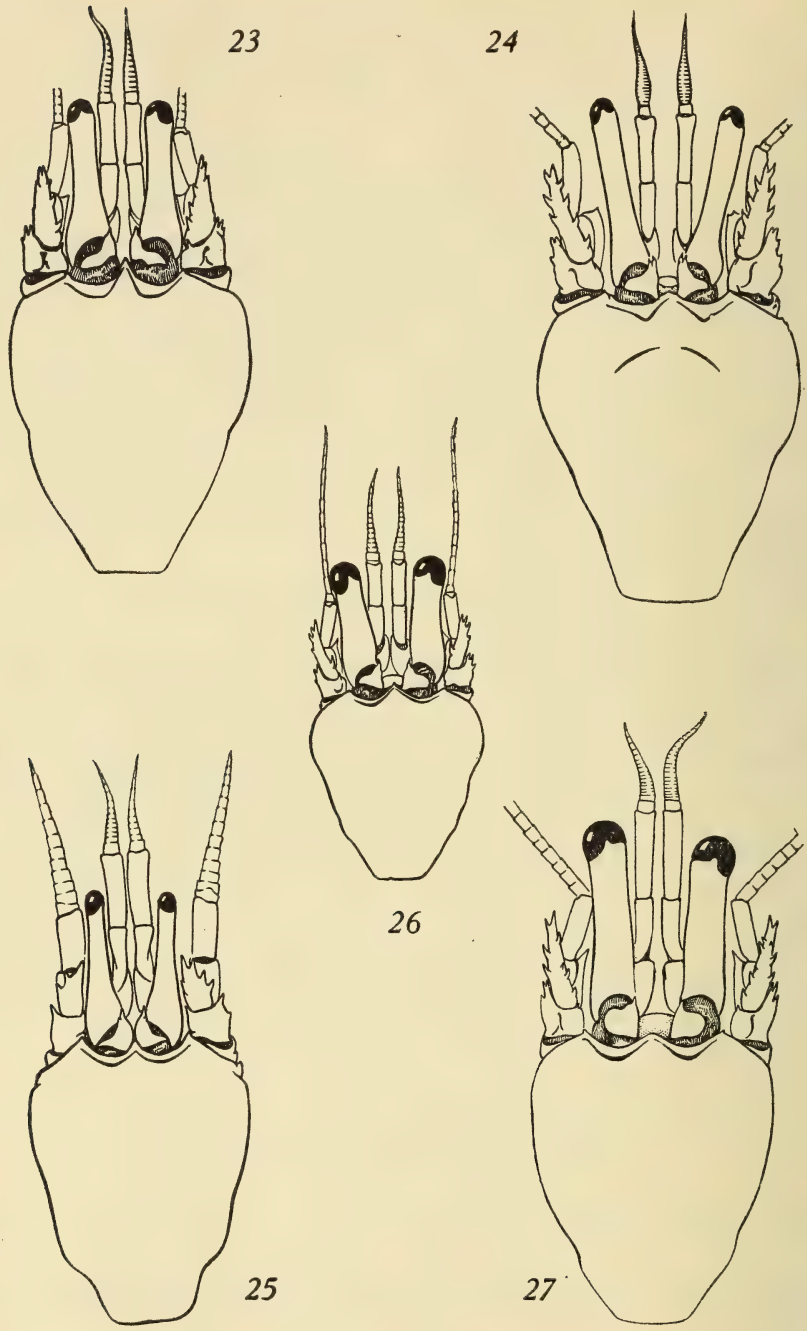
Paguristes mauritanicus Bouvier 1906

Figs. 16, 31, 44, 56

Paguristes mauritanicus Bouvier, 1906 *a*, p. 186, fig. 1; 1906 *b*, p. 96, fig. 1; 1906 *c*, p. 199.

Matériel examiné: 1 ♂, l.c. 7 mm.: au large de Novak Chott, 16–24 m., Gruvel coll. (Type).

1 ♂, l.c. 4·5 mm., 1 ♂ l.c. 6·5 mm. et 1 ♀ l.c. 4 mm.: Baie de Hann (Dakar), 8–10 m., sable coquillier grossier, 1950, R. Sourie coll.



Figs. 23–27. Région antérieure de la carapace et appendices céphaliques antérieurs: 23, *Paguristes gamianus* H. M.-Edw.; 24, *Paguristes* sp. (Table Bay); 25, *P. engyops* Barnard; 26, *P. agulhasensis* sp. nov.; 27, *P. macrotrichus* sp. nov.

Nombreux individus ♂ et ♀ de 3 à 8 mm. (l.c.) dont plusieurs ovigères: devant Thiaroye, baie de Rufisque, 10–15 m., sable coquillier, 18-1-52, Paraïso coll.

1 ♀, l.c. 3 mm., 1 ♂, l.c. 5 mm., M'Bao (Sénégal), dragage à un mille de la côte, 5–14 m., 7-2-52, Delais coll.

1 ♂, l.c. 6 mm.: "Mercator", dragage entre les Iles Tamara et Roume (Iles de Los), 8–10 m., 10-12-36.

1 ♂, l.c. 4 mm., 1 ♀, l.c. 2·5 mm., 1 ♀, l.c. 3 mm., et 2 ♀ ovigères, l.c. 4 et 5 mm., "M'Bizi", St. 144, 26 milles SSW. Cap Lopez, 95–100 m., 10-3-49.

1 ♀ ovigère, l.c. 5 mm.: "M'Bizi", St. 142, 29 milles S. Cap Lopez, 50 m., 9-3-49.

2 ♂, l.c. 4·5 et 8·5 mm.: "M'Bizi", St. 26, 25 milles SW. Pointe de Banda, 85 m., 6-9-48.

1 ♀juv., l.c. 2·5 mm., 1 ♀, l.c. 6 mm.: "M'Bizi", St. 8,15 milles SW. Moita Seca, 50 m., 3-8-48.

48 spécimens récoltés en 15 stations entre 14 et 44 m. par R. Bassindale au large de la Gold Coast. Le nombre, la taille et le sexe des individus provenant de chaque station figureront dans l'étude d'ensemble des Pagures récoltés par R. Bassindale.

Description: La région postérieure de la carapace est de même longueur ou un peu plus courte que l'écusson céphalothoracique; celui-ci (fig. 16) a une largeur sensiblement égale aux 6/7 de sa longueur; les aires latérales sont faiblement spinuleuses. Le rostre, en angle obtus, n'atteint pas l'alignement des dents latérales. Les pédoncules oculaires sont renflés aux extrémités; le rapport de leur longueur à celle de la région précervicale est compris entre 3/4 et 2/3. Les écailles oculaires sont largement écartées; leur région distale est obliquement tronquée, et le bord antéro-latéral est armé d'une épine apicale et de deux ou trois petites dents plus petites. Les pédoncules antennulaires dépassent les yeux de la moitié de la longueur de leur dernier article au moins. Les pédoncules antennaires atteignent le milieu des cornées; le deuxième article est armé de deux trois épines à l'angle antéro-externe qui est assez saillant; l'écaille antennaire, dont l'extrémité bidentée arrive au quart ou au tiers proximal du dernier article, est armée de une ou deux dents sur son bord interne légèrement concave et de deux ou trois dents sur son bord externe.

Le chélipède droit est en général un peu plus fort que le gauche, mais de même forme. Le carpe, de même longueur que le dactyle, est plus long que le bord palmaire interne. La main est à peu près deux fois plus longue que large, son épaisseur maximum est comprise 2·4 fois environ dans sa longueur. La face supérieure du carpe est armée de cinq à six fortes dents sur le bord interne et de dents plus petites irrégulièrement disposées le long du bord externe. La face supérieure du propode et du dactyle est couverte de tubercules coniques peu élevés qui ont plutôt l'aspect de gros granules chez les grands spécimens. Ces tubercules sont un peu plus aigus sur le bord externe de la main et ce sont cinq ou six fortes dents cornées qui marquent le bord palmaire interne.

Les pattes ambulatoires de la première paire (fig. 31) dépassent largement les chélipèdes. Le bord supérieur du carpe est armé de cinq ou six dents. Le bord

supérieur du propode d'une douzaine de dents; cet article est à peu près trois fois plus long que haut, alors que la longueur du dactyle représente à peu près sept fois sa hauteur à la base. Le rapport des longueurs du dactyle et du propode, mesurés le long de leur bord supérieur, est de 5/3 environ. Les p. 3 sont un peu plus grêles et un peu plus longues que les p. 2; elles sont inermes à l'exception d'une épine distale au bord supérieur du carpe.

Les femelles n'ont qu'un orifice sexuel qui s'ouvre sur la coxa de la p. 3 gauche. Chez les femelles adultes, un large repli de l'abdomen qui prend naissance en arrière du troisième et dernier pléopode biramé recouvre cet appendice et le précédent et' éventuellement, une grande partie de la ponte.

Les pléopodes 1 du ♂ (fig. 44) ont une lame inférieure quatre fois plus longue que large, à bord interne légèrement concave, et dépourvue de crochets sur le bord antérieur; sur les préparations, le lobe interne, très large et très arrondi déborde largement la lame inférieure et se rattache au lobe distal très saillant par une concavité régulière et peu profonde.

Des exemplaires qui n'ont séjourné qu'un mois dans l'alcool, présentent la coloration suivante: les régions calcifiées ont un fond blanchâtre; il y a une large tache brun-rouge en avant de la carapace, tout près du bord frontal; les écailles oculaires, la base des pédoncules antennaires, et les pédoncules oculaires tout entiers sont d'un brun-rouge intense. Les chélipèdes sont brun-violacé, les doigts et les tubercules blancs. Les deux première pattes ambulatoires portent de larges anneaux alternativement clairs et foncés. Sur les échantillons qui ont séjourné plus longtemps dans l'alcool, les marques colorées s'éclaircissent et tendent à devenir rose. C'est la coloration des pédoncules oculaires et des pattes ambulatoires qui subsiste le plus longtemps.

Les poils plumeux très denses qui couvrent la région frontale dissimulent l'ornementation de cette région, mais laissent voir une grande partie des pédoncules oculaires. Les appendices thoraciques sont aussi fortement pileux notamment sur les faces supérieure et inférieure, cependant les doigts des chélipèdes restent toujours visibles.

Remarques: Le *Paguristes mauritanicus* n'était connu jusqu'à présent que par l'unique individu ♂ décrit par Bouvier. Les nombreux spécimens dont nous disposons maintenant montrent qu'il ne s'agit pas d'une espèce rare. C'est de la région de Dakar que proviennent la plus grande partie des échantillons, dragués depuis la côte jusqu'à une profondeur de 20 à 25 m. Les individus capturés au sud de cette région et jusqu'à l'embouchure du Congo, proviennent d'un niveau inférieur, de 50 à 100 m., et présentent une différence de coloration dans les pédoncules oculaires, lesquelles ont une moitié proximale bleutée, et une moitié distale orange. Les autres caractères, et notamment la forme des pléopodes du ♂, ne permettent pas de considérer ces spécimens comme appartenant à une forme différente.

L'espèce la plus voisine est le *P. difficilis* sp. nov. décrit plus loin, dont l'aspect est fort peu différent, et qui ne peut guère être distingué que par la forme des chélipèdes et surtout par celle des pléopodes 1 du mâle, très caractéristiques.

Les coquilles abritant les *P. mauritanicus* appartiennent aux genres les plus divers, *Bullia*, *Cancellaria*, *Clavatula*, *Gibbula*, *Marginella*, *Mesalia*, *Nassa*, *Terebra*, *Trophon*, *Turritella*, etc. C'est en Baie de Rufisque, devant Thiaroye, et par 10 à 15 m. qu'ont été capturés les plus nombreux spécimens de *P. mauritanicus*. Ce dragage a ramené en outre d'autres espèces de *Paguridae*: *Petrochirus pustulatus* juv., *Pagurus pectinatus* juv., *Pseudopagurus granulimanus*, *Diogenes ovatus*, *D. pugilator* var. *intermedius*, *Eupagurus sculptimanus* et *E. souriei*, et enfin des spécimens de trois autres espèces nouvelles de *Paguristes*: *P. fagei*, *P. rubrodiscus* et *P. oxyacanthus*.

Paguristes difficilis Forest.

Figs. 17, 45, 61

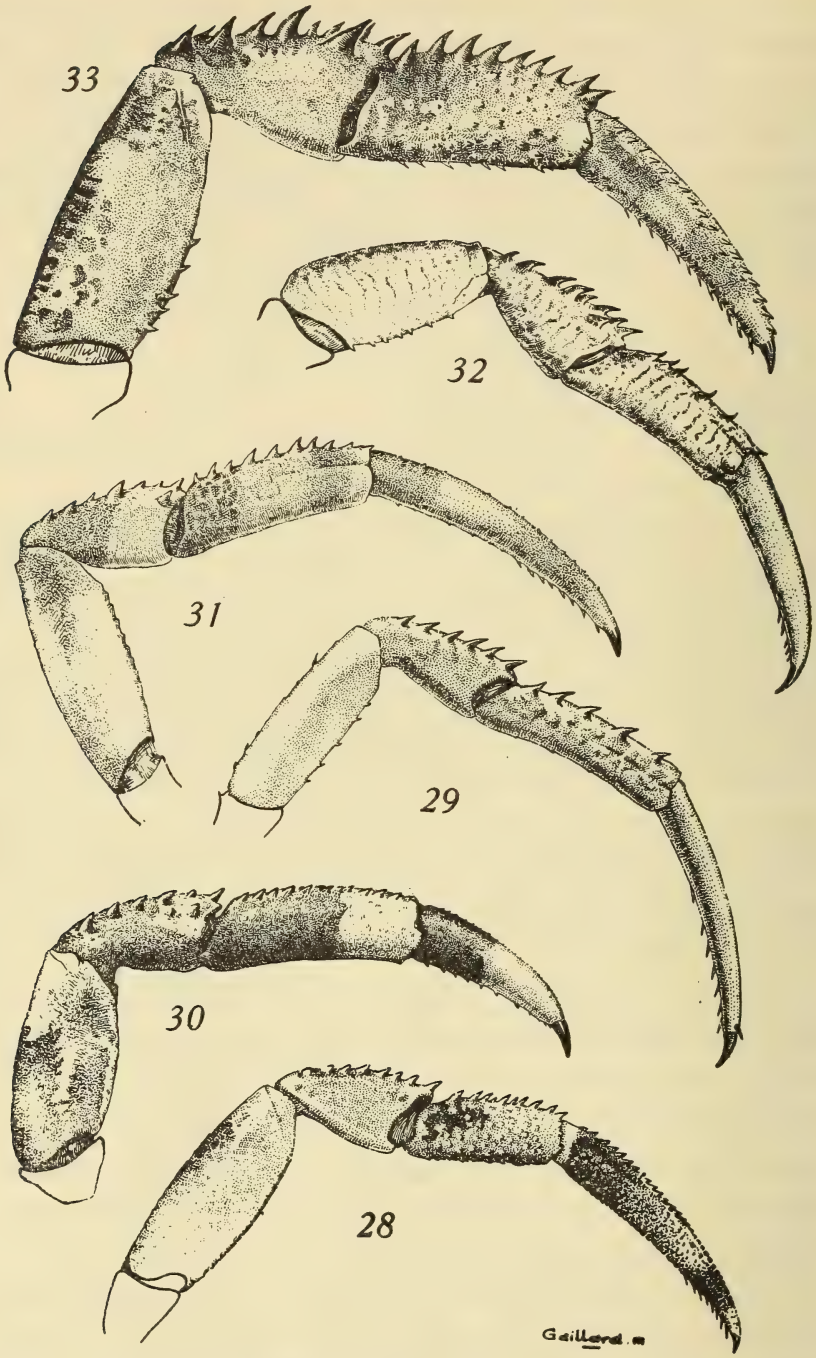
Paguristes difficilis Forest, 1952, p. 259, fig. 1.

Matériel examiné: 8 ♂ de 4 à 7 mm., 2 ♀ de 7 mm.: Baie de Hann, 8–10 m., sable coquillier grossier, Janvier 1950, Sourie coll. Type.

Description: L'écusson céphalothoracique (fig. 17) est à peu près de même longueur que la région postérieure de la carapace et un peu plus long que large; ses aires latérales sont faiblement spinuleuses. Le rostre obtus et arrondi n'atteint pas tout à fait l'alignement des dents latérales. Les pédoncules oculaires renflés aux extrémités, ont une longueur égale aux 5/6 de la région pré-cervicale; les cornées sont profondément échancrées postérieurement. Les écailles oculaires sont largement écartées; leur moitié distale est triangulaire; l'épine distale est suivie de deux ou trois petites dents sur le bord antéro-latéral. Les pédoncules antennulaires dépassent les yeux de la moitié de la longueur de leur dernier article. Les pédoncules antennaires atteignent le milieu des cornées; le deuxième article est armé de trois dents à l'angle entéro-externe qui est assez saillant; la pointe de l'écaille antennaire atteint le tiers proximal du dernier article, ses bords latéraux sont armés de deux ou trois dents; le flagelle antennaire est égal aux 3/4 de la longueur de la carapace.

Les chélipèdes sont égaux. Le carpe est un peu plus court que le dactyle dont la longueur représente les 2/3 environ de la longueur totale de la main. Celle-ci est sub-triangulaire et présente son maximum de largeur près de la base; son épaisseur maximum est comprise 2·7 fois dans la longueur. Le bord interne de la face supérieure de carpe est défini par une rangée de quatre fortes dents cornées, et le bord externe par des dents plus nombreuses mais plus petites. Le propode et le dactyle ont une face supérieure couverte de nombreux tubercules arrondis pourvus d'une très petite pointe cornée. Le bord interne de la main porte une rangée de quatre fortes dents.

Le propode des pattes ambulatoires de la première paire est armé de douze à quinze fortes dents cornées sur son bord supérieur; le bord supérieur du dactyle porte également des petites dents cornées sur toute sa longueur. Le rapport des longueurs du dactyle et du propode est de 3/2 environ. Les p. 3 sont inermes, exception faite de la petite dent distale au bord supérieur du carpe.



Figs. 28–33. Deuxième patte thoracique gauche, face interne, dénudée: 28, *Paguristes oculatus* var. *rubro-pictus* A. M.-Edw. et E. L. Bouvier; 29, *P. marocanus* A. M.-Edw., et E. L. Bouvier; 30, *P. fagei* Forest; 31, *P. mauritanicus* Bouvier; 32, *P. rubrodiscus* Forest; 33, *P. oxyacanthus* Forest.

Les femelles n'ont qu'un orifice sexuel sur la coxa de p. 3 gauche. Un large repli abdominal qui prend naissance en arrière du troisième pléopode impair recouvre les appendices précédent, et, éventuellement, une partie de la ponte. Les pléopodes 1 du mâle (fig. 45) ont une lame inférieure à peine deux fois et demie plus longue que large qui, sur les préparations, recouvre presque complètement le lobe interne. Chez les adultes le bord antérieur de cette lame est armé de petites épines recourbées vers l'extérieur. Le lobe distal est étroit et séparé du lobe interne par une profonde concavité.

La région antérieure de la carapace, les écailles oculaires, la base des pédoncules antennaires sont roses. Les pédoncules oculaires sont orange-clair. Les chélipèdes sont de la même teinte avec les doigts blancs. Les pattes ambulatoires portent de larges anneaux d'un rose plus foncé.

Les poils qui couvrent la région frontale et les appendices thoraciques sont assez denses mais ne dissimulent pas complètement l'ornementation du tégument.

Remarques: Cette espèce est la plus difficile à caractériser parmi les *Paguristes* d'Afrique occidentale. En effet, elle présente une grande ressemblance dans l'aspect de la carapace, des appendices céphaliques antérieurs et des pattes ambulatoires, avec. *P. mauritanicus*. Si la région pré-cervicale est nettement moins allongée chez *P. difficilis*, si *P. mauritanicus* a de plus des pédoncules oculaires un peu plus grêles, ce sont là des caractères assez variables et sur lesquels il serait dangereux de baser la détermination. Par contre la forme des chélipèdes diffère sensiblement d'une espèce à l'autre; chez *P. mauritanicus*, le main, subovale, présente son maximum de largeur vers le milieu de l'article et le rapport de l'épaisseur maximum sur la longueur a une valeur de 2·4 environ. Chez *P. difficilis*, la main plus finement granulée est subtriangulaire et présente son maximum de largeur un peu en avant de l'articulation du carpe; elle est aussi moins renflée: le rapport de son épaisseur maximum sur sa largeur ayant une valeur de 2·7 environ. Lorsqu'il s'agit de spécimens frais la distinction peut se faire d'après la pigmentation des pédoncules oculaires: de teinte claire chez *P. difficilis*, d'un rouge-brun très foncé chez *P. mauritanicus*. Mais pour les mâles, le meilleur moyen de distinguer les deux espèces est d'examiner les pl. 1. Chez *P. difficilis*, d'un rouge-brun très foncé chez *P. mauritanicus*. Mais pour les mâles, le meilleur moyen de distinguer les deux espèces est d'examiner les pl. 1. Chez *P. difficilis* la lame inférieure est beaucoup plus large et, chez l'adulte, armée de crochets sur le bord antérieur. Chez les plus petits exemplaires étudiés les crochets sont absents, mais la forme générale est le même que chez les individus plus âgés et l'aspect bien différent de ce qu'on observe chez les *P. mauritanicus* au même stade.

Les dix spécimens que nous avons entre les mains nous sont parvenus sans coquilles, mais quelques-uns présentent l'aplatissement dorso-ventral et l'étirement des plaques sternales thoraciques qui caractérisent les pagures vivant dans des coquilles à étroite ouverture, *Conus* ou *Marginella* par exemple.

Paguristes difficilis n'a été récolté que dans une seule localité, au large de Dakar, sur les mêmes fonds que *P. mauritanicus*: le même dragage a ramené trois spécimens de cette dernière espèce.

Paguristes oxyacanthus Forest
Figs. 18, 33, 47, 58

Paguristes oxyacanthus Forest, 1952, p. 261, fig. 5.

Matériel examiné: 1 ♀ juv., l.c. 7 mm.: Baie de Hann (Dakar), 8–19 m., sables coquilliers grossiers, 7-1-50, Sourie coll.

1 ♀ juv., l.c. 6·5 mm.: Baie de Hann, 12 m., cailloux et coquilles, 17-6-50, Sourie coll.

3 ♀, l.c. 9·5 à 11 mm., 2 ♀ juv., l.c. 5·5 et 7 mm.: devant Thiaroye, Baie de Rufisque, dragage sur fond coquillier, 10–15 m., 18-1-52, Paraïso coll. Type.

1 ♂, l.c. 12·5 mm.: sud de Gorée, 40 m., Février 52, Postel coll.

Description: L'écusson céphalothoracique est à peu près aussi long que la région postérieure de la carapace; le rapport de sa longueur à sa largeur est de 7/6 environ; sa surface présente un relief tourmenté, avec une dépression transversale très marquée en arrière du bord frontal, avec des tubercules saillants et de nombreuses spinules sur les aires antérieures et latérales; le rostre en angle obtus n'atteint pas tout à fait l'alignement des dents latérales.

Les pédoncules oculaires sont renflés à la base et, plus faiblement, au niveau des cornées qui présentent une échancrure postérieure aiguë; leur longueur est égale aux 4/5 de celle de la région pré-cervicale. Les écailles oculaires sont écartées; elles sont armées d'une épine terminale et de trois petites dents sur le bord antéro-latéral. Les pédoncules antennulaires dépassent les yeux de la moitié de leur dernier article. Les pédoncules antennaires n'atteignent pas la base des cornées; l'angle antéro-externe saillant du deuxième article est pourvu de quatre dents groupées par deux. L'écaille antennaire atteint le tiers proximal du dernier article, son extrémité est bifide, et ses bords latéraux portent trois fortes dents, celles du bord interne étant groupées dans la moitié proximale; le flagelle est égal aux 2/3 de la carapace.

Les chélipèdes sont égaux et fortement épineux; le bord inférieur de la face interne du mérus est défini par une douzaine de denticulations assez fortes. Le carpe est plus long que le dactyle et celui-ci un peu plus long que le bord palmaire interne. La face supérieure du carpe et du propode est régulièrement convexe de l'avant vers l'arrière, mais paraît plutôt concave que convexe en section transversale: en effet, les bords latéraux sont armés de très fortes dents à pointes cornées légèrement inclinées vers l'avant et vers l'extérieur: le bord externe du carpe est armé de huit dents, le bord interne de quatre dents très fortes; le bord externe du propode est défini par une rangée de dents assez nombreuses, mais plus petites; par contre, le bord interne ne porte que trois dents très développées. Le reste de la face supérieure de ces articles est couvert de tubercules coniques de plus petites tailles. La face externe du dactyle c'est-à-dire celle qui est orientée vers le plan sagittal de l'animal—est large et plate; elle est limitée en haut par une ligne de dents cornées assez forte, en bas, par des tubercules coniques cornés peu saillants; il existe une troisième ligne longitudinale intermédiaire constituée par de petites épines cornées.

Les pattes ambulatoires p. 2 et p. 3 dépassent largement les chélipèdes. Les p. 2 (fig. 33) ont un mérus dont le bord inférieur est spinuleux. La région supérieure

du carpe est armée de dix fortes dents cornées irrégulièrement disposées. Le bord supérieur du propode est défini par une ligne de neuf dents un peu plus petites. Toute la face interne de cet article est couverte de petits tubercules coniques à pointe cornée. La face interne du dactyle porte une rangée supérieure et une rangée inférieure de petites spinules cornées. Les deux articles distaux sont assez fortement déprimés latéralement; le propode n'est pas beaucoup plus de deux fois plus long que haut et le rapport des longueurs du dactyle et du propode est de 5/4 environ. Les p. 3 diffèrent peu des p. 2 dans la forme de leurs articles, mais le bord supérieur du carpe ne porte qu'une épine distale; il n'y a pas de fortes dents sur le bord supérieur du propode mais toute la face interne de cet article est couverte de tubercules coniques moins forts que sur p. 2.

Les femelles n'ont qu'un orifice sexuel, lequel s'ouvre sur la coxa de p. 3 gauche; un vaste repli de la peau qui prend naissance en arrière du troisième pléopode impair recouvre tous les pléopodes antérieurs et par conséquent la totalité de la ponte.

Les pléopodes 1 du mâle ont une lame inférieure près de quatre fois plus longue que large, à bord latéraux sinueux et parallèles à bord antérieur faiblement denticulé. Le lobe interne plus large que la lame principale est séparé du lobe distal très proéminent par une encoche arrondie peu profonde.

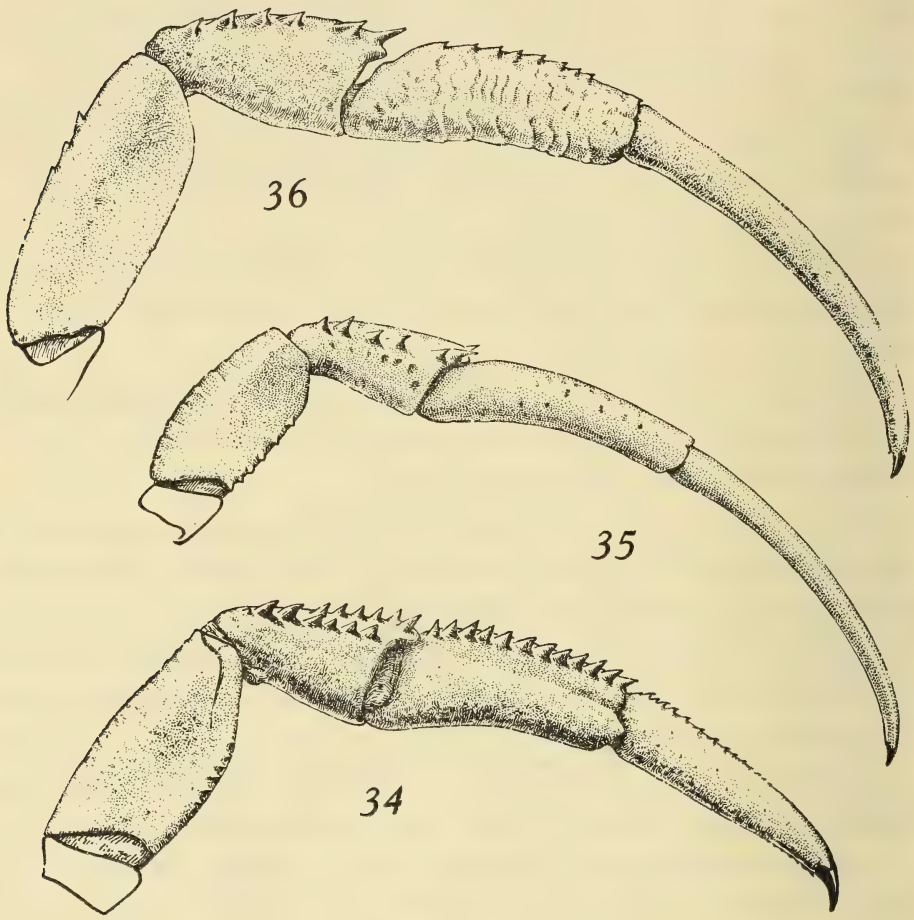
Tous les spécimens observés présentent une coloration caractéristique. Les régions calcifiées sont d'un blanc-rosé, maculé de rouge carmin. Cette teinte est particulièrement intense sur la carapace, où elle forme deux taches en arrière des concavités du bord frontal, sur la base des pédoncules antennaires, dans les régions proximales des quatre derniers articles des p. 2 et des p. 3, et dans la région antérieure de la face interne du mérus. Les pédoncules oculaires et antennulaires sont blancs avec des bandes longitudinales vermillons.

La région antérieure de la carapace, les appendices céphaliques antérieurs, et les pattes thoraciques sont fortement pileux. L'extrémité antérieure des pédoncules oculaires émerge d'un revêtement assez dense de poils plumeux.

Remarques: Cette espèce se rapproche du *P. mauritanicus* Bouvier et du *P. difficilis* Forest par la forme et les proportions de la carapace et des appendices céphaliques antérieurs. Elle s'en distingue par la coloration, par la taille et l'acuité des dents et épines des chélipèdes et des pattes ambulatoires p. 2 et p. 3, par la proportion des articles de ces appendices: le rapport de la hauteur à la longueur du propode des p. 2 en particulier est à peine inférieur à 1/2 alors qu'il est au plus égal à 1/3 dans les deux autres espèces; les plépodes 1 du ♂ ont une lame principale beaucoup moins large que chez *P. difficilis*, et à bord antérieur denticulé, alors que cette région est inerme chez *P. mauritanicus*.

P. oxyacanthus est une espèce assez grande si on la compare aux autres *Paguristes* de cette région: les ♀ de 5·5 et 7 mm. (l.c.), draguées en Baie de Rufisque le 18-1-52, présentent des caractères juvéniles: la première paire de pléopodes (pl. 1) est peu développée, les pléopodes impairs sont petits et les trois premiers ont une rame interne réduite, et il n'y a pas de repli abdominal en arrière de pl. 3. Au contraire

chez les ♀ de plus grande taille, ce repli est très développé et recouvre non seulement la région antérieure de l'abdomen mais les coxae des pattes ambulatoires. 2 ♀ de



Figs. 34–36. Deuxième patte thoracique gauche, face interne, dénudée: 34, *P. microphthalmus* Forest; 35, *P. hispidus* A. M.-Edw. et E. L. Bouvier; 36, *P. virilis* Forest.

6·5 et 7 mm. (l.c.), présentent des caractères intermédiaires et notamment un repli abdominal peu développé.

Les spécimens qui nous sont parvenus avec leurs coquilles étaient logés dans des *Mesalia*, des *Murex*, et des *Turritella*. Tous proviennent de la région de Dakar, d'une profondeur comprise entre 8 et 40 m.

Paguristes rubrodiscus Forest
Figs. 19, 32, 46, 59

Paguristes rubrodiscus Forest, 1952, p. 261, fig. 6.

Matériel examiné: 1 ♀, l.c. 7 mm., et 1 ♀ ovigère, l.c. 7·5 mm.: Gorée, Août 1946. Type.

1 ♂, l.c. 9 mm.: Anse Bernard (Dakar), sable et cailloux, 6–10 m., 6-5-50, Sourie coll.

1 ♂, l.c. 10 mm.: Baie de Hann, vers le banc de Bel Air, 12 m., cailloux et coquilles, 17-6-50, Sourie coll.

1 ♀ ovigère, l.c. 7 mm.: Gorée, filets à langoustes, 23,24-8-50.

1 individu adulte (non extrait de sa coquille): Gorée, dragage sur fond rocheux, 15 m., 28-12-51, Delais coll.

3 ♂, l.c. 4·5 à 8 mm., 2 ♀ l.c. 5·5 et 6 mm., 1 ♀ juv., l.c. 4 mm.: devant Thiaroye, Baie de Rufisque, dragage sur fond coquillier, 10–15 m., 18-1-52, Paraïso coll.

Description: L'écusson céphalothoracique (fig. 19) a une longueur sensiblement égale aux 5/4 de sa largeur et aux 4/7 de la longueur totale de la carapace; elle est faiblement spinuleuse en arrière des pédoncules antennaires. Le rostre est aigu et atteint l'alignement des dents latérales dont il est séparé par deux profondes concavités. Les pédoncules oculaires sont renflés à la base et s'élargissent au niveau des cornées qui sont assez petites et ne sont pas échancrées postérieurement.

Les écailles oculaires sont plus longues que larges, rapprochées et armées de quatre à cinq indentations dans la région antérieure. Les pédoncules antennulaires dépassent les pédoncules oculaires du quart ou du tiers de la longueur de leur dernier article. Les pédoncules antennaires sont plus courts et n'atteignent pas les cornées; leur deuxième article présente deux ou trois épines à chacun des angles antérieurs; les écailles antennaires sont longues, elles arrivent au tiers distal du dernier article pédonculaire, elles ont une extrémité bidentée et présentent trois ou quatre dents irrégulièrement disposées sur le bord interne qui est légèrement concave et deux ou trois dents au bord externe. Les flagelles antennaires ont une longueur égale au 3/4 de la région antérieure de la carapace.

Les chélipèdes sont égaux et de même forme. Le carpe est allongé et sa face supérieure est armée de dents cornées acérées dont les plus fortes sont disposées en deux rangées longitudinales, l'une externe de six, l'autre interne de quatre. La main est deux fois plus longue que large, le dactyle est nettement plus long que la région palmaire. La face supérieure porte des tubercules coniques peu proéminents sauf sur le bord palmaire interne qui est marqué par quatre très fortes dents cornées crochues dirigées vers l'avant. Il n'y a pratiquement pas de hiatus entre les doigts lorsqu'ils sont en contact par leurs ongles cornés.

Les deux premières paires de pattes ambulatoires dépassent légèrement les chélipèdes. Le mérus des p. 2 (fig. 32) est armé de cinq à six petites dents sur son bord inférieur. Le bord supérieur du carpe est défini par une rangée irrégulière de neuf fortes dents cornées, le bord supérieur du propode par six à huit dents cornées

un peu plus petites. Les p. 3 sont un peu plus longues que les p. 2, leurs articles sont inermes, à l'exception du carpe dont le bord supérieur présente une ou deux dents distales. Pour ces deux paires d'appendices le dactyle est un peu plus long que le propode et a une section circulaire.

La femelle ne possède qu'un orifice sexuel situé sur la coxa de la troisième patte thoracique gauche. Immédiatement en arrière du troisième pléopode impair on observe chez les femelles adultes un petit repli du tégument qui est frangé de longs poils et recouvre la base de cet appendice.

Les pléopodes 1 du mâle (fig. 46) ont une lame inférieure très allongée, à bords latéraux rectilignes et parallèles sur presque toute leur longueur, à bord antérieur arrondi et inerme. Le lobe interne beaucoup plus large que la lame inférieure est séparé du lobe distal par une encoche étroite et profonde.

Les régions calcifiées sont d'un blanc-rosé, maculé de rouge. Il y a en particulier deux taches rouges persistantes de chaque côté de la région pré-cervicale de la carapace, en arrière des zones épineuses. Les pédoncules antennulaires portent une bande longitudinale rouge sur toute la longueur de leur face supérieure et de leur face inférieure. La pigmentation la plus caractéristique est celle de la face interne du mérus des chélipèdes qui est marquée dans sa région antérieure par une tache rouge arrondie, toujours visible après un séjour de plusieurs années dans l'alcool.

La plus grande partie de la région antérieure du corps disparaît sous un revêtement de longs poils plumeux, particulièrement denses sur les aires latérales de la carapace, sur les pédoncules et les écailles oculaires, sur les écailles antennaires, et sur les face supérieure et inférieure des pattes thoraciques.

Remarques: Le *Paguristes rubrodiscus* présente quelques affinités avec *P. hispidus* A. Milne-Edwards et E. L. Bouvier et avec *P. microphthalmus* Forest qui ont comme lui des écailles oculaires plus longues que large et contiguës, des cornées petites et peu ou pas échancrées en arrière; cependant tout un ensemble de caractères ne laisse guère la possibilité de le confondre avec l'une ou l'autre de ces formes: région antérieure de la carapace bien plus longue que large, rostre étroit et aigu, pédoncules antennulaires à peine plus longs que les pédoncules oculaires, alors que dans les deux autres espèces, ces appendices dépassent les cornées des 2/3 de leur dernier article. La présence de la tache circulaire rouge sur la face interne du mérus des chélipèdes permet d'ailleurs de l'identifier rapidement. Les trois espèces désignées ci-dessus sont apparentées aux *Paguristes* de la Mer Rouge et l'aspect général du *P. perspicax* Nobili (décrit comme variété de *P. jousseaumei* Bouvier) est fort voisin de celui de *P. rubrodiscus*, les différences portant sur des caractères nombreux mais, dans l'ensemble, peu marqués.

La taille des *P. rubrodiscus* adultes examinés est comprise entre 4·5 et 10 mm. (l.c.); les ♀ adultes ne présentent qu'un court repli de l'abdomen en arrière de pl. 4. Quelques-uns des spécimens étaient logés dans des coquilles de *Clavatula* ou de *Turritella*, et l'un d'eux dans une coquille entièrement recouverte de Balanes; tous ont été récoltés dans la région de Dakar, entre 6 et 15 m. de profondeur.

Paguristes microphthalmus Forest
Figs. 20, 34, 48, 60

Paguristes microphthalmus Forest, 1952, p. 260, fig. 4.

Matériel examiné: 3 ♂, l.c. 4·5 à 8 mm., 1 ♀ ovigère, l.c. 6 mm.: "Mercator", dragage entre les îles Tamara et Roume (Iles de Los), 8–10 m., 10-12-36. Type.

Description: La région pré-cervicale représente près des 2/3 de la longueur totale de la carapace; le rapport de sa largeur sur sa longueur est de 5/6 environ. Le rostre, en angle obtus, atteint presque l'alignement des deux dents latérales. Les pédoncules oculaires sont deux fois plus larges à la base qu'au niveau des cornées dont l'échancrure postérieure n'est qu'à peine indiquée. Leur longueur est légèrement inférieure aux 3/4 de celle de la région pré-cervicale. Les écailles oculaires sont longues, assez étroites, et contiguës; leur bord antérieur est tronqué et armé de trois longues épines suivies d'une petite dent sur le bord externe. Les pédoncules antennulaires dépassent les cornées des 2/3 de leur dernier article. Les pédoncules antennaires sont à peu près de même longueur que les pédoncules oculaires; le deuxième article à un angle antéro-externe peu saillant armé de deux ou trois dents. L'écaille antennaire a une extrémité bidentée qui dépasse de peu la base du dernier article; son bord interne, concave, porte cinq ou six dents, le bord externe deux ou trois dents.

Les chélipèdes sont égaux et assez courts; la face interne du mérus dont le bord inférieur est armé de six ou sept dents a une largeur maximum sensiblement égale au 3/4 de la longueur. Le carpe est un peu plus long que le bord palmaire interne et celui-ci est de même longueur que le doigt fixe. La face supérieure du carpe présente de fortes dents cornées dont la plupart sont disposées en deux rangées: l'une de six le long du bord externe, l'autre de quatre ou cinq le long du bord interne. La main est couverte de tubercules coniques, peu saillants, sauf sur le bord palmaire interne marqué par cinq dents cornées.

Les deux paires de pattes ambulatoires sont un peu plus longues que les chélipèdes. Les p. 2 (fig. 34) ont un mérus dont le bord inférieur est marqué par quelques spinules. La région supérieure du carpe porte une rangée de six ou sept fortes dents, et une seconde rangée plus externe de six autres dents qui n'occupent que la moitié distale; le bord supérieur du propode est défini par une rangée de douze dents assez fortes, régulièrement espacées, qui se prolonge jusqu' à la moitié distale du dactyle sous la forme de denticules de taille décroissante. Le rapport des longueurs du dactyle et du propode, mesurées le long du bord supérieur, est de 4/3 environ.

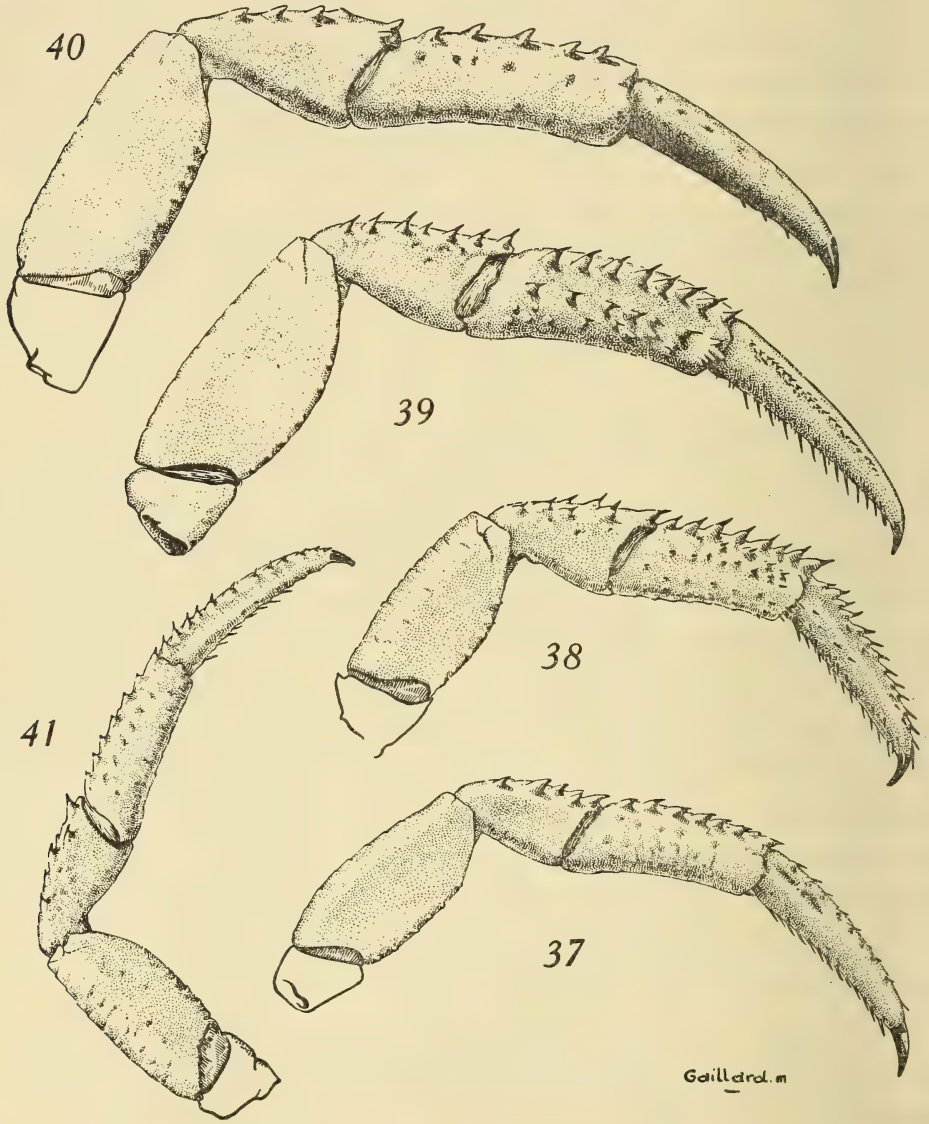
Les p. 3 sont inermes à l'exception d'une faible denticulation sur le bord supérieur du mérus et d'une dent distale au bord supérieur du carpe. Le rapport des longueurs du dactyle et du propode est voisin de 3/2.

Les femelles n'ont qu'un orifice sexuel, qui s'ouvre sur la coxa de p. 3 gauche. Le repli de l'abdomen qu'on observe chez elles en arrière du troisième pléopode impair, est peu développé.

Les pléopodes 1 du mâle (fig. 48) ont une lame inférieure quatre fois et demie à cinq fois plus longue que large, à bord antérieur arrondi. Une rangée de minus-

cules épines assez espacées s'étend du milieu du bord latéral externe au tiers interne du bord antérieur. Le lobe interne très développé est séparé par une encoche aiguë du lobe distal, lequel dépasse largement la lame inférieure.

Les exemplaires observés sont d'une teinte blanchâtre à peu près uniforme. Une tache plus foncée sans doute rouge à l'origine subsiste cependant sur la face interne du mérus des chélipèdes, dans sa région antérieure.



Figs. 37–41. Deuxième patte thoracique gauche, face interne, dénudée: 37, *Paguristes agulhasensis* sp. nov.; 38, *P. gamianus* H. M.-Edw.; 39, *P. barnardi* sp. nov.: 40, *P. engyops* Barnard; 41, *P. macrotrichus* sp. nov.

Les poils qui couvrent les régions latérales de la carapace et les appendices céphaliques antérieurs ne sont pas assez denses pour cacher complètement le tégument. Par contre les chélipèdes et les deux paires de pattes ambulatoires p. 2 et p. 3 disparaissent en grande partie sous un épais revêtement de poils plumeux.

Remarques: Par l'aspect général de la région antérieure du corps, par la forme allongée et la contiguité des écailles oculaires, *P. microphthalmus* Forest se rapproche de *P. hispidus* A. Milne-Edwards et E. L. Bouvier et de *P. rubrodiscus* Forest. La longueur relative des pédoncules antennaires et oculaires permet de distinguer facilement les trois espèces: dans la première, les pédoncules antennaires et oculaires sont à peu près de même longueur, dans la seconde, les pédoncules antennaires dépassent les yeux de la moitié de la longueur de leur dernier article et dans la troisième, ils n'atteignent pas les cornées. Par l'aspect de la région antérieure du corps *P. microphthalmus* est aussi apparenté à *P. jousseaumei* de la Mer Rouge; les différences portent sur la forme et l'ornementation des chélipèdes et des deux premières pattes ambulatoires.

Les quatre spécimens qui constituent le type de cette espèce ont été dragués dans les parages des îles de Los, par 8 à 10 m. de profondeur.

Paguristes virilis Forest
Figs. 21, 36, 49, 63

Paguristes virilis Forest, 1952, p. 262, fig. 7.

Matériel examiné: 1 ♂ et 2 ♀, l.c. 5·5 mm.: Ile Roume (I. de Los), sable vasard, 30-9-1913.

1 ♂, l.c. 7,5 mm. et 1 ♀ ovigère, l.c. 5·5 mm.: "Mercator", dragage entre les îles Tamara et Roume (I. de Los), 8–10 m., 10-12-36. Type.

1 ♂, l.c. 6 mm. et 1 ♀ ovigère de 7 mm.: "M'Bizi", station 174,13 milles W. de Banana, vase, 30–35 m., 3-4-49.

12 spécimens provenant de 5 stations entre 11 et 28 m. au large de la Gold Coast. Ces spécimens seront étudiés avec l'ensemble de la collection R. Bassindale.

Description: L'écusson céphalothoracique est à peu près de même longueur que la région postérieure de la carapace, sensiblement aussi large que long et couvert de petites saillies spinuleuses, plus nombreuses sur les aires latérales. Le rostre obtus est nettement plus court que les dents latérales. Il n'y a pas de limite définie entre le bord frontal et les côtés de la carapace.

Les pédoncules oculaires sont assez étroits dans leur région moyenne mais renflés aux extrémités; ils sont un peu plus courts que la région antérieure de la carapace. Les écailles oculaires sont aussi longues que larges, assez écartées et leur bord antérieur est quadridenté. Les pédoncules antennulaires dépassent les yeux de la moitié de leur dernier article. Les pédoncules antennaires plus courts n'atteignent pas les cornées, l'angle antéro-externe saillant de leur deuxième article est armé de quatre dents, leur bord interne de deux dents; l'écaille antennaire, qui atteint le milieu du dernier article pédonculaire, a des bords latéraux rectilignes dont chacun

est armé de cinq ou six fortes dents régulièrement espacées. La longueur du flagelle est égale aux 3/4 de celle de la carapace environ.

Les chélipèdes sont égaux. Le carpe et le dactyle sont de même longueur et plus long que le bord palmaire interne. Le rapport de la largeur à la longueur de la main est de 3/5 environ. La face supérieure de ces articles est couverte de tubercules coniques peu saillants sauf sur les bords latéraux du carpe et sur le bord palmaire interne où ils prennent l'aspect de fortes dents à pointe plus ou moins émoussée. Les doigts entrent en contact sur toute leur longueur lorsqu'ils sont fermés.

Les deux paires de pattes ambulatoires p. 2 et p. 3 dépassent les chélipèdes de toute la longueur de leur dactyle. Les p. 2 (fig. 36) ont un mérus dont le bord supérieur seul présente quelques denticulations; le bord supérieur du carpe est armé d'un nombre trés variable de dents à pointes cornées; il y a sur l'article suivant sept à onze dents plus faibles. Le dactyle est très grêle, son plus grand diamètre est compris neuf fois environ dans sa longueur; il se termine par un ongle très petit. Le rapport des longueurs du dactyle et du propode est de 5/3 environ.

Les p. 3 différent des p. 2 en ce que leur mérus est régulièrement denticulé le long du bord supérieur alors que les autres articles sont inermes. Les pattes sont plus grèles encore que les précédentes: le dactyle est dix fois plus long que large et près de deux fois plus long que le propode.

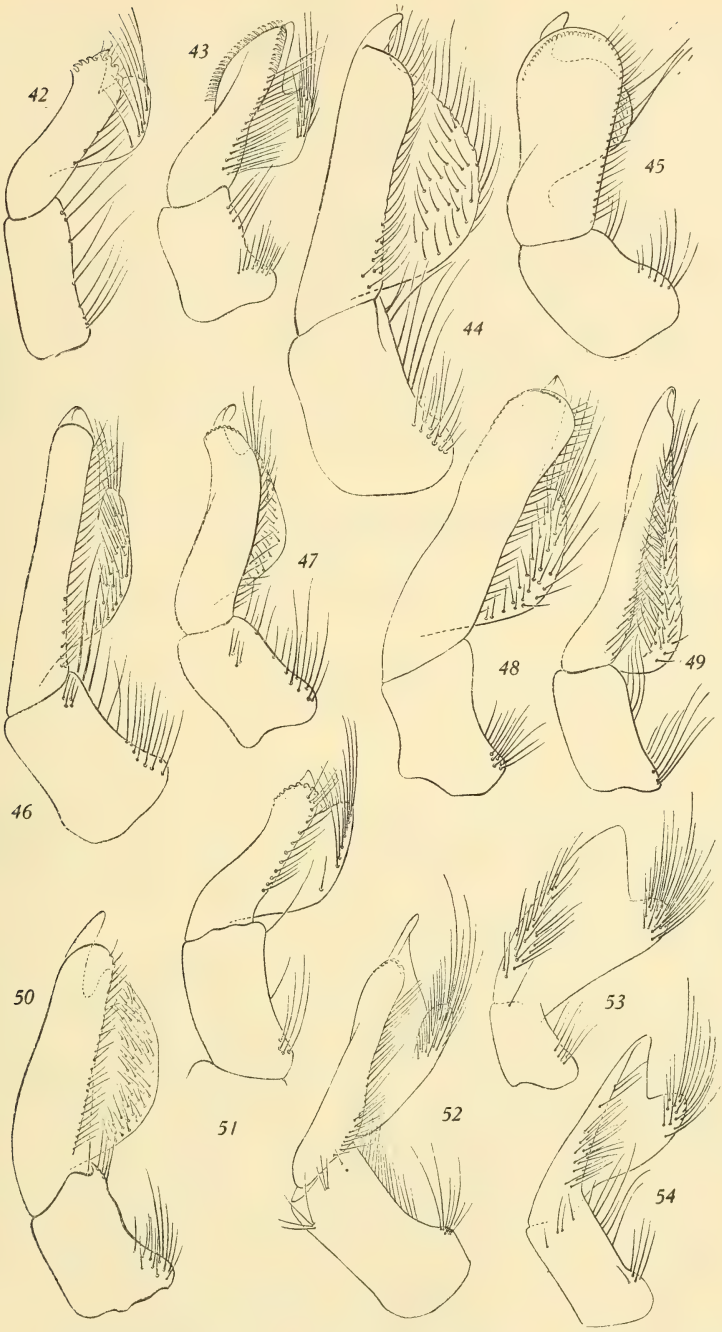
La femelle ne possède qu'un orifice génital, sur la coxa de p. 3 gauche. En arrière du troisième pléopode impair biramé, un court repli de l'abdomen coiffe la partie postérieure de la ponte.

Les pléopodes 1 du mâle (fig. 49) sont très développés. Le lobe interne n'est séparé du lobe distal que par une simple fente et la lame supérieure prend ainsi l'aspect d'un triangle très allongé.

Les spécimens observés ne présentent pas de coloration caractéristique.

La pilosité est assez forte mais les longs poils plumeux qui couvrent les bords de la carapace, les appendices céphaliques antérieurs et les pattes ambulatoires ne sont pas assez denses pour dissimuler complètement le tégument. Par contre les chélipèdes disparaissent sous un épais manchon de poils.

Remarques: *Paguristes virilis* appartient au groupe de *Paguristes* dont les écailles oculaires sont courtes et ont un bord antérieur denticulé. Quelques caractères stables et bien apparents permettent de le distinguer des espèces déjà décrites: région antérieure de la carapace aussi large que longue, rostre très bas, écailles antennaires à bords rectilignes avec des dents aiguës nombreuses et régulièrement espacées. C'est sans doute avec *Paguristes skoogi* qu'il présente les plus grandes affinités; nous n'avons malheureusement pas pu savoir où sont conservés les spécimens décrits sous ce nom par T. Odhner en 1923. D'après la description originale et la figure qui l'accompagne, deux caractères permettraient de distinguer les deux espèces: chez *P. skoogi* les pédoncules antennaires sont aussi longs que les pédoncules oculaires et les écailles antennaires sont armées de trois dents au bord externe, et de quatre à cinq dents au bord interne, alors que, chez *P. virilis*, les pédoncules antennaires n'atteignent pas les cornées et les bords externe et interne des écailles antennaires sont armés de cinq ou six dents. On peut encore relever des



Figs. 42–54. Premier pléopode sexuel droit chez les *Paguristes* ♂ des côtes occidentales et méridionales d'Afrique: 42, *P. marocanus* A. M.-Edw. et E. L. Bouvier; 43, *P. fagei* Forest; 44, *P. mauritanicus* Bouvier; 45, *P. difficilis* Forest; 46, *P. rubrodiscus* Forest; 47, *P. oxyacanthus* Forest; 48, *P. microphthalmus* Forest; 49, *P. virilis* Forest; 50, *P. hispidus* A. M.-Edw. et E. L. Bouvier; 51, *P. engyops* Barnard; 52, *Paguristes* sp. (Table Bay); 53, *P. agulhasensis* sp. nov.; 54, *P. barnardi* sp. nov.

Fig. 42, × 60; 47, 49, × 20; 52, × 15; 54, × 22. Les autres, × 35.

différences dans la taille des pédoncules oculaires, dans l'ornementation et les proportions des chélipèdes et des deux premières paires de pattes ambulatoires.

Il faut noter que les pléopodes 1 du mâle de *P. virilis* ont une forme bien caractéristique et sont près de deux fois plus longs que chez les autres *Paguristes* de même taille. Chez les femelles ovigères examinées le repli abdominal est peu développé et ne recouvre que la base du troisième pléopode biramé.

Les coquilles à l'intérieur desquelles étaient logés quelques-uns des spécimens examinés appartiennent aux genres *Murex* et *Clavatula*.

P. virilis a été décrit d'aprés du matériel provenant d'une part des îles de Los, d'autre part, d'un point beaucoup plus méridional, puisque situé au large de l'embouchure du Congo, mais ces deux localités, géographiquement fort éloignées, présentent un caractère commun: les eaux renferment une grande quantité de vase en suspension et les fonds sont vaseux. En ce qui concerne la profondeur, remarquons que les *P. virilis* du Congo ont été pris par 30 à 35 m., alors que ceux des I. de Los ont été dragués sur des fonds de 8 à 10 m.

Paguristes hispidus A. Milne-Edwards et E. L. Bouvier
Figs. 22, 35, 50, 62

Paguristes hispidus, A. Milne-Edwards et E. L. Bouvier, 1892, p. 208; 1900, p. 170, pl. XXIII, fig. 7–10.

Matériel examiné: 1 ♂, 4 mm (type) et 1 ♀ 3·5 mm., "Commandant Parfait", Monrovia (Liberia).

1 ♂, 6 mm., "M'Bizi", St. 38, 4 milles W. Moita Seca, sable et vase, 12–15 m., 5-10-48.

Description: A. Milne-Edwards et E. L. Bouvier ont donné une description détaillée du type, un mâle dont la carapace mesure 4 mm. Comme le spécimen de M'Bizi est légèrement différent, probablement en raison de sa taille plus grande, il est utile de donner une description le l'espèce qui, portant sur plusieurs spécimens, aura ainsi une validité plus grande.

La région antérieure de la carapace n'est que légèrement plus longue que la région postérieure: le rapport de la largeur de l'écusson céphalothoracique a sa longueur est de 7/8 environ; ses aires latérales sont spinuleuses. Le rostre est beaucoup moins saillant que les dents latérales. Les pédoncules oculaires sont grêles, fortement renflés à la base et légèrement au niveau des cornées; celles-ci sont petites et ne présentent pas d'échancrure postérieure; la longueur des pédoncules représente les 2/3 environ de celle de l'écusson céphalothoracique. Les écailles oculaires sont contiguës et très allongées; leur bord antérieur est armé de quatre longues dents aiguës. Le bord antérieur des cornées atteint le quart proximal du dernier article du pédoncule antennulaire et le milieu du dernier article du pédoncule antennaire. Le deuxième article de ce dernier présente deux ou trois dents aiguës sur la saillie antéro-externe. L'écaille antennaire dont l'extrémité atteint la base du dernier article, est armée, en plus des deux dents apicales, de trois ou quatre dents sur le bord interne et d'une dent sur le bord externe.

Les chélipèdes sont égaux et de même forme. La face supérieure de la main est sub-triangulaire; elle présente sa plus grande largeur—soit les 5/8 de sa longueur—au niveau du quart proximal et se rétrécit progressivement jusqu'à l'extrémité des doigts. Le dactyle est nettement plus long que le bord palmaire interne. Un large hiatus subsiste entre les doigts lorsque les ongles sont en contact. La face supérieure du carpe, peu bombée, est limitée vers l'intérieur par une rangée de six dents cornées et vers l'extérieur par quelques dents moins fortes. La face supérieure de la main est couverte de tubercules coniques peu serrés dont la plupart sont disposés en lignes longitudinales. Le bord palmaire est marqué par quatre ou cinq dents un peu plus aiguës. Les pattes ambulatoires, très grêles, dépassent largement les chélipèdes. Le bord supérieur du carpe de p. 2 (fig. 35) est armé de sept épines. Le propode et le dactyle sont inermes; la longueur du premier ne représente que les 2/3 de celle du second. Les p. 3 sont également inermes, à l'exception du bord supérieur du carpe pourvu d'une épine distale; leurs articles et surtout le propode et le dactyle, sont plus grêles encore que ceux des p. 2.

La femelle examinée (à carapace de 3·5 mm.) n'à qu'un orifice sexuel sur la coxa de p. 3 gauche. Les trois premiers pléopodes impairs de ce spécimen présentent une disposition particulière. Ils sont rapprochés les uns des autres et groupés dans le quart antérieur de l'abdomen. Un quatrième pléopode, uriramé, est situé loin en arriére.

Les pléopodes I du mâle (fig. 50) ont une lame inférieure un peu plus étroite à l'extrémité antérieure qu'a la base, le bord antérieur de cette lame est inerme. Le lobe interne est très développé et séparé par une profonde encoche du lobe distal fort saillant.

Les spécimens examinés présentent une coloration générale blanchâtre. La pilosité est assez peu développée si on la compare à celle des autres *Paguristes* de la côte occidentale d'Afrique. Les poils, bruns, assez longs, mais peu serrés, retiennent cependant la vase et cachent en partie le tégument.

Remarques: Par leurs pédoncules antennaires qui dépassent les cornées de la moitié de leur dernier article, par la gracilité de leurs pattes ambulatoires et l'absence de dents ou d'épines sur leurs deux derniers articles, ces *Paguristes* de petite taille (le ♂ de 4 mm. et la ♀ de 3·5 mm. sont adultes) ne risquent pas d'être confondus avec une autre espèce. On ne peut guère leur trouver d'affinités qu'avec *P. microphthalmus* et *P. rubrodiscus* comme nous l'avons signalé à la suite de la description de ces deux formes. L'espèce n'était connue que par les deux spécimens capturés par le "Commandant Parfait" au large du Liberia à une profondeur non précisée, décrits par A. Milne-Edwards et E. L. Bouvier et par des spécimens de Gold Coast et du Dahomey signalés par Balss. Le mâle dragué par l'Expédition "M'Bizi" provient d'une localité beaucoup plus méridionale, située au large du Congo, et d'une profondeur de 12 à 15 m.

Paguristes skoogi Odhner

Paguristes skoogi, Odhner, 1923, p. 6. pl. 1.

Parmi les *Paguristes* des côtes occidentales ou méridionales d'Afrique que nous avons examinés, aucun n'était identifiable à cette espèce, tout au moins si l'on se

rapporte à la description qui en a été faite par Odhner. D'autre part, il ne nous a pas été possible de découvrir où étaient conservés les spécimens en constituant le type. La description qui figure ci-dessous a été établie d'après celle d'Odhner.

Description: L'écusson céphalothoracique est un peu plus long que large et représente un peu plus de la moitié de la longueur totale de la carapace. Le rostre, court et obtus, n'atteint pas l'alignement des dents latérales. Les pédoncules oculaires sont cylindriques: leur longueur est égale aux 3/4 de celle de la région antérieure de la carapace. Les écailles oculaires sont assez écartées, un peu plus longues que larges et armées de trois dents sur le bord antéro-latéral, en arrière de l'épine distale. Les pédoncules antennulaires dépassent les cornées de la moitié de leur dernier article; les pédoncules antennaires sont aussi longs que les pédoncules oculaires. Les écailles antennaires atteignent le milieu du dernier article des pédoncules; elles présentent quatre ou cinq dents sur le bord interne et trois dents sur le bord externe. La longueur du flagelle est légèrement supérieure à la moitié de celle de la carapace.

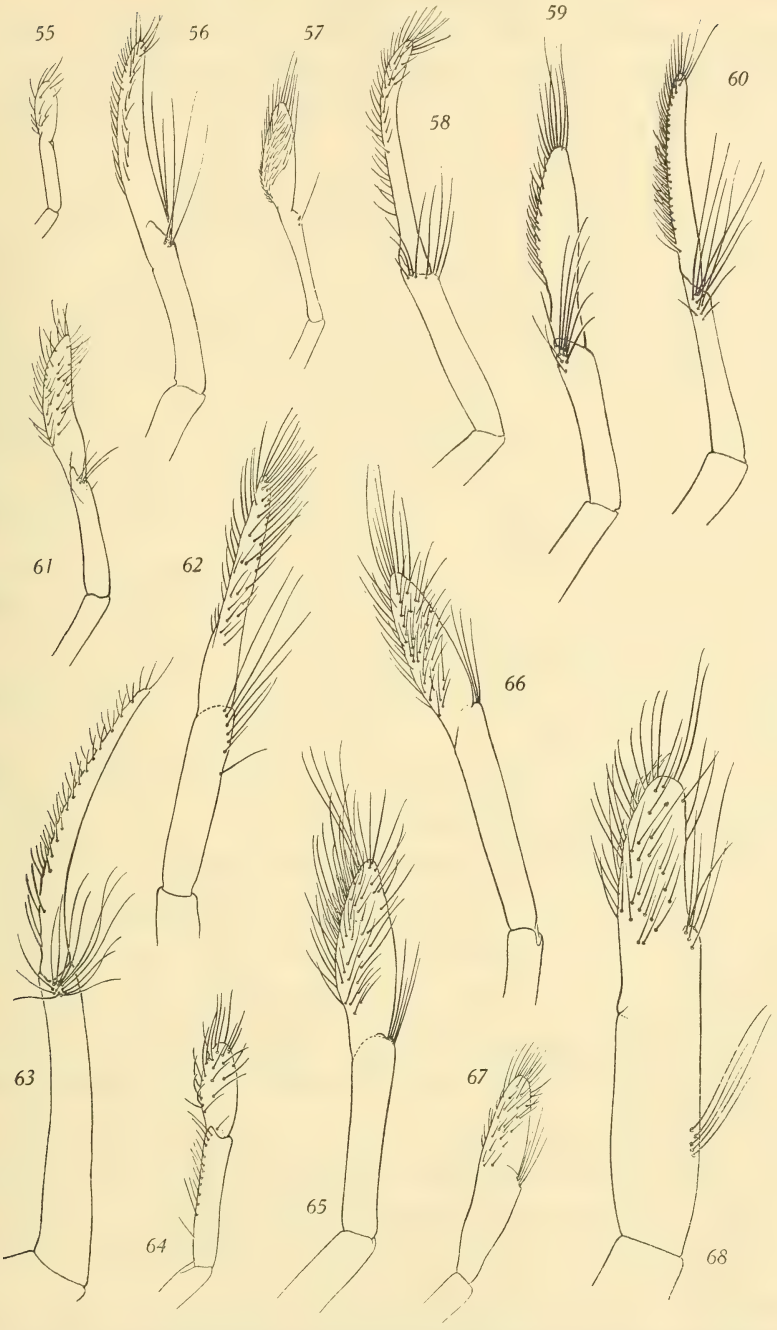
Le chélipède droit est un peu plus long que le gauche. Le carpe et le propode sont recouverts de petites épines sans pointes cornées; le bord interne de chacun de ces articles est armé de quatre à cinq dents plus fortes. Les doigts sont en contact sur toute leur longueur.

Les pattes ambulatoires p. 2 et p. 3 dépassent les chélipèdes; le rapport des longueurs du propode et du dactyle est égal à 2/3 environ. Les pattes de la première paire (p. 2) sont armées de dents sur le bord supérieur du carpe et du propode et de petites épines localisées sur les bords supérieur et inférieur du dactyle. Les pattes suivantes (p. 3) ne présentent qu'une épine distale sur le bord supérieur du carpe.

Paguristes skoogi, comme la plupart des espèces ouest-africaines est assez fortement pileux. Les régions où les poils sont les plus longs et les plus denses sont les aires branchiales de la carapace, la face supérieure des chélipèdes, les faces supérieure et inférieure des pattes ambulatoires.

Remarques: Le dessin et la description de *Paguristes skoogi* donnés par Odhner, suffisants pour distinguer cette forme des seules espèces d'Afrique occidentale connues jusque là, *P. hispidus*, *P. oculatus* et *P. mauritanicus*, présentent quelques imprécisions qui rendent difficile la comparaison avec les autres *Paguristes* récemment décrits. L'espèce la plus proche est sans doute *Pagauristes virilis* Forest, caractérisée par un écusson céphalothoracique très court, des écailles antennaires à bords latéraux régulièrement dentés, des pattes ambulatoires à dactyle long et grêle, et des pléopodes 1 très allongés chez le mâle.

Les caractères suivants, décrits ou figurés par Odhner, nous obligent à considérer pour l'instant, *P. skoogi* comme une espèce distincte de *P. virilis*: l'écusson céphalothoracique est un peu plus long que large, les pédoncules oculaires ont une longueur égale aux trois quarts de celle de la région antérieure de la carapace, les écailles antennaires sont armées de trois dents sur le bord externe et non de cinq ou six, les pédoncules antennaires sont aussi longs que les pédoncules oculaires et non nettement plus courts.



Figs. 55–68. Deuxième pléopode sexuel droit chez les *Paguristes* ♂ des côtes occidentales et méridionales d'Afrique: 55, *P. marocanus* A. M.-Edw. et E. L. Bouvier; 56, *P. mauritanicus* Bouvier; 57, *P. fagei* Forest; 58, *P. oxyacanthus* Forest; 59, *P. rubrodiscus* Forest; 60, *P. microphthalmus* Forest; 61, *P. difficilis* Forest; 62, *P. hispidus* A. M.-Edw. et E. L. Bouvier; 63, *P. virilis* Forest; 64, *P. engyops* Barnard; 65, *P. gamianus* H. M.-Edw.; 66, *P. barnardi* sp. nov. 67, *P. agulhasensis* sp. nov.; 68, *Paguristes* sp. (Table Bay).
Figs. 55, 60, 62, 67, × 35; 58, 65, 68, × 22. Les autres, × 28.

L'examen des six exemplaires d'Odhner, s'il est possible de les retrouver, ou de spécimens provenant de la même région que le type (Port Alexander, Angola, 72 m. de profondeur) et la comparaison des pléopodes du mâle, qui, chez *P. virilis*, sont si caractéristiques, confirmera la validité de cette dernière espèce ou permettra de l'identifier à *Paguristes skoogi*.

Paguristes gamianus (H. Milne-Edwards)
Figs. 10, 11, 12, 23, 38, 65, et pl. iv.

Pagurus gamianus, H. Milne-Edwards, 1836, p. 283; 1837, p. 235.
Paguristes gamianus, Stimpson, 1858, p. 74.
Paguristes rosaceus, Barnard, 1947, p. 375; 1950, p. 420, fig. 78 *e-g*.
et non *Paguristes gamianus*, Stebbing, 1910, p. 351.
„ „ „ Balss, 1912, p. 91, fig. 2.
„ „ „ Stebbing, 1920, p. 257.
„ „ „ Barnard, 1950, p. 418, fig. 78 *a–d*.

Matériel examiné: 2 ♂, l.c. 12 et 15 mm.; 2 ♀, l.c. 11 et 14 mm.: Cap de Bonne-Espérance, Raynaud coll. (Type).

1 ♀, l.c. 10 mm.; 2 ♀ ovigères, l.c. 11 et 11·5 mm.: Buffels River, 23-2-40.

3 ♀, l.c. 10 à 14 mm.; 1 ♀ ovigère, l.c. 11 mm.: Hondeklip Bay, 8-2-40.

2 ♀, l.c. 10 et 11 mm.: Groen River, 7-3-40

1 ♀, l.c. 10 mm.: Zout River, 19-4-40.

1 ♀ juv., l.c. 6 mm.: Langebaan Lagoon, 16-7-46; 1 ♀ ovigère, l.c. 11 mm.: Langebaan Lagoon, 26-4-48.

1 ♀, l.c. 7 mm.; 1 ♀ ovigère, l.c. 10 mm.: Langebaan Lagoon.

1 ♀, l.c. 13·5 mm.: Table Bay, dragage par 17 m.

1 ♂, l.c. 8 mm.: St. James (False Bay), 23-2-33.

1 ♂, l.c. 16 mm.: False Bay, dragage par 24 m., 22-2-52.

1 ♂, l.c. 8 mm., 1 ♀, l.c. 16 mm.: False Bay, dragage par 11–12 m., 5-3-52.

1 ♂ juv., l.c. 6 mm. (avec un orifice sur la coxa de la troisième patte thoracique droite); 4 ♀ juv., l.c. 4·5 à 5·5 mm.; 2 ♀, l.c. 6·5 et 7 mm.: Cape Hangklip, 8-1-40.

4 ♀ ovigères, l.c. 7 à 11·5 mm.: Hermanus, 30-6-39.

2 ♂ juv., l.c. 4 et 5 mm.; 2 ♀ juv., l.c. 5 mm.: Danger Point, 5-7-39.

2 ♀, l.c. 7 et 7·5 mm.; 1 ♀, l.c. 8·5 mm.: Danger Point.

2 ♀, l.c. 7 et 8 mm., 1 ♀, l.c. 7·5 mm.: Keurbooms River, Plettenberg Bay (Type de *P. rosaceus* Barnard).

Tous ces échantillons—à l'exception du premier qui est le type de H. Milne-Edwards et qui est conservé au Muséum de Paris—proviennent des collections du Département de Zoologie de l'Université de Cape Town et du South African Museum. Ce matériel nous a été aimablement communiqué par le Dr. K. H. Barnard, Directeur du South African Museum.

Description: L'écusson céphalothoracique est un peu plus long que la région postérieure de la carapace et le rapport de sa largeur sur sa longueur est égal à 4/5 environ. Le rostre aigu dépasse nettement les dents latérales. Les pédoncules

oculaires sont renflés à la base et plus faiblement au niveau des cornées qui sont assez petites et présentent une échancrure postérieure. Leur longueur représente les 5/9 environ de celle de la région pré-cervicale. Les écailles oculaires largement écartées, sont lancéolées et ne présentent pas d'indentations sur le bord antéro-latéral. Les pédoncules antennulaires sont à peu près de même taille que les pédoncules oculaires. Les pédoncules antennaires n'arrivent pas tout à fait à la base des cornées; leur second article est armé de trois dents aiguës à l'angle antéro-externe qui est assez saillant. L'extrémité bidentée de l'écaille antennaire atteint ou dépasse de peu le milieu du dernier article; son bord interne, sensiblement rectiligne, est armé de trois dents assez peu saillantes; son bord externe présente au moins une dent dans la région antérieure. Le flagelle est presque aussi long que la région antérieure de la carapace.

Les chélipèdes sont égaux et de même forme. Le carpe est de même longueur ou légèrement plus court que le dactyle et plus long que la région palmaire. La main est un peu plus de deux fois et demie plus longue que large. Le carpe, le propode et le dactyle, sont couverts par dessus de dents épineuses à pointe cornée, particulièrement développées sur le bord interne des articles.

Les pattes ambulatoires sont assez courtes et trapues: elles dépassent légèrement les chélipèdes. Les p. 2 (fig. 38 et pl. IV) ont un mérus à bord inférieur spinuleux; le bord supérieur du carpe porte des dents cornées qui existent aussi sur toute la face interne du propode et sont particulièrement développées sur le bord supérieur de cet article où on observe une rangée de huit dents à très longue pointe cornée, plus fortes que sur le carpe. Cette rangée se prolonge sur le dactyle sous la forme de dents de plus en plus petites qui se réduisent à des épines cornées dans le voisinage de l'ongle. Le propode est à peine deux fois et demie plus long que haut. Le dactyle a une hauteur à la base comprise cinq fois environ dans sa longueur. Le rapport des longueurs du premier et du second de ces articles est sensiblement égal à 3/4.

Les p. 3 diffèrent des pattes précédentes en ce que leurs dents épineuses, qui occupent les mêmes emplacements, sont beaucoup moins fortes.

Les femelles possèdent un orifice sexuel sur chacune des coxae des p. 3; un repli de l'abdomen qui prend naissance en arrière du troisième pléopode impair biramé recouvre les appendices ovigères.

Les pl. 1 du mâle (fig. 12) ont un article distal en général peu enroulé; la région désignée sous le nom de lame inférieure chez *P. oculatus* n'est pas nettement séparée du lobe distal. Les pl. 2 (fig. 65) ont une portion distale à peine plus courte que la portion proximale.

La région antérieure de la carapace, les pédoncules oculaires, les antennes, les chélipèdes et les pattes ambulatoires sont rouge-rosé ou carminé et souvent maculés de pourpre; la moitié distale des dactyles des p. 2 et p. 3 est blanche. Cette coloration disparaît rapidement dans l'alcool et la plus grande partie des spécimens examinés sont uniformément jaunâtres.

La pilosité est assez forte sur les chélipèdes et sur les deux paires d'appendices suivantes, mais les poils plumeux fasciculés ne forment pas de revêtement continu et ne dissimulent pas complètement l'ornementation du tégument.

Remarques: Le type de *Paguristes gamianus* H. Milne-Edwards est représenté par 2 ♂ et 2 ♀ adultes provenant du Cap de Bonne-Espérance. Le spécimen signalé par Balss (1912), et ceux de Stebbing redécrits par K. H. Barnard, diffèrent considérablement du type et appartiennent beaucoup plus probablement à l'espèce décrite plus loin sous le nom de *P. macrotrichus*. Par contre le *Paguristes rosaceus* que K. H. Barnard a décrit sans avoir pu le comparer au type de l'espèce de H. Milne-Edwards est bien à mettre en synonymie avec celle-ci.

Nous décrirons plus loin sous le nom de *Paguristes* sp. un spécimen apparenté à *Paguristes gamianus* mais en différant cependant sur quelques points assez importants: extrémités bidentées des écailles oculaires, forme des chélipèdes, proportions des deux derniers articles des pattes ambulatoires, ornementation des pléopodes sexuels. Nous indiquerons à la suite de la description de ce *Paguristes* sp. les raisons qui nous font hésiter à le considérer comme appartenant à une nouvelle espèce.

Parmi les *Paguristes* provenant d'Afrique du Sud et que nous avions déterminés comme *P. gamianus* figuraient un certain nombre de spécimens qu'il était impossible de distinguer de la forme typique par l'aspect de la carapace et des appendices céphaliques antérieurs mais qui présentaient une pilosité fort différente des chélipèdes et des deux paires de pattes ambulatoires. Après épilation, la forme et l'ornementation des dactyles de celles-ci se sont également révélées nettement différentes; nous avons été ainsi amené à séparer ces individus de l'espèce de H. Milne-Edwards et à les décrire sous le nom de *Paguristes barnardi* sp. nov.

Les échantillons de *P. gamianus* proviennent surtout de la zone intercotidale des côtes ouest et sud-ouest d'Afrique du Sud, depuis Buffels River, jusqu'à la région de Cape Town. L'un d'entre eux provient cependant d'un point situé beaucoup plus à l'est, de Plettenberg Bay. Quelques spécimens parmi les plus grands ont été dragués entre 11 et 24 m. de profondeur.

Paguristes sp.
Figs. 24, 52, 68

Matériel examiné: 1 ♂, l.c. 20 mm., Table Bay (côte occidentale d'Afrique du Sud, dragage par 17 m.

Description: L'écusson céphalothoracique est un peu plus long que la région postérieure de la carapace; le rapport de sa largeur et de sa longueur est égal à 6/7. Le rostre ne dépasse pas l'alignement des dents latérales. Les pédoncules oculaires, renflés à la base ont une longueur égale aux 2/3 environ de celle de la région précervicale. Les cornées sont petites et légèrement échancrées postérieurement. Les écailles oculaires sont triangulaires et ont un sommet bidenté. Les pédoncules antennulaires sont un peu moins longs que les pédoncules oculaires. Les pédoncules antennaires sont plus courts encore; le second article a un angle antéro-externe fortement saillant et armé de trois dents aiguës. L'écaille antennaire atteint le tiers distal du dernier article pédonculaire, son bord interne est armé de quatre fortes dents, son bord externe de trois dents. Le flagelle est aussi long que la région antérieure de la carapace.

Les chélipèdes sont égaux et de même forme. Le carpe est un peu plus court que le dactyle dont la longueur représente plus des 2/3 de celle de la main; celle-ci est sub-triangulaire et plus de deux fois plus longue que large. La face supérieure des trois derniers articles est couverte de fortes dents à pointe cornée, moins nombreuses sur les doigts où on observe deux bandes longitudinales inermes. Les pattes ambulatoires sont un peu plus longues que les chélipèdes. Les trois derniers articles des p. 2 sont armés par dessus de fortes dents cornées acérées. La face interne des deux derniers est également épineuse, on observe en particulier une rangée longitudinale sub-médiane de sept dents sur la face interne du propode. Cet article est à peu près trois fois plus long que haut et d'un tiers plus court que le dactyle. Celui-ci a une hauteur maximum comprise six fois dans sa longueur. Les pattes de la paire suivante présentent des proportions voisines et des dents cornées implantées dans les mêmes régions mais moins fortes.

Les pl. 1 du mâle (fig. 52) ont une lame inférieure à bord antérieur arrondi armé de six ou sept crochets, séparée du processus distal très long par une incisure bien marquée.

L'unique exemplaire ne présente pas de coloration caractéristique.

Les trois premières paires de pattes thoraciques présentent une pilosité assez forte constituée par des touffes de longs poils, plumeux à l'extrémité, particulièrement nombreux sur les régions de la face supérieure des chélipèdes proches du bord externe, sur la région supérieure du carpe et sur les régions supérieure et inférieure du propode et du dactyle des deux paires ambulatoires. Il n'y a pas de revêtement continu de poils plumeux très serrés sur la face interne du propode de ces appendices et les dents épineuses situées sur cette face sont toujours bien dégagées.

Remarques: Le spécimen décrit ci-dessus présente des affinités avec *Paguristes gamianus*, tout en en différant sur un certain nombre de points. Comme il s'agit d'un individu de taille nettement supérieure à celle des plus grands *P. gamianus* observés, il est possible que ces différences soient liées à l'âge et nous avons préféré ne pas le décrire comme espèce nouvelle. Les ressemblances avec l'espèce de H. Milne-Edwards portent sur l'aspect général, sur les proportions de la carapace et sur l'ornementation des trois premières paires de péréiopodes. *Paguristes* sp. se distingue de *P. gamianus* par la brièveté du rostre, par les écailles oculaires dont l'extrémité antérieure est bidentée, par la forme des chélipèdes dont la main est subtriangulaire et dont le dactyle est très long, par les proportions des deux derniers articles des pattes ambulatoires p. 2 et p. 3: le propode de ces appendices a une hauteur comprise trois fois environ dans sa longueur: le dactyle une hauteur maximum comprise six fois environ dans sa longueur, alors que ces rapports valent respectivement 2·5 et 5 chez *P. gamianus*.

Un dernier caractère morphologique rend probable l'appartenance de *Paguristes* sp. à une espèce distincte: les pl. 1 ♂ présentent, sur le bord antérieur de la lame inférieure des crochets bien développées qui n'existent pas chez *P. gamianus*. Quant aux pl. 2, la forme de leur région distale est particulière (fig. 68).

Il faut noter que ce *Paguristes* a été capturé en même temps qu'une femelle de *P. gamianus* typique dans la région de Table Bay.

Paguristes engyops Barnard

Figs. 25, 40, 51, 64

Paguristes engyops, Barnard, 1947, p. 375; 1950, p. 421, fig. 78 *h-i*.

Matériel examiné: 3 ♂, l.c. 2 à 3 mm., 6 ♀ ovigères, l.c. 2·25 à 3 mm., Buffels Bay, False Bay, littoral, dans des coquilles de *Trochidae* (Type).

1 ♂, l.c. 7 mm., Langebaan Lagoon, 26-4-48.

4 ♀, l.c. 3 à 7·5 mm., 1 ♀ ovigère, l.c. 5·5 mm., Langebaan Lagoon, récolte intercotidale.

Description: La longueur de l'écusson céphalothoracique est égale aux 7/6 environ de sa largeur et aux 3/5 de la longueur totale de la carapace. Le rostre aigu atteint l'alignement des deux pointes latérales dont il est séparé par deux fortes concavités. Les pédoncules oculaires larges à la base s'amincissent progressivement jusqu'à la région cornéenne qui est légèrement renflée; leur longueur représente les 4/7 environ de celle de la région pré-cervicale; les cornées ne sont pas échancrées postérieurement. Les écailles oculaires sont rapprochées, assez grandes, lancéolées, uni- ou, rarement, bidentées à l'extrémité avec parfois une épine vers le tiers distal du bord interne qui est fortement convexe. Les pédoncules antennulaires dépassent les yeux de la moitié environ de la longueur de leur dernier article. Les pédoncules antennaires atteignent la base des cornées, leur second article a un angle antéro-externe aigu mais peu saillant. L'écaille antennaire courte et large atteint la base du dernier article pédonculaire, son bord interne est rectiligne et inerme ou faiblement denticulé, son bord externe convexe et armé de deux ou trois fortes dents. Le flagelle antennaire est un peu plus court que les pédoncules oculaires.

Les chélipèdes sont sub-égaux chez les femelles et chez les jeunes mâles. Chez les mâles adultes le droit est un peu plus fort que le gauche. Le carpe est un peu plus long que le dactyle. La longueur de ce dernier représente les 2/3 environ de la longueur totale de la main. Il y a quelques tubercules peu saillants sur la face supérieure du carpe, plus forts sur le bord interne. La région palmaire est aussi pourvue de quelques tubercules, plus développés également sur le bord interne. Les doigts sont couverts de petits tubercules arrondis. Une forte dent au milieu de la face interne du doigt fixe se loge dans une concavité bien marquée de la face correspondante du doigt mobile.

Les pattes ambulatoires sont trapues; elles sont nettement plus courtes que les chélipèdes et comme eux sont faiblement armées: des dents peu nombreuses et émoussées existent sur le bord supérieur du carpe et du propode des p. 2 (fig. 40), alors que le dactyle n'est armé par dessous que de quelques spinules cornées placées en arrière de l'ongle. Les p. 3 sont inermes à l'exception d'une dent distale sur le bord supérieur du carpe et de quelques spinules sur les faces interne et inférieure du dactyle. Dactyle et propode des deux paires sont sub-égaux.

Les femelles possèdent une paire d'orifices génitaux, et un très court repli abdominal en arrière du troisième pléopode impair. Les pl. 1 du mâle (fig. 51) ont une lame inférieure spatulée dans la région distale et armée sur le bord antérieur de

huit à dix crochets. Le lobe interne est presque aussi proéminent que le processus distal dont il est séparé par une profonde encoche.

La pilosité est constituée par des touffes de poils plumeux très denses sur les écailles oculaires, plus ou moins abondants sur les trois premières paires d'appendices thoraciques.

Remarques: Si la description originale du *Paguristes engyops* diffère quelque peu de celle que nous donnons ci-dessus, c'est que le type est constitué par des individus de très petite taille. Les individus plus âgés ont en particulier une région antérieure de la carapace moins allongée, des pédoncules oculaires plus grêles, des cornées plus renflées que les jeunes.

Il est intéressant de noter que l'espèce la plus voisine de *P. engyops* est *P. marocanus* des côtes marocaines. Tous deux sont de petite taille, ont une carapace et un bord frontal d'aspect voisin, des cornées non échancrées postérieurement et dépigmentées dans l'alcool, des écailles oculaires à peu près de même forme, des flagelles antennaires courts et épais, des pléopodes mâles de même type. Elles sont cependant bien distinctes: la réduction des cornées chez *P. engyops*, la forme des chélipèdes, les proportions des pattes ambulatoires sont autant de caractères qui interdisent toute confusion.

Il existe aussi entre les deux espèces des différences écologiques considérables. Les spécimens connus de *P. marocanus*, malheureusement fort peu nombreux, ont été dragués sur des fonds de 115 à 290 m., alors que l'un des spécimens de *P. engyops* au moins provient de la zone intercotidale, les autres étant seulement qualifiés de "littoraux" sur les étiquettes.

Les plus petits mâles observés (2 mm. de carapace) ont déjà des pléopodes du type adulte, et les plus petites femelles (2·25 mm.) sont déjà ovigères, portant 3 ou 4 oeufs dont le plus grand diamètre est compris entre 0·8 et 1·2 mm.

Paguristes agulhasensis sp. nov.
Figs. 26, 37, 53, 67

Matériel examiné: 1 ♂, l.c. 5·5 mm., Agulhas Bank, dans une coquille de *Fusus rubrolineatus*, 55 mètres. (Type.)

Description: La longueur de l'écusson céphalothoracique est légèrement supérieure à la largeur et sensiblement égale aux deux tiers de la longueur de la carapace. Le rostre, large et aigu, dépasse de peu l'alignement des pointes latérales. Les pédoncules oculaires, épais et sub-cylindriques, sont égaux aux deux tiers de la région antérieure de la carapace. Les écailles oculaires qui sont très écartées ont une région antérieure triangulaire se terminant par une pointe très aiguës. Les pédoncules antennulaires sont de même longueur que les pédoncules oculaires. Les pédoncules antennaires n'arrivent pas tout à fait au niveau des cornées, l'angle antéro-externe du second article est fort saillant et armé de trois dents aiguës. L'écaille antennaire dont la pointe dépasse le milieu du dernier article pédonculaire a un bord interne concave armé d'une dent proximale, et trois dents aiguës sur le bord externe. Le flagelle est un peu plus court que l'écusson céphalothoracique.

Les chélipèdes sont sub-égaux. La longueur du dactyle est sensiblement la même que celle du carpe et représente les 2/3 environ de la longueur totale de la main. La face supérieure du carpe et du propode est ornée de quelques tubercules à sommet corné mais peu aigu sauf sur le bord palmaire interne, lequel est marqué par quatre fortes dents. Sur la moitié proximale du dactyle dans le prolongement du bord palmaire existent des dents cornées aiguës.

Les p. 2 (fig. 37) portent sept ou huit petites dents cornées irrégulièrement implantées dans la région supérieure du carpe et une rangée de sept dents un peu plus fortes sur le bord supérieur du propode; on observe sur le bord supérieur du dactyle des denticules de taille décroissante, réduits à leur pointe cornée dans le voisinage de l'ongle, et, sur le bord inférieur, une douzaine de spinules cornées. Le rapport des longueurs du propode et du dactyle est sensiblement égal à 3/4, et la hauteur maximum du dernier article est comprise cinq fois et demie dans sa longueur. Les p. 3 sont inermes à l'exception du bord supérieur du carpe pourvu d'une dent distale et des régions supérieure et inférieure du dactyle armées de spinules cornées.

Les régions les plus pileuses sont la région rostrale, les écailles antennaires, les aires branchiales de la carapace et les appendices thoraciques. Les poils présents sur le propode et sur le dactyle des trois premières paires de péréiopodes sont dépourvus de barbules, alors que sur les autres régions on observe une forte proportion de soies plumeuses.

Remarques: La description ci-dessus est celle d'un unique spécimen mâle, de petite taille mais possédant des pléopodes sexuels bien développés. Il présente quelque ressemblance dans l'aspect général avec *Paguristes gamianus* et avec le spécimen décrit plus loin sous le nom de *P. macrotrichus* sp. nov.

Paguristes agulhasensis se distingue des *Paguristes gamianus* de même taille par la forme du rostre plus large, moins aigu et moins saillant, par les pédoncules oculaires plus épais, par les écailles oculaires plus écartées, par les écailles antennaires armées d'une seule dent proximale sur le bord interne et non de trois ou quatre, et enfin, caractère qui est peut-être le plus net, par le présence de dents moins nombreuses et beaucoup moins fortes sur le propode et le dactyle des pattes ambulatoires; ces deux articles présentent d'ailleurs une pilosité moins dense et constituée par des poils simples alors qu'on observe une forte proportion de poils plumeux chez *P. gamianus*.

Il faut noter que les premiers pléopodes sexuels du spécimen étudié (fig. 53) semblent avoir atteint leur taille et leur forme définitive ce qui permet de croire que nous avons affaire à un adulte, alors que chez les *P. gamianus* de même taille, soit 5·5 mm. de carapace, ils sont plus courts et n'ont pas acquis leur plein développement. La structure de ces appendices ne permet cependant pas de distinguer les deux espèces.

La ressemblance de *P. agulhasensis* et du spécimen femelle décrit plus loin sous le nom de *Paguristes macrotrichus* nov. sp. est sans doute plus grande notamment en ce qui concerne les denticules implantés sur les deux derniers articles des pattes ambulatoires p. 2 et p. 3. *P. macrotrichus* présente cependant plusieurs caractères qui ne permettent guère de l'identifier à *P. agulhasensis* pour l'instant et en particulier un rostre plus court et arrondi, des écailles oculaires plus petites et plus écartées

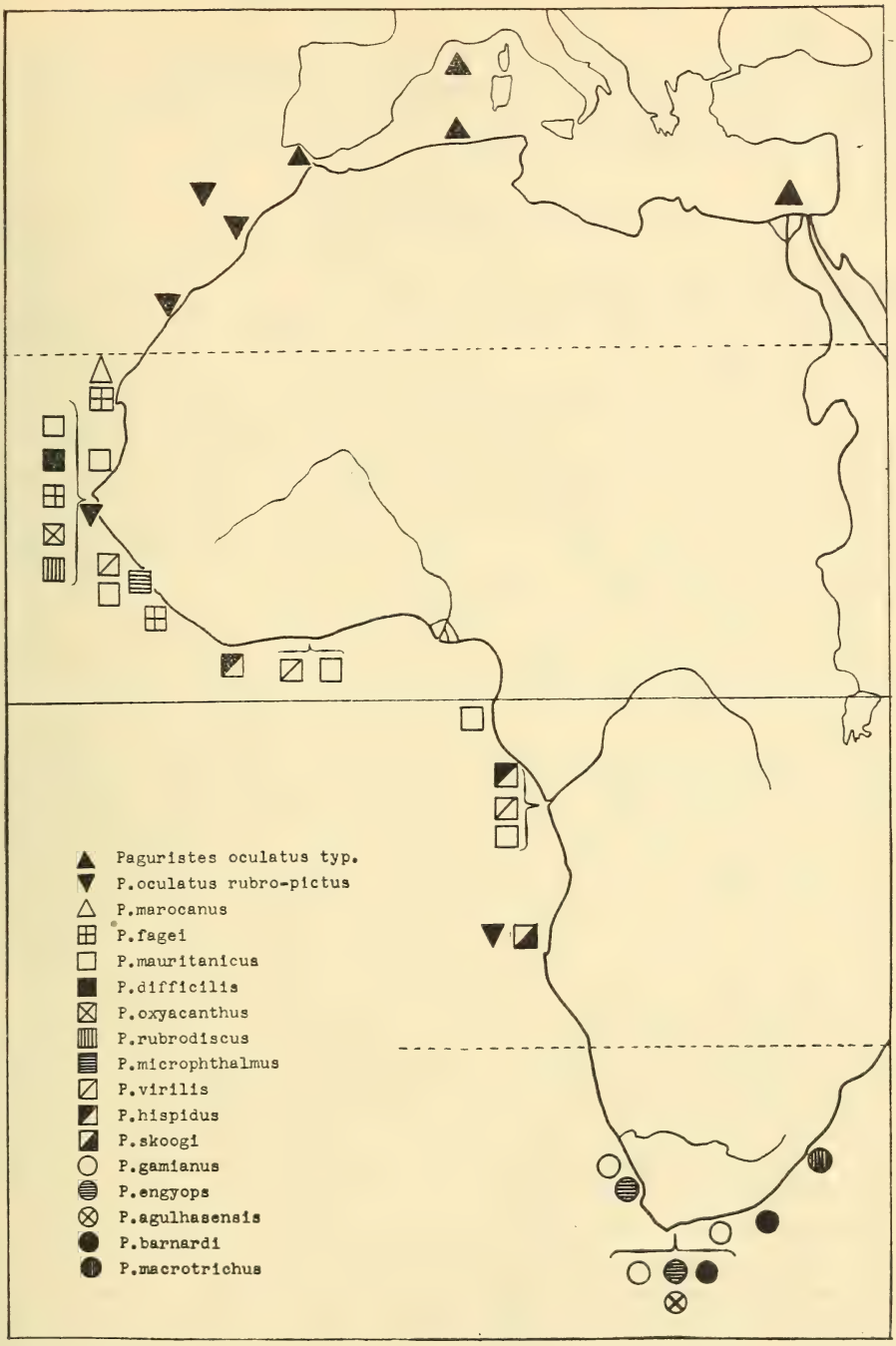


Fig. 69. Le genre *Paguristes* sur les côtes occidentales et méridionales d'Afrique. Les espèces chez lesquelles les femelles ne possèdent qu'un orifice génital sont représentées par des signes carrés.

encore, des écailles antennaires armées de plusieurs dents sur leur bord interne, une zone allongée dépourvue de tubercules ou de dents sur les doigts des chélipèdes et enfin une pilosité plus forte, qui sur le propode et le dactyle des pattes ambulatoires est constituée par de longs poils plumeux.

Paguristes barnardi sp. nov.
Figs. 39, 54, 66, et pl. iv.

Paguristes rosaceus (pars), Barnard, 1947, p. 375.

Matériel examiné. 1 ♂, l.c. 6 mm., 1 ♂ juv., l.c. 4 mm., 1 ♀ juv., l.c. 4·5 mm.: Kleinmond, 19-3-39.

1 ♂, l.c. 10 mm.: Kleinmond, 20-3-39.

5 ♂, l.c. 8 à 13 mm., 1 ♀, l.c. 5·5 mm.: Cap Agulhas, 29-9-39. (Syntypes.)

4 ♂, l.c. 5·5 à 7·5 mm., 1 ♀ ovigère, l.c. 6 mm.: Arniston, 23-11-39.

5 ♂, l.c. 6 à 10 mm.: Still Bay, 10-11-39. (Syntypes.)

1 ♂, l.c. 6·5 mm., 3 ♂ juv., l.c. 3 à 4 mm., 1 ♀ juv., l.c. 4 mm.: Knysna, 6-4-39.

2 ♂, l.c. 7 et 10 mm., 1 ♂ juv., l.c. 5 mm., 1 ♀ ovigère, l.c. 5 mm., 2 ♀ juv., l.c. 2·5 et 3·5 mm.: Storms River, 2-4-39. (Syntypes.)

1 ♀, l.c. 5 mm., 1 ♀, l.c. 6·5 mm.: Jeffries Bay, 1-6-39.

1 ♀, l.c. 7 mm.: Port-Elisabeth.

Tous les échantillons appartiennent à l'Université de Cape Town ou au South African Museum; ils ont été récoltés dans la zone intercotidale.

Description: En ce qui concerne la carapace et les appendices céphaliques antérieurs la description de *P. gamianus* peut s'appliquer à *P. barnardi*. Les différences entre les deux espèces portent surtout sur les trois premières paires de péréiopodes et sur la pilosité. Dans l'espèce nouvelle on observe les caractères suivants: Le carpe des chélipèdes est un peu plus long que le dactyle et sa face supérieure est armée de dents cornées plus nombreuses que chez *P. gamianus*. Le carpe des p. 2 (fig. 39) est aussi plus épineux. Le dactyle des p. 2 et des p. 3, un peu plus long que le propode, est peu déprimé latéralement; son bord supérieur ne porte pas de fortes dents à base calcifiée, mais de nombreuses spinules cornées de très petite taille.

Comme chez *P. gamianus* les pl. 1 ♂ (fig. 54) sont peu enroulés, l'encoche qui sépare le lobe interne du lobe distal est en général plus profonde que dans l'espèce de H. Milne-Edwards, mais ce caractère n'est pas assez net pour qu'on puisse lui accorder une valeur discriminatoire. Par contre la portion distale du dernier article des pl. 2 ♂ (fig. 66) est bien plus courte que la portion proximale, alors que les deux régions sont sub-égales chez *P. gamianus*.

Les régions calcifiées des spécimens les moins décolorés sont teintées de rose.

Le carpe et le propode des chélipèdes ont une face supérieure bordée latéralement d'une frange très dense de longs poils plumeux et les dents cornées présentes sur cette face sont en grande partie dissimulées par un revêtement très épais de poils plumeux plus courts. La face supérieure du carpe, les faces supérieure et inférieure du propode et du dactyle des deux paires d'appendices suivantes sont également garnies d'une épaisse frange de longs poils plumeux qui cachent les dents et spinules

présentes sur ces régions (pl. iv). Comme sur les chélipèdes, il y a sur la face interne du propode un feutrage continu de poils courts.

Remarques: L'examen des *Paguristes* figurant dans les collections du South African Museum et de l'Université de Cape Town sous le nom de *P. gamianus* nous a amené tout d'abord à en séparer un spécimen qui sera décrit sous le nom de *P. macrotichus* sp. nov. Les autres peuvent être rassemblés en deux groupes: le premier comprend les individus identifiables au véritable *P. gamianus* de H. Milne-Edwards et en particulier le type de *P. rosaceus* Barnard. Le second est constitué par d'assez nombreux spécimens fort proches de *P. gamianus* par l'aspect de la carapace et des appendices céphaliques mais présentant des différences marquées dans l'ornementation des dactyles des pattes ambulatoires et surtout dans la pilosité.

La constance de ces différences, l'absence de formes intermédiaires et certaines considérations biologiques nous ont décidé à faire du second groupe une espèce nouvelle que nous sommes heureux de dédier au Dr. K. H. Barnard. Les caractères permettant de distinguer *P. barnardi* de *P. gamianus* ont été indiqués ci-dessus. L'aspect du dactyle de la première ou de la seconde patte ambulatoire montre immédiatement à quelle espèce on a affaire: chez *P. gamianus* cet article est déprimé latéralement et armé par dessus de fortes dents à base calcifiée, bien visibles en raison du peu de développement de la pilosité (pl. IV en bas); chez *P. barnardi*, sa section est sub-circulaire et il présente par dessus et par dessous une frange très fournie qui couvre complètement les régions supérieure et inférieure et cache la totalité des spinules cornées (pl. IV en haut).

Il faut noter que *P. gamianus* est de plus grande taille que *P. barnardi*. Le tableau ci-dessous donne la taille moyenne (l.c.) en millimètres pour les différentes catégories d'individus: ♂ juvéniles, ♂ adultes, ♀ juvéniles, ♀ adultes (ovigères incluses), et ♀ ovigères.

	♂ juv.	♂ adultes	♀ juv.	♀ adultes	♀ ovig.	♂ + ♀ adultes
P. gamianus	*5*	*10·7*	*5·2*	*9·7*	*9·9*	*9·8*
P. barnardi	*3·8*	*8·4*	*3·9*	*5·8*	*5·8*	*7·8*

Le nombre d'individus examinés, quarante-quatre pour la première espèce, trente-quatre pour la seconde, est suffisant pour que les chiffres obtenus aient une signification; il faut retenir en particulier la différence de taille à la maturité sexuelle: la plus petite ♀ ovigère mesure 7 mm. chez *P. gamianus* et 5 mm. seulement chez *P. barnardi*.

Dans l'ensemble la répartition géographique des deux espèces présente aussi des différences: les échantillons de *P. gamianus* proviennent pour la plupart des côtes ouest de l'Afrique du Sud alors que les *P. barnardi* ont été capturés sur la côte sud. Sur les 13 localités ou ont été récoltés les *P. gamianus*, 12 se trouvent à l'ouest et au nord de Danger Point, cap situé dans la région occidentale de la côte sud. Sur les 8 localités de *P. barnardi*, 7 sont à l'est de ce cap. Sur la figure 70 les courants marins ont été schématiquement représentés, ainsi que les points où ont été récoltés *P. gamianus* et *P. barnardi*. La première espèce a surtout été récoltée sur les côtes baignées par les courants froids (courant du Benguela) et la seconde, sur la côte sud, là où le

courant chaud des Aiguilles exerce son influence. La région ou les deux espèces se rencontrent l'une et l'autre est celle du Cap et de Danger Point qui voit aussi la confluence des eaux chaudes et froides. En ce qui concerne le niveau de récolte, notons que tous les *P. barnardi* se trouvaient dans la zone intercotidale comme beaucoup de *P. gamianus* mais que quelques-uns de ceux-ci ont été dragués entre 11 et 24 m.

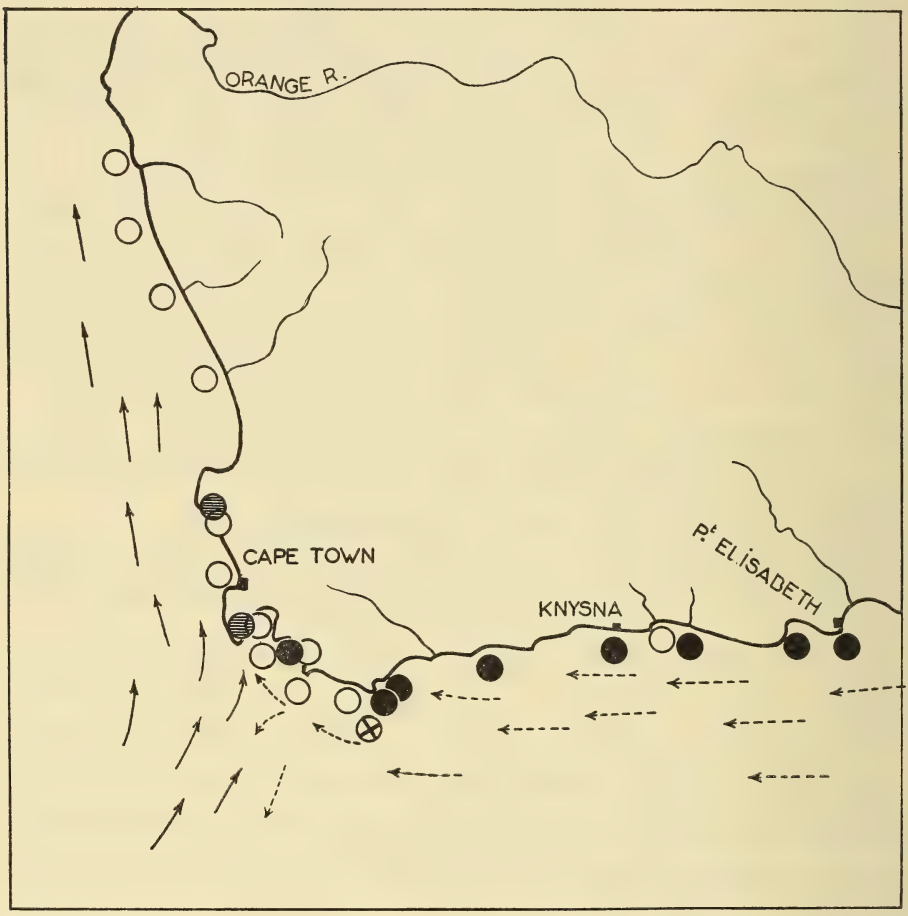


Fig. 70. Détail de la distribution des *Paguristes* sur les côtes d'Afrique du Sud. Pour l'explication des signes voir fig. 69. Courants chauds — — → et courants froids ——→.

Paguristes macrotrichus sp. nov.
Figs. 27, 41

Paguristes gamianus, Stebbing, 1910, p. 351.
„ „ Balss, 1912, p. 91, fig. 2.
„ „ Stebbing, 1920, p. 257.
„ „ Barnard, 1950, p. 418, fig. 78, *a-d.*

Matériel examiné: 1 ♀, l.c. 7 mm., région de Natal, 90 mètres, identifiée par Stebbing comme *P. gamianus* H. Milne-Edwards. (Type.)

Description: La longueur de l'écusson céphalothoracique est légèrement supérieure à sa largeur et représente les deux tiers environ de la longueur totale de la carapace. Le rostre arrondi atteint l'alignement des pointes latérales. Les pédoncules oculaires sont sub-cylindriques, assez épais, faiblement dilatés au niveau des cornées qui présentent une échancrure postérieure. Leur longueur est égale aux $\frac{3}{4}$ de celle de la région pré-cervicale. Les écailles oculaires sont petites, triangulaires dans la région distale, et très écartées. Les pédoncules antennulaires sont un peu plus longs que les pédoncules oculaires, ceux-ci dépassant les pédoncules antennaires du tiers de leur longueur. Les écailles antennaires sont longues; leurs bords latéraux sont armés de trois à cinq dents irrégulièrement développées. Les flagelles antennaires ont la même longueur que l'écusson céphalothoracique.

Les chélipèdes sont égaux. Le carpe est plus court que le dactyle et celui-ci a une longueur égale aux deux tiers de la longueur totale de la main. La face supérieure de ces trois articles porte des tubercules sauf dans les régions voisines des bords de contact des doigts. Il y a cinq dents cornées sur le bord interne du carpe, quatre sur le bord palmaire interne, et d'autres plus nombreuses mais plus petites et plus aiguës sur les régions externes des doigts. Les p. 2 (fig. 41) sont armées de quelques dents cornées sur la face supérieure du carpe, de sept dents plus régulières sur le bord supérieur du propode et d'une rangée de denticules de taille décroissante sur le bord supérieur du dactyle: le bord inférieur de cet article est également armée d'épines cornées assez longues. Le rapport des longueurs du propode et du dactyle est sensiblement égal à trois quarts.

Les p. 3 sont inermes à l'exception du bord supérieur du carpe armé d'une épine distale et de la face interne du dactyle qui présente deux rangées longitudinales de spinules cornées, l'une près du bord supérieur l'autre près du bord inférieur.

Un repli abdominal recouvre les trois premiers pléopodes du spécimen étudié qui est une femelle non ovigère.

La pilosité est surtout constituée par de longs poils fins et plumeux assez denses mais ne dissimulant pas l'ornementation du tégument. Les régions les plus pileuses sont: le bord frontal, les écailles oculaires et antennaires, les trois premières paires de péréiopodes et particulièrement les régions supérieures de leurs trois derniers articles où l'on observe des faisceaux de longs poils insérés à la base des dents et des tubercules ou dans des dépressions du tégument.

Remarques: Le spécimen étudié ci-dessus a été déterminé par Stebbing, décrit et figuré par Barnard sous le nom de *Paguristes gamianus*. Il appartient probablement

à la même espèce que les spécimens décrits par Balss sous le même nom. En fait, il s'agit d'une forme bien différente de l'espèce de Milne-Edwards, comme en témoigne la comparaison des figures 23 et 27 pour la région antérieure de la carapace et les appendices céphaliques antérieurs, et 38 et 41 pour les pattes ambulatoires. L'écologie des deux espèces est aussi bien différentes: *P. macrotrichus* a été capturé par 90 m. (Stebbing) et 150 m. (Balss) de profondeur, alors que les véritables *P. gamianus* proviennent de la zone intercotidale ou d'une profondeur n'excédant pas 24 m.

P. macrotrichus paraît plus proche du spécimen décrit plus haut sous le nom de *Paguristes* sp. qui est soit un *P. gamianus* très âgé, soit une espèce nouvelle. A ne considérer que l'aspect de la région antérieure du corps, il paraît hasardeux d'identifier les deux spécimens à une même espèce. Les pédoncules oculaires sont bien plus grêles chez *Paguristes* sp. qui, par ailleurs, a des écailles oculaires bidentées, mais il faut faire preuve de beaucoup de prudence dans l'utilisation de caractères présentés par des individus de taille très dissemblable et, qui plus est, de sexes différents. La comparaison des autres régions du corps ne peut trancher la question. En effet si les chélipèdes sont d'une forme voisine, les pattes ambulatoires paraissent moins fortement armées chez *P. macrotrichus*: chez celui-ci on observe seulement sur la face interne du propode de peu nombreuses et minuscules spinules alors qu'il existe en cet endroit de fortes dents cornées chez *Paguristes* sp. La différence dans la denticulation est ici bien plus accentuée qu'entre les plus petits et les plus grands spécimens de *P. gamianus*.

La comparaison entre *P. macrotrichus* et *P. agulhasensis* sp. nov. figure à la suite de la description de ce dernier.

Parmi tous les *Paguristes* d'Afrique du Sud que nous avons eu l'occasion d'étudier, l'unique spécimen femelle de *P. macrotrichus* est celui qui provient de la localité la plus orientale (Natal) et de la plus grande profondeur.

BIBLIOGRAPHIE

Alcock, A., 1905. Catalogue of the Indian Decapod Crustacea in the collection of the Indian Museum. Pt. 2. Anomura, fasc. 1. Pagurides, i–xi, 1–197, 16 pl.

Balss, H., 1912. 'Paguriden.' *Wiss. Ergebnisse der deutsche Tiefsee-Exp. "Valdivia"*, Iena, *20*, no. 2, 87–124, pl. 7–11.

———, 1921. 'Crustacea VI: Decapoda Anomura und Brachyura.' *Beiträge zur Kenntnis der Meeresfauna Westafrikas*, Hamburg, *3*, no. 2, 13–67.

———, 1940–44. 'Decapoda: Morphologischer Teil.' (H. G. Bronns: *Klassen und Ordnungen des Tierreichs*, Leipzig, *5* [1], 7. Buch, 22–669).

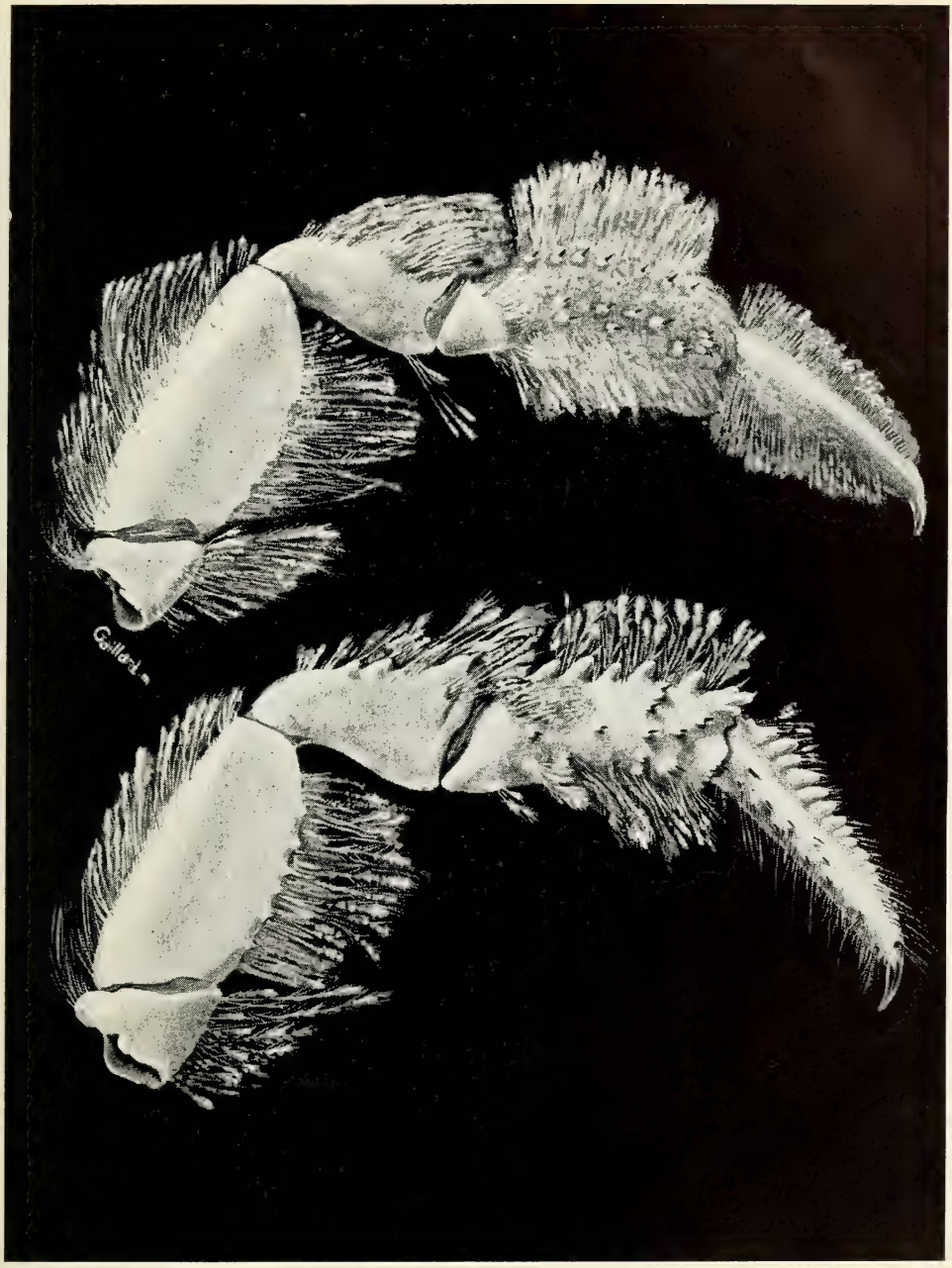
Barnard, K. H., 1947. 'Description of new species of South African Decapod Crustacea with notes on synonymy and new records.' *Ann. Mag. Nat. Hist.* (11) *13*, 361–92.

———, 1950. 'Descriptive Catalogue of South African Decapod Crustacea (Crabs and Shrimps).' *Ann. S. Afr. Mus.*, *38*, 1–837, 154 figs.

Boas, J. E. V., 1880. 'Studier over Decapodernes Slaegtskabsforhold.' *K.D. Vid. Selsk. Skr.* 6 *R. nat. og. math. Afd.*, Kobenhavn, *1*, 2, 26–210, 7 pl.

———, 1926. 'Zur Kenntnis Symmetrischer Paguriden.' *Biol. Meddel. K. Danske Vid. Selsk*, *5*, 6, 1–52, 25 fig.

Bouvier, E. L., 1892 'Etude sur les Paguriens recueillis par le Dr. Jousseaume sur les côtes de la Mer Rouge.' *Bull. Soc. Philom. Paris*, 1891–92, sér. 8, *4*, 50–5.
———, 1906 *a*. 'Sur les Crustacés Décapodes marins recueillis par M. Gruvel en Mauritanie.' *Bull. Mus. Nat. Hist. Nat.*, Paris, *12*, no. 4, 185–7, fig. 1.
———, 1906 *b*. *Mission des Pêcheries de la côte occidentale d'Afrique*, no. 7, 95–97.
———, 1906 *c*. *Act. Soc. Linn.*, Bordeaux, *1 (61)*, 198–200.
Brocchi, M., 1875. 'Recherches sur les organes génitaux mâles des Crustacés Décapodes.' *Ann. Sc. Nat. Zool.* (6), *2*, 1–131, pl. 4–10.
Cavolini, 1787. *Memoria sulla generazione dei Pesci e dei Granchi*, Naples.
Chevreux, M. et Bouvier, E. L., 1892. 'Voyage de la Goëlette "Melita" aux Canaries et au Sénégal, 1889-90, Paguriens.' *Mem. Soc. Zool. France*, *5*, 83–144, pl. II–IV.
Fabricius, J., 1775. *Systema Entomologiae*.
Forest, J., 1952 *a*. 'Remarques sur les genres *Diogenes* Dana et *Troglopagurus* Henderson. . . .' *Bull. Inst. Roy. Sci. Nat. Belgique*, *28*, no. 11, 1–15, 15 fig.
———, 1952 *b*. 'Notes préliminaires sur les Paguridae des côtes occidentales d'Afrique. II. Diagnose sommaire de six espèces nouvelles appartenant au genre *Paguristes* Dana.' *Bull. Mus. Nat. Hist. Nat.*, Paris, 2e sér., *24*, no. 3, 257–62, figs.
———, 1952 *c*. 'Contributions à la revision des Crustacés *Paguridae*. I. Le genre Trizopagurus.' *Mém. Mus. Nat. Hist. Nat.*, Paris. sér. A, Zool. 5, no. 1, 1–40, 25 figs.
Krauss, F., 1843. *Die Südafrikanischen Crustaceen*, Stuttgart, 1–68, pl. 1–4.
Miers, E. J., 1881. 'On a collection of Crustacea made by Baron Hermann Maltzam (*sic* = Maltzan) at Gorée Island, Senegambia.' *Ann. Mag. Nat. Hist.*, London, (5) *8*, no. 45–47, 204-20, 259–81, 364–77, pl. 13–16.
Milne-Edwards, A., et Bouvier, E. L., 1891. 'Sur les modifications que présentent les Pagures suivant le sens de l'enroulement de la coquille qu'ils habitent.' *Bull. Soc. Philomath. Paris*, sér. 8, *3*, 151–3.
———, 1892. 'Observations préliminaires sur les Paguriens recueillis par les Expéditions du "Travailleur" et du "Talisman".' *Ann. Sci. Nat. Zool.*, sér. 7, *13*, 185–226.
———, 1900. 'Expéditions du "Travailleur" et du "Talisman".' *Crustacés Décapodes* 1. Paris, 1–396 32 pl.
Milne-Edwards, H., 1836. 'Observations zoologiques. . . .' *Ann. Sci. Nat. Zool.*, Paris, sér. 2, *6*, 257–88, 2 pl.
Monod, Th., 1933. 'Sur quelques Crustacés de l'Afrique occidentale.' *Bull. Com. Et. Hist. Scient. A.O.F.*, *15*, no. 2–3, 456–548, figs.
Nobili, G., 1906 *a*. 'Faune carcinologique de la Mer Rouge. Décapodes et Stomatopodes.' *Ann. Sc. Nat. Zool.*, Paris, 1, *1*–347, pl. I–XI.
———, 1906 *b*. 'Mission J. Bonnier et Ch. Pérez (Golfe Persique 1901). Crustacés Décapodes et Stomatopodes.' *Bull. Sci. France-Belgique*, Paris, *40*, 13–159, pl. II–VII.
Odhner, Th., 1923. 'Marine Crustacea Podophthalmata aus Angola und Süd-Afrika gesammelt von H. Skoog 1912.' *Göteborg K. Vet. Samh. Handl.*, *27*, no. 5, 1–39, figs.
Rathbun, M. J., 1900. 'The Decapod Crustaceans of West Africa.' *Proc. U.S. Nat. Mus.*, Washington, *22*, no. 1199, 271–316.
Schmitt, W., 1926. 'The Macruran, Anomuran, and Stomatopod Crustaceans collected by the American Museum Congo Expedition, 1909–1915.' *Bull. Amer. Mus. N. H.*, New York, 53, 1–67, 9 pl.
Stebbing, T. R. R., 1910. 'General catalogue of South African Crustacea.' *Ann. S. Afr. Mus.*, *6*, 281–593, pl. XV–XXII.
———, 1920. 'South African Crustacea.' IX. ibid., *17*, pt. 4, 231–72, pl. XVIII–XXVII.
Stimpson, W., 1858. 'Prodromus descriptionis animalium evertebratorum, quae . . . VII. Crustacea Anomoura.' *Proc. Acad. Sci. Philadelphia*, 63–90.



Deuxième patte thoracique gauche, face interne: en bas, *Paguristes gamianus* H. M.-Edw.; en haut, *P. barnardi* sp. nov.

The *ANNALS OF THE SOUTH AFRICAN MUSEUM* are issued in parts at irregular intervals as material becomes available. As far as possible each volume is devoted exclusively to a particular subject (Zoology, Botany, etc.). Two or more volumes may be in course of publication concurrently.

Most of the Geological and Palaeontological papers are issued in conjunction with the Geological Survey of the Union of South Africa.

Some volumes and parts are out of print, and others are only sold as parts of a set, or volume, respectively. The prices of parts published prior to 1940 have been increased.

Out of print: Vols. I, II, V (Parts 1, 2, 9), VII, VIII, IX (Part 1), XII (Part 7), XXII, XXIV (Part 2), XXXI (Parts 1, 2, 3).

Vol.			£	s.	d.
III.	1903–1905	Zoology	1	19	0
IV.	1903–1908	Palaeontology	3	7	0
V.	1906–1910	Geology, Palaeontology, Zoology, Anthropology	1	2	0
VI.	1908–1910	Zoology	3	3	6
IX.	1911–1918	Botany (excl. Part 1)	2	16	0
X.	1911–1914	Zoology	4	16	0
XI.	1911–1918	Zoology	3	1	6
XII.	1913–1924	Palaeontology and Geology (excl. Part 7)	3	13	0
XIII.	1913–1923	Archaeology and Zoology	3	10	6
XIV.	1915–1924	Zoology	3	6	6
XV.	1914–1916	Zoology	4	5	0
XVI.	1917–1933	Botany	3	11	0
XVII.	1917–1920	Zoology	3	10	0
XVIII.	1921	Zoology	4	5	6
XIX.	1924–1925	Zoology	3	7	0
XX.	1924–1926	Zoology	2	12	0
XXI.	1925–1927	Zoology	3	6	0
XXIII.	1925–1926	Zoology	1	15	0
XXIV.	1929–1938	Anthropology and Ethnology (excl. Part 2)	2	9	6
XXV.	1927–1928	Zoology	1	19	0
XXVI.	1928	Zoology	1	10	0
XXVII.	1929	Anthropology	1	10	0
XXVIII.	1929–1932	Palaeontology	2	12	0
XXIX.	1929–1931	Zoology	2	8	0
XXX.	1931–1935	Zoology	3	13	6
INDEX of papers, authors, and subjects, published in Vols. I–XXX			0	1	6
XXXI.	1934–1950	Palaeontology (Part 4 only)	0	14	0
XXXII.	1935–1940	Zoology	3	3	6
XXXIII.	1939	Zoology	2	2	0
XXXIV.	1938	Zoology	2	8	0
XXXV.	Reserved for conclusion of monograph in Vol. XXXIV.				
XXXVI.	1942–1948	Zoology	2	11	0
XXXVII.	1947–1952	Archaeology	1	16	0
XXXVIII.	1950	Zoology	3	15	0
XXXIX.	1952	Zoology	2	14	6
XL.	1952–	Botany Part 1, 1*s.* Part 2	0	17	6
XLI.	1952–	Zoology Part 1, 7*s.* 6*d.* Part 2, 7*s.* 6*d.* Part 3	0	15	0
XLII.	1953–	Palaeontology Part 1, 12*s.* 6*d.* Part 2	0	15	0

Copies may be obtained from—

The LIBRARIAN, South African Museum, Cape Town,

except the Geological and Palaeontological parts, which are obtainable from the Government Printer, Pretoria.

ANNALS

OF THE

SOUTH AFRICAN MUSEUM

VOLUME XLI

PART V, *containing:—*

ISSUED FEBRUARY 1955 *PRICE* 20*s.*

PRINTED FOR THE

TRUSTEES OF THE SOUTH AFRICAN MUSEUM

BY THE RUSTICA PRESS (PTY.) LIMITED, COURT ROAD, WYNBERG, CAPE

9. *New Species of Hydrozoa from South Africa.**—By N. A. H. Millard, Department of Zoology, University of Cape Town. (With three text-figures.)

Introduction

The species described were collected by members of the Zoology Department during the course of an ecological survey of the estuaries and shallow coastal waters of South Africa. The survey has received financial support from the Carnegié Corporation, the South African Council for Scientific and Industrial Research, the Staff Research Fund of the University of Cape Town, and the Natal Provincial Council. Specimens bearing the reference letters FAL were collected from False Bay, Cape, by Mr. J. C. Morgans, who is investigating the bottom fauna of this area by diving and by dredging.

Fam. Hydractinidae

Hydractinia altispina n. sp.

Fig. 1

Description. Colonies living on the shell of the gastropod *Thais* (*Purpura*) *squamosa*. Hydrorhiza covered with a layer of free coenosarc, from which the zooids arise direct. Spines long, smooth, hollow and horn-coloured.

Gastrozooids creamy-white in colour with a pink area below origin of tentacles, in preserved specimens short and fat, generally shorter than the spines. Tentacles 5–12 in number, but usually 6 or 8, with long and short ones alternating, about four times the length of manubrium in living specimens, short and lumpy when preserved. Several bifurcating tentacles observed. No spiral zooids or tentacular filaments.

Gonozooids much smaller than gastrozooids, with mouth and 3–5 very short tentacles. Sporosacs borne on short stalks below tentacles and near base of gonozooid, male and female on separate colonies. Male sporosacs spherical, with width slightly exceeding length; with four radial canals and a circular

* The South African Museum collection of Hydrozoa consists mainly of the material collected many years ago by the Cape Government trawler s.s. *Pieter Faure*. Samples from this collection were submitted to an overseas specialist, who for various reasons was prevented from reporting on them. The collection has now been submitted to Dr. Millard who will study it in conjunction with the collection made in recent years by the Zoology Department of the University of Cape Town. This is Dr. Millard's first report on these collections. [Ed.]

one; containing four groups of spermatogenic cells arranged around a central spadix, which is solid except just at the base; no sign of tentacles. Female sporosacs oval; with four radial canals and a circular one; containing approximately 32 eggs (about 8 eggs visible in transverse section, about 4 on each side in longitudinal section), arranged around a central, hollow spadix.

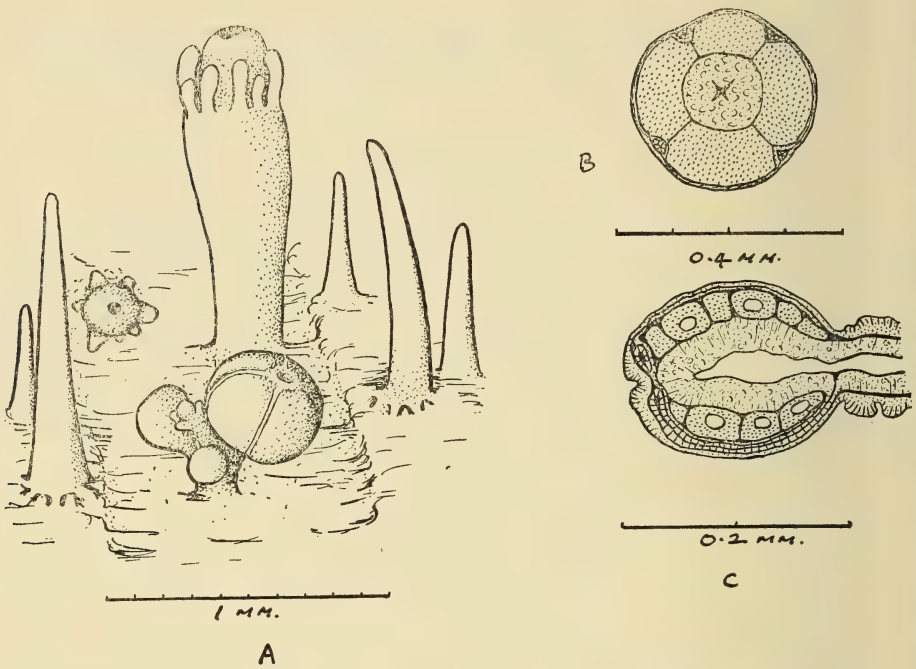


Fig. 1. *Hydractinia altispina* n. sp.

A. Portion of preserved colony on shell of host, showing an extra large gastrozooid, a small gastrozooid, a male gonozooid and a number of spines.
B. Transverse section of male sporosac, showing the 4 groups of spermatogenic cells surrounding the spadix, and the 4 radial canals.
C. Longitudinal section of female sporosac, passing through a radial canal on one side.

Measurements. Spines reaching 0·98 mm. in length. Gastrozooids reaching 4 mm. in length to origin of tentacles when expanded, up to 1·03 mm. preserved.

Gonozooids reaching 0·44 mm. in length to origin of tentacles (preserved).

Male sporosacs, max. length 0·42 mm., max. width 0·51 mm.

Female sporosacs, max. length 0·46 mm., max. width 0·36 mm.

Cotypes in Zoology Department, University of Cape Town, nos. F 274, CP 258, B 92, FAL 7 Z. CP 258 also in S.A. Museum.

Localities. St. James (intertidal), Lambert's Bay (intertidal), False Bay (dredged from 24 metres).

Remarks. This species possibly includes the specimens from South West Africa described by Broch, 1914, as *Hydractinia* sp. The size of the spines and gastrozooids, and the number of tentacles on the latter, are within range, but the name of the host-snail was not given and no gonozooids were described. Apart from this, only two species of *Hydractinia* have previously been recorded from South Africa. Of these *H. pacifica* Hartlaub 1905 is without spines, and *H. parvispina* Hartlaub 1905 has very short spines.

Ripe sporosacs have been found in March, July and August, and sterile colonies in February and April.

The host-snail, *Thais squamosa*, typically inhabits the lower parts of the intertidal area in the Cape Province, and is also brought up occasionally in dredgings in False Bay.

Hydractinia kaffraria, n. sp.

Fig. 2

Description. Colonies living on shell of *Nassarius kraussianus*. Hydrorhiza covered with a layer of free coenosarc. Zooids arising direct from hydrorhiza. No spines.

Gastrozooids with 8–15 tentacles arranged in two close-set, alternating verticils. Manubrium conical when contracted, generally club-shaped when expanded.

No spiral zooids at lip of shell, but a few tentacular filaments sparsely and irregularly scattered amongst the zooids.

Gonozooids smaller than gastrozooids, with 5–12 tentacles arranged in two close-set, alternating verticils. Mouth apparently present, though very small. Sporosacs spherical, borne immediately below tentacles, each on a short stalk, male and female on separate colonies. Male sporosac with four radial canals and a circular, and with indications of a velum and rudimentary tentacles on inner edge of umbrella margin. Female sporosac with four radial canals and a circular, containing 21–32 ova arranged around a central spadix.

Measurements (preserved). Tentacular filaments up to 3·0 mm. long.

Gastrozooids reaching 2·0 mm. in length to origin of tentacles.

Gonozooids reaching 1·1 mm. in length to origin of tentacles, usually about 0·7 mm. Stalk of sporosac about 0·05 mm. long.

Male sporosac reaching 0·55 mm. in length by 0·50 mm. in diameter.

Female sporosac reaching 0·45 mm. in length by 0·40 mm. in diameter.

Cotypes in Zoology Department, University of Cape Town, nos. BRE 111 A, female colony, from the Breede River Estuary; HAM 3 Q, male and female colonies, from the Keiskamma River Estuary. Paratype SUN 3 N in S.A. Museum.

Localities. Breede River Estuary, Knysna Estuary, Sunday's River Estuary, Kleinmond Estuary (Bathurst Division), Bushman's River Estuary, Keiskamma River Estuary, Durban Bay.

Remarks. This species was recorded by Day, Millard and Harrison (1952) from Knysna Estuary as *Hydractinia* sp. It is closely related to *H. pacifica* Hartlaub, which species, however, has no radial canals and only one ovum in the female sporosac. It is also close to *H. parvispina* Hartlaub, from which it differs in the absence of spines.

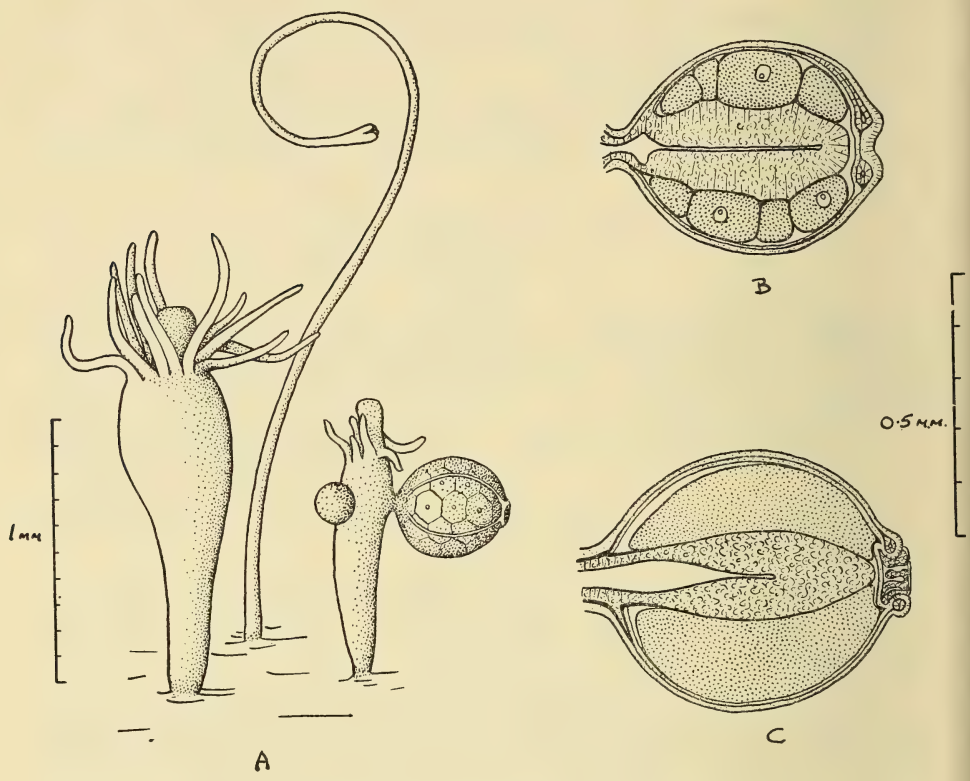


Fig. 2. *Hydractinia kaffraria* n. sp.
A. Three individuals of a colony: gastrozooid, tentacular filament and female gonozooid bearing sporosacs.
B. Longitudinal section of female sporosac.
C. Longitudinal section of male sporosac.

Ripe sporosacs have been found in January, February, July and September. Since no empty sporosacs have been observed there is a possibility that these structures have a short free-living existence before the discharge of the sexual products.

The host snail, *Nassarius kraussianus*, is common in the *Zostera* beds of the estuaries of the Cape Province and Natal. The hydroid has its centre of distribution in the Transkei area of the Cape Province, extending as far north as Durban on the east coast and as far west as the Breede River on the south coast.

Fam. Lafoeidae

Zygophylax cornucopia n. sp.

Fig. 3

Description. Hydrorhiza creeping on the posterior surface of the stem of *Antenella africana* Broch, divided irregularly by slightly oblique nodes.

Colony stolonial, with hydrothecae arising directly from the hydrorhiza, each on a short stem. Stems directed alternately to right and left, forming two rows more or less at right angles to one another. Stems also directed upwards forming an angle of roughly 45° with the hydrorhiza. Stem borne on apophysis

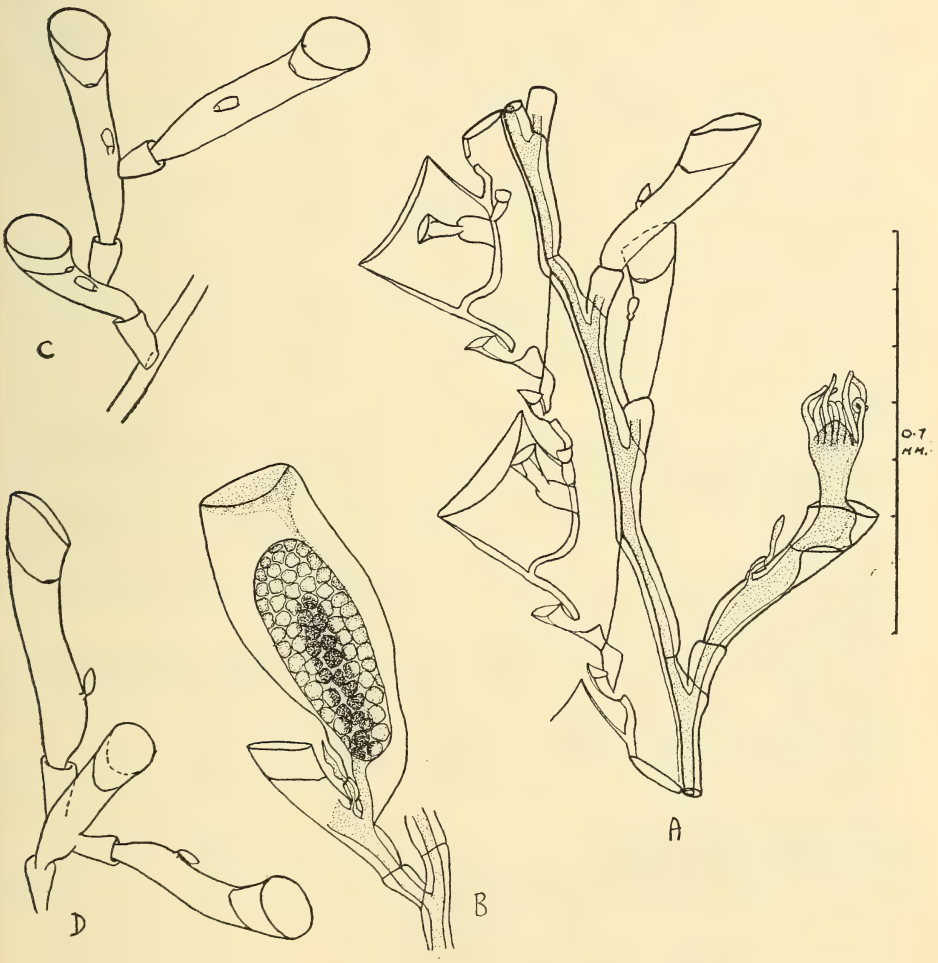


Fig. 3. *Zygophylax cornucopia* n. sp.
A. Normal colony growing on *Antenella africana*.
B. A single hydrotheca with female gonotheca.
C and D. Two forms of branching which occur in the paratype FAL 217 N.

of hydrorhiza, and consisting usually of one basal segment and a hydrothecal pedicel which is not sharply demarcated from the hydrotheca. Sometimes there is no node separating the basal segment from the apophysis. Apophysis and basal segment devoid of nematothecae.

Pedicel and hydrotheca together forming a cornucopia-shaped figure, curving evenly outwards and then upwards, widening towards mouth. Pedicel more than twice length of hydrotheca, and bearing one nematotheca about half-way along its adcauline side. Nematotheca barrel-shaped, slightly longer on side away from pedicel, mounted on short stalk.

Hydrotheca bilaterally symmetrical, aperture oval and facing upwards, margin smooth and more or less perpendicular to hydrorhiza. Diaphragm oblique and bilaterally symmetrical, sloping downwards and inwards towards its aperture which is on the adcauline side.

Hydranth with abcauline blind pouch, conical proboscis and about 18 tentacles. Can be completely retracted into hydrotheca.

Gonothecae not aggregated into coppinia, but borne singly upon hydrothecal pedicels, at more or less the same level as nematothecae. Female gonotheca long and slender, with no distinct stalk, tapering at proximal end to its attachment, truncated at distal end, oval in section. Containing numerous eggs arranged in a mass around a central blastostyle, which extends for about $\frac{3}{4}$ length. Male gonotheca similar in shape but slightly shorter, containing a dense mass of spermatogenic cells. Male and female on separate hosts.

Notes

In one of the paratypes (FAL 217 N), in addition to the normal form, some branching individuals occur, in which secondary stems (including basal segment, pedicel and hydrotheca) may arise from a primary one. The secondary stems arise from the sides of the primary hydrothecal pedicel at about the same level as the nematotheca. As many as 3 secondary stems have been seen to arise from one primary in this way, or a primary stem may give rise to a secondary, and this to a tertiary.

In another paratype (FAL 78 S) an additional very short segment is occasionally interpolated between the normal basal segment of the stem and the apophysis of the hydrorhiza.

Gonophores have been found in June, August and December.

Measurements (Holotype)

Diameter of hydrorhiza:	0·03 — 0·05 mm.
Length of basal segment:	0·06 — 0·12 mm.
Length of hydrothecal pedicel, abcauline:	0·22 — 0·29 mm.
„ „ „ „ to diaphragm aperture:	0·18 — 0·25 mm.
Length of hydrotheca, abcauline:	0·06 — 0·10 mm.
„ „ „ adcauline:	0·05 — 0·09 mm.
Max. width of hydrotheca, at margin:	0·10 — 0·13 mm.
„ „ „ „ at diaphragm aperture:	0·06 — 0·08 mm.

Length of nematotheca plus stalk:	0·05 — 0·06 mm.
Female gonotheca, length:	0·50 — 0·83 mm.
„ „ max. width:	0·14 — 0·29 mm.
Male gonotheca, length:	0·49 — 0·56 mm.
„ „ max. width:	0·18 — 0·24 mm.

In the paratypes some of the measurements show a slightly larger variation, as follows:

Length of hydrothecal pedicel, abcauline:	0·20 — 0·29 mm.
„ „ „ „ to diaphragm aperture:	0·15 — 0·25 mm.
Length of hydrotheca, abcauline:	0·06 — 0·12 mm.
Max. width of hydrotheca, at margin:	0·10 — 0·15 mm.
Length of nematotheca plus stalk:	0·03 — 0·06 mm.

Holotype in Zoology Department, University of Cape Town, no. FB 131 B, from dredgings in False Bay, at 5–8 metres. Numerous colonies on *Antenella africana*, some bearing gonophores.

Paratypes: TB 1 B, FAL 78 S, FAL 169 X, FAL 217 N, in Zoology Department; FAL 78 S also in S.A. Museum.

Localities. False Bay, from 4 to 18 metres. Table Bay, from 19 to 20 metres.

Remarks. *Zygophylax cornucopia* differs from other members of the genus in the stolonial nature of the colony, absence of coppinia, position of nematophores, length of hydrothecal pedicel and asymmetry of diaphragm.

It is included in the genus *Zygophylax* for the following reasons. Levinsen, 1913, maintained that among the hydroids the arrangement of the hydrothecae in the colony is not a good diagnostic character. In the genus *Zygophylax* this is borne out by the fact that in *Z. valdiviae* Stechow 1923 a, hydrothecae may arise either from upright stems (which are unfascicled) or direct from the hydrorhiza.

Further, Levinsen and also Broch, 1918, maintain that the presence of coppinia in the *Lafoeidae* is not a generic character. They are present, for instance, in some species of *Lafoea* and not in others. Totton, 1930, has pointed out that although coppinia are present in *Z. sibogae* Billard 1918, some of the gonothecae arise separately.

In shape the hydrotheca and its pedicel resemble most those of *Z. sibogae* Billard 1918, where also the double curvature is apparent and the hydrothecal pedicel is long.

Z. africana Stechow 1923 b is the only other species so far reported from South Africa. No reproductive structures were described, but otherwise it differs from *Z. cornucopia* in the features listed above.

References

Billard, A., 1918. 'Notes sur quelques espèces d'hydroides de l'expédition du "Siboga".' *Arch. Zool. exp. gén. Paris*, vol. LVII, pp. 21-7.

Broch, H., 1914. 'Hydrozoa benthonica.' *Beitr. Kennt. Meeresfauna Westafrikas* von W. Michaelsen, vol. I, pp. 19-50.

Broch, H., 1918. 'Hydroida II.' *Danish Ingolf Exped.*, vol. V, pp. 1-205.
Day, J. H., Millard, N. A. H. and Harrison, A. D., 1952. 'The Ecology of South African Estuaries. Part III. Knysna: A Clear Open Estuary.' *Trans. Roy. Soc. S. Afr.*, vol. XXXIII, pp. 367-413.
Hartlaub, C., 1905. 'Die Hydroiden der magalhaensischen Region und chilenischen Küste.' *Fauna Chilensis*, vol. III, pp. 497-714.
Levinsen, G. M. R., 1913. 'Systematic Studies on the Sertulariidae.' *Vidensk. Medd. naturh Foren. Kjob.*, vol. LXIV, pp. 249-323.
Stechow, E., 1923 a. 'Neue Hydroiden der Deutschen Tiefsee-Expedition, nebst Bemerkungen über einige andre Formen.' *Zool. Anz.*, vol. LVI, pp. 1-20.
Stechow, E., 1923 b. 'Ueber Hydroiden der Deutschen Tiefsee-Expedition, nebst Bemerkungen über einige andre Formen.' *Zool. Anz.*, vol. LVI, pp. 97-119.
Totton, A. K., 1930. 'Coelenterata. Part V. Hydroida.' *Brit. Antarct.* ('*Terra Nova*') *Exped.*, 1910. *Nat. Hist. Rep., Zool.*, vol. V, pp. 131-252.

10. *South African Parasitic Copepoda.*—By K. H. Barnard, D.Sc., F.L.S. (With 33 text-figures.)

This paper includes the species of South African Parasitic Copepods which have been already recorded in the literature, together with the additional species of which I have been able to examine specimens.

Most of this material is in the South African Museum collections, but I wish to thank Dr. Fitzsimons, Director of the Transvaal Museum; Dr. Hewitt, Director of the Albany Museum, Grahamstown; Dr. Lawrence of the Natal Museum, and Dr. van Hille and Mr. Macnae of Rhodes University, Grahamstown, for submitting specimens for identification. Mr. A. C. Harrison of the Cape Provincial Inland Fisheries has obtained specimens from fresh-water fishes; and Mr. C. L. Biden has collected very useful material while investigating sharks, including species hitherto unrecorded from South Africa. I wish to thank also the Librarian of the Medical Library, University of Cape Town, for access to periodicals not available in the Museum.

The greater part of the South African Museum collection has been derived from the collection of marine fishes made by the Cape Government trawler s.s. *Pieter Faure*. My examination of several hundreds of fishes, however, produced only a rather surprisingly small number of parasites, especially in the case of permanently fixed parasites. Undoubtedly a considerable number of species have yet to be discovered when South African fishes are specially examined for parasites as soon as possible after capture.

Although only a preliminary study, the present compilation may be useful for future work. A list of the South African hosts with their parasites is given at the end of this paper.

Suborder ARGULOIDA

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, p. 11.

Fam. Argulidae

1902. Wilson, *Proc. U.S. Nat. Mus.*, xxv, pp. 635 sqq. (review of family).
1904. Thiele, *Mitt. Zool. Mus. Berlin.*, ii, pp. 5 sqq.
1928. Monod, *Rev. Zool. Bot. Afric.*, xvi, pp. 242 sqq. (African genera and species, with keys).
1943. Ringuelet, *Rev. Mus. la Plata*, n.s. iii, no. 19, pp. 43 sqq. (neotropical species).
1947. Brian, *An. Mus. Argent.*, xlii, pp. 353 sqq. (S. American species).
1948. Ringuelet, *Rev. Mus. la Plata*, v, no. 33, pp. 281 sqq. (neotropical species).

Sexes alike. Body flattened; cephalothorax shield-like, consisting of fused head and 1st thoracic segment; 3 free thoracic segments; abdomen unsegmented, bilobed. Eyes distinct. Four pairs of biramous swimming legs, with plumose setae. No ovisacs; eggs attached to stones and other objects.

Marine, estuarine, and fresh water. On the skin, fins, and in the branchial chamber of fishes. Also on tadpoles. Both sexes leave the host at the breeding season, and the eggs are laid on any suitable surface, in single rows, each row containing 3–25 eggs. Monod gives a figure of eggs scattered more or less singly on a fish scale. The larvae when hatched are in general shape similar to the adult. Accessory sexual structures in male present on the basal joints of the posterior legs.

Although fresh-water members of this family are numerous in Central Africa, their occurrence in southern Africa, especially the extreme south, appears to be rare. In parts of Rhodesia, however, e.g. the Matopo Dam, a heavy infestation has been recorded (Hey, 'Inland Fish. Dept., Cape, Rep. no. 3.' 1946, p. 34).

Key to African genera

1. No ventral sucking discs. ***Dolops***
2. Ventral sucking discs.
   a. One pair of antennae. Cephalothorax constricted anteriorly. Thorax elongate. ***Chonopeltis***
   b. Two pairs of antennae. Cephalothorax subcircular or elliptical. Thorax short. ***Argulus***

Gen. *Dolops* Audouin

1837. Audouin, *Ann. Soc. ent. Fr.*, vi, p. xiii ('nom. nud.' apud Neave. Nomencl. Zool.).
1857. Heller, *SB. Ak. Wiss. Wien. math. nat. kl.*, xxv, p. 89 (*Gyropeltis*).
1891. Stuhlmann, *Zool. Jahrb. Abt. syst.*, vi, p. 152 (*Gyropeltis*).
1899. Bouvier, *Bull. Soc. Philom. Paris*, ser. 8, x, p. 53 and ser. 9, i, p. 12.
1902. Wilson, *Proc. U.S. Nat. Mus.*, xxv, pp. 638, 701 (in key), 730.
1904. Thiele, loc. cit., p. 7.
1911. Maidl, *Arb. Zool. Inst. Univ. Wien.*, xix, p. 317 (anatomy).
1928. Monod, loc. cit., p. 243 (in key).
1943. Ringuelet, loc. cit., p. 75 (S. American species).

Cephalothorax subcircular. Anterior maxillipeds hook-like, stout, with strong falciform claws, not transformed into sucking discs. Apical joint of posterior maxillipeds without claws, but with spiniferous processes. No preoral stylet.

Neave quotes Audouin's name as *nomen nudum*, but Wilson (p. 638) says Audouin's description 'establishes with sufficient accuracy the characteristics of the genus', and Bouvier and later writers accept it.

Several species in South America, one species in Africa.

Dolops ranarum (Stuhlmann)
Fig. 1 *a–d*

1891. Stuhlmann, loc. cit., p. 154, fig. (*Gyropeltis r.*).
1902. Wilson, loc. cit., p. 737, pl. 27, figs. 89 (♀), 90 (♂).

1904. Thiele, loc. cit., p. 17, pl. 6, figs. 26-31 (appendages).
1913. Cunnington, *Proc. Zool. Soc. Lond.*, p. 263.
1928. Monod, loc. cit., p. 248.
1940. Brian, *Rev. Zool. Bot. Afric.*, xxxiii, p. 78, figs 1-3 (♀).

Cephalothorax subcircular. Abdominal lobes narrow, 2–2½ times as long as wide, with notch on inner margin. Flagellum (an elongate setose process attached at end of 2nd basal joint of leg on its dorsal surface) on 1st and 2nd legs only. Basal joint of 3rd leg ♂ with a scabrous papilla pointing dorsally and forwards.

♀ 11 mm., ♂ 4·5 mm. (total length). Greyish or greenish.

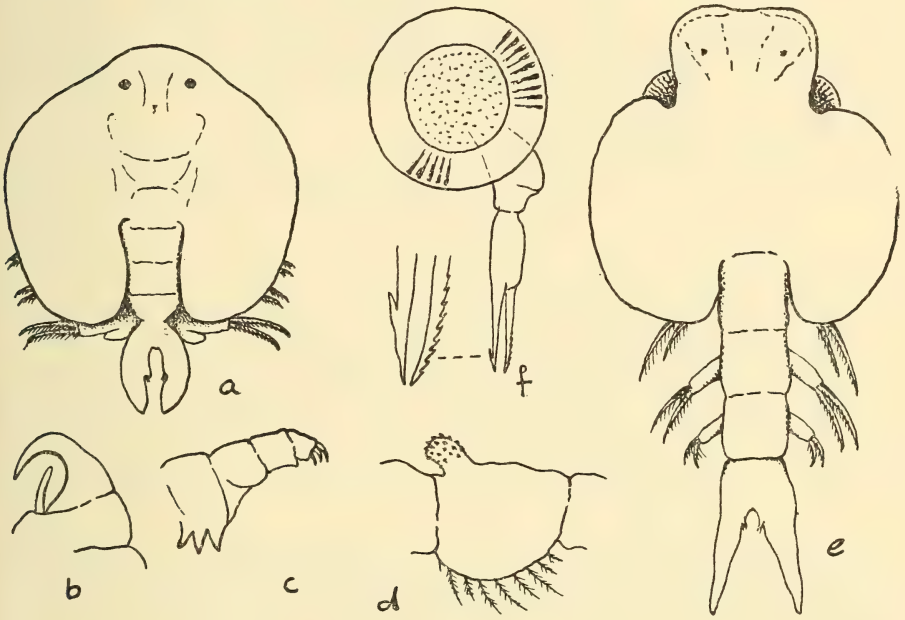


Fig. 1. *Dolops ranarum* (Stuhlmann). *a*, dorsal view; *b*, anterior maxilliped; *c*, posterior maxilliped; *d*, basal joint of 3rd leg ♂. *Chonopeltis inermis* Thiele. *e*, adult (copy after Thiele and Brian); *f*, juvenile, transformation of anterior maxilliped into sucking disc (only some of the supporting rods shown).

Localities. Hartebeest Poort dam, Pretoria, mouth and gills of *Tilapia mossambica* (Transvaal and Albany Museums); Aapies River, near Pretoria, on *Barbus gunningi* (Transv. Mus.); Olifants River, Middelburg, on *Barbus swierstrae* (Transv. Mus.); Matopo dam, Bulawayo, on introduced Black Bass (*Huro salmonoides*) (per A. C. Harrison, May 1950).

Distribution. Lake Victoria Nyanza (Stuhlmann, Cunnington), Lake Tanganyika (Cunnington), Lake Nyasa (Cunnington), White Nile (Cunnington), Lake Moero (Mweru) (Monod), Lake Albert (Brian).

On various fishes: *Protopterus*, Silurids, *Eutropius*, *Lates*. The original specimens were found on tadpoles (hence *ranarum*).

Gen. *Chonopeltis* Thiele

1900. Thiele, *Zool. Anz.*, xxiii, no. 606, p. 46.
1902. Wilson, loc. cit., pp. 701 (in key), 729.
1904. Thiele, *Mitt. Zool. Mus. Berlin*, ii, p. 43.
1912. Calman, *Proc. Zool. Soc. Lond.*, p. 766.
1928. Monod, *Rev. Zool. Bot. Afric.*, xvi, p. 244 (in key).

Front portion of cephalothorax constricted, so that the sucking discs are partially visible in dorsal view; posterior portion forming oval lateral lobes not extending to end of thorax and thus covering only the anterior 2 pairs of legs. Free segments of thorax elongate. Abdominal lobes pointed. Antenna 1 absent (see Calman, loc. cit.); antenna 2 simple, 4-jointed. Anterior maxillipeds transformed into sucking discs. Posterior maxillipeds as in *Argulus*. No preoral stylet. Secondary sexual characters in ♂ on 2nd and 4th legs, the latter with only one natatory ramus.

One species in Africa, one in Japan.

Chonopeltis inermis Thiele
Fig. 1 *e, f*

1900. Thiele, loc. cit., p. 47 (♀).
1902. Wilson, loc. cit., p. 729.
1904. Thiele, loc. cit., p. 44, pl. 9, figs. 110-16 (♀).
1913. Cunnington, *Proc. Zool. Soc. Lond.*, pp. 263, 280 (locality only).
1928. Monod, loc. cit., p. 260, pl. 1, fig. C, pl. 7, figs. C, D, E (♀).
1940. Brian, *Rev. Zool. Bot. Afric.*, xxxiii, p. 80, figs. 1-14 (♀, ♂, juv.) (var. *schoutedeni*).
1951. Dartevelle, *Zooleo.*, n.s. no. 9, p. 12, figs. 1, 2 (juv. ♀, juv. ♂) (var. *schoutedeni*).

Front portion of cephalothorax subquadrangular, with more or less developed median indent on front margin; ventrally front margin with chitinous border from which 2 pairs of ribs converge backwards; the antenna arises between the inner and outer rib of each pair. The length of the abdominal lobes in relation to basal portion variable (see Brian's figures). In 2 mm. juveniles (S. Afr. Mus.) the lobes are shorter than the basal portion.

Up to ♀ 10 mm., ♂ 7 mm. (Brian).

Locality. Okawango River, at the bases of the barbels on chin, in folds of lower lip, and in axil of pectoral fin of *Synodontis melanostictus*. (S. Afr. Mus. 3 juv.)

Distribution. East Africa, on 'Chromis' (*Cichlidae*) (Thiele); Lake Nyasa (Cunnington); Congo, in branchial cavity of *Gnathonemus* and *Marcusenius* (Monod, Brian).

Remarks. The 3 specimens in the S. African Museum are juveniles 1·75–2 mm. in length, smaller than any in Brian's material. They show the transformation of the anterior maxillipeds from a chelate appendage into a sucking disc (fig. 1*f*) (cf. Wilson, 1902, loc. cit., fig. 11, after Claus).

Dartevelle claims *schoutedeni* as a separate species characterized by lengthening of the hinder part of body, different shape of appendages, and particularly the smallness of the 4th pair of legs.

Gen. *Argulus* O. F. Müller

1785. Müller, *Entomostr.*, p. 121.
1902. Wilson, loc. cit., pp. 701 (key to species), 704.
1913. Cunnington, *Proc. Zool. Soc. Lond.*, p. 265 (key to African species).
1928. Monod, loc. cit., pp. 244 (key to African species), 249.
1931. id., *Rev. Zool. Bot. Afric.*, xxi, p. 18 (emendation to key).
1940. Brian, ibid., xxxiii, p. 87.
1940. Meehean, *Proc. U.S. Nat. Mus.*, lxxxviii, pp. 459 sqq.
1943. Ringuelet, loc. cit., p. 54 (S. American species).
1944. Wilson, *Proc. U.S. Nat. Mus.*, xciv, pp. 551 sqq.

Cephalothorax subcircular or elliptical. Free segments of thorax short (normally). Two pairs of antennae, the anterior pair armed with stout hooks. Anterior maxillipeds transformed into sucking discs. Preoral stylet present. Secondary sexual characters in ♂ on 2nd–4th legs.

Marine and fresh water. Very few species have been obtained from marine fishes around the African coast. Monod (1928) records 4 species from the whole of the Mediterranean and western coast of Africa. Two more species are recorded below, occurring on the south-east side of the continent.

The genus is common on fresh-water fishes in Central Africa, but hitherto none have been recorded from the southern region. One species is herein described; it is evidently very rare; in the course of revising the south-west Cape fishes I have examined many thousands of specimens, both in the field and in the Museum collections, but without finding a single specimen of *Argulus*.

The following species have been recorded from localities sufficiently close to our South African area to raise a reasonable expectation that they may be found to occur actually within our boundaries. They are included in the key, but not described here.

Marine

A. alexandrensis Wilson 1923 (♂). Port Alexander, on *Zeus*. (syn. *otolithi* Brian 1940 (♂). Cameroons, on *Pseudotolithus*).
A. dartevellei Brian 1940 (♀). Congo, on *Polynemus*.

Fresh water

A. africanus Thiele 1900 (♀ ♂). Lakes Nyasa and Moeru. Widely distributed in Central Africa on various fishes.
A. reticulatus Wilson 1920 (♀ ♂). Congo River, on *Hydrocyon*.
A. wilsonii Brian 1940 (♂). Congo River, on *Hydrocyon*.
A. rhipidiophorus Monod 1931 (♀ ♂). Lake Albert, on ? *Hydrocyon*.
A. schoutedeni Monod 1928 (♀ ♂). Katanga.
A. rijckmansii Brian 1940 (♀). Matadi, River Congo.

Cunnington (1913) criticized Wilson's 1902 identification key on the ground that the relative length of the carapace was an unsatisfactory and inconstant

character. Wilson (1923) counter-criticized. Where the carapace is manifestly so short as to leave the last two thoracic segments completely uncovered, one may assume this condition to be natural and not produced by contraction or distortion in preservative (e.g. *schoutedeni*). Where, however, 'species' are distinguished and keys constructed according as the carapace just reaches, or just does not reach, to the base of the abdomen, or overlaps the abdomen to a greater or less extent, one does not feel on such sure ground. The varying action of different methods of preservation, or of similar preservative on different individuals, does not appear to be fully realized by all investigators.

Key to South African species (and some other African species)

Marine

I. Abdominal lobes pointed.
   a. Carapace evenly elliptical, not extending beyond base of abdomen; antero-lateral sinuses slight; suckers not visible in dorsal view. *alexandrensis*
   b. Carapace elliptical, extending to middle of caudal lobes, antero-lateral sinuses deep; suckers partly visible in dorsal view. *multipocula*
   c. Carapace narrowed in front, but without definite sinuses, extending to base of abdomen; suckers partly visible in dorsal view. *belones*

II. Abdominal lobes rounded. *dartevellei*

Fresh Water

I. Last 2 thoracic segments entirely free and visible. Abdominal lobes pointed. *schoutedeni*

II. Carapace covering more or less all the thoracic segments and extending at least to base of abdomen.
   A. Abdominal lobes rounded.
      1. Basal plate of maxilliped with 3 spines (2 at least acute). { *rhipidiophorus* / *rijckmansii*
      2. Basal plate with 3 lobes.
         a. Lobes close together. *africanus*
         b. Lobes widely separated by triangular spaces. { *reticulatus* / *wilsonii*
   B. Abdominal lobes pointed (bluntly). *capensis*

Wilson in 1902, and in the descriptions and explanation to figures in 1944 used the term 'Maxilliped', but in his 1944 Key followed Meehean 1940 in terming these appendages (Second) Maxillae.

Argulus belones van Kampen

Fig. 2

1909. Van Kampen, *Zool. Anz.*, xxxiv, p. 443, figs. 1–4 (♀).

♀—Carapace elliptical, narrowed in front, posterior lobes broadly rounded, almost reaching the abdomen. Eyes moderate, far forward, their distance apart about twice the distance of eye from lateral margin. Anterior respiratory area subsemicircular (inner margin nearly straight), well separated from the elongate reniform posterior area. Abdomen broadly ovate, a little longer than wide (5:4), sinus extending $\frac{3}{5}$ length, narrowly triangular, lobes pointed, anal lobes minute. Antenna 1 with small claw on anterior margin, strong apical claw, and a small projection on hind margin. Antenna 2 4-jointed, sparsely setose. Suckers situated well forward, partially visible in dorsal view where the carapace narrows, completely hiding the eyes in ventral view; rods supporting the margin composed of a number of short discs or cups, each wider than long. Accessory spines between maxillipeds apparently absent. Maxilliped robust,

basal plate with large scabrous area, hind margin trilobed, the lobes rounded, the middle one smaller than the others; 2nd and 3rd joints with apical scabrous areas, 4th and 5th joints abruptly narrower than 3rd, 4th with a few scabrosities on outer margin, 5th tipped with 2 points and a spine. Basal joint of 4th leg with trapezoidal projection on hind margin, the outer posterior corner pointed. No flagella on any of the legs.

One ♀ 15 mm., two ♀♀ also with full ovaries 8 and 9 mm., one immature 5 mm. Greenish.

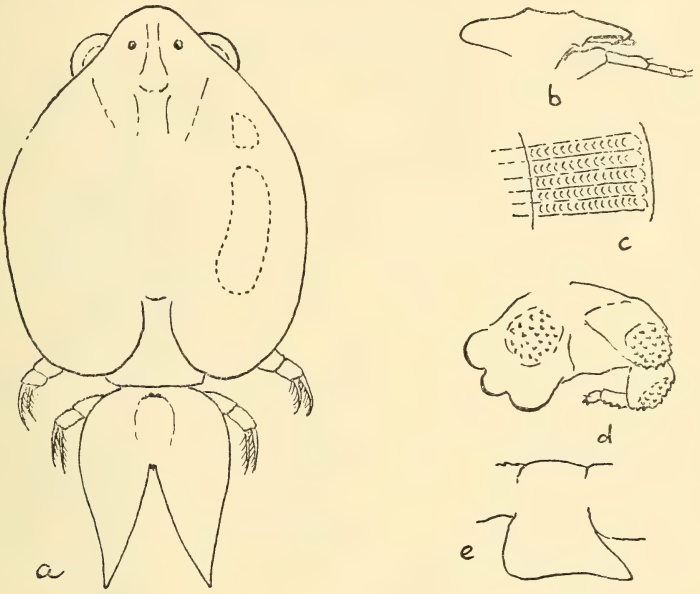


Fig. 2. *Argulus belones* van Kampen. *a*, ♀, respiratory areas dotted (not visible in dorsal view); *b*, antennae 1 and 2. *c*, portion of margin of sucking disc; *d*, posterior maxilliped; *e*, basal joint of 4th leg.

Locality. Natal, on side of head of Barracuda (*Sphyraena commersoni*) (collected by the late H. W. Bell-Marley, the largest example ex Natal Museum).

Distribution. Sumatra, on *Belone schismatorhynchus*.

Remarks. The specimens described above show all the specific features of *belones*, and are clearly conspecific. Van Kampen's 13¾ mm. ♀, however, had the posterior lobes of the carapace meeting ('sogar miteinander verwachsen oder verklebt') in the middle line, and extending backwards to cover half the abdomen. This shows the danger of regarding the carapace length as a constant specific character, and of utilizing it to separate species in a key.

Van Kampen mentions a pair of blunt spines between the maxillipeds, but they are not traceable in the present material.

This species is distinguished from *alexandrensis* Wilson, *arcassonensis* Cuenot, and *alosae* Gould (cf. remarks of Wilson, 1923, p. 5, and Monod, 1928, p. 255) by the lateral indentations of the carapace, and also the eyes and suckers, being much farther forward; the relatively broader and more deeply incised abdomen; the very robust proximal joints of the maxilliped with the two abruptly narrower distal joints.

So far as I am aware, this species has not been recorded since its description. Its occurrence in Natal waters, and on a fish of a different family, is therefore interesting.

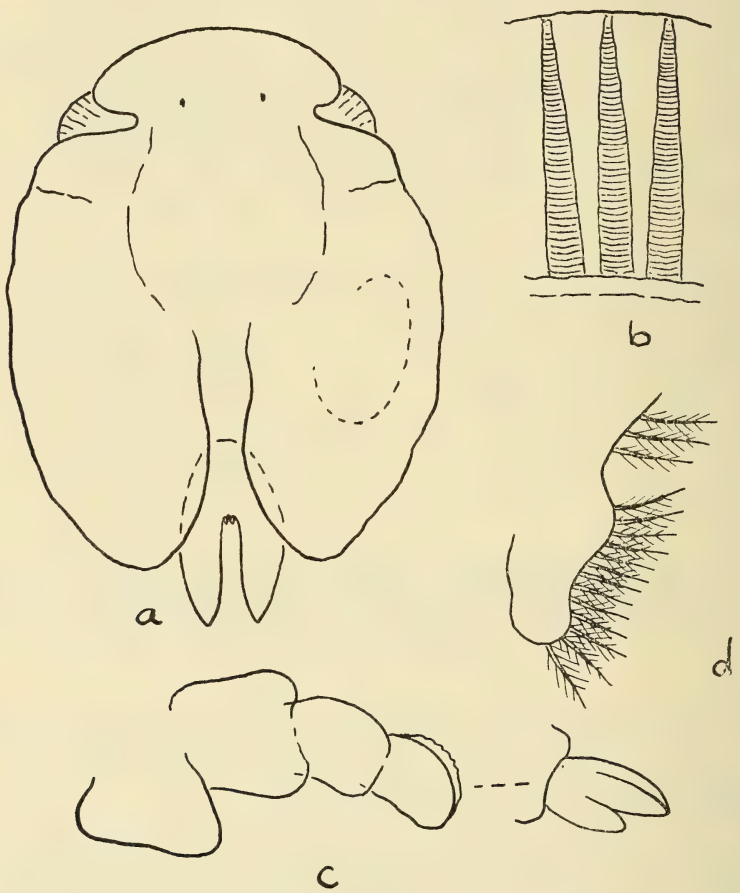


Fig. 3. *Argulus multipocula* n. sp. *a*, ♀, respiratory area dotted; *b*, portion of margin of sucking disc; *c*, maxilliped, with edgewise view of 5th joint; *d*, process of basal joint of 4th leg.

Argulus multipocula n. sp.

Fig. 3

♀—Carapace broadly elliptical, with deep antero-lateral sinuses, posterior lobes rounded, extending to middle of caudal lobes. Eyes distinct, separated by a distance equal to that between eye and lateral margin of carapace. Posterior respiratory area reniform, anterior area not clearly traceable, but apparently subtriangular or oval. Abdomen ovate, cleft to a little beyond middle, lobes apically pointed. Antennae 1 and 2 as in *belones*. Suckers partially visible in dorsal view in the antero-lateral sinuses of the carapace. Rods

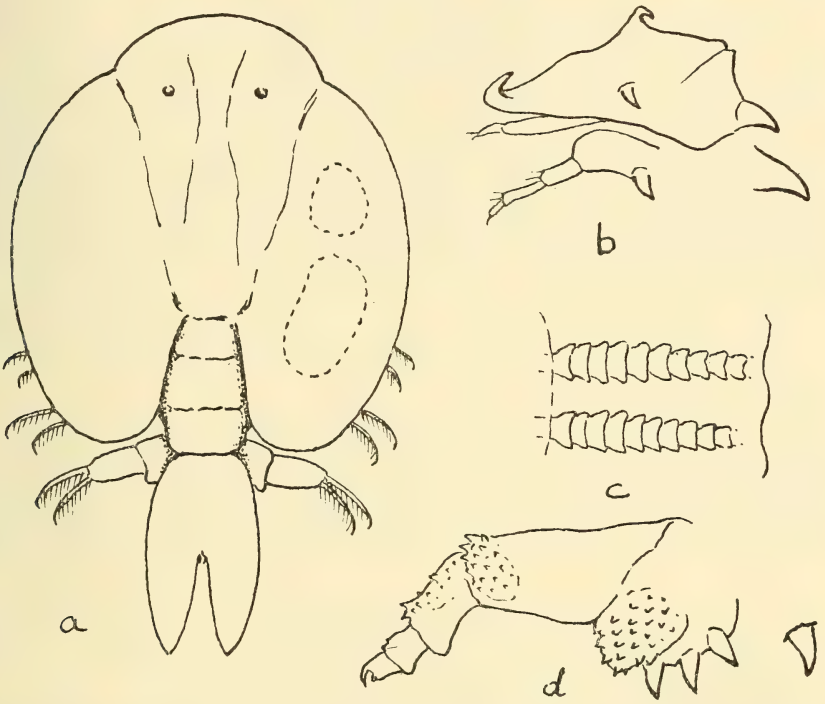


Fig. 4. *Argulus capensis* n. sp. *a*, ♀, respiratory areas dotted; *b*, antennae 1 and 2; *c*, portion of margin of sucking disc; *d*, maxilliped, with one of the pair of accessory spines.

supporting the margin composed of very numerous extremely short cups (*multipocula*) producing a transversely striated appearance. Accessory spines between maxillipeds absent. Basal plate of maxilliped trapezoidal, entire, without any lobes or spines, no scabrosities on any of the joints; 5th joint with 2 oval plates, basally fused, distally separate but adpressed, the dorsal one with scarious, minutely crenulate anterior margin. Basal joint of 4th leg with digitiform process. No flagella on any of the legs.

10 × 7 mm. (anterior margin to tips of posterior lobes of carapace 9 mm.).

Locality. Richards Bay, Natal. One ovigerous ♀, not attached to any host, but found among the usual miscellaneous collection of littoral animals obtained by shore collecting (University of Cape Town Ecological Survey, 1949).

Remarks. The distinctive specific characters are the deep antero-lateral sinuses, the entire basal plate and bifid nonunguiculate apex of the maxilliped, and the striated appearance of the supporting rods of the suckers. The latter feature invites comparison with *A. melanostictus* Wilson 1935 (see: Wilson, loc. cit., 1944, p. 565, pl. 25, fig. 91) from California and Siam.

Argulus capensis n. sp.

Fig. 4

♀—Carapace subcircular, slightly longer than broad (4 × 3·75), front broad, lateral indents distinct but shallow, posterior lobes broadly rounded, reaching almost to base of abdomen. Eyes small. Anterior respiratory area wholly in front of the posterior area. Abdomen ovate, cleft nearly to midway, lobes ovate, bluntly pointed. Antenna 1 with small claw on anterior margin, strong apical claw and small projection near hind margin. Antenna 2 4-jointed sparsely setose, basal joint with rather strong spine. Supporting rods of sucker composed of 10-12 cups, the basal one slightly the longest. Basal joint of maxilliped with 3 strong spines, scabrous area pear-shaped. A pair of accessory spines between the bases of the maxillipeds, but no additional pair. No flagella on any of the legs.

6 mm. Whitish, the respiratory areas marked by dark interrupted line.

Locality. Zoetendals Vlei (Bredasdorp District), on the Cape Kurper (*Sandelia capensis*). (Transvaal Mus. 1 ♀ 1941.)

Remarks. This species is undoubtedly closely similar to *A. personatus* Cunn. 1913, from Lake Tanganyika. It differs in having no flagella on the legs, the basal joint of 4th leg (♀) not so strongly produced postero-laterally, and no additional pairs of spines behind the pair between the bases of the maxillipeds.

Suborder CYCLOPOIDA

1913. Scott, T. & A., *Brit. Parasit. Copepoda*, i, p. 33.
1918. Sars, G. O., *Crust. Norw.*, vi, p. 1.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 310 and 583 (key to genera).

Thorax (cephalothorax) usually more robust than, and sharply demarcated from, the narrow abdomen. Antenna 1 slender and elongate, or short and stout, those of ♂ alike on both sides, sometimes prehensile. Antenna 2 uniramous (some parasitic forms with rudimentary exopod), sometimes prehensile. Mouth-parts varying according to habits. First 4 pairs of legs well developed, but with exceptions in ♀ of some parasitic forms. Fifth pair of legs small, simple, alike in both sexes. Two lateral or subdorsal egg-sacs.

The group includes free-swimming, commensal, and parasitic forms, both marine and fresh water.

Sars includes *Sabelliphilus* in the family *Lichomolgidae*, and *Cancerilla* in the *Cancerillidae*. Dogiel compares *Entobius* with *Enterognathus* and *Mytilicola*.

Key to South African genera

1. Cephalothorax ovate, abdomen segmented.
   a. Each ramus of first 4 pairs of legs 3-jointed. Antenna 2 with 3 (2) apical claws. On Polychaet worms. *Sabelliphilus*
   b. Rami of legs unevenly jointed.
      i. Rami of 2nd, 3rd, and 4th legs 3-jointed. Antenna 2 with 4 large apical claws. On fishes. *Ancistrotos*
      ii. First 3 pairs of legs more or less reduced; 4th absent. Antenna 2 with one stout apical claw. On Brittle-stars. *Cancerilla*
2. Cephalothorax narrow elongate, abdomen unsegmented. Antenna 2 not prehensile, with apical spine-seta. On Polychaet worms. *Entobius*

Gen. *Sabelliphilus* M. Sars

1862. Sars, M., *Forh. Vidensk. Selsk. Christiania*, 1861, p. 139.
1918. Sars, G. O., loc. cit., p. 187.
1932. Wilson, loc. cit., p. 587 (in key).

Thorax in ♀ (typically) narrow ovate, abdomen slender. Antenna 1 7-jointed. Antenna 2 prehensile, uniramous, 4-jointed, 2nd joint with 6 stout teeth on inner surface, 3rd joint with curved claw, 4th joint subequal to or shorter than 3rd, with 3 claws (normally). Each ramus of first 4 legs 3-jointed. Fifth leg reduced to a single distinct joint with 2 setae.

Ectoparasitic on Sabellid Polychaet worms.

Sabelliphilus (?) *bispirae* M'Intosh

Fig. 5 *a–c*

1904. M'Intosh, *Mar. Invest. S. Afr.*, iii, p. 86, pl. 9.

Thorax ovate, not twice as long as wide, longer than abdomen, 1st segment (♀ ♂) and 2nd segment (♀) with angular, more or less projecting posterolateral corners. Abdomen narrow. Caudal rami narrow, 5 times as long as wide. Antenna 2 with only 2 apical claws.

♀ 1·2 mm., ♂ 0·7 mm.

Locality. Cape, on *Bispira volutacornis* (M'Intosh).

Remarks. M'Intosh notes that this species does not agree with *Sabelliphilus* in having only 2 apical claws on antenna 2, and in other details; and quotes Scott's opinion that it cannot be satisfactorily ascribed to any described genus.

In Wilson's key this species might be followed down to *Uperogcos*, but M'Intosh does not state the exact number of joints in antenna 2.

Gen. *Ancistrotos* Brian

1906. Brian, *Copep. Parasit. Pesci. Ital.*, p. 33.
1911. Wilson, *Proc. U.S. Nat. Mus.*, xxxix, pp. 384-6, and pp. 391, 392 (with key to species).
1924. id., ibid., lxiv, Art. 17, p. 6.
1932. id., loc. cit., pp. 384, and (in key) 595.
1935. Leigh-Sharpe, *Parasitology*, xxvii, p. 266.
1939. id., ibid., xxxi, p. 166.
1939. Yamaguti, *Parasit. Copep. Japan*, pt. 4, Cyclopoida 2 (Vol. Jub. Prof. Yoshida II), pp. 410-13.

Cephalothorax ovate, wider than the free segments. Abdomen 3 or 4 segmented. Antenna 1 6-jointed. Antenna 2 prehensile, with 4 apical claws. Each ramus of 1st leg consisting of a single widened joint; rami of 2nd-4th legs 3-jointed; 5th leg 1-jointed. Egg-sacs stout, moderately long.

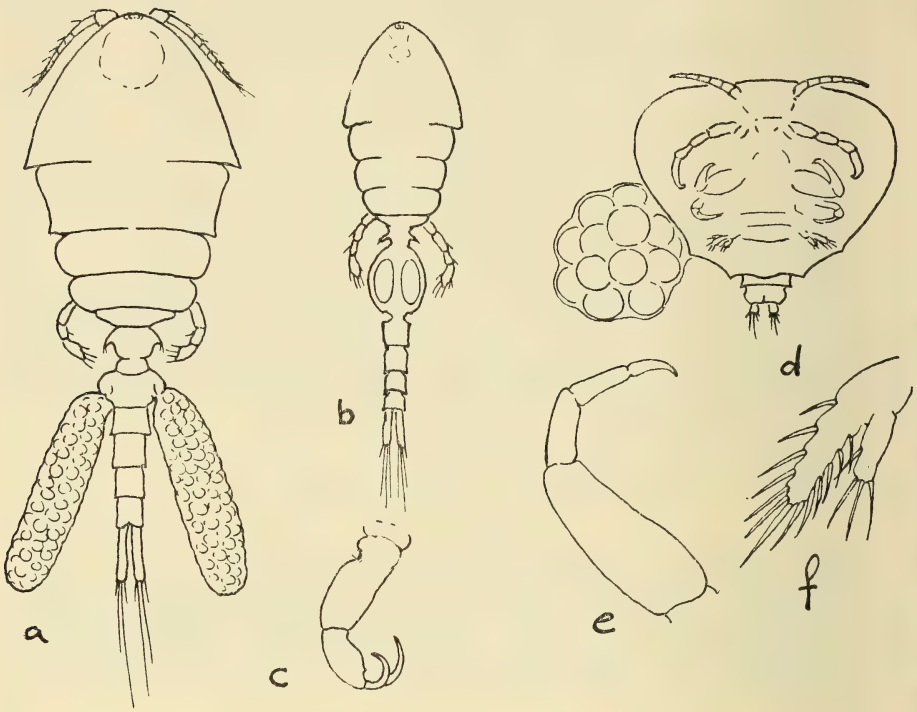


Fig. 5. *Sabelliphilus bispirae* M'Int. *a*, ♀; *b*, ♂; *c*, antenna 2 ♂. *Cancerilla durbanensis* Steph. *d*, ventral view of *C. neozelanica* Steph. ♀; *e*, maxilliped; *f*, 2nd leg (copies: *a-c*, after M'Intosh; *d-f*, after Stephensen).

Ancistrotos ostracionis (Richiardi)

1870. Richiardi in Bianconi, *Spec. zool. Mosambicana*, fasc. xix/xx, p. 347. (*Bomolchus* [sic.] *o*, sine descr.).

1870. id., *Arch. Zool. Anat.*, (2) ii, p. (? 53, quotation from this page in Wilson, 1911). (*Bomolochus o.*)

1911. Wilson, loc. cit., pp. 385, and (in key) 392.

Abdomen 3-segmented, last segment longest. Terminal claw of maxilliped as long as basal joint, and without filaments. Both rami of 4th leg with plumose setae (Wilson, in key, 1911).

Locality. Mozambique, on *Ostracion cornutum* (Richiardi).

Remarks. Bianconi includes among the Zoophyta a brief note on the occurrence of Richiardi's species.

Gen. *Cancerilla* Dalyell

1851. Dalyell, *The Powers of the Creator*, i, p. 223.
1918. Sars, G. O., loc. cit., p. 138.
1927. Stephensen, *Vid. Medd. Dansk. Naturh. For.*, lxxxiii, p. 377.
1932. Wilson, loc. cit., p. 597 (in key).
1951. Heegaard, *Vid. Medd. Dansk. Naturh. For.*, cxiii, p. 172.

Thorax in ♀ very broadly ovoid, abdomen short, 3-segmented; in ♂ ovate, longer than broad, abdomen elongate, 5-segmented. Caudal rami smaller in ♀ than in ♂. Antenna 1 in ♀ short, 6-jointed, in ♂ longer, 10-jointed. Antenna 2 with stout apical claw. First 3 pairs of legs reduced in ♀, better developed in ♂; outer ramus of 3rd leg 1-jointed, inner ramus absent; 4th leg absent; 5th leg 1-jointed, with 2 setae in ♀, 5 in ♂.

Cancerilla durbanensis Steph.

Fig. 5 *e, f.*

1933. Stephensen, *Vid. Medd. Dansk. Naturh. For.*, xciii, p. 198, fig. 1.

♀—Thorax broadly cordate, widest near anterior end, front margin very slightly convex; genital segment very broad, nearly half as wide as thorax, 4 times as broad as long, lateral margin angulate. Second leg with both rami long, narrow, outer ramus with 6 setae on both inner and outer margins, inner ramus $\frac{2}{3}$ length of outer, with 4 setae. Ovisacs globular. 1 mm.

Locality. Off Durban, 127-225 fathoms, on the cosmopolitan Brittle-star *Amphipholis squamata.*

Remarks. C. tubulata Dalyell and *C. neozelanica* Steph. occur on the same species of Ophiuran in Europe and New Zealand respectively. The South African and the New Zealand species agree in the shape of the thorax, and differ in this respect (as well as in minor details of the appendages) from the European species.

Gen. *Entobius* Dogiel

1908. Dogiel, *Zool. Anz.*, xxxiii, p. 561.
1932. Wilson, loc. cit., p. 592 (in key).

♀♂—Body narrow, with segmental constrictions but not truly segmented. Five thoracic segments. Abdomen unsegmented, ending in a pair of semi-articulated caudal styles. Antenna 1 3- or 4-jointed. Antenna 2 3-jointed, with terminal spine-seta, but not prehensile. Mandibles present. One pair of minute maxillae. Maxillipeds robust, prehensile, consisting of a basal joint and apical curved claw. Four pairs of biramous legs, rami of a single joint, setose on inner margin; 5th leg absent. Egg-sacs elongate, eggs multiseriate proximally, uniseriate distally.

Entoparasites on marine Polychaets. The type species was found in the intestine of a Terebellid (*Loimia*).

Remarks. Dogiel regards the segment behind that which carries the last pair of legs as the 5th thoracic segment, and the following segment as the 1st abdominal segment. The latter, however, carries the ovisacs and is clearly the genital segment of the thorax.

Entobius euelpis Brnrd.
Fig. 6 *a*.

1948. Barnard, *Ann. Mag. Nat. Hist.*, (xii), 1, p. 242, fig. 1.

♀—In general agreeing with *E. loimiae*. Antenna 1 3-jointed (not 4). Abdominal segment more flask-shaped, the caudal styles stouter and closer together (resembling a bifurcation); each style with a minute apical spine-seta but no subapical or marginal setae.

8 mm., breadth about 1 mm., ovisacs 6–7 mm.

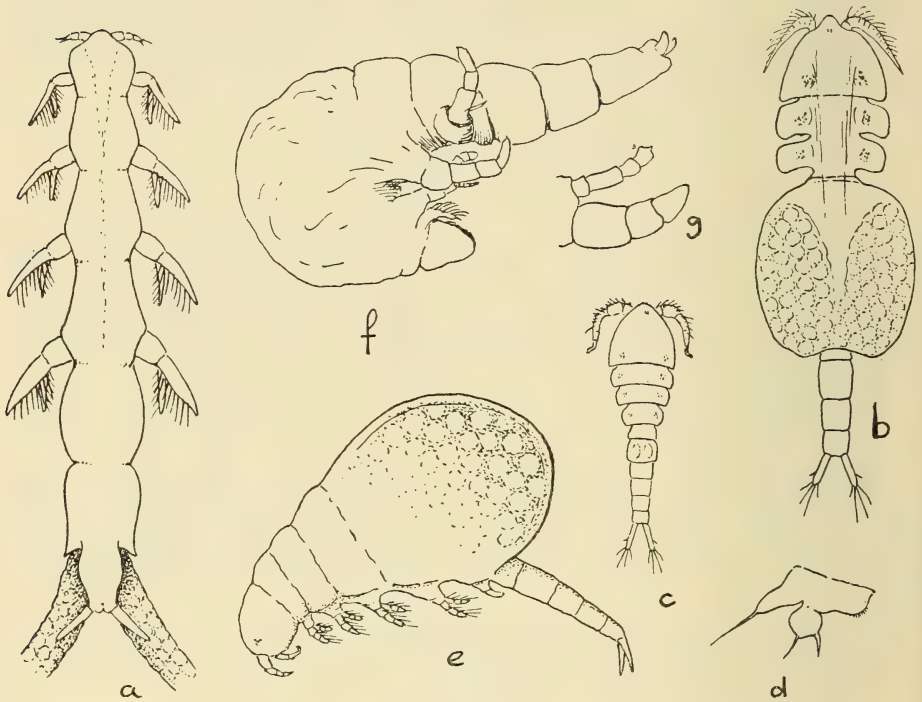


Fig. 6. *Entobius euelpis* Brnrd. *a*, ♀ (ovisacs not completely drawn). *Notodelphys allmani* Thorell. *b*, ♀; *c*, ♂; *d*, 5th leg. *Doropygus pulex* Thorell. *e*, ♀. *Gunenotophorus globularis* Costa. var. *giganteus* Schell. *f*, ♀; *g*, 2nd leg.

Locality. One ovigerous ♀ found in a bottle of slimy and much decomposed Polychaets in the s.s. *Pieter Faure* collection; uncertain whether from the Cape area or Natal.

Suborder NOTODELPHYOIDA

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 385 and 598 (key to genera).

1948. Lang, *Ark. Zool.*, xl, 3, no. 14, pp. 1–36.

Ento- or ecto-parasites, or commensals; the majority living within Ascidians. Females usually much modified and not leaving host after maturity, males retaining capacity for free-swimming.

Schellenberg (1922) adopts one family, but Sars (1921) and Wilson (1932) more than one. In these circumstances sharply defined family diagnoses are not advisable, and Schellenberg's scheme is adopted.

Fam. Notodelphyidae

1921. Sars, *Crust. Norw.*, viii, p. 29 (part, includes only 2 genera).
1921. Schellenberg, *K. Norsk. Vid. Selsk. Skr.*, no. 3, p. 3.
1922. id., *Mitt. Zool. Mus. Berlin*, x, p. 219 (key to genera).

Key to South African genera ♀♀

1. Ova contained in the swollen thoracic segments. Antenna 2 with apical claw. 5 pairs of legs in normal ventral position (*Notodelphyinae*).
   a. Rami of 1st-4th legs setose.
      i. 1st thoracic segment fused with head, 2nd and 3rd free. Brood pouch ovoid, dorso-ventrally flattened. Caudal rami with plumose apical setae. *Notodelphys*
      ii. Head and 1st three thoracic segments distinct. Brood pouch dorsally gibbous. Caudal rami with minute apical setules. *Doropygus*
   b. Rami of 1st-4th legs non-setose. Head distinct, thoracic segments much swollen. Caudal rami non-setose. *Gunenotophorus*
2. Ova contained in external ovisacs. Antenna 2 without apical claw (S. African genera). 5th legs more or less dorso-lateral in position (*Ascidicolinae*)
   a. 5th legs digitiform. *Botryllophilus*
   b. 5th legs lamelliform.
      i. Exopods of 1st-4th legs spiniform. *Enterocola*
      ii. Exopods of 1st-4th legs falciform *Zanclopus*

Gen. *Notodelphys* Allman

1847. Allman, *Ann. Mag. Nat. Hist.* (1), xx, p. 2.
1878. Brady, *Brit. Copep.* (*Ray Soc.*), i, p. 125.
1921. Sars, loc. cit., p. 30.
1922. Schellenberg, loc. cit., p. 225 (key to species).
1932. Wilson, loc. cit., p. 386.
1948. Lang, loc. cit., p. 4.

♀—1st thoracic segment usually fused with head, 2nd and 3rd free, separated by deep lateral incisions. Brood pouch arising from 4th segment, ovoid, dorso-ventrally somewhat flattened. Caudal rami each with 4 plumose setae and a spine on outer margin. Antenna 1 15-jointed. Antenna 2 3-jointed. 1st-4th pairs of legs biramous, both rami 3-jointed; 5th pair very small, basal joint produced externally into a digitiform process tipped with a long spine, ramus ovoid, with a spine and a seta.

♂—All segments, except 1st thoracic, free. 1st abdominal segment slightly swollen, with (when mature) 2 spermatophores.

Antenna 1 11- or 12-jointed, last 2 joints bent, feebly prehensile.

Remarks. Several species have been described, but they are not easily separable. The position of the spine on outer margin of caudal rami has been used, but Schellenberg thinks the 5th pair of legs may be a better differential character (cf. figures of 7 species in Sars).

Key to South African species

1. ♀ 1st thoracic segment fused with head. ♂ cephalic segment longer than wide, postero-lateral corners not elongated. *allmani*

2. ♀ 1st thoracic segment free. ♂ cephalic segment as wide as long, postero-lateral corners elongated. *weberi*

Notodelphys allmani Thorell

Fig. 6 *b–d.*

1860. Thorell, *K. Sv. Vet. Akad. Handl.*, iii, p. 31, pl. 1, pl. 2, fig.
1869. Buchholz, *Z. wiss. Zool.*, xix, p. 111, figs. (*mediterranea*).
1878. Brady, loc. cit., p. 126, pl. 25, figs. 1–10.
1921. Sars, loc. cit., p. 31, pls. 15, 16.
1922. Schellenberg, loc. cit., p. 227 (in key), and p. 262 (locality record).

♀—1st thoracic segment fused with head. Last abdominal segment quadrangular. Spine on outer margin of caudal ramus at about ¾ length of ramus. 5th leg see fig. 6*d.*

♀ 4·5 mm., ♂ 1·9 mm. Pale yellowish, eggs greenish.

Localities. Simons Bay, in *Ascidia sydneiensis* (Schellenberg); Still Bay, in Ascidians, coll. T. A. Stephenson. 4 ovig. ♀♀ (S. Afr. Mus.); mouth of Zwartkops River estuary, Port Elizabeth, in Ascidians (W. Macnae, Rhodes University, ovig. ♀♀, ♂♂).

Distribution. West coast of Europe, Mediterranean.

Remarks. Some of the specimens I have seen resemble closely Stock's figure of the ♀ *weberi* as regards the *outline* of the hind part of head with the 1st thoracic segment; but the latter is certainly not a free segment.

Notodelphys weberi Stock

1950. Stock, *Amsterdam Nat.*, I, 2, pp. 37–42, figs. 1–3. (♀ ♂).

See key above. ♀ 4·2 mm., ♂ 2·2 mm. Yellowish-grey.

Locality. Knysna, in *Ascidia canaliculata* (Stock).

Gen. *Doropygus* Thorell

1859. Thorell, *Ofvers. Vet. Akad. Forh.*, xvi, p. 339 (part).
1860. id., *K. Sv. Vet. Ak. Handl.*, n.f., iii, no. 8, p. 46.
1921. Sars, loc. cit., p. 42.
1922. Schellenberg, loc. cit., p. 238 (key to species).
1932. Wilson, loc. cit., p. 387.
1948. Lang, loc. cit., p. 6.

♀—Body somewhat laterally compressed and curved ventrally. Head and first 3 thoracic segments distinct; 4th and 5th segments fused and overlaid by the large gibbous brood pouch. Caudal rami elongate, sometimes coiled distally, apical setae not plumose, usually minute. Antenna 1 usually 9-, sometimes 10- or 13-jointed; first 2 joints enlarged. Antenna 2 2- or 3-jointed. 1st-4th pairs of legs basally stout and muscular, biramous, rami 3-jointed, or endopods of 2nd-4th pairs 2-jointed; 5th pair with a single one-jointed ramus (sometimes biramous).

♂—Body cylindrical, tapering. All thoracic segments free.

Doropygus pulex Thorell

Fig. 6 *e.*

1860. Thorell, loc. cit., p. 46, pl. 6.
1878. Brady, loc. cit., p. 133, pl. 28, figs. 1–12.

1921. Sars, loc. cit., p. 42, pl. 20.
1922. Schellenberg, loc. cit., pp. 241 (in key), 246, 271, 272, figs. 26, 27.
1932. Wilson, loc. cit., p. 389, fig. 239.

Last abdominal segment cleft (♀ ♂). Caudal rami not apically coiled, apical setae minute. 5th leg uniramous. Apical claw of antenna 2 as long as 2nd joint.

♀ 3·8 mm., ♂ 1.5 mm.

Localities. Lüderitzbucht, in *Pyura stolonifera* ('Red Bait') (Schellenberg); St. James, False Bay, in *Pyura stolonifera*, coll. K.H.B. 1913 (S. Afr. Mus.); Kleinmond, Cape, in Ascidian (Univ. Cape Town Ecolog. Surv. 1939); mouth of Zwartkops River estuary, Port Elizabeth, in Ascidians (W. Macnae, Rhodes University, ovig. ♀♀); Durban, in *Microcosmus oligophyllus* var. *wahlbergi* (Schellenberg).

Distribution. Europe, Mediterranean, east coast of N. America, Barbados, West Africa, Australia, Japan.

Gen. *Gunenotophorus* Costa

1840. Costa, *Fauna Regn. Nap. Cat. Crost.*, p. 7.
1864. Claus, *Z. wiss. Zool.*, xiv, p. 379 (*Sphaeronotus*, non Laporte 1832).
1869. Buchholz, ibid., xix, p. 144 (*Gunentophorus*).
1879. Kerschner, *Denkschr. Ak. Wiss. Wien.*, xli, p. 156 (*Gunentophorus*).
1905. Norman, *Mus. Norman.*, ed. 2, no. 3, p. 36 (*Gunetotrophus*).
1910. Stebbing, *Gen. Cat. S. Afr. Crust.*, p. 550.
1921. Sars, loc. cit., p. 56 (*Gunentophorus*).
1922. Schellenberg, *Mitt. Zool. Mus. Berlin*, x, p. 257.
1932. Wilson, loc. cit., p. 602 (in key) (*Gunentophorus*).

♀—Thorax greatly inflated, segments more or less confluent, at least dorsally in ovigerous individuals. Head bent ventrally. Abdomen straight, only 3 segments distinct. Antenna 1 short, compressed, joints ill-defined. Antenna 2 3-jointed, with apical claw. Mandibles well developed. One pair of maxillae, 2 pairs of maxillipeds. 1st-4th pairs of legs biramous, outer rami 3-jointed, inner ramus of 1st pair 3-jointed, of 2nd and 3rd pairs 4-jointed, of 4th 2-jointed; only the 1st pair setose, closely applied to the mouth-parts, inner rami of 2nd-4th pairs small and weak; 5th pair absent. Caudal rami curved outwards, 1-jointed, with minute apical setules. No external ovisacs. Male unknown. In Ascidians.

Remarks. I have not seen Kerschner's reasons for the change in spelling. There is not a great difference in the meaning of the two compound words. But if Stebbing's statement (p. 550) is correct, viz. that Costa gave no definition of the genus or the species, then maybe Costa's name is a *nomen nudem* and Kerschner's name should be adopted. There is no justification for Norman's suggested name. Stebbing also points out that Costa's specific name may have to be replaced by *thorelli* Claus 1864.

One other species: *spinipes* Schell. 1922, in S. America.

Gunenotophorus globularis Costa

Fig. 6 *f*, *g*.

1840. Costa, loc. cit., p. 7.
1864. Claus, loc. cit., p. 379 (*Sphaeronotus thorelli*).

1910. Stebbing, loc. cit., p. 550.
1921. Sars, loc. cit., p. 57, pl. 28, fig. 2.
1922. Schellenberg, loc. cit., p. 258, fig. 38 (prp. 2), and var. *giganteus* p. 258, fig. 39 (prp. 2), and pp. 268, 271.

Third joint of outer ramus of 2nd leg without spines.
Up to 6·5 mm., var. *giganteus* up to 8·4 mm.

Localities. Var. *giganteus*: False Bay, in *Pyura stolonifera* ('Red Bait') (Stebbing, and S. Afr. Mus.); Lüderitzbucht, Simons Bay, and Plettenberg Bay (Schellenberg); Groen River, south of Hondeklip Bay (west coast), in *Pyura stolonifera* (Univ. Cape Town Ecol. Surv. 1939).

Distribution. Mediterranean and coasts of France and Scandinavia.

Remarks. The variety differs from the typical form in having the outer ramus of 2nd leg stout and very little longer than inner ramus, instead of slender and nearly twice as long. All the South African specimens which I have seen, including Stebbing's material, belong to the variety.

Gen. *Botryllophilus* Hesse

1864. Hesse, *Ann. Sci. Nat.*, ser. 5, i, p. 345.
1921. Sars, loc. cit., p. 67.
1922. Schellenberg, loc. cit., pp. 281, 296.
1932. Wilson, loc. cit., p. 392.
1948. Lang, loc. cit., pp. 8, 14.

♀—Head distinct. The 5 thoracic segments more or less completely fused, often swollen in adult. Abdomen 4-8-segmented. Caudal rami prehensile, each with 4 stout curved spines. Antenna 1 short, basal joint broad, other joints reduced. Antenna 2 with 2nd joint short, 3rd with strong spines. Maxilliped very stout, conical, 3-jointed, with apical claw. 1st-4th legs biramous, rami 1- or 2-jointed, outer rami sometimes symmetrical; 5th legs unjointed, digitiform, supporting on either side the round ovisacs.
♂—Cyclopiform. Abdomen 6-8-jointed. Genital segment broad.

Schellenberg (p. 285) has discussed the asymmetry of the legs in the ♀. Inhabits the gill-sac and cloaca of Ascidians.

Key to the South African species

1. Outer rami of 1st-4th legs asymmetrical. *africanus*
2. Outer rami approximately symmetrical. *aspinosus*

Schellenberg (p. 294) also records a species of this genus in *Polycitor renieri* from Plettenberg Bay.

Botryllophilus africanus Schell.

1922. Schellenberg, loc. cit., p. 284, figs. 3 *a–d.*

Length ♀ 1·2 mm.

Locality. Angola, in *Macroclinum angolanum* (Schellenberg).

Botryllophilus aspinosus Schell.

Fig. 7 *a.*

1922. Schellenberg, loc. cit., p. 283, figs. 1, 2 *a–c.*

Length ♀ 2 mm.

Locality. Angola, in *Styela hupferi* (Schellenberg).

Distribution. Plymouth, England.

Gen. *Enterocola* van Bened.

1860. Van Beneden, *Bull. Ac. Belg.*, ser. 2, ix, p. 154.
1909. Chatton & Brément, *Bull. Soc. zool. Fr.*, xxxiv, p. 223 (references).
1921. Sars, loc. cit., p. 76.
1922. Schellenberg, loc. cit., p. 287.

♀—Head distinct. Thorax cylindrical, 4–5 segmented. Abdomen short, conical, more or less distinctly segmented. Caudal rami lamellate or digitiform. Antenna 1 short. Antenna 2 1-2-jointed, lamellate. Mandibles absent.

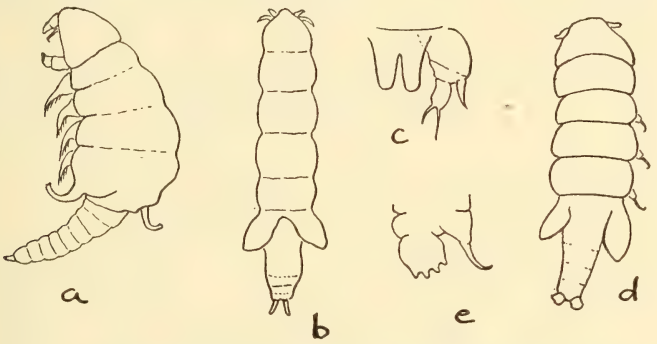


Fig. 7. *Botryllophilus aspinosus* Schell. *a*, ♀. *Enterocola bilamellatus* Sars. *b*, ♀; *c*, 2nd leg, with median lamina. *Zanclopus cephalodisci* Calman. *d*, ♀; *e*, 4th leg (copies: *a*, after Schellenberg; *b*, *c*, after Sars; *d*, *e*, after Calman).

1st-4th pairs of legs united by a median projecting lamina, flattened, biramous, both rami 1-jointed, outer rami spiniform, inner rami with 2 spine-setae; 5th legs broadly lamellate, acting as ovitectrices.

♂—Cyclopiform. Abdomen 5-segmented. Antenna 1 8-jointed. Antenna 2 3-jointed, with apical claw. 1st-4th legs natatory, biramous, both rami usually 3-jointed.

Only found in compound Ascidians (*Krikobranchiata*).

Enterocola fulgens van Bened.

1860. Van Beneden, loc. cit.
1909. Chatton & Brément, loc. cit., p. 227.
1922. Schellenberg, loc. cit., p. 287.

♀—Thorax without alate expansions (except the modified 5th pair of legs). Caudal rami $1\frac{1}{2}$–2 times as long as wide. 1·5 mm.

Locality. Table Bay, in *Amaroucium erythraeum* (Schellenberg).

Distribution. Europe, Mediterranean.

Remarks. In fig. 7 is given an illustration of an allied species, *E. bilamellatus* Sars 1921, as an example of the genus.

Gen. *Zanclopus* Calman

1908. Calman, *Mar. Invest. S. Afr.*, v (*Tr. S. Afr. Phil. Soc.*, xvii), p. 178.
1913. Gravier, *Deux. Exp. antarct. Franç.*, p. 68.
1922. Schellenberg, loc. cit., p. 295 (in list of genera, etc.).
1932. Wilson, loc. cit., p. 601 (in key to genera).

♀—Head distinct. Thorax cylindrical, 5-segmented. Abdomen obscurely segmented. Caudal rami short, with 4 short spiniform points directed outwards. Antenna 1 short but conspicuous, 1-jointed. Antenna 2 smaller than antenna 1. 1st-4th pairs of legs biramous, outer ramus ending in a sickle-shaped claw, inner ramus subcircular with 4 marginal papillae; 5th legs large, ovate.

♂—Cyclopiform. Abdomen 5-segmented. Antenna 1 (in adult) 7-jointed. Antenna 2 3-jointed, with 2 or 3 apical claws. 1st-4th pairs of legs natatory, biramous, rami 3-jointed; 5th leg consisting of 2 small papillae, each bearing a seta.

In the stomachs of the zooids of *Cephalodiscus* (*Pterobranchiata*).

Zanclopus cephalodisci Calman
Fig. 7 *d*, *e*.

1908. Calman, loc. cit., p. 178, pls. 18, 19.
1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 550.

Length ♀ 0·62 mm., ♂ 0·6 mm.

Locality. Agulhas Bank in *Cephalodiscus gilchristi* (Calman).

Suborder CALIGOIDA

1913. Scott, T. & A., *Brit. Parasit. Copepoda*, i, p. 43.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 397 and 604 (key to genera).

Body segmented or not. Fourth thoracic segment usually movably articulated with 3rd segment, but firmly attached to 5th. In some fixed parasites the movable articulation is lost in the ♀, the whole body becoming rigid. First, or 1st and 2nd, or 1st to 3rd thoracic segments often fused with head, forming a shield-like carapace. Antenna 1 reduced to 1 or 2 joints. Antenna 2 prehensile. A sternal fork (furca) sometimes present between bases of maxillipeds. Usually 4 pairs of legs, but one or two pairs may be wanting. Fifth pair rudimentary or obsolete. Two lateral ovisacs, usually filiform or cylindrical, uniseriate.

Parasitic on aquatic mammals and fishes, rarely on Invertebrates; mostly retaining the power of swimming and sometimes (especially males) captured in plankton.

Remarks. Scott excludes the family *Lernaeidae* from the *Caligoida*, including it with the *Chondracanthidae* and *Lernaeopodidae* in a suborder (tribe) *Lernaeoida*. Wilson, however, includes the *Lernaeidae* in the *Caligoida*, and the *Chondracanthidae* and *Lernaeopodidae* in the suborder *Lernaeopodoida*, not recognizing *Lernaeoida*.

The sternal fork (intercoxal plate: Lang, 1951, *Ark. Zool.*, 2nd ser., I, 6, p. 499) is not found in all *Caligoida*, but it is not found in any other suborders.

Wilson's families are here adopted, but without family diagnoses. The key to the South African genera utilizes some of the characters in Wilson's key, but it is admittedly unsatisfactory.

Dysgamus St. & Lütk., 1861 occurs on the Whale Shark (*Rhyneodon typicus*) (Wilson, 1944, *Proc. U.S. Nat. Mus.*, xciv, pp. 531, 533), a shark which is known to occur in South African waters. Heegaard (1943, *Ark. Zool.*, xxxiv, 4, A. 18, p. 24, figs. 65-75) records specimens from a 'Cape-line ship' which he would have considered to be the free-swimming stage of some Caligid, had not Bassett-Smith (1899, *Proc. Zool. Soc. Lond.*, p. 460) recorded ovigerous ♀♀. Wilson (1907, *Proc. U.S. Nat. Mus.*, xxxi, p. 712) accepted the genus provisionally pending the discovery of the ovigerous ♀.

Key to the South African genera (♀♀ only)

I. A shield-like cephalothorax. Body more or less depressed.
  A. Head and first 3 thoracic segments fused, 4th segment free.
    1. 4th segment without dorsal plates.
      a. With frontal lunules. — *Caligus*
      b. Without frontal lunules.
        i. 4th leg uniramous. — *Lepeophtheirus*
        ii. 4th leg biramous. — [*Dysgamus*]
    2. 4th segment with a pair of dorsal plates — *Alebion*
  B. Head and first 2 thoracic segments fused, 3rd and 4th free, without dorsal plates. — *Trebius*
  C. Head and first thoracic segment fused, 2nd-4th free (2nd and 3rd sometimes fused); one or more segments with dorsal plates.
    1. 3 pairs of dorsal plates (segments 2–4).
      a. A 6th thoracic segment concealing the abdomen. — *Pandarus*
      b. No 6th segment. — *Perissopus*
    2. 2 pairs of dorsal plates (fused 2–3, and 4).
      a. Ovisacs visible, elongate. — *Achtheinus*
      b. Ovisacs concealed, coiled. — *Cecrops*
    3. One pair of dorsal plates (segment 4).
      a. Legs not foliaceous.
        i. Ovisacs visible.
          α. Plates of 4th segment and those of 5th with smooth margins.
            * 2nd and 3rd segments not fused.
              † A 6th thoracic segment with a pair of small dorsal plates. — *Dinemoura*
              †† No 6th thoracic segment. — *Echthrogaleus*
            ** 2nd and 3rd segments fused, with lateral lobes — *Nesippus*
          β. Plates of 4th segment and those of 5th with serrated margins. — *Philorthragoriscus*
        ii. Ovisacs concealed. — *Orthagoriscicola*
      b. Legs foliaceous, forming with the dorsal plates of 4th segment a skirt surrounding the genital segment and abdomen. — *Anthosoma*
    4. 2nd-4th segments fused, with a single dorsal plate covering genital segment and abdomen. — *Lernanthropus*

II. Body without shield-like carapace, more or less segmented and cylindrical. Head without horns or processes for attachment.
  A. Body distinctly segmented. 4 pairs of biramous legs. — *Nemesis*
  B. Body divided into head, neck, and unsegmented trunk. 2 pairs of biramous legs. — *Hatschekia*

III. Body without carapace, cylindrical but not segmented. Head and neck distinct; head with horns or processes for attachment.
  A. Abdomen without processes.
    1. Head with horn-like processes. *Lernaea*
    2. Head with branched processes. *Cardiodectes*
  B. Abdomen with plumose processes. *Pennella*

Fam. Caligidae

1905. Wilson, *Proc. U.S. Nat. Mus.*, xxviii, p. 532 (*Caliginae*).
1934. Gurney, *Proc. Zool. Soc. Lond.*, 1934, 2, pp. 177 sqq., figs. (development).

Gen. *Caligus* Müller

1785. Müller, O. F., *Entomostraca*, p. 128.
1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 446 (list of species).
1905. Wilson, loc. cit., p. 555 (key to species).
1908. id., ibid., xxxiii, pp. 594 sqq.
1913. Scott, T. & A., *Brit. Parasit. Copep.*, p. 44.
1924. Brian, 'Parasit. Mauritan.' (*Bull. Com. Etud. Hist. Sci. Afr. occid. Fr.*), fasc. 1, pp. 13 sqq.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 397, and 605 (in key).
1935. Brian, *Ann. Mus. Civ. Genoa*, lvii, p. 152 (Mediterranean species).
1936. Yamaguti, *Parasit. Copep. Japan*, pt. 2, Caligoida 1, pp. 2–9.
1937. Wilson, *Hancock Pacific Exp.*, II, 4, p. 24.
1939. Yamaguti, *Parasit. Copep. Japan*, pt. 5, Caligoida 3 (*vol. Jubil. Prof. Yoshida*, II), pp. 445–9.
1951. Pearse, *Proc. U.S. Nat. Mus.*, ci, p. 344.
1954. Yamaguti, *Publ. Seto Mar. Biol. Lab. III*, 3, pp. 379 sqq.

Carapace large, oval or subcircular. Genital segment simple, without plates or processes. Abdomen 1-4-segmented; caudal rami usually moderate or small. Frontal lunules present. Maxilla 2 simple, spiniform. Sternal fork present. 1st and 4th legs uniramous, 2nd and 3rd biramous; 4th leg 3-jointed, rarely 4-jointed. Rudiments of 5th and 6th legs sometimes present. Ovisacs elongate, uniseriate.

On a variety of hosts, mostly Teleost fishes.

Key to South African species

I. 4th leg 4-jointed.
  A. 1st abdominal segment 4 times the length of 2nd. *pelamydis*
  B. 1st abdominal segment shorter than 2nd. [*elongatus*]

II. 4th leg 3-jointed.
  A. Abdomen ♀ 4, ♂ 2-segmented. *coryphaenae*
  B. Abdomen 1-segmented, or more or less distinctly 2-segmented.
    1. Abdomen long, in ♀ about as long as, in ♂ longer than, genital segment.
      a. Caudal rami long, in ♀ about half length of, in ♂ longer than abdomen. *lalandei*
      b. Caudal rami short.
        i. Caudal rami short. Abdomen distinctly 2-segmented, a little shorter than genital segment. *cossackii*
        ii. Caudal rami very short. Abdomen 1-segmented, a little longer than genital segment. *arii*

2. Abdomen short, about half length, or less, of genital segment.
   a. Caudal rami much longer than wide. *engraulidis*
   b. Caudal rami about as broad as long. *tetrodontis*

C. elongatus Heegaard (1943, *Ark. Zool.*, xxxiv, 4, A. 18, p. 11, figs. 21-31) was described from specimens from a 'Cape-line ship', but not necessarily from South African waters. No host was recorded.

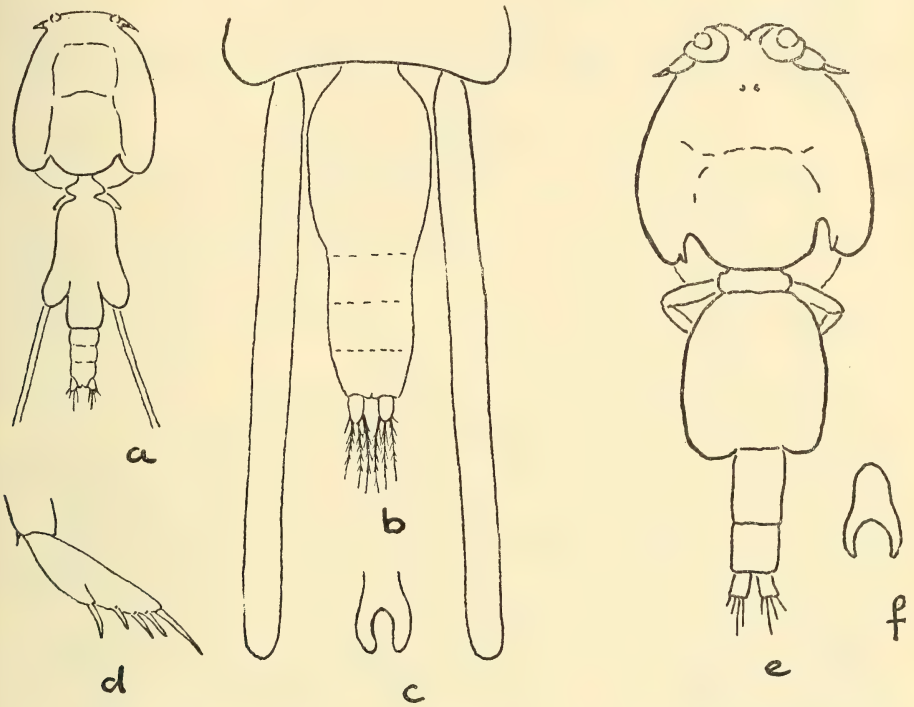


Fig. 8. *Caligus coryphaenae* St. & L. *a*, ♀; *b*, abdomen ♀; *c*, furca; *d*, 4th leg. *Caligus cossackii* B-S. *e*, ♀; *f*, furca (copies: *a*, from Brian, after St. & L.; *b-d*, after Brian; *e-f*, after Heegaard).

Caligus pelamydis Kröyer

1863. Kröyer, *Naturh. Tidsskr.*, ser. 3, ii, p. 124 (*fide* Stebbing), p. 50 (*fide* Wilson), pl. 4, figs. 4 *a–g*.
1905. Wilson, loc. cit., p. 594, pl. 13, figs. 154-61, pl. 14, fig. 161 *a*.
1910. Brady, *Deutsch Südpol. Exp.*, xi (zool. iii), p. 589, fig. 69 (♀).
1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 558.
1913. Scott, T. & A., loc. cit., p. 57, pl. 7, figs. 2, 3 (♀), pl. 9, figs. 1–5 (♀), pl. 71, fig. 14 (♂).
1932. Wilson, loc. cit., p. 406, fig. 254.
1935. Brian, loc. cit., p. 183, figs. xii (after Wilson) and xiii.

♀—Carapace oval, less than half total length. 4th segment narrow, short. Genital segment a little longer than wide, oblong, narrowing anteriorly, truncate posteriorly. Abdomen as long as carapace, and slightly longer than

genital segment, obscurely 2-segmented, 1st segment nearly 4 times length of 2nd; caudal rami shorter than 2nd segment, with plumose setae. Furca with base much narrower than width across prongs, these short, broad, curved. 4th leg 4-jointed, last 3 joints with 1, 1, and 3 spines respectively, these 5 spines set closely together like a comb. Ovisacs rather stout, as long as carapace plus genital segment, about 30 eggs in each.

3·3 mm. Yellowish-white.

Locality. Simons Bay (Brady).

Distribution. Danish and British seas, Mediterranean, east coast of N. America. On *Pelamys sarda* and *Gymnosarda pelamys*.

Caligus coryphaenae St. & L.

Fig. 8 *a–d*.

1861. Steenstrup & Lütken, *K. Dansk. Videns. Sels. Skr.* (5), v, p. 360, pl. 4, fig. 7.
1894. Scott, *Trans. Linn. Soc. Lond.* (2), vi, p. 130, pl. 14, fig. 20 (*bengoensis*) (juv. ♂).
1905. Wilson, loc. cit., p. 555 (*bengoensis*), and pp. 556, 559 (in key).
1923. id., *Ark. Zool.*, xv, 3, p. 5.
1935. Brian, loc. cit., p. 202, figs. xix, xx.
1936. Yamaguti, loc. cit., p. 5, pl. 4, figs. 40–54.
1949. Heegaard, *Vid. Medd. Dansk. nat. For.*, cxi, p. 240, figs. 6–10.

♀—Carapace oval, less than half total length. Genital segment longer than wide, somewhat wider posteriorly (deeply lobed: Steenstrup & Lütken; not so deeply: Brian's and Yamaguti's figures). Abdomen about as long as genital segment, 4-segmented (junctions somewhat obscure: Brian's figures), 1st segment as long as the others together; caudal rami short, with plumose setae. Furca narrow, with narrow prongs. 4th leg 3-jointed, 1 apical spine on 2nd joint, 4 spines on 3rd (Brian, Yamaguti). Ovisacs slender, elongate.

♂—Carapace oval, more than half total length. Genital segment quadrate. Abdomen a little shorter than genital segment, 2-segmented; caudal rami short (Steenstrup & Lütken's figures in Brian). Rudiments of 5th leg visible.

Length: ♀ 6–7 mm., ♂ 2–3 mm.

Locality. Delagoa Bay, on *Squalus acanthias* (Wilson).

Distribution. Atlantic and Mediterranean, on *Coryphaena hippurus*; Loanda; Pacific.

Caligus lalandei Brnrd.

Fig. 9 *a–c*.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 243, fig. 2.

♀—Carapace oval, less than half total length. 4th segment not laterally prominent. Genital segment oval, longer than wide, posterior corners rounded, slightly produced. Abdomen nearly as long as genital segment, obscurely 2-segmented, 1st segment slightly narrower than 2nd which is about $2\frac{1}{2}$ times as long as 1st, straight-sided; caudal rami about $\frac{2}{3}$ length of abdomen, elongate-lanceolate, apical setae short, nonplumose. Furca widening distally, with oval sinus between broad apically truncate prongs. 4th leg 3-jointed, one spine on apex of 2nd joint, apex of 3rd joint with 1 long and 2 short spines each with serrated scale at base. Ovisacs about $\frac{2}{3}$ total length.

♂—Genital segment quadrate, longer than wide, hind corners quadrate. Abdomen about twice as long as genital segment, obscurely 2-segmented, 2nd segment about $2\frac{1}{2}$ times as long as 1st, sides gently converging; caudal rami very elongate, about $\frac{2}{3}$ total length, filiform, with 2 long and 1 short apical spine-setae, nonplumose.

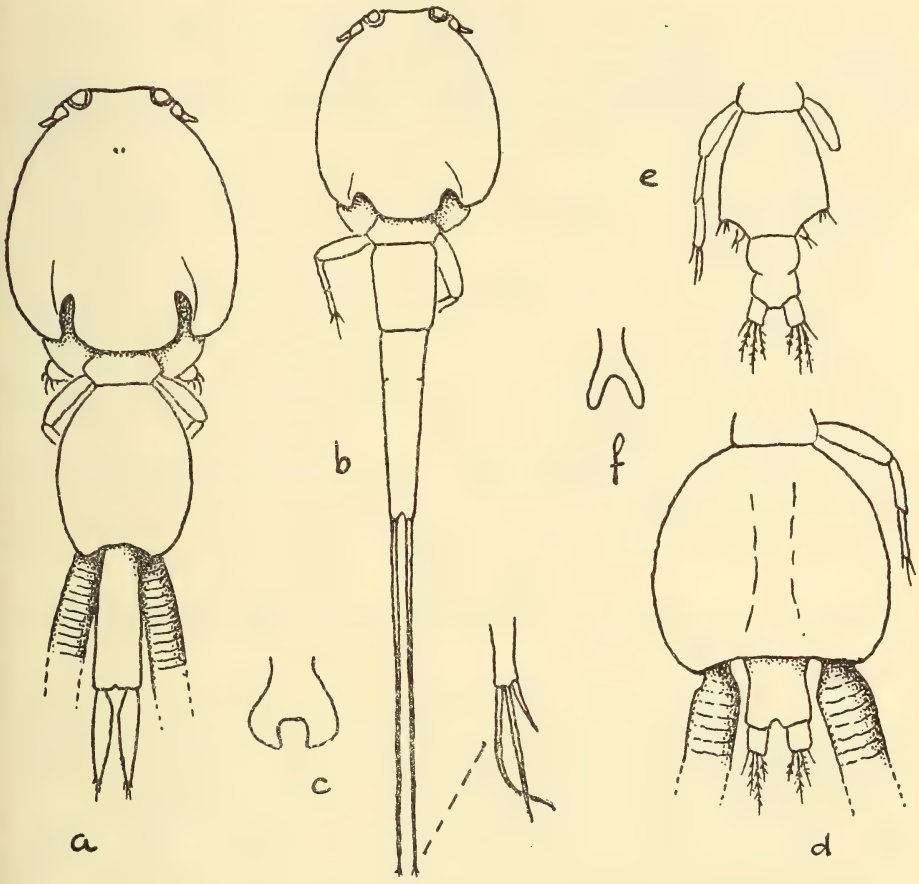


Fig. 9. *Caligus lalandei* Brnrd. *a*, ♀; *b*, ♂; *c*, furca. *Caligus tetrodontis* Brnrd. *d*, genital segment and abdomen ♀; *e*, genital segment and abdomen ♂; *f*, furca.

♀ 10·5 mm. (9 mm. to end of abdomen); ♂ 16 mm. (9 mm. to end of abdomen), carapace 4 mm., abdomen 3 mm., caudal rami 7 mm.

Locality. Kalk Bay (Cape Peninsula), on Yellow-tail (*Seriola lalandei*), 4 ♀♀, 1 ♂, C. L. Biden.

Remarks. Noteworthy on account of the length of the caudal rami in both sexes, but especially in the ♂. The ♀ differs from that of *seriolae* Yamaguti 1936 in the shape of the furca and the considerably longer caudal rami: the ♂ of *seriolae* is unknown.

Caligus cossackii B-S.

Fig. 8 *e, f.*

1898. Bassett-Smith, *Ann. Mag. Nat. Hist.* (vii), 2, p. 85, pl. 4, figs. 3, 3 *a–f* (♀).

1943. Heegaard, *Ark. Zool.*, xxxiv, A. 18, p. 5, fig. 12 A-C (♀).

♀—Carapace subcircular, shorter than half total length, frontal plate concave. 4th segment not laterally prominent. Genital segment longer than broad, oblong, without 'neck', hind corners rounded, without processes or rudiments of 5th legs. Abdomen distinctly 2-segmented, 2nd segment a little shorter than 1st; caudal rami short, well developed. Lunules very prominent. Furca with divergent prongs, slightly incurved apically. 4th leg 3-jointed. Ovisacs moderately stout.

♂—More elongate. Genital segment oval. Caudal rami longer and more profusely setose (Bassett-Smith).

♀ 5 mm., ♂ 3 mm.

Locality. Madagascar, in gill cavity of *Sparus berda* (Heegaard).

Distribution. Persian Gulf and Ceylon, on *Chrysophrys sarba* (Bassett-Smith).

Remarks. As both *Acanthopagrus berda* and *Austrosparus sarba* are found in South African waters, it is reasonable to expect that this parasite will eventually be included in the South African fauna-list.

There seems to be a strong similarity between this species and *affinis* Heller (see figure in Brian, *Rev. Zool. Bot. Afric.*, xxxii, p. 178, fig. 1, 1939. Mouth of Congo River, on *Sphyraena*).

Caligus arii B-S.

Fig. 10 *a, b.*

1898. Bassett-Smith, *Ann. Mag. Nat. Hist.* (vii), 2, p. 82, pl. 4, figs. 1, 1 *a–d* (♀).

1948. Barnard, ibid. (xii), 1, p. 244.

♀—Carapace subcircular, considerably shorter than half total length. 4th segment not laterally prominent. Genital segment slightly longer than broad, oblong, with a 'neck' anteriorly of about the same width as 4th segment, hind corners rounded, slightly produced, without processes or rudiments of 5th legs. Abdomen 1-segmented (Bassett-Smith: 2-segmented, 2nd segment short, as long as wide), as long as genital segment (without the 'neck'), slightly tapering; caudal rami distinct, well developed, but very short. Lunules very prominent. Furca with moderately divergent prongs, slightly incurved apically. 4th leg 3-jointed. Ovisacs stout, not very much longer than abdomen.

4·5 mm.

Locality. Chinde, mouth of Zambezi River, on palate of *Arius dussumieri*, 3 ♀♀, K.H.B. 1912.

Distribution. Ceylon, on *Arius acutirostris.*

Remarks. There is little doubt that these specimens should be regarded as conspecific with the Ceylon specimens in spite of certain differences. The abdomen shows no trace of a division into two segments near the hind end, and the caudal rami are quite well developed although small. The 4th leg is composed (as usual) of 3 joints, there being no trace of a division near the apex

(as shown in Bassett-Smith's figure). These differences may be due to the hosts being different species, though of the same genus, but they scarcely warrant the institution of a separate species.

Caligus engraulidis Brnrd.

Fig. 10 *c*, *d*.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 244, fig. 3.

♀—Carapace oval, longer than rest of body. 4th segment small, not laterally prominent. Genital segment wider than long, subquadrangular, hind corners

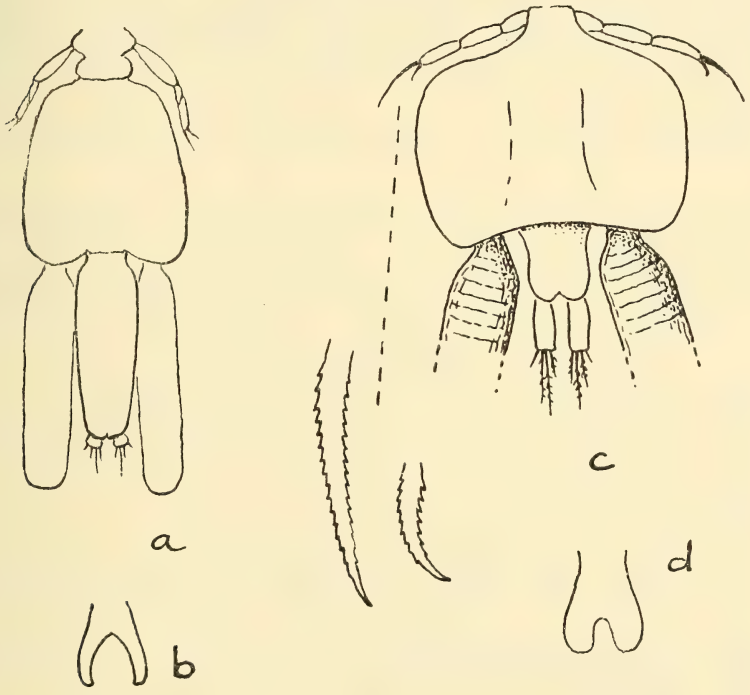


Fig. 10. *Caligus arii* B-S. *a*, genital segment and abdomen ♀; *b*, furca. *Caligus engraulidis* Brnrd. *c*, genital segment and abdomen ♀, apical spines of 4th leg further enlarged; *d*, furca.

rounded, only slightly produced, without processes or rudiments of 5th legs. Abdomen a little less than half length of genital segment, oblong; caudal rami a little shorter than abdomen, with 3 long plumose setae. Furca with short, rather stout, and narrowly separated prongs. 4th leg with 1 long and 1 short spine on apex of 3rd joint, both serrate on both margins. Ovisacs stout, about as long as body.

3·5 mm.

Locality. Zwartkops River, Algoa Bay, on *Engraulis* (*Anchoviella*) *holodon*. 1 ♀.

Caligus tetrodontis Brnrd.

Fig. 9 *d–f*.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 245, fig. 4.

♀—Carapace about half total length. Genital segment cordate, a little wider than long, hind corners rounded, not produced, 5th legs represented by 2–3 fine setules (better visible in immature ♀). Abdomen a little less than half length of genital segment, obscurely 2-segmented; caudal rami nearly as long as broad, with plumose setae. Furca with narrow, divergent prongs. 4th leg with 1 spine on apex of 2nd joint, and 3 spine-setae of varying lengths on apex of 3rd joint, with 2 short biserrate spines (scales) at their base. Ovisacs stout.

♂—Genital segment longer than broad, hind corners obliquely bevelled off, showing tufts of setae (3 and 2 respectively) representing 5th and 6th legs. Abdomen distinctly 2-segmented, 1st segment shorter but slightly wider than 2nd, with convex lateral margins, 2nd about as long as wide, with straight sides. 4–5 mm.

Locality. Port Elizabeth, on *Tetrodon hypselogeneion*. 2 ovig. ♀♀, 2 juv. ♀♀, 4 ♂♂.

Remarks. Closely allied to *parvus* Bassett-Smith from Bombay, also parasitic on a species of *Tetrodon*. The present specimens, however, are larger (*parvus*: ♀ 3·4, ♂ 2·3 mm.), the abdomen and caudal rami are longer, and the prongs of the furca longer. The abdomen of *parvus* is apparently only 1-segmented.

Gen. *Lepeophtheirus* Nordmann

1832. Nordmann, *Mikr. Beitr. Wirbellos. Thiere*, ii, p. 30.
1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 453 (list of species).
1905. Wilson, *Proc. U.S. Nat. Mus.*, xxviii, p. 615 (key to species).
1908. id., ibid., xxxiii, pp. 600 sqq.
1908. id., ibid., xxxv, pp. 439 sqq.
1913. Scott, T. & A., *Brit. Parasit. Copep.*, p. 64.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 409, and 606 (in key).
1933. Gurney, *Brit. Freshwater Copep.*, iii, p. 324 (development)
1936. Yamaguti, *Parasit. Copep. Japan*, pt. 2, Caligoida 1, pp. 10–15.
1939. id., pt. 5, Caligoida 3, pp. 449–53.
1944. Wilson, *Proc. U.S. Nat. Mus.*, xciv, pp. 533 sqq.

Carapace large, broadly oval or subcircular. Fourth segment free, without dorsal plates. Genital segment simple, without plates or processes. Abdomen 1-, 2- (or 4-) segmented; caudal rami moderate. No frontal lunules. Maxilla 2 small, bifurcate. Sternal fork present. 1st and 4th legs uniramous, 2nd and 3rd biramous; 4th leg 4-jointed, sometimes 3-jointed. Rudiments of 5th and 6th legs sometimes present. Ovisacs elongate, uniseriate.

Closely resembling *Caligus*, but without the frontal lunules.

Key to the South African species

1. Abdomen (♀) well developed.
   a. Furca with narrow acute prongs.
      i. Carapace subcircular, considerably more than half total length. 4th leg 4-jointed. *insignis*
      ii. Carapace oval, very little more than half total length. 4th leg 3-jointed. sp.
   b. Furca with broad, blunt prongs. *lichiae*

2. Abdomen very short, concealed under genital segment.
   a. No rudiments of 5th legs on genital segment (♀). *brachyurus*
   b. Rudiments of 5th legs on genital segment (♀). *plotosi*

Lepeophtheirus insignis Wilson

Fig. 11.

1908. Wilson, loc. cit., p. 444, pls. 70, 71.
1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 247.

♀—Carapace subcircular, about as wide as long, considerably more than half total length. Eyes minute. 4th segment rather prominent laterally, not as wide as genital segment, which is ovoid, longer than broad in adult. Abdomen of one segment, oblong, shorter than genital segment in adult. Furca with simple rather widely diverging prongs.

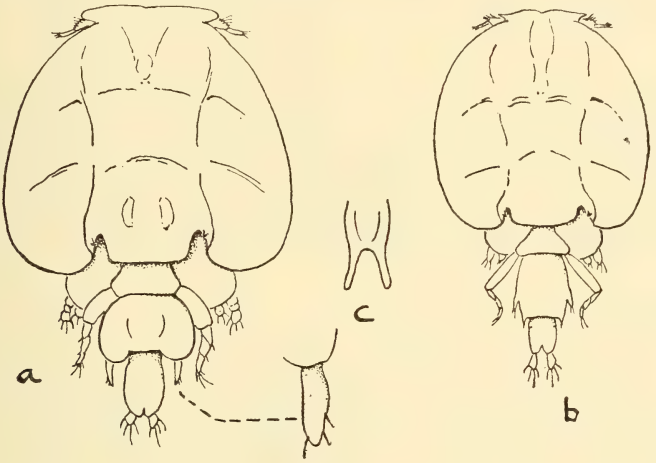


Fig. 11. *Lepeophtheirus insignis* Wilson. *a*, immature ♀, 6th leg further enlarged; *b*, ♂; *c*. furca.

♂—Similar to ♀, but carapace relatively slightly larger. Genital segment ovoid, with rudiments of 5th and 6th legs. Abdomen 2-segmented.

♀ 11·75 mm., carapace 6·5 mm., ♂ 6·6 mm., carapace 4 mm. (Wilson). Yellowish, chitinous ribs and thickenings on carapace purple, internal oviducts orange, ovisacs yellow (Wilson). White marbled with reddish-grey (K.H.B.).

Locality. Table Bay, on Sunfish (*Mola mola*). 1 immature ♀, 1♂ (K.H.B.).

Distribution. Coast of Southern California, on *Mola mola.*

Remarks. The ♂ (carapace 4 × 4 mm.) corresponds closely with Wilson's description. The ♀ (carapace 5 × 5 mm.) clearly belongs to Wilson's species but is in a stage intermediate between the young ♀ figured on pl. 71, fig. 51, and the adult figured on pl. 70, fig. 37; the genital segment is more ovoid than in fig. 51 but has not reached its full length as shown in fig. 37. The 6th leg is narrower than in fig. 51; there is no trace of a rudimentary 5th leg. (Comparison of pl. xxii, fig. 273, and pl. xxv, fig. 311, in Wilson's 1905 paper

with pl. 70, fig. 44, in the 1908 paper leaves a doubt whether these trispinose appendages represent the 5th or the 6th legs; in the former paper they are called the 5th, in the latter the 6th.)

Lepeophtheirus sp.

Two ovigerous ♀♀ of a species very close to *L. longispinosus* Wilson (1908, *Proc. U.S. Nat. Mus.*, xxxiii, p. 604, pl. 52) were taken by Mr. C. L. Biden from

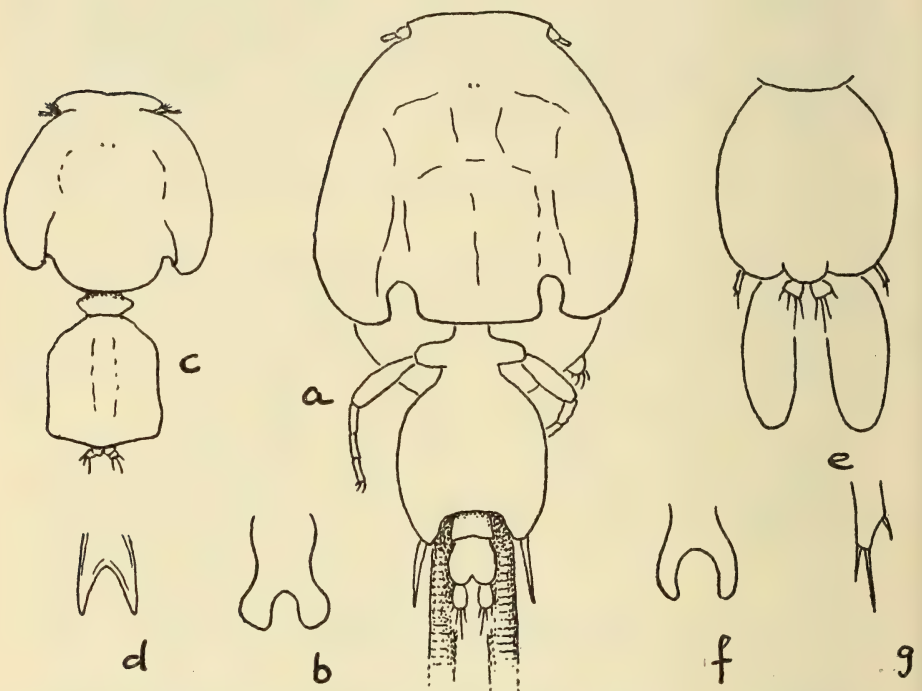


Fig. 12. *Lepeophtheirus lichiae* Brnrd. *a*, ♀; *b*, furca. *Lepeophtheirus brachyurus* Heller. *c*, ♀; *d*, furca. *Lepeophtheirus plotosi* Brnrd. *e*, genital segment and abdomen ♀; *f*, furca; *g*, 5th leg.

a Sand Shark (*Rhinobatus*) at Durban 1953. Wilson's species was taken from a Hammerhead Shark off the coast of North Carolina.

The present specimens agree with Wilson's species in having the 4th leg 3-jointed, but differ in the shape of the furca which consists of 2 small acute subparallel prongs.

5 mm., ovisacs 3 mm. Whitish.

Lepeophtheirus lichiae Brnrd.

Fig. 12 *a*, *b*.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 247, fig. 5.

♀—Carapace oval, about as broad as long, very slightly more than half total length. Eyes minute. 4th segment laterally prominent, almost as wide as

genital segment, which is slightly broader than its median length; posterior corners of genital segment lobately produced, with a strong straight spine arising from ventral surface and projecting backwards, ¾ length of segment. Abdomen a little longer than half median width of genital segment, 2-segmented. Furca with broad, apically rounded prongs.

7·5 mm.

Locality. Natal, on *Lichia amia.* Ovig. and nonovig, ♀♀.

Remarks. The spines on the genital segment are reminiscent of *Gloiopotes.*

Lepeophtheirus brachyurus Heller
Fig. 12 *c, d.*

1865. Heller, '*Novara*', *Crustac.*, p. 185, pl. 16, fig. 4.
1906. Wilson in *Herdman's Ceylon Pearl Oyster Fish Rep.*, v., p. 190. pl. 1, figs. 1–10.
1948. Barnard, loc. cit., p. 248.

♀—Carapace as broad as long, slightly longer than half total length, hind margin strongly convex and extending farther backwards than lateral lobes. 4th segment less than half width of genital segment, which is about as long as wide, subquadrangular with anterior angles bevelled off, hind margin very slightly convex medianly; no rudiments of 5th or 6th legs. Abdomen extremely short, inserted ventrally, scarcely visible dorsally. Furca with simple, diverging prongs.

5 mm.

Locality. Durban, on *Tetrodon hypselogeneion*, 1 ♀.

Distribution. Java, on *Tetrodon calamariae*; Ceylon, on *T. stellatus.*

Remarks. This specimen in so far as a comparison is possible (4th legs missing) is very like Heller's species. His figure shows the genital segment subcircular, not subquadrate, and the 4th legs as 2-jointed.

Lepeophtheirus plotosi Brnrd.
Fig. 12 *e–g.*

1948. Barnard, loc. cit., p. 248, fig. 6.

♀—Carapace about as broad as long, slightly longer than half total length. 4th segment well developed. Genital segment oval, longer than wide, hind corners rounded, not at all produced, with distinct rudimentary 5th legs. Abdomen very short, broader than long, attached to dorsal surface of genital segment; caudal rami shorter than abdomen, broader than long. Furca with narrow prongs, sinus wide, U-shaped. Ovisacs stout, as long as genital segment.

3·5 mm.

Locality. East London, on gills of *Plotosus anguillaris.*

Remarks. The three species listed by Bassett-Smith as parasitic on Bagrid fishes: *bagri* Dana, *quadratus* Kr., and *longipalpus* B-S. all have a 2-segmented abdomen. I have not seen descriptions of the first two, but the third has an elongate abdomen.

Fam. Euryphoridae

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, p. 415.

Gen. *Alebion* Kröyer

1863. Kröyer, *Naturh. Tidsskr.* (3), 2, p. 239.
1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxi, p. 702 (key to species).
1932. id., loc. cit., pp. 418, 606.
1951. Gnanamuthu, *Ann. Mag. Nat. Hist.* (xii), 4, p. 1237.
1953. Capart, *Bull. Inst. franç. Afr. Noire*, xv, 2, p. 655.

Sexes nearly similar. Head and first 3 thoracic segments fused into a shield-like carapace. Fourth segment free, with a pair of dorsal plates in ♀, but these much reduced or absent in ♂. Genital segment with hind corners usually produced in ♀, rounded in ♂. Abdomen 2-segmented, hind corners of basal segment in ♀ produced. Caudal rami lamelliform. First 3 pairs of legs biramous, outer rami with large horny claws, rami of 1st leg 2-jointed, of 2nd and 3rd 3-jointed, 4th legs rudimentary. No frontal lunules. No furca.

On sharks.

Alebion carchariae Kröyer

Fig. 13 *a*.

1863. Kröyer, loc. cit., p. 165, pl. 12 (page and plate quoted from Wilson, 1932).
1907. Wilson, loc. cit., xxxi, p. 704 (in key).
1932. id., loc. cit., p. 422, fig. 266.
1953. Capart, loc. cit., p. 655, fig. 3.

♀—Carapace subcircular, about as wide as long, median lobe short, truncate, with 2-4 denticles at each postero-lateral corner. Dorsal plates of 4th segment subtriangular, separated by a triangular notch. Genital segment widest behind middle, lateral margins distally fringed with spines; posterior processes flattened, upper margins fringed with spines; centre of segment gibbous, hind margin excavate, without spines or denticles.

9 mm. (Wilson: 14 mm.).

Localities. Ifafa, Natal, on a shark (Dept. Zool. Rhodes Univ. Grahamstown, 1948); Durban, on *Carcharinus* (C. L. Biden 1951).

Distribution. N. Atlantic, Cape Verde Islands, Senegal.

Remarks. The present specimens agree with *carchariae* except the processes of the genital segment are spinose along the upper margin as in *crassus*.

Fam. Trebiidae

1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxi, p. 669 (*Trebinae* [*sic*]).
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 413 (*Trebidae* [*sic*]).

Gen. *Trebius* Kröyer

1838. Kröyer, *Naturh. Tidsskr.*, ii, p. 30.
1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 461.
1907. Wilson, loc. cit., p. 672 (key to the 3 species known).
1932. id., loc. cit., p. 413, and 604 (in key).
1953. Capart, *Bull. Inst. franç. Afr. Noire*, xv, p. 665.

Sexes similar. Head and first 2 thoracic segments fused into a shield-like carapace. 3rd and 4th segments free, without dorsal plates. Abdomen elongate, 1-3-segmented. No frontal lunules. Furca present. All 4 pairs of legs biramous, rami of 1st leg 2-jointed, of the other legs 3-jointed (or inner ramus of 4th leg 2-jointed). Rudiments of 5th and 6th legs on genital segment in ♂. No adhesion pads. Ovisacs elongate, uniseriate.

On skates (rays) and Dogfish.

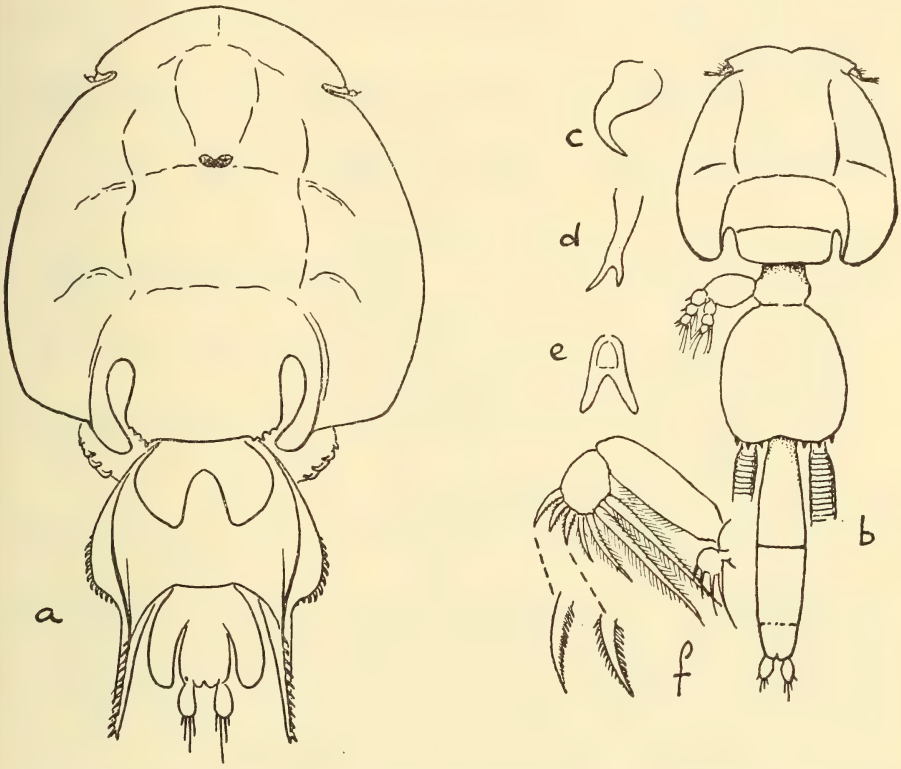


Fig. 13. *Alebion carchariae* Kröyer. *a*, ♀. *Trebius caudatus* Kröyer. *b*, ♀; *c*, maxilla 1; *d*. maxilla 2; *e*, furca; *f*, 1st leg.

Trebius caudatus Kröyer

Fig. 13 *b–f*.

1838. Kröyer, loc. cit., p. 30, pl. 1, fig. 4 (♀).
1863. id., *Naturh. Tidsskr.* (3), ii, p. 149, pl. 10, fig. 1 (♂).
1907. Wilson, loc. cit., p. 681, pl. 15, figs. 11–13, pl 16, figs. 14–22.
1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 81, pl. 22, figs. 1–2, pl. 54, figs. 1–11.
1934. Gurney, *Proc. Zool. Soc. Lond.*, 1934, 2, p. 192, figs. 18–20 (development).

1941. Sproston & Hartley, *J. Mar. Biol. Assoc. Plymouth*, xxv, p. 393 (bionomics).

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 249.

♀—Carapace subcircular, well arched dorsally. Eyes obsolete in adult. Genital segment oval, hind corners rounded, each with 3-4 denticles. Abdomen subequal to carapace, longer than genital segment, fusiform, more or less distinctly 3-segmented. Furca with narrow divergent prongs. Maxilla 2 apically bifurcate.

♂—Genital segment barrel-shaped. Abdomen a little longer than genital segment, 2-segmented.

10mm.

Locality. Table Bay, on skate (*Raia marginata*). 13 ♀♀ in poor condition (S. Afr. Mus.).

Distribution. British Seas, on skates and dogfishes.

Fam. Pandaridae

1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, pp. 325, 345 (*Pandarinae*).

Gen. *Pandarus* Leach

1816. Leach, *Encycl. Brit.*, ed. 5, Suppl., p. 405 (♀).

1819. id., *Dict. Sci. Nat.*, xiv, p. 535 (♂) (*Nogaus*).

1840. Milne Edwards, *Suite à Buffon* (*Crust.*), iii, p. 460 (*Nogagus* pro *Nogaus*).

1907. Wilson, loc. cit., pp. 346, 387 (key to species).

1913. Scott, T. & A., loc. cit., p. 94.

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 432, and (in key) 607, 609.

Sexes dissimilar. Head and 1st thoracic segment fused. Carapace smooth, without grooves, postero-lateral lobes moderate, hind margin excavate, dentate. Free thoracic segments (3) each with a pair of plates, those on segment 2 dorso-lateral, the others dorsal. Genital segment large, posterior corners more or less lobately prolonged. Segment 6 represented by a median plate concealing the abdomen. Abdomen short, broad, 2-segmented, covered ventrally by a short broad median plate. Caudal rami attached laterally to the ventral median plate, flattened, subtriangular or more or less conical and acicular. Four pairs of adhesion pads: at bases of 1st and 2nd antennae, between bases of 1st maxillipeds and opposite 1st legs. Antenna 1 2-jointed; antenna 2 with apical claw. Maxilliped 2 swollen, with a pair of knobs. Four pairs of biramous legs, spinose and indistinctly jointed legs. Ovisacs elongate filiform, uniseriate.

♂—Carapace broadly oval, posterior lobes prominent, posterior margin straight, usually with a pair of accessory lobes, lateral grooves distinct. Free thoracic segments without dorsal plates, but the first with lateral lobes. Genital and 6th segments fused, with 2 pairs of rudimentary legs. Abdomen 2-segmented; caudal rami laminate, with 4 plumose setae. Maxilliped 2 with apical claw or corrugated knobs. All 4 pairs of legs biramous, both rami 2-jointed, with long plumose setae.

On various sharks and dogfishes.

Key to the South African species (♀♀)

1. Dorso-lateral plates of 2nd segment not extending beyond ends of plates on 3rd segment.
   a. Caudal rami not very prominent. *bicolor*
   b. Caudal rami prominent. 3rd and 4th segments each with a pair of dorsal spines. *armatus*
2. Dorso-lateral plates of 2nd segment extending beyond ends of plates on 3rd segment.
   a. Dorsal plates of 3rd segment fused. *cranchii*
   b. Dorsal plates of 3rd segment separate (in adult). *smithii*

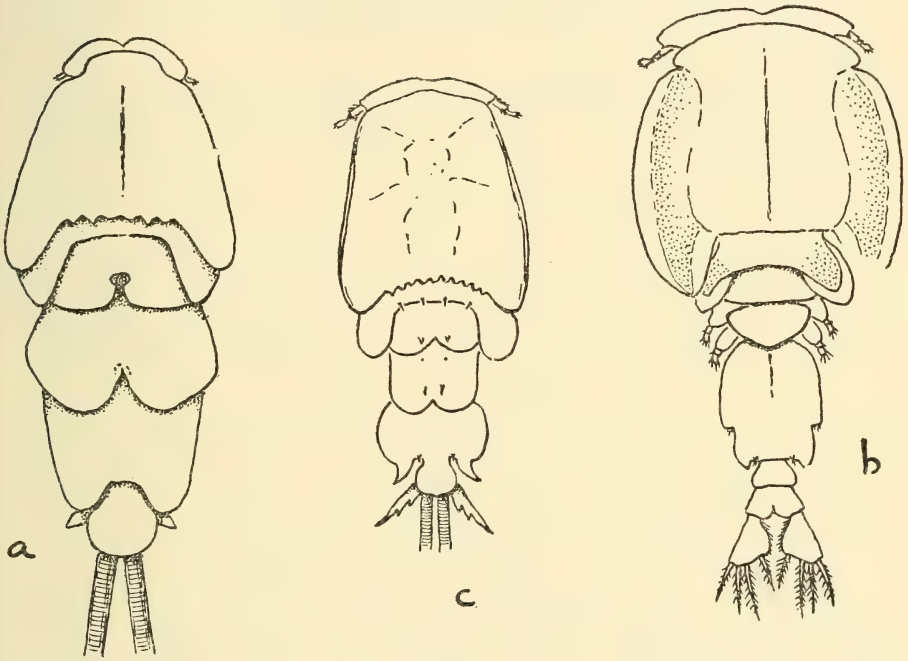


Fig. 14. *Pandarus bicolor* Leach. *a*, ♀; *b*, ♂, right corner of carapace cut away. *Pandarus armatus* Heller. *c*, ♀ (copy after Heller).

Pandarus bicolor Leach
Fig. 14 *a*, *b*.

1816. Leach, loc. cit., p. 405, pl. 20, figs. 1, 2 (♀).
1900. Scott, T., *Rep. Fish. Board Scotl.*, xviii, pt. 3, p. 157, pl. 6, figs. 33–8 (*Nogaus* ♂).
1907. Wilson, loc. cit., p. 400, pl. 27 (♀).
1913. Scott, T. & A., loc. cit., p. 95, pl. 21, fig. 2, pl. 22, figs. 5, 6, pl. 26, figs. 4–19, pl. 58, figs. 1–8 (♀ ♂).
1932. Wilson, loc. cit., p. 436, fig. 274 (♀ ♂).
1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 249.

♀—Carapace widest posteriorly, hind margin dentate. Dorso-lateral plates of 2nd segment not reaching beyond plates of 3rd segment; the latter with

narrow median sinus, more or less expanded anteriorly; plates of 4th segment overlapping genital segment for about half its length, with angular sinus. Genital segment with broadly rounded posterior lobes; 6th segment plate at least half width of genital segment, subcircular. Caudal rami short, laminate, triangular, thickened on anterior margin.

♂—Carapace as wide as long, no accessory lobes on hind margin. 2nd segment with lateral lobes (in adult), 3rd and 4th successively narrower; genital segment wider than 4th, hind corners shortly lobed. Caudal rami subtriangular.

♀ 9–10 mm., ovisacs 15–16 mm.; ♂ 6–7 mm. ♀ yellowish, when adult with dark chestnut brown patches on 1st joint of 1st antennae, carapace (except a Y-shaped pale median mark and the hind lobes); dorsal plates of 3rd and 4th segments brown; ♂ pale yellow.

Localities. Table Bay and False Bay, on *Carcharius* and *Galeorhinus*. ♀♀ adult and juv., ♂♂ (S. Afr. Mus.); Durban, from nostrils of Grey Shark (C. L. Biden, 1953).

Distribution. British Seas, North Atlantic.

Remarks. The figure of a ♂ given by Wilson 1932 after T. Scott is that of an immature example. Wilson's figures (1907 and 1932) of the caudal rami in dorsal view scarcely convey the impression that they are really triangular; Wilson's figure (1907, pl. 27, fig. 123) of the ventral surface is more correct.

Pandarus armatus Heller

Fig. 14 *c*.

1865. Heller, *Reise 'Novara', Crust.*, p. 202, pl. 19, fig. 4.
1907. Wilson, loc, cit., p. 395 (in key only).
1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 558.
1953. Capart, *Bull. Inst. franç. Afr. Noire*, xv, p. 659, fig. 7.

♀—Carapace oblong, only slightly wider posteriorly. Dorso-lateral plates of 2nd segment not extending beyond plates of 3rd segment, 4 spines on hind margin between the lobes. Plates of 3rd and 4th segments with moderate median sinus, each with a spine near hind margin (i.e. a pair of spines on each fused plate). Genital segment wider than 4th segment plates, lateral margins convex, with deep notch anterior to the acute hind corners. 6th segment plate rather bluntly rounded apically. Caudal rami prominent, extending considerably beyond 6th segment plate.

8 mm.

Locality. Cape of Good Hope, on *Scyllium africanum* (Heller).

Distribution. Senegal, on *Sphyrna tudes* (Capart).

Pandarus cranchii Leach

1819. Leach, *Dict. Sci. Nat.*, xiv, p. 535.
1907. Wilson, loc. cit., p. 403, pl. 28.
1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 14, pl. 3, fig. 1 (coloured).
1923. Wilson, *Ark. Zool.*, xv, 3, p. 9.
1932. id., loc. cit., p. 435, fig. 273.

1935. id., *Pap. Tortugas Lab. Carneg. Inst.*, xxix (452), p. 333, pl. 5, figs. 58–70, pl. 6, fig. 71.
1943. Heegaard, *Ark. Zool.*, xxxiv, A 18, p. 27, figs. 76–8.
1948. Barnard, loc. cit., p. 249.

♀—Carapace broad, widest posteriorly, length (incl. lateral lobes) nearly as long as rest of body (excl. 6th segment). Dorso-lateral plates of 2nd segment reaching beyond dorsal plates of 3rd segment to about half length of those of 4th segment; 3rd segment plates broad, sinus deep; 4th segment plates covering at least half of genital segment, with broad but shallow sinus. Genital segment with pointed posterior lobes, the outer margin of lobe more or less concave; 6th segment plate subcircular but with distinct basal neck. Caudal rami acicular.

♂—[after Wilson] Accessory lobes on carapace present, longer than wide. Genital segment with hind corners and a lateral lobe acute, rudiments of 5th and 6th legs represented by spines.

♀ 8 mm., ovisacs 8 mm.; ♀ yellowish, more or less suffused dorsally with dark chestnut brown, the median pale mark on carapace often more oblong or cuneiform than Y-shaped.

Localities. Durban (Wilson); Natal coast, on *Stegostoma fasciatum*, ♀♀, and on Hammerhead Shark, ♀♀; off Tugela River mouth, ♀ (S. Afr. Mus.).

Distribution. North Atlantic, east coast of N. America, Cape Verde Islands, Gulf of Guinea, Bay of Bengal, Pacific.

Remarks. In the present specimens the lobes of 2nd thoracic segment do not extend so far back as in Wilson's descriptions and figures; but that is not of great importance.

Wilson (1907) makes *zygaenae* Brady a synonym of *satyrus* Dana. Perhaps both might be combined with *cranchii* as there seems very little real difference.

Pandarus smithii Rathbun

1886. Rathbun, *Proc. U.S. Nat. Mus.*, ix, p. 315, pl. 5, fig. 3, pl. 7, fig. 9.
1907. Wilson, loc. cit., p. 410, pls. 29, 30.
1932. id., loc. cit., p. 434, fig. 272.
1944. Brian, *An. Mus. Argentino*, xli, p. 202, pl. 5, fig. 40.
1948. Barnard, loc. cit., p. 249.

♀—Carapace broad, widest posteriorly, length (incl. lateral lobes) almost as long as rest of body. Dorso-lateral plates of 2nd segment extending beyond ends of 3rd segment plates to about half length of those of 4th segment; the dorsal area is demarcated by grooves, but, although described as a plate (Wilson), has no free edges. Plates of 3rd segment completely separated (at least in adult). Plates of 4th segment covering more than half genital segment, with moderately deep notch. Genital segment with pointed posterior lobes, their outer margin slightly concave; 6th segment plate slightly longer than wide. Caudal rami prominent, trapezoidal, outer (thickened) and inner margins nearly parallel, apical margin oblique, denticulate.

♂—[after Wilson] Accessory lobes on carapace present, broader than long. Genital segment not wider than the preceding free segments, hind corners and lateral lobe not very acute.

♀ 9 mm. Yellowish, greater part of carapace, except hind margin and a transverse crescentic mark over the ocular area, and all the dorsal plates more or less suffused with dark chocolate brown.

Localities. Table Bay, on *Carcharias*, 2 ♀♀ (S. Afr. Mus.); Durban, on *Carcharinus* (C. L. Biden 1951, ♀♀).

Distribution. East coast of N. America and Gulf of Mexico, Hawaiian and Laysan Islands, Argentine.

Gen. *Perissopus* St. & L.

1861. Steenstrup & Lütken, *K. Dansk. Videas. Sels. Skr.* (5), v, p. 393.
1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 468.
1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 352, and p. 340 (larval stages).
1930. Leigh Sharpe, *Mem. Mus. Roy. Hist. Nat. Belge* (H.s.) III, 2, p. 7.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 424, and 608, 609 (in key).
1945. Heegaard, *Ark. Zool.*, xxxv, A 18, p. 18 (discussion on *Nogagus*).
1951. Gnanamuthu, *Spolia Zeylanica*, xxvi, 1, p. 9.

♀—Body ovate, squarish posteriorly. Carapace smooth, without grooves. Free thoracic segments (3) each with a pair of plates, those on 2nd segment dorso-lateral but fused across middle line, those on 3rd and 4th dorsal, meeting but not fused medianly. Genital segment large, postero-lateral corners quadrate, posterior margin with small excision through which abdomen and caudal rami are more or less visible. Abdomen 1-segmented. Terminal joints of 2nd maxilliped enlarged, fleshy, reniform, rough and scaly. Four pairs of biramous legs, rami of 3rd and 4th pairs minute; 5th pair obsolete. Four pairs of adhesion pads. Ovisacs straight, elongate, uniseriate.

♂—Carapace longer than wide; 2nd thoracic segment with small lateral plates, 3rd and 4th segments without plates. Genital segment with 5th legs. Abdomen 1-segmented, caudal rami large, with plumose setae. Maxilliped 2 with stout claw shutting against a pair of corrugated knobs. All 4 pairs of legs biramous, 2-jointed, but joints of 4th pair more or less fused.

On sharks.

Perissopus dentatus St. & L.
Fig. 15 *a*.

1861. Steenstrup & Lütken, loc. cit., p. 393, pl. 12, fig. 25.
1887. Rathbun, *Proc. U.S. Nat. Mus.*, x, p. 560, pls. 29, 30 (*communis*).
1899. Bassett-Smith, loc. cit., p. 468.
1907. Wilson, loc. cit., p. 354, pls. 17, 18 (*communis*).
1924. Brian, *Parasitolog. Mauritanica*, fasc. 1, p. 33 (*communis*).
1932. Wilson, loc. cit., p. 425, fig. 267 (*communis*).
1953. Capart, *Bull. Inst. franç. Afr. Noire*, xv, p. 662.

♀—Carapace narrowed anteriorly, large, about $\frac{3}{4}$–$\frac{4}{5}$ length of genital segment. A large knob on ventral surface of carapace near the margin, external to the large 2nd maxilliped. Plates on 2nd and 4th segments with denticulate margins, those on 3rd segment with entire margins.

♀ 6 mm. (Wilson: 3·75–4·25 mm.).

Locality. Durban, on Milk Shark (*Scoliodon*). 3 ♀♀, C. L. Biden, 1953.

Distribution. Eastern coast of N. America, on various sharks and dogfish (Wilson); coast of Mauritania (Brian); Senegal (Capart).

Remarks. Wilson (1907) maintains *communis* as a valid species distinguished from *dentatus* St. & L. by relative sizes of carapace and genital segment (1907, p. 353 in key), the knob on ventral surface of carapace, and certain details (1907, p. 361).

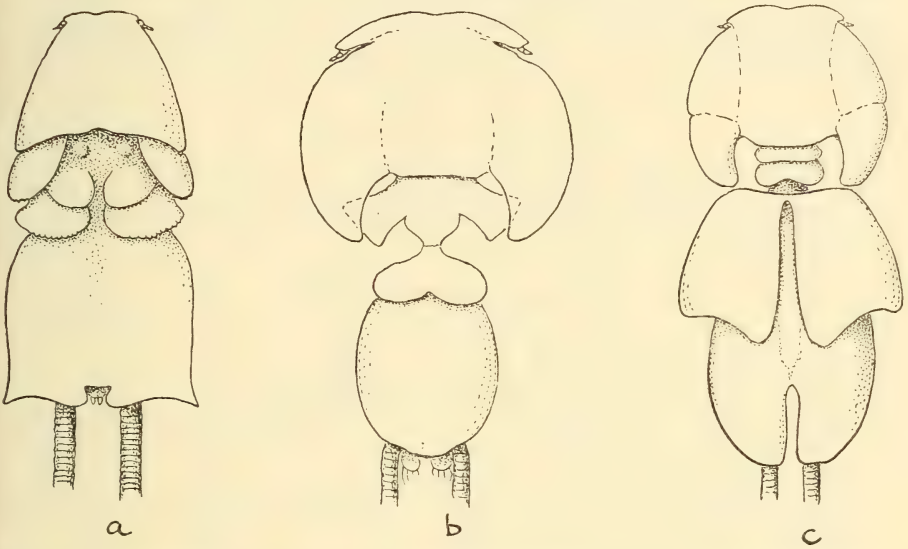


Fig. 15. *Perissopus dentatus* St. & L. *a*, ♀; *Nesippus alatus* Wilson. *b*, ♀. *Echthrogaleus coleoptratus* (Guérin). *c*, ♀.

Gen. *Dinemoura* Latr.

1814. Rafinesque, *Précis Som.*, p. 31 (*Dinemurus*).
1829. Latreille, *Règne Anim.*, iv, Crust., p. 197.
1835. Burmeister, *Nova Acta Ac. Leop. Carol.*, xvii, 1, p. 284 (*Dinematura*).
1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 85.
1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 374 (key to species) (*Dinematura*).
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 430, and 608, 609 (in key) (*Dinematura*).
1943. Dollfus, *Bull. Inst. ocean. Monaco*, 851, p. 7 (comparison *Dinematura* with *Demoleus*).

♀—Body elongate-oval, carapace with grooves. Dorsal plates on 4th segment moderate, divided by a deep sinus. Genital segment oblong. Segment 6 distinctly separated from genital segment, with a pair of dorsal plates, and ventrally a rudimentary pair of legs. Abdomen small, one-segmented; caudal rami laminate, with nonplumose setae. Two adhesion pads behind each antenna 1. Maxilliped 2 with terminal claw closing between 2 knobs on basal

joint. Four pairs of biramous legs, both rami of 1st 2-jointed, of 2nd and 3rd 3-jointed, of 4th laminate, 1-jointed; first 3 pairs with plumose setae, 4th without setae or spines. Ovisacs straight, elongate, uniseriate.

♂—Carapace broadly oval; 2nd segment with lateral processes, 3rd without dorsal or lateral plates, 4th with or without lateral lobes slightly overlapping genital segment. Genital and 6th segments fused. Abdomen 2-segmented; caudal rami laminate, with 4 plumose setae. All 4 pairs of legs biramous, rami of 1st and 4th 2-jointed, of 2nd and 3rd 3-jointed.

On various sharks.

Wilson (1907, p. 375) ascribes the establishment of the genus to Latreille in 1829, and makes no mention of Rafinesque 1814. Latreille seems to have altered Rafinesque's spelling. The original works are not accessible to me. But Wilson's combination '*Dinematura* Latreille' is certainly not acceptable.

Key to the South African species

1. ♀ carapace ⅓ total length. Dorsal plates of 4th segment much longer than wide, apically rounded. ♂ 4th segment without lateral lobes. *producta*
2. ♀ carapace ½ total length. Dorsal plates of 4th segment wider than long, posterior margin truncate. ♂ 4th segment with lateral lobes. *latifolia*

Dinemoura producta (Müller)
Fig. 16 *a*, *b*.

1785. Müller, *Entomostr.*, p. 132, pl. 21, figs. 3, 4.
1907. Wilson, loc. cit., p. 380, pl. 23 (references).
1913. Scott, T. & A., loc. cit., p. 86, pl. 22, fig. 3, pl. 26, figs. 1–3, pl. 27, figs. 1–8.
1923. Fage, *Bull. Soc. zool. Fr.*, xlviii, p. 281.
1923. Wilson, *Ark. Zool.*, xv, 3, p. 8, pl. 2, figs. 11–18 (♂).
1932. id., loc. cit., p. 431, fig. 270.
1944. Brian, *An. Mus. Argent.*, xli, p. 202 (*Dinematura p.*).
1950. Matthews & Parker, *Proc. Zool. Soc. Lond.*, cxx, p. 568, figs. 14, 15 (*Dinematura p.*).

♀—Carapace subcircular, about ⅓ total length. Dorsal plates of 4th segment longer than wide, apically rounded. Genital segment with apices of dorsal plates obliquely truncate. Abdomen quadrangular.

♂—4th segment without lateral lobes, hind margin slightly sinuous. Genital segment elliptical.

♀ up to 20 mm., ovisacs 40–80 mm., ♂ 12·5 mm.

Locality. Durban (Wilson).

Distribution. Northern Atlantic. Usually on *Lamna cornubica*, also on *Alopias*, *Scymnus*, *Laemargus*, and *Cetorhinus*.

Remarks. Matthews and Parker figure the ♂ and ♀ 2nd maxillipeds showing differences in the specimens taken on *Lamna* and *Cetorhinus* and differences in other appendages are noted. It is suggested that 'the species has a number of ecotypic variants associated with the different hosts' (p. 568), the differences being 'determined by the nature of the host-skin on which the larvae settle' (p. 573).

Dinemoura latifolia St. & L.

Fig. 16 *c*, *d*.

1861. Steenstrup & Lütken, *K. Dansk. Viden. Selsk. Skr.* (5), v, p. 378, pl. 8, fig. 16.
1907. Wilson, loc. cit., p. 383, pls. 24, 25.
1923. id., loc. cit., p. 6, pl. 1, figs. 6–10, pl. 2, fig. 19 (immat. ♀).
1932. id., loc. cit., p. 432, fig. 271.
1936. Yamaguti, *Paras. Copep. Japan*, pt. 3, Caligoida 2, p. 9, pls. 5, 6.
1944. Brian, loc. cit., xli, p. 201 (*Dinematura l.*).
1954. Debouttéville & Nunes-Ruivo, *Vie et Milieu*, iv, p. 204, figs. 2, 3 (*Dinematura l.*).

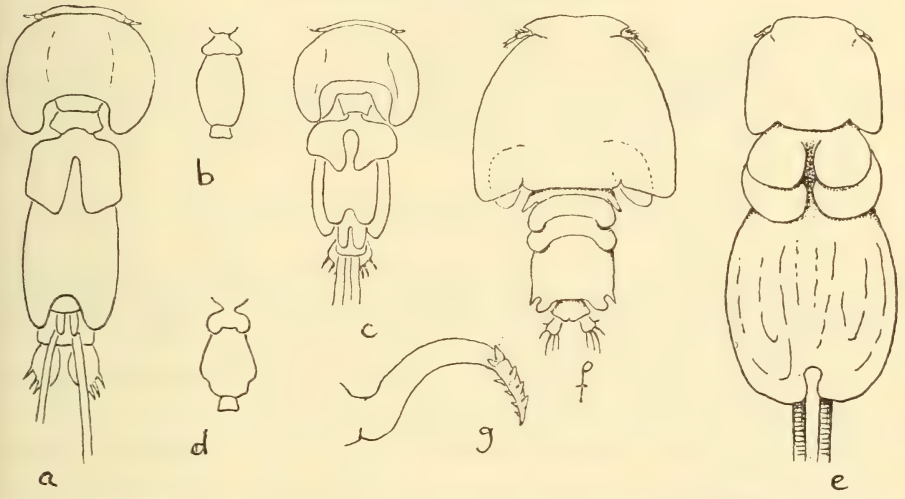


Fig. 16. *Dinemoura producta* (Müller). *a*, ♀; *b*, 4th and genital segments ♂. *Dinemoura latifolia* St. & L. *c*, ♀; *d*, 4th and genital segments ♂. *Achtheinus dentatus* Wilson. *e*, ♀; *f*, ♂. *g*, antenna 2 ♀ (copies: *a*, after Scott; *b-d*, after Wilson).

♀—Carapace broadly ovate, about ½ total length. Dorsal plates of 4th segment wider than long, posterior margin truncate and slightly emarginate. Genital segment with apices of dorsal plates bluntly rounded. Abdomen kidney-shaped, twice as wide as long.

♂—4th segment with lateral lobes. Genital segment somewhat wedge-shaped.

♀ up to 16 mm., ovisacs 30 mm., ♂ 8·5 mm.

Locality. Durban (Wilson).

Distribution. Northern Atlantic and Mediterranean, Argentine, Pacific.

Gen. *Echthrogaleus* St. & L.

1861. Steenstrup & Lütken, *K. Dansk. Videns. Selsk. Skr.* (5), v, p. 380.
1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 362 (key to species).
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 426, and 608, 609 (in key).

♀—Body ovate-elliptical. Carapace with grooves. Dorsal plates of 4th segment large, covering more than half genital segment. The latter as large as or larger than carapace, with deep posterior sinus between rounded lobes. Abdomen small, wholly or partly concealed beneath genital segment; caudal rami large, with nonplumose setae. Four pairs of biramous legs, rami of 1st pair 2-jointed, outer rami of 2nd and 3rd 3-jointed, inner rami 2-jointed, rami of 4th pair large, lamellate, indistinctly jointed. Ovisacs elongate, filiform, uniseriate.

♂—Carapace broader than long, with accessory lobes on hind margin. 2nd-4th thoracic segments free, each with a pair of small dorsal plates. Genital segments much smaller than carapace. Abdomen visible in dorsal view, 2-segmented; caudal rami large, with plumose setae.

On sharks.

Echthrogaleus coleoptratus (Guérin)

Fig. 15 *c*.

1907. Wilson, loc. cit., p. 367, pl. 19.
1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 559 (not the specimen there recorded, which = *Philorthragoriscus*, *q.v.*).
1923. Wilson, *Ark. Zool.*, xv, 3, p. 13.
1932. id., loc. cit., p. 427, pl. 27.
1936. Yamaguti, *Paras. Copep. Japan*, pt. 3, p. 7, pls. 4, 5.
1944. Brian, *An. Mus. Argentino*, xli, p. 202.

♀—Body more than twice as long as wide, carapace smaller than genital segment. Margins of plates on 4th segment not serrate. Abdomen concealed.

♂—Carapace subcircular. Lateral lobes of 2nd segment extending outwards, tips concealed by lobes of carapace.

♀ 12–14 mm., ♂ 3·6 mm. Yellowish; carapace, especially the central portion, and dorsal plates of 4th segment brown.

Localities. Durban (Wilson); Kalk Bay (False Bay), on *Carcharinus glaucus*. 1 ♀ (S. Afr. Mus.).

Distribution. Atlantic and Indian Oceans, Pacific, Argentine.

Remarks. In the General Catalogue of S.A. Crustacea Stebbing recorded a specimen ('No. 54') from *Orthagoriscus mola*. In tube 54, as returned to the S.A. Museum, with Stebbing's autograph label, there were 3 specimens of *Philorthragoriscus* (not recorded by Stebbing) and no *Echthrogaleus*. The Sunfish would be an unusual host for this latter genus. (cf. 1946, Dollfus, *Ann. Soc. Sc. Nat. Charante-Maritime*, iii, 7, p. 71.)

Wilson's record, and the present specimen, however, prove that the genus does occur in South Africa, as would be expected.

Gen. *Nesippus* Heller

1865. Heller, *Reise 'Novara', zool.*, ii, Crust., p. 193.
1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 424.
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 438, 607, 609 (in key).
1943. Heegaard, *Ark. Zool.*, xxxiv, A 16, p. 6.
1944. Wilson, *Proc. U.S. Nat. Mus.*, xciv, p. 538 (♂ formerly ascribed to *Achtheinus*).

♀—Carapace broader than long, smooth, without grooves; 2nd and 3rd segments fused, with lateral plates; 4th segment free, with a pair of fused dorsal plates. Genital segment large, ovate, without posterior processes or rudiments of legs. Abdomen small, concealed; caudal rami large, more or less concealed. Antenna 2 uncinate. Maxilliped swollen, with terminal claw. Four pairs of biramous legs, rami of first 3 pairs 2-jointed, of 4th 1-jointed. Ovisacs elongate, filiform, uniseriate.

♂—Carapace ovate. Free thoracic segments much narrower than carapace, 2nd segment with lateral lobes. Genital segment ovate, without rudiments of legs (or these reduced to mere spines). Abdomen one-segmented; caudal rami small, with plumose setae. Maxilliped with knobs or a terminal claw. Legs resembling those of ♀.

Nesippus alatus Wilson
Fig. 15 *b*.

1907. Wilson, loc. cit., p. 426, pls. 34, 35 (♀ ♂).
1932. id., loc. cit., p. 438, fig. 276 (♀ ♂).

♀—Dorso-lateral plates of 2nd segment large, alate, angular; dorsal plates of 4th segment slightly overlapping base of genital segment.
6–7 mm., ovisacs 12–13 mm.

Locality. Durban, on hind part of tongue of *Carcharodon carcharias* (numerous ♀♀, C. L. Biden, 1953).

Distribution. Eastern coast of N. America, on various sharks (Wilson).

Remarks. Usually found on the gill-arches, rarely on the floor or roof of the mouth; Wilson (1932) says this is the only Copepod likely to be found inside the throat of a shark.

Heller's species *orientalis* and *crypturus* were taken at Java; neither of them have the alate plates on 2nd segment characteristic of *alatus*, and the plates on 4th segment do not reach the genital segment.

Brian (1924. 'Parasitol. Mauritanica,' fasc. 1, p. 33) identifies Mauritanian specimens with *orientalis*. Capart (1953. *Bull. Inst. franç. Afr. Noire*, XV, 2, pp. 658, 659, fig. 6) also identifies Senegal specimens with *orientalis*, and considers that more abundant material will eventually show that *alatus* Wilson and *angustatus* v. Ben. should be united with Heller's species. Capart's fig. 6 certainly suggests that the plates on 2nd segment are alate.

Gen. *Achtheinus* Wilson

1908. Wilson, *Proc. U.S. Nat. Mus.*, xxxv, p. 450.
1911. id., ibid., xxxix, p. 630.
1912. id., ibid., xlii, p. 235.
1924. Kurtz, *SB. Ak. Wiss. Wien. Abt.*, 1, cxxxiii, p. 613 (*Pholidopus*).
1927. Wilson, *Science*, N.Y., lxvi, p. 397 (validity of genus).
1922. id., *Ark. Zool.*, xiv, no. 10, p. 4.
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 608, 609 (in key).
1936. Yamaguti, *Parasit. Copep. Japan*, pt. 3, Caligoida 2, p. 11.
1944. Wilson, *Proc. U.S. Nat. Mus.*, xciv, p. 539.

♀—Body ovate-elliptical; carapace (head + 1st thoracic segment) smooth, without grooves; 2nd and 3rd segments fused, with a single pair of dorsal plates; 4th segment free, with a similar pair of plates. Genital segment with apical median sinus. Abdomen small, concealed beneath genital segment, caudal rami large, partly or wholly concealed. Antenna 2 stout, with strong claw. Maxilliped swollen, with slender apical claw. Four pairs of biramous legs, rami of first 3 pairs 2-jointed, of 4th pair 1-jointed. Ovisacs straight, elongate, uniseriate.

♂—Carapace, broadly ovate. Free thoracic segments much narrower than carapace, dorsal plates represented only by lateral lobes. Genital segment with rudiments of 5th legs. Abdomen 1-segmented, caudal rami laminate, with 4 setae. Antenna 2 without teeth. Maxilliped with strong terminal claw. Legs resembling those of ♀.

On sharks.

Pholidopus Wilson 1907 (pro *Lepidopus* Dana 1852 preocc.) and *Achtheinus* are very closely related, but Wilson (1927) showed that Kurtz's arguments were ill-founded, and maintained the validity of the latter genus.

Key to the South African species (♀♀)

1. Antenna 2 dentate. *dentatus*
2. Antenna 2 not dentate. *pinguis*

Achtheinus dentatus Wilson

Fig. 16 *e–g*.

1911. Wilson, loc. cit., p. 630, pl. 67, figs. 22–31 (♀).
1912. id., loc. cit., p. 238.
1917. Stebbing, *Ann. S. Afr. Mus.*, xvii, p. 41, pl. 8 (*S. Afr. Crust.*, pl. 97) (♀ & ♂)
1921. Wilson, *Proc. U.S. Nat. Mus.*, lix, p. 6, pl. 3, figs. 20–27 (♂ & immature ♀).
1922. id., *Nyt Mag. Naturv.*, lx, p. 107.
1923. id., *Medd. Goteb. Mus. Zool. Avd.*, no. 19, p. 7, pl. 1, figs. 6–12 (♀) (*parvidens*).
1944. id., loc. cit., p. 537, pl. 33, figs. 196–208 (♀ & true ♂).
1944. Brian, *An. Mus. Argentino*, xli, p. 203, pl. 2, figs. 15–17, pl. 3, figs. 18–29 (♀ ♂).

♀—Carapace about as broad as long, posterior corners rounded (not acute as might be thought from Stebbing's figure). Antenna 2 falciform, with a double row of stout teeth apically, 4 teeth on dorsal edge and 3 on ventral edge of inner margin, and a pair of slightly larger teeth proximally to these two rows. Dorsal plates separate from their bases. Abdomen with an accessory lobe on each side at base.

♂—Carapace slightly longer than broad (as broad as long if pressed flat), hind margin as in ♀. Lateral angles of 1st free segment subacute; on 2nd and 3rd segments rounded and overlapping the succeeding segment. Genital segment quadrate, hind corner with a minute spiniferous denticle (5th leg); hind margin with a rounded exsert lobe on each side.

♀ up to 8·5 mm., ovisacs 15–18 mm.; ♂ 3·75 mm. Yellowish.

Localities. Algoa Bay, on shark (Stebbing); Table Bay, on *Acanthias* (Wilson); Kalk Bay, on *Mustelus* and *Carcharias*; Table Bay, on *Carcharodon* (S. Afr. Mus.); Natal, on dogfish (Natal Mus.).

Distribution. Coast of Peru and California, Argentine.

Remarks. Stebbing says Wilson's figure shows the relative length and breadth of the ♀ carapace better than his; in fact Stebbing's figure is an accurate representation of the South African specimens. Wilson (1911) described and figured the 2nd antenna as having only a single row of teeth, but corrected this statement in 1921, and in 1944 (fig. 197).

Stebbing described what he thought was a ♂, and appeared to have considered this the first description of the ♂ of this genus. Wilson, however, in 1912 had described a ♂ assigned to *A. pinguis*.

In 1921 Wilson, without reference to Stebbing's 1917 paper, described a ♂ assigned to *dentatus*, and also immature ♀♀. Wilson's immature ♀, 3·5 mm. in length, corresponds with the specimen described by Stebbing as a ♂. Stebbing found his specimen attached to the underside of the genital segment of a ♀, with the head pointing forwards. Among other specimens of the same lot there are several such 'pairs', and from the position of the smaller specimens one would naturally assume them to be males.

In 1944 Wilson, again without reference to Stebbing, retracted his 1912 description of the ♂ of *pinguis* (assigning it to *Nesippus**), and also his description of the (supposed) ♂ of *dentatus*. The supposed immature ♀♀ are now regarded as ♂♂.

Thus Stebbing was right in claiming the first description of the ♂, not only of *dentatus*, but of the genus *Achtheinus*.

Wilson's *parvidens* is obviously a synonym.

Achtheinus pinguis Wilson

1912. Wilson, loc. cit., p. 235, pl. 31, figs. 8–14 (♂), pl. 32, figs. 15–21 (♀).
1923. id., *Ark. Zool.*, xv, 3, p. 5.
1941. Capart, *Mem. Mus. R. Hist. Nat. Belge*, ser. 2, fasc. 21, p. 184, figs. 5–7.
Not 1944. Wilson, loc. cit., p. 538 (♂ = *Nesippus*).

♀—Similar to *dentatus*, but antenna 2 not dentate.

5·75 mm.

Localities. Cape of Good Hope, on Saw-shark (*Pliotrema warreni*) (Wilson); Table Bay, on 'dogfish shark' (Wilson); off Dassen Island (West coast), on *Acanthias vulgaris* (Capart).

Remarks. The differences in plumpness and relative width of carapace between this species and *dentatus*, mentioned by Wilson, would not seem to be of great significance.

Unfortunately the only specimens (♀♀) in the South African Museum from *Pliotrema* have lost the 2nd antennae, and are therefore only presumed to be *pinguis*. They were collected in 1898 by Dr. Gilchrist, then Marine Biologist to the Cape Government.

* See Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 424.

Fam. Cecropidae

1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 461 (*Cecropinae*).
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 441.

The four genera, three of which occur in South Africa, are found most commonly on Sunfishes (*Molidae*), but are found occasionally also on *Diodon*, *Thynnus*, and other Teleosts, and on sharks.

More gregarious than the *Pandaridae*, and when thus congregated in bunches cause sores and pits in the flesh of the host. Both sexes are incapable of swimming.

Gen. *Cecrops* Leach

1816. Leach, *Encycl. Brit.* (suppl. to 4th-6th eds.), I, (2), p. 405.
1907. Wilson, loc. cit., p. 466.
1923. id., *Amer. Mus. Nov.*, no. 80, p. 1.
1932. id., loc. cit., p. 441 (diagnosis of ♂ legs not quite accurate).

♀—Carapace oval, deeply emarginate posteriorly, frontal plates fused with carapace. 3rd segment with small fused dorsal plates; 4th segment with larger fused plates. Genital segment with fused dorsal plates larger than carapace. Abdomen with expanded ventral plates. Antenna 1 2-jointed. Rami of 1st-3rd pairs of legs 2-jointed, of 4th pair 1-jointed. Ovisacs numerous, irregularly coiled, concealed, uniseriate.

♀—similar to ♀ but 4th dorsal plates not completely covering abdomen. 4th pair of legs not much enlarged.

Margins of carapace and dorsal plates in both sexes smooth.

Two species, one of which is found chiefly on the Sunfish, usually attached to the gills, but has also been found on *Diodon*, *Thynnus*, and *Pleuronectes*; the other (*exiguus* Wilson 1923) on sharks.

Cecrops latreillii Leach
Fig. 17 *a–c*.

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 465 (references).
1907. Wilson, loc. cit., p. 468, pls. 38, 39.
1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 558.
1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 13 (references).
1932. Wilson, loc. cit., p. 442, fig. 278.
1936. Yamaguti, *Paras. Copep. Japan*, pt. 3, p. 10, pl. 6, figs. 62–66.

Ovig. ♀ up to 30 mm., width 12–15 mm.; ♂ up to 17 mm., width 11 mm. Uniform yellowish white.

Locality. From the Cape (Stebbing, and S. Afr. Mus.), on the Sunfish (*Orthagoriscus* = *Mola*).

Distribution. Atlantic and Pacific Oceans.

Remarks. Heegaard (1943. *Ark. Zool.*, xxxiv, 18, p. 26) records a specimen from *Thynnus*, but suggests that this may be due to a mistake in labelling, or accidental transference from the parasite's normal host.

Gen. *Orthagoriscicola* Poche

1902. Poche, *Zool. Anz.*, xxvi, p. 15.
1907. Wilson, loc. cit., p. 472.
1932. id., loc. cit., p. 443.

♀—Carapace subcuneiform, shallowly emarginate posteriorly, lateral margins serrate, frontal plates fused with carapace but their outlines indicated by grooves. Dorsal surface spinulose. 2nd and 3rd segments free, without dorsal plates; 4th segment with large fused plates, with serrate margins. Genital segment with large overlapping dorsal plates, with serrate margins. Abdomen with expanded lateral plates. Antenna 1 3-jointed. Rami of 1st and 2nd pairs of legs 2-jointed, of 3rd and 4th 1-jointed and laminately enlarged. Ovisacs numerous, irregularly coiled, concealed, uniseriate.

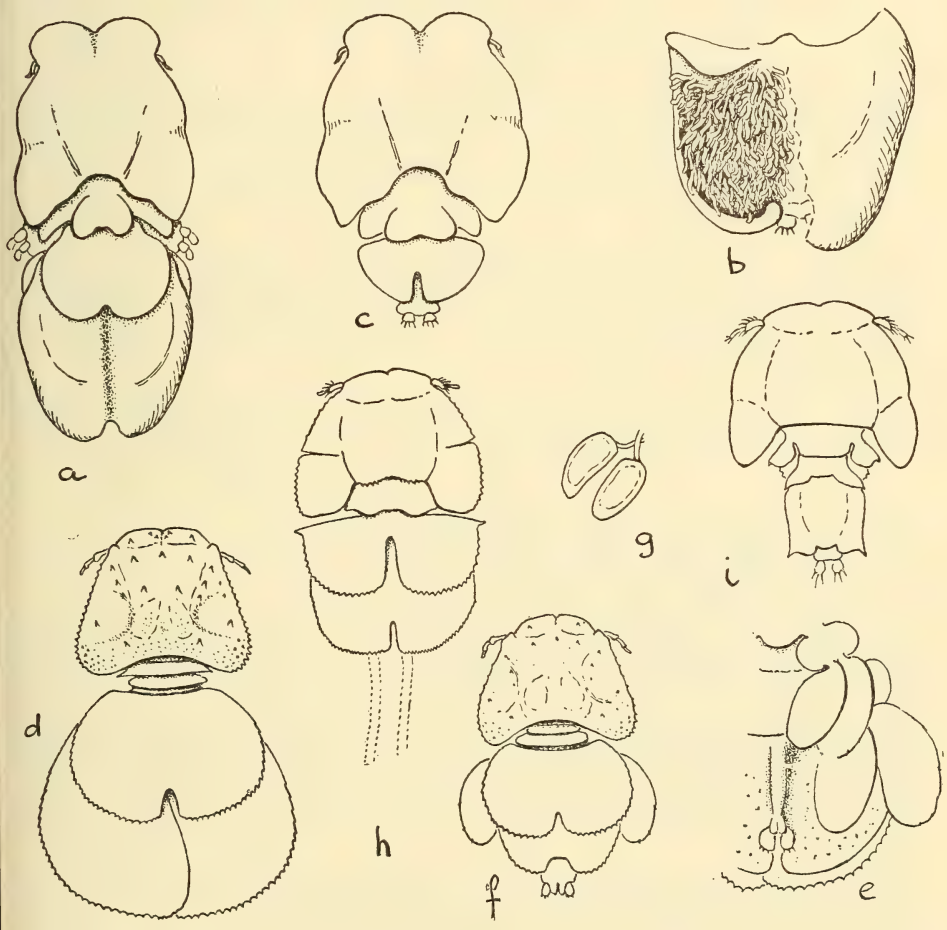


Fig. 17. *Cecrops latreillei* Leach. *a*, ovigerous ♀; *b*, genital segment ♀; left half of dorsal plate removed to show ovisacs; *c*, ♂. *Orthagoriscicola muricatus* (Kröyer). *d*, ♀; *e*, ventral view ♀ genital segment with abdomen and 3rd and 4th legs; *f*, ♂; *g*, ♂ spermatophores removed from ♀. *Philorthragoriscus serratus* (Kröyer). *h*, ♀; *i*, ♂ (copy after Wilson).

♂—Similar to ♀ but carapace relatively wider. Genital segment much swollen, its dorsal plates fused, with posterior sinus, margins serrate. Abdomen and caudal rami relatively larger. Rami of 1st-3rd pairs of legs 2-jointed, of 4th pair as in ♀.

A single species found on the Sunfish (*Orthagoriscus* = *Mola*), on the gills or more frequently on the surface of the skin; has also been found on *Selene vomer* (*Carangidae*).

Orthagoriscicola muricatus (Kröyer)
Fig. 17 *d–g*.

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 467 (*Laemargus m.*).
1907. Wilson, loc. cit., p. 473, pls. 40, 41.
1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 559.
1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 14, pl. 2, figs. 1, 2, pl. 6, figs. 5–8 (references).
1932. Wilson, loc. cit., p. 443, fig. 279.

Ovig. ♀ up to 20 mm., width 7–9 mm.; ♂ up to 15 mm., width 8 mm. Pale yellow.

Locality. Table Bay (Stebbing and S. Afr. Mus.), on *Mola.*

Distribution. Atlantic.

Remarks. Wilson states that the carapace of ♂ has the margins and dorsal surface smooth; but that is not the case with the specimens I have examined, in which the ♂ carapace resembles that of the ♀ though not so strongly serrate and spinulose.

One ♂ in the S.A. Museum collection still has the two frontal filaments attached though it is mature with fully developed spermatophores. The filaments are nearly as long as the body.

Gen. *Philorthragoriscus* Horst

1897. Horst, *Notes Leyden Mus.*, xix, p. 137.
1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 478.
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 444.

♀—Carapace rounded, deeply emarginate posteriorly, lateral margins serrate, frontal plates fused. 4th segment with a pair of large plates fused at base, but deeply cleft, margins serrate. Genital segment not quite as large as carapace, with fused dorsal plates, apically cleft, margins finely serrate, antero-lateral angle acute. Abdomen concealed, without lateral expansions; caudal rami large. Antenna 1 2-jointed. Rami of 1st-3rd pairs of legs 2-jointed, with spines and setae; peduncles of 3rd pair large, concealing the small 4th pair of legs, the rami of which are 1-jointed, with spines only. Ovisacs elongate, not concealed.

♂—Carapace much larger than rest of body, 2nd and 3rd segments fused, with small lateral plate. 4th segment with rudimentary dorsal plates. Genital segment quadrangular, with short fused dorsal plates at its base, postero-lateral angles acute.

A single species parasitic on the Sunfish; originally placed in *Dinemoura* (*Pandaridae*).

Philorthragoriscus serratus (Kröyer)

Fig. 17 *h*, *i*.

1863. Kröyer, *Naturh. Tidsskr.*, p. 176, pl. 8, figs. 4 *a–i* (*Dinematura s.*).
1897. Horst, loc. cit., p. 137, pl. 7.
1907. Wilson, loc. cit., p. 479, pls. 42, 43.
1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 12, pl. 2, fig. 3, pl. 6, fig. 9.
1922. Wilson, *Nyt Mag. Naturv.*, lx, p. 108.
1932. id., loc. cit., p. 445, fig. 280.
1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 249.

♀ 7·5 mm., width 4·5 mm., ovisacs (Wilson) 15 mm.; ♂ 5 mm., width 4 mm. Yellowish, clouded with grey (Wilson).

Locality. Table Bay, on *Mola* (S. Afr. Mus.).

Distribution. Atlantic.

Remarks. A single non-ovigerous ♀ was found among the specimens of *Orthagoriscicola* identified by Stebbing, and overlooked by him; three ♀♀ returned by Stebbing labelled as 'No. 54. Echthrogaleus coleoptratus'.

Wilson (1922) records this species from *Squalus acanthias*.

Fam. Anthosomidae

1922. Wilson, *Proc. U.S. Nat. Mus.*, lx, 5, pp. 1, 19, 20 (*Dichelesthiidae* part, *Anthosominae*).
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 446 (*Anthosomidae*).

Gen. *Anthosoma* Leach

1816. Leach, *Encycl. Brit.* (suppl. to 4th-6th eds.), I, 2, p. 406.
1922. Wilson, loc. cit., p. 23.
1932. id., loc. cit., p. 446.

♀—Body short, stout; head and 1st thoracic segment fused to form a large oval carapace. 4th segment dorsally with 2 large overlapping plates concealing the genital segment and most or all of the abdomen. Abdomen 1-segmented, caudal rami narrow, unarmed. Antenna 1 6-jointed. Antenna 2 3-jointed, stout, porrect, with apical claw. Maxillipeds stout, with strong apical claw. First 3 pairs of legs large foliaceous, inner margin of 1st and 2nd pair notched but without rami; 4th pair of legs absent. Ovisacs slender, elongate, eggs uniseriate.

♂—similar but smaller; 4th segment without dorsal plates. Inner margin of 1st and 2nd legs notched, with 2 small rami, those on 1st leg ovate, the inner one on 2nd leg 2-jointed, with 3 apical curved spines, moved by powerful muscles.

Parasitic on sharks.

Anthosoma crassum (Abildgaard)

Fig. 18.

1794. Abildgaard, *Skr. nat. Selsk. Copenhagen*, iii, p. 46, pl. 5, figs. 1–3. (*Caligus c.*)
1816. Leach, loc. cit., p. 406, pl. 20, figs. 1–6 (*smithii*).

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 468.
1915. Stebbing, *Ann. S. Afr. Mus.*, xv, p. 58 (record only).
1922. Wilson, loc. cit., p. 23, pl. 1, figs. 1–8.
1923. id., *Ark. Zool.*, xv, 3, p. 13.
1924. id., *Proc. U.S. Nat. Mus.*, lxiv, p. 12.
1932. id., loc. cit., p. 446, fig. 281.
1936. Yamaguti, *Paras. Copep. Japan*, pt. 3, Caligoida 2, p. 12.
1944. Brian, *An. Mus. Argentino*, xli, p. 208, pl. 5, figs. 43, 44.
1948. Debouteville, *Bull. Mus. Hist. Nat. Paris*, xx, 5, p. 446.
1952. Birkett & Burd, *Ann. Mag. Nat. Hist.* (xii), v, p. 391. fig.

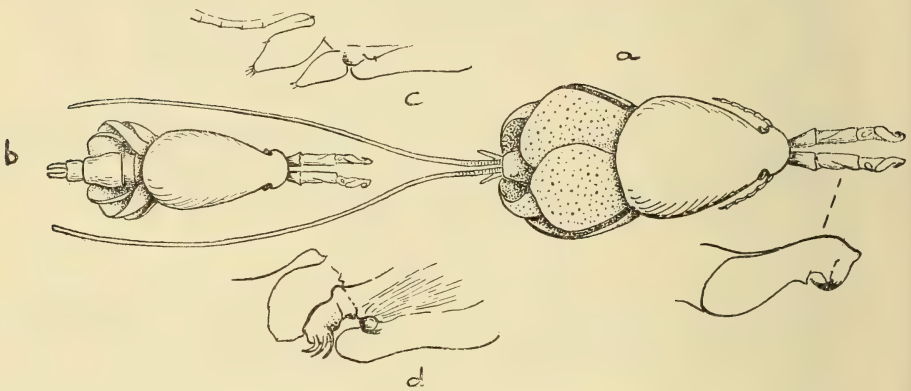


Fig. 18. *Anthosoma crassum* (Abildg.). *a*, ♀, with 2nd antenna further enlarged; *b*, ♂; *c*, 1st leg ♂; *d*, 2nd leg ♂.

♀ 15 mm., ♂ 9 mm., ovisacs 25 mm. Carapace yellowish-brown or amber, dorsal plates and foliaceous legs greyish-white, abdomen brown.

Localities. Durban (Stebbing, Wilson); Table Bay, False Bay, and Durban, on Porbeagle and species of *Carcharias* (S. Afr. Mus.).

Distribution. Europe, east and west coasts of N. America, New Zealand, Japan, Argentine. On various sharks: *Lamna*, *Carcharias*, *Isurus*, *Oxyrhyncha*, *Cetorhinus*, *Selache*.

Remarks. Wilson says this parasite is usually found in the throat attached to the gill-arches. Birkett & Burd record a heavy infestation in the skin of the underside of the shark, *Selache*, extending around the [axils of the] pectoral fins and into the mouth and gill-slits.

The South African Museum specimens were collected by Mr. C. L. Biden (1928 and 1953) from among the teeth of Porbeagles and species of *Carcharias*. The parasites were present in enormous numbers, closely packed together; the flesh of the jaws was raw and suppurating, and in some cases most of the teeth had fallen out. As Birkett & Burd remark, such an infestation must seriously endanger the health and even the life of the host.

Gen. *Lernanthropus* Blainv.

1822. Blainville, *J. de Physique*, xcv, p. 443.
1832. Nordmann, *Mikrosc. Beitr.*, ii, p. 45 (*Epachthes*).
1864. id., *Bull. Soc. Nat. Moscou*, xxxvii, p. 510 (*Stalagmus*).
1922. Wilson, loc. cit., p. 30 (key to species).
1932. id., loc. cit., p. 447, and 609 (in key).
1935. id., *Pap. Tortugas Lab. Carneg. Inst.*, xxix (452), p. 338.
1936. Yamaguti, *Parasit. Copep. Japan*, pt. 3, pp. 13–18.
1940. Gnanamuthu, *Rec. Ind. Mus.*, xlv, p. 291.
1950. id., *Parasitology*, xl, p. 277.
1954. Deboutteville & Nunes-Ruivo, *Bull. Inst. franç. Afr. Noire*, xvi, pp. 141–58.
1954. Yamaguti, *Publ. Seto Mar. Biol. Lab. III*, 3, pp. 387 sqq.

♀—Head and 1st thoracic segment fused into a carapace with lateral margins curved down ventrally. 2nd-4th segments fused, covered by a single dorsal plate prolonged backwards over genital segment and abdomen; latter 1- (or 2-) segmented. Antenna 1 filiform, joints more or less fused. Antenna 2 and maxillipeds prehensile, uncinate. 1st and 2nd pairs of legs biramous but rudimentary; rami of 3rd and 4th pairs modified: each leg of the 3rd pair formed of fused inner and outer ramus, folded along middle (cross-section semicircular), fleshy; rami of 4th legs elongate, extending backwards, fleshy. Ovisacs elongate, filiform, eggs uniseriate.

♂—Carapace with flat margins. 2nd-4th segments fused with genital segment, no dorsal plate. Abdomen 1-segmented, visible dorsally. 1st-3rd legs as in ♀, rami of each 4th leg fused, elongate, projecting backwards.

Key to the South African species

1. Ventral plate present. *petersi*
2. Ventral plate absent. *paradoxus*

Lernanthropus petersi v. Ben.

Fig. 19.

1857. Van Beneden, *Bull. Ac. Roy. Belgique*, xxiv, n.s. I, pp. 51–63, pl.
1864. Nordmann, loc. cit., p. 510 (*Stalagmus p.*).
1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 472 (reference to van Beneden omitted).
1922. Wilson, loc. cit., p. 35 (in key).
1939. Brian, *Rev. Zool. Bot. Afr.*, xxxii, p. 183, fig. vi.

♀—A dorsal plate covering entire body, only rami of 3rd and 4th legs visible dorsally; posterior margin of plate pointed. A ventral plate similar to the dorsal plate, covering bases of 3rd and 4th legs but leaving genital segment and abdomen uncovered. (Characters from Wilson's 1922 key.)

10 mm.

Localities. Mozambique, on gills of *Serranus goliath* (= *Epinephelus fuscoguttatus*) (van Beneden); Belgian Congo, host unknown (Brian).

Lernanthropus paradoxus (Nordm.)

1832. Nordmann, *Mikrogr. Beitr.*, ii, p. 45 (*Epachthes p.*).
1833. Burmeister, *Act. Ac. Leop. Car. Nat. Cur.*, xvii, p. 307, pl. 14, fig. 12.

1840. Milne Edwards, *Hist. Nat. Crust*, iii, p. 499
1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 469.
1922. Wilson, loc. cit., pp. 22, 36, and 35 (in key).

♀—A dorsal plate covering entire body, only rami of 3rd and 4th legs visible, but no ventral plate. 3rd and 4th legs, genital segment, and abdomen entirely visible in ventral view. 3rd legs biramous. (Characters from Wilson's 1922 key.)

8·7 mm.

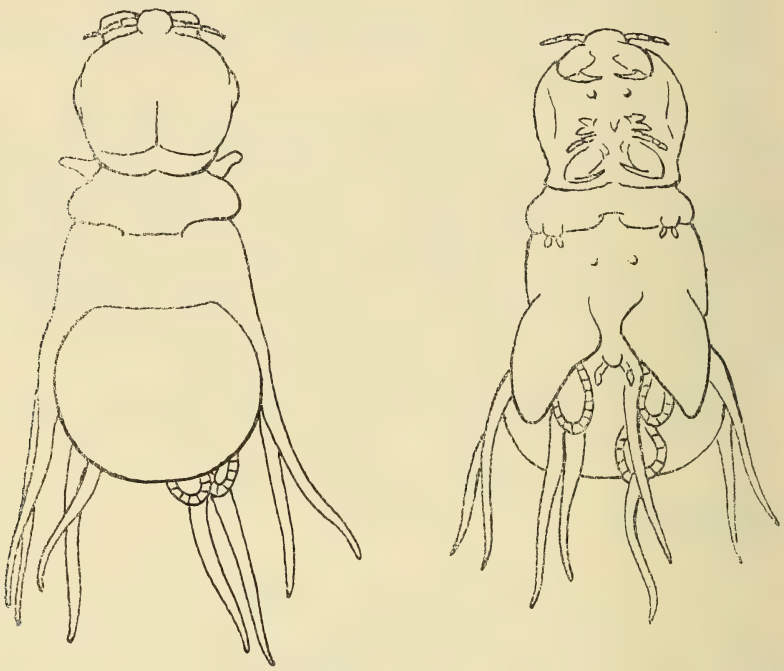


Fig. 19. *Lernanthropus petersi* van Ben. Dorsal and ventral views ♀ (copies from van Beneden; the ventral view shows the 2nd antennae turned downwards as in Brian's figure).

Locality. Cape of Good Hope, on *Mugil* sp.

Remarks. Wilson (1922, p. 36) says that Nordmann in his text referred to pl. 12, figs. 12-14, that no such plate was published, and that the only illustration of this species is that published by Burmeister.

Fam. Eudactylinidae

1922. Wilson, *Proc. U.S. Nat. Mus.*, lx, 5, pp. 1, 19, 20 (*Dichelesthiidae* part, *Eudactylinae*).
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 452 (*Eudactylinidae*).

Gen. *Nemesis* Risso

1826. Risso, *Hist. Nat. Eur.*, v, p. 135.
1913. Wilson, *Proc. U.S. Nat. Mus.*, xliv, p. 236.
1922. id., loc. cit., p. 58 (references and key to 5 species) (characters of ♂ incorrectly stated).
1923. Fage, *Bull. Soc. Zool. Fr.*, xlviii, p. 282.
1932. Wilson, loc. cit., p. 460 (key to 3 species).

♀—Head and 1st thoracic segment fused. Carapace elliptical, longer than wide. 1st-3rd free segments wider than long, each covered with a dorsal plate whose sides curve round on to ventral surface; 4th free (= 5th) segment narrower than preceding segments; genital segment narrower than 4th. Abdomen narrow, 2-3-segmented; caudal rami tipped with spine-setae. Antenna 1 10-15-jointed. Antenna 2 uncinate. Maxillipeds large, uncinate. 4 pairs of biramous legs, rami of 1st pair differing from those of 2nd-4th; 5th pair rudimentary, uniramous. Ovisacs elongate, filiform, uniseriate. Spermatophores spherical, attached to genital segment.

♂—Similar, but narrower. Dorsal plates of 1st-3rd free segments not curved over ventrally to such an extent as in ♀; 4th free segment much shorter than 3rd; genital segment large. Abdomen 3- or 4-segmented; caudal rami larger than in ♀. 1st-4th pairs of legs larger, more strongly setose.

Gill-parasites on sharks.

Nemesis pallida Wilson
Fig. 20 *a*, *b*.

1932. Wilson, loc. cit., p. 464, pl. 30 *b–p*.
1935. id., *Pap. Tortugas Lab. Carn. Inst.*, xxix (452), p. 340.
1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 250.

♀—Carapace regularly oval, greatest width in centre. 1st free segment without notch on lateral margin; 4th free segment wider than long, but narrower than 3rd, hind margin evenly curved, sternal plate just visible laterally. Genital segment wider than long. Abdomen 3-segmented. Antenna 1 13-14-jointed. No trace of 5th pair of legs on the 4th free segment.

♂—Abdomen 4-segmented.

♀ 4·5 mm., ovisacs 7–8 mm., ♂ 4 mm. As preserved dirty yellowish-grey, ovisacs yellow, spermatophores dark maroon.

Locality. Table Bay, on gills of Thresher shark (*Alopias*) (S. Afr. Mus.).

Distribution. East coast of N. America.

Remarks. In general features these specimens correspond with Wilson's description, but the hind margin of the 5th (4th free) segment in ♀ cannot be described as 3-lobed.

Fam. Dichelesthiidae

1922. Wilson, *Proc. U.S. Nat. Mus.*, lx, 5, pp. 1, 19–21. (*Dichelesthiidae*, part, *Dichelesthiinae*.)
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 476. (*Dichelesthiidae* restricted.)

Lamproglena Nordmann has the abdomen nearly as long as the trunk, obscurely 3-segmented. *L. monodi* Capart (1944. *Bull. Mus. Hist. Nat. Belg.*,

xx, 24, p. 8, fig. 2) occurs in the Belgian Congo on the fresh-water fishes *Serranochromis thumbergi* and various species of *Haplochromis*.

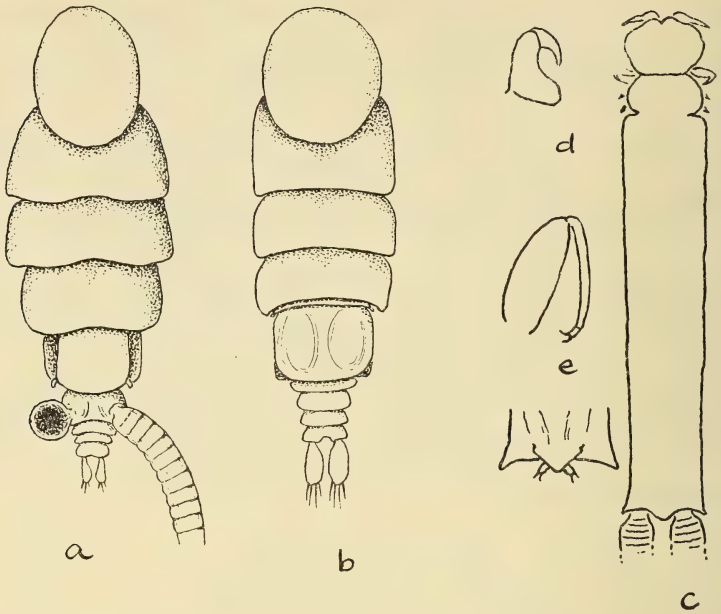


Fig. 20. *Nemesis pallida* Wilson. *a*, ♀, spermatophore shown on left, base of ovisac on right side; *b*, ♂. *Hatschekia acuta* Brnrd. *c*, ♀, with ventral view of abdomen; *d*, antenna 2; *e*, maxilliped.

Gen. *Hatschekia* Poche

1902. Poche, *Zool. Anz.*, xxvi, p. 16.
1913. Wilson, *Proc. U.S. Nat. Mus.*, xliv, p. 239.
1922. id., loc. cit., p. 81 (key to species).
1932. id., loc. cit., p. 476.
1939. Yamaguti, *Paras. Copep. Japan*, pt. 5, Caligoida 3, vol. *Jubil. Prof. Yoshida*, II, pp. 458–69.
1951. Pearse, *Proc. U.S. Nat. Mus.*, ci, p. 357.
1953. Yamaguti, *Publ. Seto. Mar. Biol. Lab.*, III, 2, p. 225.
1954. id., ibid., III. 3 pp. 392 sqq.

♀—Head rounded or transversely oval. First 2 thoracic segments more or less free, but often fused, each with a pair of biramous legs. Remaining thoracic segments and genital segment forming a trunk, subcylindrical, more or less elongate, but sometimes elongate-ovate. Abdomen short, 1-segmented, or absent. Antenna 1 3-6-jointed, often indistinctly jointed. Antenna 2 stout, with apical claw. Maxilliped slender, uncinate. Two pairs of biramous legs, sometimes rudiments of 3rd and 4th pairs. Ovisacs cylindrical, short or moderately long, eggs uniseriate.

♂—Head rounded, separated from the fused thoracic segments. Abdomen more or less distinct; caudal rami larger than in ♀. Antenna 1 longer and stouter than in ♀. Maxilliped very long, slender, projecting far beyond margin of head. Two pairs of biramous legs, rami 1-jointed.

Parasitic on gills of various Teleost fishes.

Hatschekia acuta Brnrd.

Fig. 20 *c–e*.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 250, fig. 7.

♀—Head transversely oval. First 2 thoracic segments completely fused, as wide as (or nearly) head; trunk cylindrical, about 6 times as long as wide, smooth, without indents or constrictions, postero-lateral corners acute. Antenna 1 obscurely 3- or 4-jointed. Ovisacs elongate.

4 mm., ovisacs 7–8 mm.

Locality. Fish Hoek, False Bay, on gills of *Brama raii* (coll. K.H.B. 1935).

Remarks. Appears to be distinguished from other species by the acute postero-lateral corners of the trunk, but in this respect resembles the Japanese *conifera* Yamaguti 1939, from the gills of *Stromateoides*.

Fam. Lernaeidae

1905. Stebbing, *Mar. Invest. S. Afr.*, iv. p. 116.
1917. Wilson, *Proc. U.S. Nat. Mus.*, liii, pp. 1–150, pls. 1–21 (revision of family).
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 479.
1933. Gurney, *Brit. FW. Copep.*, iii, p. 334 (restricted).

In 1917 Wilson admitted four subfamilies: *Lernaeinae*, *Lernaeenicinae* [*sic*], *Lernaeocerinae*, and *Pennellinae*; in 1932 the *Pennellinae* are given full family rank. Gurney included only the first subfamily in the family *Lernaeidae*.

Life-history. The Copepodid ♂♂ and ♀♀ infest the gills or fins of fishes, but the ♂♂ do not develop beyond the fourth Copepodid stage when they become sexually mature. The ♀♀, after fertilization, seek a second fish host, a species different from the first host, which is necessary for the maturing of the eggs.

The ♀♀ burrow into the second host until the head reaches the dorsal aorta or one of the main blood-vessels. Horns and variously shaped processes grow out from the head and fix the parasite in the tissues of the host; and a hard cyst forms around the head of the parasite.

Parasitic on various fishes, marine and fresh water.

Key to the South African genera (♀♀)

1. 2–4 soft horns symmetrically arranged on head. Ovisacs sack-like, eggs multiseriate. Fresh water. *Lernaea*
2. Head with branched processes but no horns. Ovisacs filiform, eggs uniseriate. Marine. *Cardiodectes*

Gen. *Lernaea* Linn.

1758. Linnaeus, *Syst. Nat.*, 10th ed., p. 655.
1914. Cunnington, *Proc. Zool. Soc. Lond.*, ii, p. 819 (*Lernaeocera*).
1917. Wilson, loc. cit., p. 36.

1918. id., *Bull. Bureau Fish.*, xxxv, 1915–16, p. 163, pls. 6–15.
1920. id., *Bull. Amer. Mus. Nat. Hist.*, xliii, p. 5.
1925. Leigh-Sharpe, *Parasitol.*, xvii, p. 245.
1928. Wilson, *Swed. zool. Exp.*, *White Nile*, pt. 5, no. 3, p. 13.
1932. Monod, *Ann. Parasitol.*, x, p. 345, and pp. 359, 378 (list of species and bibliography).
1933. Gurney, loc. cit., p. 336 (development).
1944. Capart, *Bull. Mus. Hist. Nat. Belg.*, xx, no. 24, p. 2.
1950. Harding, *Bull. Br. Mus.* (*N.H.*), I, 1, pp. 3–27, figs. (key to species).

♀ (adult)—Head a rounded knob, behind which one or two pairs of horns, simple or forked, soft, conical. Neck soft, thin, gradually enlarging into trunk, which has a pregenital prominence in front of vulva. Abdomen short, blunt. A pair of maxillipeds as well as 2 pairs of maxillae. 4 pairs of biramous legs, and a 5th pair of 1-jointed stumps just in front of vulva. Ovisacs cylindrical or ovoid, eggs multiseriate.

Parasitic on fresh-water fishes. In Africa 8 species have been found on *Polypterus*, *Labeo*, *Barbus*, *Clarias*, *Distichodus*. In North America the Black-bass and Blue-gills are attacked.

Only one record actually from South Africa.

Lernaea barbicola Leigh-Sharpe
Fig. 21 *a*.

1930. Leigh-Sharpe, *Parasitol.*, xxii, p. 334, figs. 1–6.
1950. Harding, loc. cit., p. 23, fig. 89.

Locality. Transvaal, on the tail of a young *Barbus*. Length 7·2 mm.

The following species occur in Lake Tanganyika or Lake Nyasa, on *Polypterus*, *Bagrus*, *Clarias*, *Tilapia*, *Haplochromis*, etc., and may be found in Rhodesia or the Transvaal:

haplocephala (Cunn)., *diceracephala* (Cunn.), *bagri* Harding, *tilapiae* Harding, *barilii* Harding, *palati* Harding, *lopharia* Harding, *bistricornis* Harding, *tuberosa* Harding.

Gen. *Cardiodectes* Wilson

1917. Wilson, loc. cit., p. 50.
1928. Brian, *Boll. Mus. Zool. Univ. Genova*, viii, no. 26, p. 1.
1934. Leigh-Sharpe, *Siboga Exp. monogr.*, 29 b, p. 143.
1936. Markevitsch, *Treubia*, xv, 4, p. 407.
1937. Stekhoven, *Mem. Mus. Hist. Nat. Belge*, ser. 2, fasc. 9, p. 13.
1953. Capart, *Bull. Inst. franc. Afr. Noire*, xv, p. 665.

♀ (adult)—Whole anterior surface of head covered with dichotomously branched ampulliform processes forming a more or less spherical mass, radiating chiefly from short horns which are continued along the lateral margins. Neck curved, trunk straight, abdomen hemispherical. 4 pairs of legs, the first two close together and biramous, 3rd pair uniramous, 4th pair without rami. Ovisacs straight, elongate, eggs uniseriate.

The parasite penetrates the isthmus and buries its head in the heart of the fish; but is sometimes attached to other parts of the body. Hosts: various species of *Scopelus* (*Myctophidae*), *Stolephorus* (*Engraulidae*), and *Apogon* (*Apogonidae*).

C. frondosus Stekhoven 1937 appears to be a synonym of *bellottii* (Richiardi) and *hardenbergi* Markev. 1936 a synonym of *rubosus* L.-S. 1934. But see: Capart, 1953.

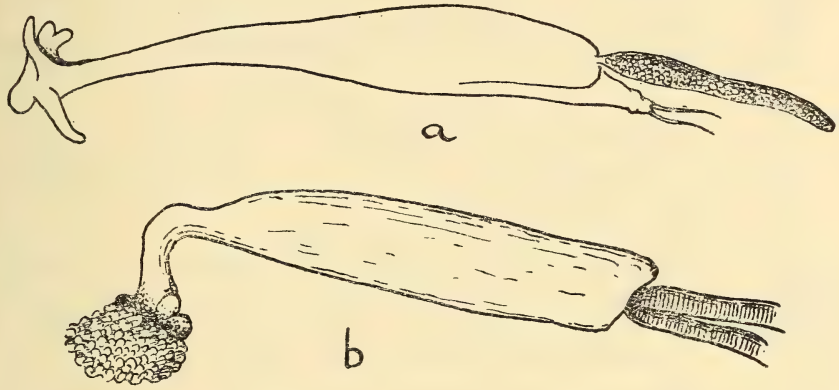


Fig. 21. *Lernaea barbicola* L-S. *a*, ♀ (copy after Leigh-Sharpe). *Cardiodectes medusaeus* (Wilson); *b*, ♀.

Cardiodectes medusaeus (Wilson)
Fig. 21 *b*.

1908. Wilson, *Proc. U.S. Nat. Mus.*, xxxv, p. 458, pl. 76, figs. 99, 100 (*Lernaeenicus m.*).
1912. Brian, *Res. Sci. Camp, Monaco*, fasc. 38, p. 27, pl. 10, figs. 1–5 (*Lernaeenicus m.*).
1917. (May). Stebbing, *Ann. S. Afr. Mus.*, xvii, p. 42 (*Lerneaenicus m.*).*
1917. (June). Wilson, loc. cit., p. 52, pl. 3, figs. 15–23.
1933. Pesta, *Zool. Anz.*, civ, p. 278, fig. (*Lernaeenicus m.*).
1950. Kirtisinghe, *Parasitology*, xl, p. 84, figs. 36–9.

♀—Two pairs of horns, the anterior flattened, the posterior pair more or less lobate, covered with nodular processes forming a semiglobular mass resembling a mulberry. Ovisacs about twice as long as body.

Body (excluding curved portion within host) 5–8 mm., ovisacs 13–16 mm.

Localities. Off Saldanha Bay, on *Scopelus argenteus* Gilch. (= *hectoris* Gnthr.) (Stebbing); off Cape Peninsula and Cape Point, on *Myctophum hectoris* and *coccoi* (S. Afr. Mus.).

Distribution. Pacific coast of N. America, and off Japan; near Mauritius; Ceylon (on *Anchoviella*).

* *Lerne ae nicus* is correct.

Fam. Pennellidae

1917. Wilson, *Proc. U.S. Nat. Mus.*, liii, p. 103 (*Lernaeidae* part, *Pennellinae*).
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 489 (*Pennellidae*).

Gen. *Pennella* Oken

1815. Oken, *Lehrb. Nat.* (3), i, p. 358.
1877. Wierzejski, *Z. wiss. Zool.*, xxix, p. 562, pls. 32, 33 (larval stages).
1905. Stebbing, *Mar. Invest. S. Afr.*, iv, p. 117 (references).
1913. Quidor, *Deux. Exp. Antarct. Franc. Copep. Parasit.*, p. 197. (*Penella, sic*).
1917. Wilson, loc. cit., p. 105 (key to species).
1928. Leigh-Sharpe, *Parasitol.*, xx, p. 79.
1931. id., ibid., xxiii, p. 109.
1932. Wilson, loc. cit., p. 489.
1932. Kirtisinghe, *Parasitol.*, xxiv, pp. 137, 548.
1938. Monod, *Bull. Trav. St. d'Aquic. Pêche Castiglione*, p. 3 (reprint).
1943. Heegaard, *Ark. Zool.*, xxxiv, A 18, p. 28.
1952. Rose & Hamon, *Bull. Soc. Hist. Nat. Afr. Nord*, xliv, p. 172. (*Pennella varians*, larval stages on Cephalopods)

♀ (adult)—Head more or less globular, truncated, with 2 or 3 horns, usually chitinous and usually unbranched. Neck long, cylindrical, passing insensibly into the trunk which is wider, straight, and transversely rugulose. Abdomen shorter than trunk, with a row of plumose appendages along each side, and a pair of minute caudal rami with long setae. Antennae dorsal; antenna 1 with few joints, antenna 2 chelate. Mouth-parts obsolete. First 2 pairs of legs biramous, close together, 3rd and 4th pairs uniramous, all rami 2-jointed, setose. Ovisacs filiform, several times the length of the body, eggs uniseriate.

Copepodid ♂—Head fused with 1st segment; 2nd, 3rd and 4th segments free and diminishing in width; 5th and genital segments fused. Abdomen one-segmented, caudal rami short, wide, setose. Antenna 1 indistinctly jointed. Antenna 2 2-jointed, with stout chela. Mandibles, 2 pairs of maxillae, and a pair of maxillipeds well developed. Swimming legs like those of ♀; 5th pair absent.

Adult ♀♀ are parasitic on Fishes (*Mola*, *Diodon*, *Lophius*, *Exocoetus*, *Thunnus*, *Germo*, *Naucrates*, *Remora*, *Xiphius*, *Histiophorus*, and *Tetrapturus*) and on Whales. *Pennella* is the only Copopod parasitic on Mammals.

Life-history. The larva is presumed to hatch as a typical Nauplius. At the first Copepodid stage (fig. 22 *g*, *h*) the larva attaches itself to the gills of Cephalopods. In subsequent stages the ♂♂ and ♀♀ mature and fertilization occurs. The ♀ then leaves the Cephalopod and seeks the second host, in which it buries its head, seeking one of the larger blood-vessels. A large cyst forms round the head of the parasite, and this becomes very hard and persists some time after the death of the parasite.

Young ♀♀ in the final stage have been described under the names *Baculus* Lubbock 1860 (*Tr. Linn. Soc. Lond.*, xxiii, p. 190, pl. 29, fig. 40) and *Hessella*

Brady 1883 (see *Challenger Rep.*, viii, p. 136, pl. 55, figs. 9-13; also Brian, 1912, loc. cit., *infra* pl. 6, fig. 10). These three figures represent successive stages leading to the adult ♀ form.

Pennella filosa (Linn.)
Fig. 22 *a*, *b*.

1758. Linnaeus, *Syst. Nat.*, p. 819 (*Pennatula f.*).
1905. Stebbing, loc. cit., p. 119 (as *orthagorisci*).
1912. Brian, *Res. Sci. Camp. Monaco*, fasc. xxxviii, p. 16, pl. 3, figs. 2–4, pl. 6, fig. 10.
1913. Quidor, loc. cit., pl. 1, figs. 5–8, pl. 4, figs. 35, 36.
1917. Wilson, loc. cit., p. 119, pl. 15, figs. 125–7, pl. 16, figs. 128–33, pl. 17, figs. 134–9.
1928. Leigh-Sharpe, loc. cit., p. 82, figs. 3, 7.
1932. Wilson, loc. cit., p. 490, fig. 295 *a*, *b*.
1954. Debouttéville & Nunes-Ruivo, *Vie et Milieu*, iv, p. 215, figs. 7, 8.

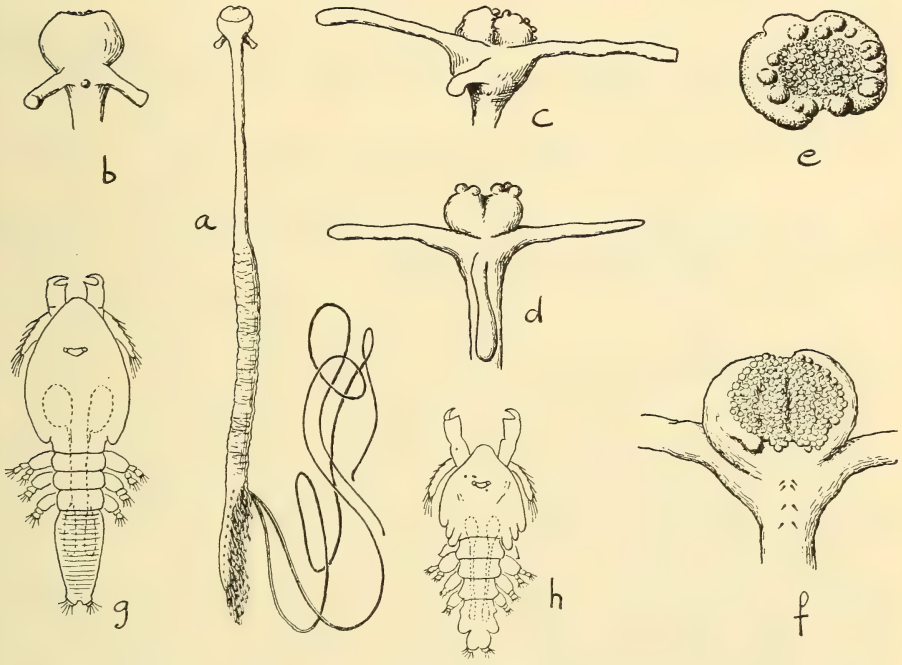


Fig. 22. *Pennella filosa* (Linn.). *a*, ♀; *b*, dorsal view of head ♀. *Pennella crassicornis* St. & L. *c*, *d*, two views, dorsal and slightly oblique, of head ♀; *e*, ventral (buccal) surface of head ♀. *Pennella balaenopterae* K. & D. *f*, ventral surface of head ♀. *Pennella varians* St. & L. *g*, *h*, Copepodid stage of ♀ and ♂ respectively (copy after Wilson, from Wierzejski).

♀—Two short stout horns projecting nearly at right angles to head, sometimes (more or less developed) a third horn medio-dorsal between the bases of the other two. Neck varying in length; trunk about twice as wide as neck.

Abdomen about half length of trunk, plumes branched. Ovisacs very slender, at least twice length of body.

One of the specimens in S. Afr. Mus.: trunk 50 mm., abdomen 23 mm., ovisac 280 mm. Neck pale yellowish, trunk and abdomen dark slaty brown.

Locality. Table Bay (Stebbing, and S. Afr. Mus.), on *Mola mola.*

Distribution. Atlantic, Mediterranean, east coast of N. America. Recorded also as parasitic on the Swordfish and Tunny.

Pennella exocoeti (Holten)

1802. Holten, *Skr. Naturh. Selsk*, v, p. 136, pl. 3, fig. 3.
1913. Quidor, loc. cit., p. 205 (in key), pl. 1, fig. 3, pl. 4, fig. 39.
1913. id., ibid., p. 209, pl. 1, fig. 1, pl. 2, fig. 26, pl. 3, fig. 28, pl. 4, fig. 37 (*liouvillei*).
1915. Calman, *West Indian Bull.*, xv, p. 120, pl.
1917. Wilson, loc. cit., p. 112 (in key), 115.
1928. Leigh-Sharpe, loc. cit., p. 83, fig. 4.
1954. Deboutteville & Nunes-Ruivo, *Bull. Inst. franc. Afr. Noire*, xvi, p. 163, fig. 16 *a–g*.

A small species, as one would expect from its host: Flying-fishes (*Exocoetus*). Quidor's specimen described as *liouvillei* measured about 37 mm. Not yet recorded from South African waters.

Pennella crassicornis St. & L.
Fig. 22 *c–e*.

1861. Steenstrup & Lütken, *K. Dansk. Videns. Selsk. Skr.* (5), v, p. 416, pl. 14, fig. 34 (on *Hyperoodon*).
1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 18, pl. 3, figs. 5–9 (on *Mola*).
1917. Wilson, loc. cit., p. 113 (in key to species).
1938. Monod, loc. cit., p. 3, fig. 1 (on *Xiphius*).
1954. Deboutteville & Nunes-Ruivo, *Vie et Milieu*, iv, p. 217, fig. 9.

In the South African Museum there are three specimens, consisting of head and neck only, taken from the belly of a Minke (Lesser Rorqual or Piked Whale) (*Balaenoptera acutorostrata*) stranded on the beach in Table Bay 1914. The neck of the longest specimen is 90 mm. in length.

They do not correspond with the figures given by Brian for the specimens which he assigned with a ? to *crassicornis*. But they are very like the figures given by Monod for two Algerian specimens. The medio-dorsal horn varies in length; in the specimen where it is longest it is somewhat bulbously enlarged in its distal half. Around the buccal surface of the head are several hard, blunt knobs varying in number and size in the 3 specimens; the central portion is filled with spongy tissue without such definite granules or nodules as seem to be indicated in Monod's figure. *P. liouvillei* Quidor (1913. loc. cit.) from a Flying-fish, as shown in pl. 2, fig. 26, appears to have a similar but more effusive growth of knobs on the buccal surface.

I have not seen the original description of *crassicornis*, and merely record these specimens as corresponding with Monod's specimens.

Pennella orthagorisci Wright

1917. Wilson, loc. cit., p. 124.
1924. id., *Proc. U.S. Nat. Mus.*, lxiv, p. 12.
1928. Leigh-Sharpe, loc. cit., p. 81, fig. 2.
1932. Wilson, loc. cit., p. 492, fig. 295 *d*.

Stebbing's 1905 description of the horns of his specimen corresponds with those of specimens from a *Mola* caught in Table Bay and received by the South African Museum in 1936. Wilson diagnoses Wright's species as having 2 (or 3) slender horns, longer than head and directed obliquely backwards; and abdomen $\frac{1}{3}$-$\frac{2}{5}$ length of trunk. Whether Wright's species can be maintained as distinct from *filosa* seems rather doubtful.

Hosts: *Mola mola, Germo alalonga.*

Pennella balaenopterae K. & D.
Fig. 22 *f*.

1877. Koren & Danielssen, *Fauna Littor. Norveg*, pt. 3, p. 157, pl. 16, figs. 1–9.
1905. Turner, *Tr. Roy. Soc. Edinb.*, xli, 2, p. 409, pls. 1–4 (anatomy).
1910. Quidor, *Bull. Mus. Paris*, p. 97.
1913. id., loc. cit., p. 205 (in key), pl. 1, fig. 14, pl. 4, fig. 32.
1913. id., ibid., p. 206, pl. 1, figs. 15–18, pl. 4, figs. 29, 34 (*antarctica*).
1917. Wilson, loc. cit., p. 116, pl. 15, figs. 119–24 (*antarctica*), and pp. 112, 113 (in key).
1928. Leigh-Sharpe, loc. cit., p. 86, fig. 6.
1939. Legendre, *Bull. Soc. zool. Fr.*, lxiv, p. 312 (comparison with *germonia*).
1944. Brian, *An. Mus. Argentino*, xli, p. 215.

In the South African Musuem are two specimens from whales taken at Saldanha Bay, and one from a Fin Whale stranded in False Bay. The latter has no head, and a specimen of the barnacle *Conchoderma virgatum* is firmly fixed over the vulva. The thorax measures 65 mm. and the abdomen 40 mm.

The measurements of the former two specimens are: neck 170 and 130 mm., thorax 42 and 40 mm., abdomen 30 and 25 mm., respectively. The ovisacs are 180 mm. in the one, and the single sac in the other 350 mm. long.

Although Wilson keeps *antarctica* as a separate species, there seems every likelihood that with further study all Quidor's species, about which he himself (loc. cit., p. 204) was somewhat diffident, viz.: *antarctica, charcoti, anthonyi* and *cettei*, are forms of *balaenopterae*.

Mathews (1938. *Discovery Rep.*, xvii, p. 126) records *Penella* [*sic*] on a Sperm Whale caught at Durban, and (ibid., p. 238) on South African examples of Sei-whales; but the parasite is rare.

LERNEOPODOIDA

1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 141 (*Lernaeoida* part).
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 492, and 613 (key to genera).
1945. Gurney, *Ann. Mag. Nat. Hist.* (xi), 12, p. 121 (remarks on classification).
1947. id., *J. Mar. Biol. Assoc.*, xxvii, 1, p. 133 (remarks on classification).

Body usually without movable articulations, often without any trace of segmentation. Sexes very dissimilar, the male a pygmy clinging to the female, which is immovably attached to the host. Antenna 2 small, but sometimes prehensile. Maxillae 2 in ♀ often modified into 'arms', separate or fused at their tips, or completely fused, with a 'bulla' for attachment. During development the maxillipeds sometimes migrate from their normal position until they lie between or even in advance of the bases of maxillae 2. Eggs in the two ovisacs multiseriate (extracted from Wilson).

Key to the South African genera (♀♀ only)

I. Parasitic on fishes.
  A. Body more or less elongate. Parasite attached to host by antennae 2, maxillae 2, or maxillipeds, or by combination of two or more of these appendages.
    1. Antenna 2 prehensile. Maxilla 2 non-prehensile.
      a. Head and trunk with paired lateral processes. *Chondracanthus*
      b. No lateral processes on head; only one pair at hind corners of genital segment. *Acanthochondria*
    2. Antenna 2 non-prehensile. 2nd maxillae usually fused, at least at their tips, with apical bulla for attachment.
      a. Maxillipeds between bases of 2nd maxillae, both close to mouth; 2nd maxillae longer than head, which is more or less in line with trunk or bent forwards.
        i. Trunk without processes. Abdomen distinct. Fresh water. *Achtheres*
        ii. Trunk with 2 posterior processes ventral to the ovisacs. No abdomen. *Lerneopoda*
      b. Maxillipeds close to mouth, 2nd maxillae far removed. Head more or less in line with trunk or bent backwards.
        i. 2nd maxillae short, fused.
          α. Antenna 1 3-jointed; antenna 2 uniramous. *Clavella*
          β. Antenna 1 4-jointed; antenna 2 biramous. *Clavellopsis*
        ii. 2nd maxillae short, separate, fused only (if at all) at tips, with bulla.
          α. Tips of 2nd maxillae not lobate. Antenna 1 3-jointed. *Eubrachiella*
          β. Tips of 2nd maxillae lobate. Antenna 1 4-jointed. *Parabrachiella*
        iii. 2nd maxillae long, separate, but fused at their tips, or tips enlarged.
          α. Bulla small. *Brachiella*
          β. Bulla large (or tips of 2nd maxillae enlarged or branched). *Charopinus*
  B. Head and (wholly or in part) neck buried in host.
    1. Genital segment with 2 short posterior processes. *Medesicaste*
    2. Genital segment with long, digitate posterior processes. *Strabax*
    3. Genital segment with 2 profusely branched posterior processes. *Sphyrion*
II. Parasitic on Crustacea. Body spherical, attached by 2nd maxillae and maxillipeds. *Sphaeronella*

Fam. Chondracanthidae

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 488 (part).
1930. Oakley, *Parasitology*, xxii, pp. 182 sqq.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, p. 493 (no definition).
1951. Deboutteville, *Arch. Zool. exp. gen.*, lxxxvii, notes no. 4, p. 139 (classification).

Remarks. The *Zoological Record* (lxvii, 1930, Crust., p. 41) lists *Chondracanthoides* [*sic* = *odes*] and *Chondracanthopsis* as new genera 'ex Wilson MS'. Oakley (loc. cit., p. 182) says: 'The descriptions of *Chondracanthodes* and *Chondracanthopsis* were communicated to me in manuscript by Wilson.' He proceeds, however (p. 196), to give as genotype of the latter *C. nodosus* Müller 1779. As this is a well-known species the Rules of Nomenclature are satisfied, and the genus must be credited to Oakley, although a full generic description was not given until 1932 by Wilson.

For the other 'n.g.' on the other hand, Oakley gave as genotype an undescribed species 'deflexus'. Both genus and species were first described by Wilson in 1932. The result is thus:

Chondracanthopsis Oakley 1930, genotype *C. nodosus* (Müller) 1779.

Chondracanthodes Wilson 1932, genotype *C. deflexus* Wilson 1932.

Gen. *Chondracanthus* De la Roche

1811. De la Roche, *N. Bull. Sci. Soc. Philom. Paris*, 2 (44), p. 270.
1899. Bassett-Smith, loc. cit., p. 491 (part).
1922. Wilson, *Ark. Zool.*, xiv, 10, pp. 8–12.
1930. Oakley, loc. cit., p. 186 (genotype: *zei* de la Roche).
1932. Wilson, loc. cit., p. 497.
1939. Yamaguti, *Paras. Copep. Japan*, pt. 6 (vol. *Jub. Prof. Yoshida*, II), pp. 531–3.
1943. Heegaard, *Ark. Zool.*, xxxiv, A 18, p. 30.

♀—Head separated from thorax by a more or less constricted neck, with barb-like process at each hind corner. First two thoracic segments more or less free; other segments fused with genital segment, with paired processes. Abdomen very small, without caudal rami. Antenna 2 prehensile. Two pairs of fleshy biramous legs. Ovisacs multiseriate.

♂—Head large, more or less fused with thorax. Caudal rami present. Antenna 2 strongly prehensile. Mandibles and maxillipeds falcate. Two pairs of uniramous legs.

Key to the South African species

1. Without dorsal processes. *merluccii*
2. With medio-dorsal crest-like processes.
   a. Head longer than wide. *lophii*
   b. Head circular. *congiopodi*

Chondracanthus merluccii (Holten)

Fig. 23 *a*, *b*.

1802. Holten, *Skr. Natur. Selsk.*, v, 2, p. 135, pl. 3, fig. 2.
1899. Bassett-Smith, loc. cit., p. 494.
1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 180, pl. 20, fig. 10 (♂), pl. 47, fig. 8 (♀), pl. 53, figs. 16–19.
?1923. Wilson, *Ark. Zool.*, xv, 3, p. 14. (*Chondracanthus* sp. nova 1 ♀.)
1923. id., *Medd. Goteb. Mus. zool. Avd.*, no. 19 (*Goteb. Vet. Handl.* (4) xxv, 6), p. 10, pl. 1, fig. 13 (♂), pl. 2, figs. 14, 15 (♀) (*stramineus*).
1930. Oakley, loc. cit., p. 188, fig. 2.
1932. Wilson, loc. cit., p. 498, fig. 298 and pl. 1, fig. a.
1933. Saby, *Proc. Zool. Soc. Lond.*, 1933, 4, p. 865, pl. 2, figs. 7–9 (anatomy).
1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 251.

♀—Head wider behind than in front, and gibbous dorsally, a small projection at postero-lateral corner. Thoracic segment with antero-lateral

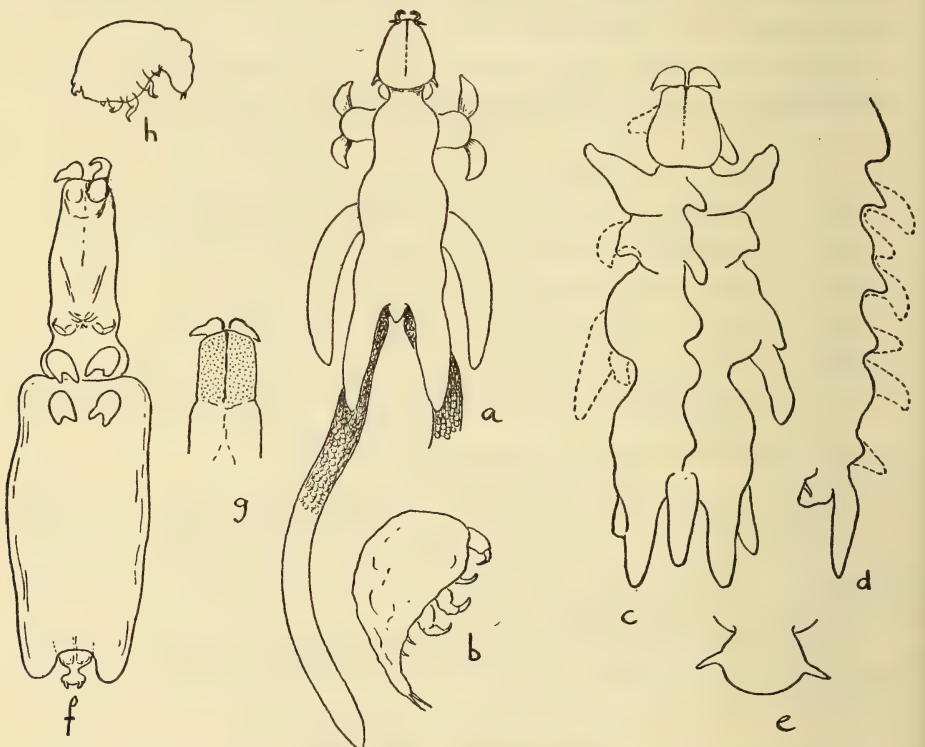


Fig. 23. *Chondracanthus merluccii* (Holten). *a*, dorsal view ♀; *b*, ♂. *Chondracanthus lophii* Johnston. *c*, dorsal view ♀; *d*, dorsal profile ♀; *e*, ventral view of abdomen ♀. In *c* and *d* the dotted lines indicate the differences in a Plymouth specimen and the Cape specimens. *Acanthochondria lepidionis* n. sp. *f*, ventral view ♀, left antenna 1 and right antenna 2 removed; *g*, dorsal view of head ♀; *h*, ♂.

corners slightly prominent. Genital segment with a pair of long processes anteriorly, a ventral median knob, and hind corners produced. Abdomen small. Basal joint of antenna 1 large.

♂—Head much inflated dorsally. Attached to ♀ near vulva.

♀ up to 12 mm., ovisacs 14 mm., ♂ 0·6 mm.

Localities. Agulhas Bank, on *Merluccius capensis*, 1 ♀ with ♂ (Wilson); Table Bay, on gills and floor of mouth of the Stockfish, *M. capensis* (S. Afr. Mus., ♀♀, ♂♂).

Distribution. Europe, east coast of N. America.

Remarks. In *Ark. Zool.* 1923 Wilson records a single ♀ taken in Table Bay on *Gadus* [sic.] *capensis* by Dr. Holub in 1894, and says: '. . . apparently the same species as one obtained . . . from . . . *Merluccius bilinearis*, on the New England coast. It is a new species . . . and will soon be published.' I have not been able to trace this advertised description; but as Wilson has recorded *C. merluccii* from *M. bilinearis* in 1932, it would appear that he revised his opinion and decided it was not a new species.

Wilson's second 1923 record refers to a single ♀ collected by Skoog in 1912 on the Agulhas Bank. There seems no reason for regarding it as distinct from *merluccii*.

Chondracanthus lophii Johnston

Fig. 23 *c–e*.

1836. Johnston, *Loud. Mag. Nat. Hist.*, p. 181, fig. 16.
1862. Turner & Wilson, *Trans. Roy. Soc. Edinb.*, xxiii, p. 67, pl. 3.
1899. Bassett-Smith, loc. cit., p. 494 (references).
1913. Scott, T. & A., loc. cit., p. 179, pl. 52, fig. 4 (♀), pl. 56, figs. 16–18.
1927. Goggio, *Publ. Staz. zool. Napoli*, viii, pp. 427 sqq., figs.
1930. Oakley, loc. cit., p. 187, fig. 1, B.C.D.
1948. Barnard, loc. cit., p. 251.

♀—Head longer than wide, with a lateral projection near hind corner. Thoracic segment indistinctly bisegmented, with 2 lateral processes, the hinder one (in Cape specimens) rounded, scarcely developed; a pair of bifid ventral processes (legs). Genital segment constricted in middle, anterior portion with an obscurely bifid lateral process, posterior portion with two (dorsal and ventral) postero-lateral processes. Abdomen small, dorsally concealed by a more or less elongate process. A mid-dorsal crest with more or less developed processes on thoracic and genital segments. Antenna 1 obscurely jointed, strongly expanded at base. Ovisacs curved or twisted.

10–12 mm.

Locality. Agulhas Bank, on *Lophius piscatorius* (♀♀ S. Afr. Mus.).

Distribution. British Seas.

Remarks. In comparison with a Plymouth specimen certain differences in the development of the lateral processes and dorsal crest were found, which are indicated in fig. 23 *c*, *d*.

The ovisacs break up, and the nauplii hatch within a few hours (Sproston, 1942. *J. Mar. Biol. Assoc. Plymouth*, xxv, p. 442).

Chondracanthus congiopodi n. sp.
Fig. 24.

♀—Cephalothorax subcircular, gibbous posteriorly on dorsal surface, 'barbs' large, lobate. Trunk unsegmented, but with 4 lateral processes separated by deep indents, 4 medio-dorsal knobs, a pair of posterior processes extending beyond abdomen. Antenna 1 fusiform, 2-jointed. Two pairs of uniramous fleshy legs, ovate or more or less boot-shaped, the 'toe' pointing medianwards. Ovisacs shorter than body, stout.

♀ 5 mm., ovisac 3 mm., ♂ 0·6 mm.

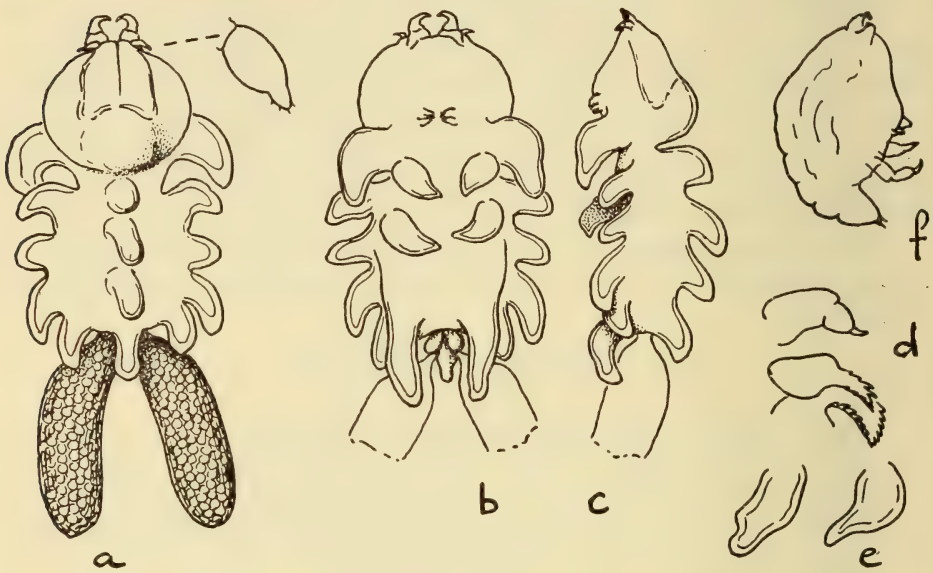


Fig. 24. *Chondracanthus congiopodi* n. sp. *a*, dorsal view ♀, with antenna 1 further enlarged; *b*, ventral view ♀; *c*, lateral view ♀; *d*, maxilla, maxilliped and mandible ♀; *e*, variations in shape of leg ♀; *f*, ♂.

Locality. Table Bay, on gills of Horse-fish (*Congiopodus torvus*). (S. Afr. Mus. ♀♀, ♂♂.)

Remarks. Although the legs are not definitely bifid, there seems no reason why this species should not be included in *Chondracanthus*.

Gen. *Acanthochondria* Oakley

1927. Oakley, *Parasitology*, xix, p. 466 (genotype: *cornuta* O. F. Müller).
1930. id., ibid., xxii, p. 189.
1932. Yu & Wu, *Bull. Fan. Mem. Inst.*, III, 4, pp. 57–71 (*Chondracanthus* spp.)
1933. Saby, *Proc. Zool. Soc. Lond.*, 1933, 4, p. 861, pl. 1 (anatomy).
1939. Yamaguti, *Paras. Copep. Japan*, pt. 6, vol. *Jub. Prof. Yoshida*, II, pp. 533–41.
1940. Heegaard, *Vid. Medd. Dansk nat. For.*, civ, p. 87.
1944. id., ibid., cvii, p. 33.

♀—Head separated from thorax, without barb-like processes. First 2 thoracic segments free; other segments fused with genital segment. No dorsal or ventral processes except a pair at posterior corners of genital segment. Abdomen very small, no caudal rami. Antenna 2 prehensile. Two pairs of uniramous or feebly biramous legs.

Acanthochondria lepidionis n. sp.

Fig. 23 *f–h.*

♀—Cephalothorax subcylindrical, very slightly widening posteriorly, where there is a slight constriction between it and the following thoracic segment. Head dorsally indicated by a slightly more strongly chitinized brown area, with a darker brown median line. A constriction between 2nd and 3rd thoracic segments, the latter completely fused with genital segment, its identity marked only by the position of the 2nd pair of legs. Genital segment longer than rest of body, and wider; posterior corners rounded, shortly produced. Abdomen very small, wider than long, with 2 small acute processes (? degenerate caudal rami). Antenna 1 expanded basally. Two pairs of small rudimentary bifid legs.

♀ 4–4·5 mm., ♂ 0·5 mm.

Locality. Off Cape Point, 300 fathoms, on gills of *Lepidion capense.*

Remarks. Resembling *longicephalus* Yu & Wu, and *pingi* Yu & Wu in the long cephalothorax; the latter species has the posterior corners of the genital segment conically produced.

Fam. Lerneopodidae

1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, pp. 565 sqq.
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 509 and (in key) 613 sqq.

The importance of the male in delimiting the genera has long been recognized and Wilson has very usefully brought together illustrations of 17 generic types of male on plates 25-28 of his 1915 revision of the family.

Gen. *Achtheres* Nordmann

1832. Nordmann, *Mikr. Beitr. wirbell. Th.*, ii, p. 63.
1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 617.
1933. Gurney, *Brit. FW. Copep.*, iii, p. 359.

♀—Trunk without posterior processes. Abdomen distinct.
♂—Cephalothorax in line with body-axis, smaller than the segmented trunk.

Remarks. This genus contains species parasitic on the gills of fresh-water fishes, mostly North American. As one species is found on the Small-mouth Black Bass *Micropterus dolomieu*, which has been imported into South Africa, the genus is included here; it is possible that the parasite has been imported with the fishes.

Achtheres micropteri Wright

Fig. 25

1882. Wright, *Proc. Canad. Inst.*, n.s., i, p. 249, pl. 2, figs. 1–11.
1915. Wilson, loc. cit., p. 620, pl. 34, figs. 64–7, pl. 35, figs. 68, 69.
♀ 4–4·5 mm.

Gen. *Lerneopoda* Blainv.

1822. Blainville, *J. de Phys.*, xcv, p. 442.
1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 631 (*Lernaeopoda*).
1918. Leigh-Sharpe, *Parasitology*, xi, p. 256.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 617, 619 (in key) (*Lernaeopoda*).
1939. Yamaguti, loc. cit., p. 549 (*Lernaeopoda*).

♀—Cephalothorax more or less inclined to axis of trunk, with dorsal carapace; one or two thoracic segments distinct. Trunk ovoid with a cylindrical

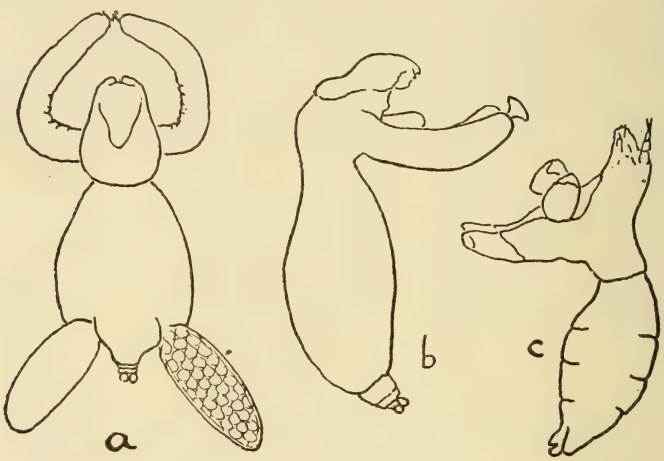


Fig. 25. *Achtheres micropteri* Wright. *a*, *b*, dorsal and lateral views ♀; *c*, ♂ (copies after Wilson).

or foliaceous posterior process on either side of the minute genital process *ventral* to the ovisacs; no anal lamellae. Antenna 1 4-jointed. Maxillipeds inside the 2nd maxillae, both close to mouth; 2nd maxillae long, separate, tips joined and enlarged into a disc or with a bulla.

♂—Unusually large (2–3·5 mm.). Cephalothorax in line with trunk, with a dorsal carapace, and separated by a groove from the unsegmented trunk; anal lamellae enlarged, turned forwards dorsally. Antenna 1 4-jointed. Antenna 2 apically chelate.

Remarks. The ventral position of the posterior processes separates the genus from *Lerneopodina* Wilson 1915.

Lerneopoda galei Kröyer
Fig. 26 *a*, *b*.

1837. Kröyer, *Naturh. Tidsskr.*, i, p. 272, pl. 3, fig. 5 *a–f*.
1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 197, pl. 60, figs. 4–6, pl. 68, figs. 9–15, pl. 63, fig. 1 (♀ ♂).
1915. Wilson, loc. cit., p. 635.
1923. Monod, *Bull. Inst. ocean. Monaco*, no. 427, p. 5, figs 1*a* (♀ ♂), 2.

♀—Trunk obovate, dorso-ventrally flattened; posterior processes cylindrical. 2nd maxillae nearly or quite as long as trunk, with apical bulla. Ovisacs typically rather slender and about as long as total length.

♀ (trunk) 7–10 mm., 2nd maxillae 4–5 mm., ♂ 2·15 mm. (Wilson).

Locality. Kalk Bay (False Bay), in cloaca of *Mustelus laevis* (S. Afr. Mus. 1 ♀).

Distribution. British Seas.

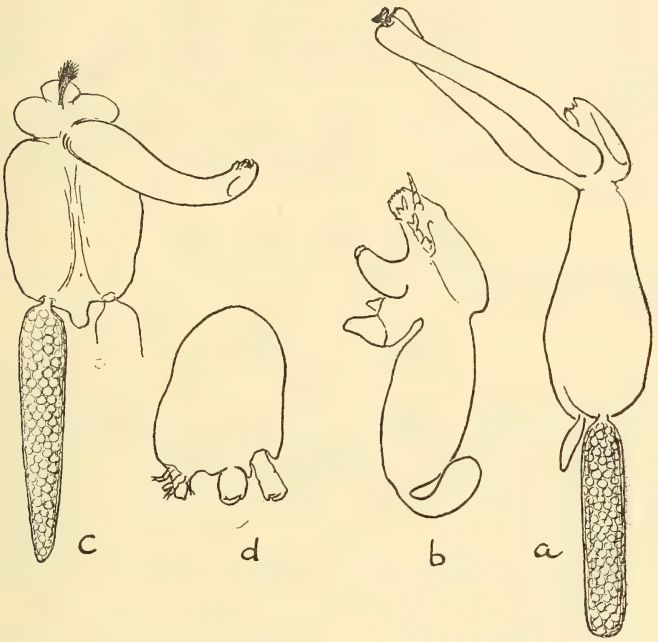


Fig. 26. *Lerneopoda galei* Kröyer. *a*, ♀; *b*, ♂ of *L. bidiscalis* (redrawn from Wilson after Kane). *Clavella pagelli* (Kröyer). *c*, ♀; *d*, ♂.

Remarks. In the present specimen the ovisacs are rather stout and not quite as long as trunk, but may not be fully developed.

The ♂ here figured belongs to another species, but shows the generic characters.

Gen. *Clavella* Oken

1815. Oken, *Lehrb. Nat.* (3), i, p. 358.
1822. Blainville, *J. de Phys.*, xcv, p. 438 (*Lernaeomyzon*).
1832. Nordmann, *Mikr. Beitr. wirbell. Th.*, 2, p. 53. (*Anchorella*, non Cuvier).
1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 561 (*Lerneomyzon*).
1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 666 (key to species).
1918. Leigh-Sharpe, *Parasitology*, xi, p. 118.
1920. id., *J. Mar. Biol. Assoc. Plymouth*, n.s., xii, p. 332 (excretory system).

1925. id., *Parasitology*, xvii, p. 194 (revision of British species).
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, p. 513.
1933. Saby, *Proc. Zool. Soc. Lond.*, 1933, 4, p. 857 (*uncinata*, anatomy).
1934. Gurney, ibid., 1934, 2, pp. 196, sqq. (*uncinata*, development).
1939. Yamaguti, loc. cit., pp. 553–6.
1939. Poulsen, *Vid. Medd. Dansk naturf. Foren.*, cii, p. 223 (*uncinata*, biology).

♀—Cephalothorax long, bent backwards at an angle with axis of trunk, with or without dorsal carapace. Trunk ovoid, without posterior processes, abdomen, or anal lamellae; an unpaired genital process often present. Antenna 1 3-jointed. Antenna 2 uniramous. 2nd maxillae fused, usually short, sometimes absent.

♂—Cephalothorax and trunk folded together, forming an unsegmented ovoid mass, hind end rounded, not projecting below bases of 2nd maxillae. Antenna 1 2-jointed. Antenna 2 uniramous, 3-jointed. Maxilla 1 bipartite. No anal lamellae.

Key to the South African species

1. Cephalothorax ♀ distinctly longer than trunk. *pagelli*
2. Cephalothorax ♀ about same length as trunk. *denticis*

Clavella pagelli (Kröyer)
Fig. 26 *c*, *d*.

1863. Kröyer, *Naturh. Tidsskr.* (3), ii, p. 295, pl. 16, fig. 3 (*Anchorella p.*).
1865. Heller, '*Novara*' *Crust.*, p. 242, pl. 24, fig. 6 (*A. canthari*).
1910. Stebbing, loc. cit., p. 526 (*Lerneomyzon p.*).
1913. Scott, T. & A., *Brit. Parasit. Copep.*, p. 224, pl. 69, figs. 1–3 (*canthari*).
1915. Wilson, loc. cit., pp. 668, 669, and 671, 672 (in key) (*canthari* and *pagelli*).
1924. Brian, *Parasitol. Maurit.*, p. 52 (*Clavellodes c.*).

♀—Cephalothorax distinctly longer than trunk, curved backwards, with dorsal carapace, expanded into 2 lobes where it joins the trunk. Trunk ovoid, usually longer than wide and width usually greater than dorso-ventral depth, but sometimes subspherical, a small knob-like genital process. 2nd maxillae very short, fused, forming a lobe between the lobes of the cephalothorax, with a clavate bulla ending in a brush of minute bristles. Ovisacs about as long as cephalothorax, cylindrical, slightly tapering distally.

♂—See figure 26 *d*. Dorso-ventral depth greater than 'head to tail' length.

♀ cephalothorax 3–4 mm., trunk 2 mm., ovisacs 3 mm., ♂ (major diameter) 0·5 mm.

Locality. Cape: on *Cantharus bleekeri* (sic., now *Pachymetopon blochi*) (Heller); on gills of White Steenbras (*Pagellus lithognathus*) (S. Afr. Mus. several ♀♀ and ♂♂).

Distribution. European seas, on *Cantharus* and *Pagellus*.

Remarks. T. & A. Scott include *pagelli* Kröy. with a ?, and adopt Heller's specific name. Wilson keeps the two separate in his rather unsatisfactory key.

There would seem to be little doubt that *canthari* is a synonym of *pagelli*. Among the present lot those specimens with subspherical trunk have the ovisacs shorter and more distinctly tapering than the others.

Clavella denticis (Kröyer)

1863. Kröyer, loc. cit., p. 296, pl. 16, fig. 4 (*Anchorella d.*).
1865. Heller, loc. cit., p. 243.
1910. Stebbing, loc. cit., p. 562 (*Lerneomyzon d.*).
1915. Wilson, loc. cit., pp. 668, and (in key) 672.

♀—(Characters from Wilson's key.) Cephalothorax slender, linear, about same length as trunk; latter ovoid, considerably longer than wide, narrowed anteriorly, posteriorly truncate. Genital process present. Ovisacs thick, ellipsoidal. 2nd maxillae?

Locality. Cape, on *Dentex rupestris* (Heller).

Distribution. European seas.

Gen. *Clavellopsis* Wilson

1915. Wilson *Proc. U.S. Nat. Mus.*, xlvii, p. 686 (key to species).
1939. Yamaguti, loc. cit., pp. 556–62.
1950. Kirtisinghe, *Parasitology*, xl, p. 84.

♀—Cephalothorax usually shorter and thicker than in *Clavella*. Trunk squat, often wider than long, sometimes with posterior processes, but no abdomen or anal lamellae; an unpaired genital process present. Antenna 1 4-jointed. Antenna 2 biramous, endopod 1-jointed, exopod 2-jointed. 2nd maxillae short, broad, fused, with folds of skin or swellings, with apical bulla.
♂—Cephalothorax and trunk at right angles, latter strongly arched dorsally, unsegmented, hind end projecting below bases of 2nd maxillae. Antenna 1 3-jointed. Antenna 2 biramous, each ramus 1-jointed. 1st maxillae tripartite.

Remarks. Differs from *Clavella* in general body form, 1st and 2nd antennae, 2nd maxillae in ♀, and 1st maxillae in ♂.

Wilson (p. 688) gives a reference to his own original description of *Clavella robusta*; but the paper is not quoted in his bibliography (p. 721), and seems to have been omitted from the *Zoological Record*.

Key to the South African species

1. No posterior processes. *fallax*
2. Two dorsal and 2 ventral posterior processes. *hostilis*

Clavellopsis fallax (Heller)

Fig. 27 *a–c*.

1865. Heller, '*Novara*', *Crust.*, p. 241, pl. 24, figs. 4, 5.
1924. Brian, 'Parasit. Maurit'., p. 53.
1943. Heegaard, *Ark. Zool.*, xxxiv, A 18, p. 32, figs. 88-94.

♀—Cephalothorax longer than trunk, with dorsal carapace, and a lobe on either side at junction with trunk. Trunk dorso-ventrally flattened, broader than long, front and hind angles rounded, genital process about $\frac{1}{4}$–$\frac{1}{3}$ length of trunk. 2nd maxillae short, fused, lobulate, bulla mushroom-shaped. Ovisacs stout, cylindrical, apically rounded.

♂—Dorso-ventral depth about equal to 'head to tail' length.
♀—Cephalothorax 2·5, trunk 1·5 × 2, ovisacs 2·5–3·5 mm.; ♂ 1 mm.

Localities. On gills of White Steenbras (*Pagellus lithognathus*) (loc. unrecorded); East London, in mouth of *Pagrus nasutus*. (S. Afr. Mus, ♀♀, ♂♂.)

Distribution. Mediterranean, on *Dentex vulgaris*.

Remarks. Kurz (1877. *Zeitschr. Wiss. Zool.*, xxix, p. 393, pl. 25, figs. 5, 6, 29, 51, 52) has described *C. sargi* which, according to Wilson's key (loc. cit., p. 687), differs in having a cylindrical genital process ⅓ length of trunk instead

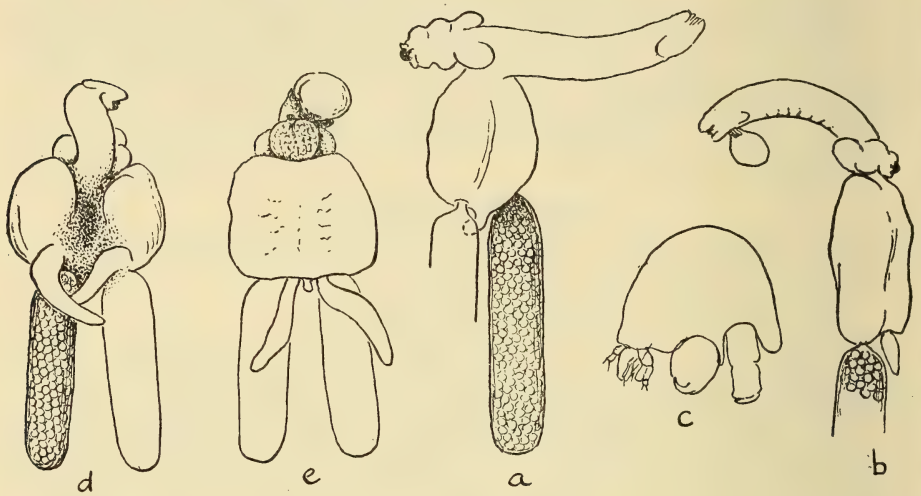


Fig. 27. *Clavellopsis fallax* (Heller). *a*, ♀ from *Pagellus*; *b*, ♀ from *Pagrus*, with ♂ attached to head; *c*, ♂. *Clavellopsis hostilis* (Heller), *d*, *e*, dorsal and ventral views ♀.

of a minute one, and smooth instead of wrinkled 2nd maxillae. Yamaguti (loc. cit., 1939, p. 556, pl. 48, figs. 144-148) records *sargi* from Japanese Sparid fishes.

In the South African specimens from *Pagellus* the thoracic and maxillary lobes vary in distinctness; and the genital process in the specimens from *Pagrus* is larger and more pointed than in those from *Pagellus*.

Clavellopsis hostilis (Heller)
Fig. 27 *d e*.

1865. Heller, '*Novara*' *Crust.*, p. 243, pl. 24, figs. 7, 7 *a*.
1915. Wilson, loc. cit., pp. 669 and (in key) 702 (? *Brachiella*).
1924. Brian, 'Parasitol. Maurit'., p. 51 (*Clavella h.*).

♀—Cephalothorax curved ventrally, about as long as trunk. Head without carapace. Trunk broader than long, tumid, with dorsal median concavity; 2 dorsal and 2 ventral posterior processes, of about equal length, the 2 dorsal ones far apart, the 2 ventral ones approximate; a small genital process. Antenna 1 4-jointed. Antenna 2 biramous. 2nd maxillae short, entirely fused, wrinkled, with small bulla. Ovisacs stout, apically rounded.

Cephalothorax and trunk each 1·25 mm., width of trunk 2 mm., ovisac 2·5 mm.

Locality. Natal, on gill-rakers of *Umbrina robinsoni* (S. Afr. Mus. 1 ♀).

Distribution. Mediterranean, on *Umbrina cirrhosa* (Heller).

Remarks. The present specimen appears to belong to *Clavellopsis* (1st and 2nd antennae), and is certainly very similar to Heller's species. No ♂ is present, and Heller had no ♂; and as Wilson remarks the ♂ is necessary for an exact generic determination. Wilson's suggestion to transfer Heller's species to *Brachiella* seems rather a strange one.

C. appendiculata Kirtisinghe 1950, on *Chirocentrus*, has similar posterior processes.

Gen. *Charopinus* Kröyer

1864. Kröyer, *Naturh. Tidsskr.*, (3), ii, p. 361. (*Nomencl. Preuss. Ak.*, gives date 1863; Marschall, and Neave give 1864.)
1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 188.
1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 652 (key to species).
1928. Leigh-Sharpe, *Parasitology*, xx, p. 276.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 511 and (in key) 617, 619.
1939. Yamaguti, loc. cit., p. 552.
1946. Capart, *Bull. Mus. Hist. Nat. Belg.*, xxii, no. 10, pp. 1–6, figs.

♀—Cephalothorax elongate, often flexed backwards, head usually without carapace. Trunk swollen, pear-shaped, flattened dorso-ventrally, with a pair of posterior processes dorsal to the ovisacs; no genital process, abdomen or anal lamellae. Ovisacs long, cylindrical. Antenna 1 indistinctly 4-jointed. Antenna 2 biramous. 2nd maxillae elongate, either fused at their tips with a bulla of varying shape, or each one apically enlarged into a chitinous bar, or knob, or processes.

♂—Cephalothorax separated by a constriction from the trunk, which is segmented, with anal lamellae. Antenna 1 indistinctly 4-jointed. Antenna 2 biramous.

Remarks. Distinguished from *Brachiella* by the (usually) more elongate 2nd maxillae in ♀, and the segmented ♂.

T. & A. Scott (loc. cit., pp. 190, 191) describe the posterior processes as situated 'ventrally', and on pl. 55, figs. 1 and 5 label ventral view as 'dorsal'.

Parasitic in the nasal passages or spiracles, or on the gills, of sharks and skates.

Charopinus dubius T. Scott
Fig. 28

1900. Scott, T., *18th Ann. Rep. Fish. Board Scotl.*, p. 130, pl. 7, fig. 15.
1913. Scott, T. & A., loc. cit., p. 190, pl. 55, fig. 5.
1915. Wilson, loc. cit., p. 654 (in key).

♀—Cephalothorax slightly shorter than trunk, which is dorso-ventrally flattened, pear-shaped in dorsal view, concave dorsally; posterior processes slightly shorter than trunk. Maxilliped with very small apical spine instead of a

claw (cf. Wilson, 1915. loc. cit., pl. 41, fig. 113. *Brianella corniger*). 2nd maxillae longer than trunk, firmly joined at their tips to a large boat-shaped chitinous plate.

Cephalothorax 5 mm., trunk 6 mm., width 5 mm., posterior process 5 mm., 2nd maxillae 7 mm., ovisacs 9–10 mm.

Locality. Port Elizabeth, on a skate (1 ♀ sent by Dr. van Hille, Rhodes University, 1948).

Distribution. Scotland.

Remarks. The ♂ of this species is unknown.

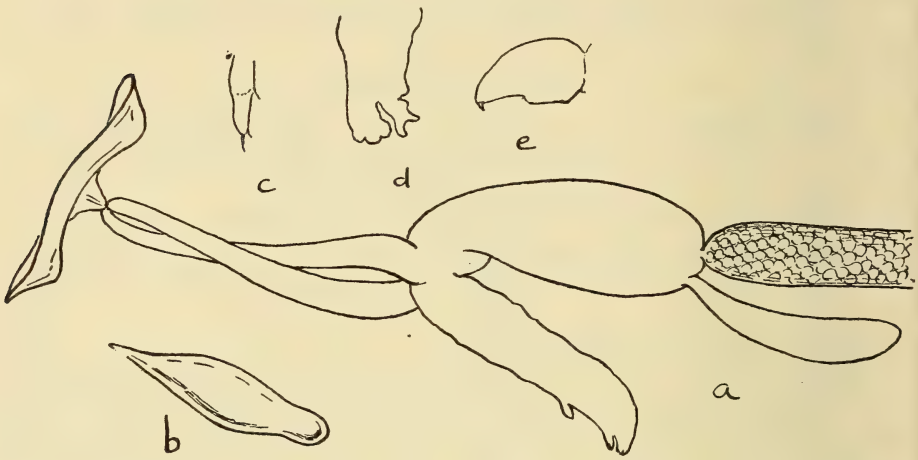


Fig. 28. *Charopinus dubius* T. Scott. *a*, ♀; *b*, end view of bulla; *c*, antenna 1; *d*, antenna 2; *e*, maxilliped.

Gen *Brachiella* Cuvier

1830. Cuvier, *Règne Anim.*, ed. 2, iii, p. 257.
1905. Miculicich, *Zool. Anz.*, xxviii, pp. 599 sqq.
1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 203.
1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 698 (key to species).
1928. Leigh-Sharpe, *Parasitology*, xx, p. 25.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 520 and (in key) 618, 619.
1933 Saby, *Proc. Zool. Soc. Lond.*, 1933, 4, p. 873, figs. (*merluccii* and *obesa*, anatomy).
1939. Yamaguti, loc. cit., p. 566.
1951. Gnanamuthu, *Spolia Zeylan*, xxvi, 1, p. 13.

♀—Cephalothorax elongate, more or less flexed backwards, head with dorsal carapace. Trunk swollen, flattened dorso-ventrally, with rows of pits, grooves, or knobs on dorsal and ventral surfaces in some species; 2 or 4 posterior processes and an unpaired genital process, no abdomen or anal lamellae. Ovisacs long, slender. Antenna 1 2-4-jointed (usually 3). Antenna 2 biramous. 2nd maxillae long, usually separate and joined at tips by a bulla, but sometimes fused.

♂—Cephalothorax separated by a constriction from trunk. Trunk fusiform, narrower than cephalothorax, unsegmented, with small anal lamellae. Antenna 1 3-jointed. Antenna 2 biramous, both rami 1-jointed.

Remarks. Wilson (1915. p. 700) refers to *B. lophii* M. Edw. 1840, and says it had not been seen by other investigators. Evidently he had overlooked the

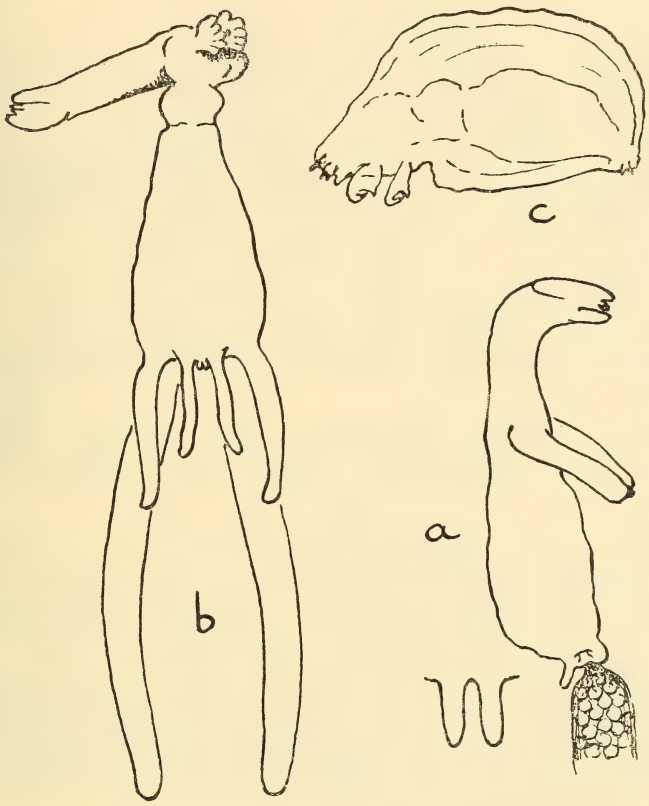


Fig. 29. *Brachiella* sp. *a*, lateral view of ♀ with dorsal view of posterior processes further enlarged. *Parabrachiella australis* Wilson. *b*, ♀; *c*, ♂.

record of T. & A. Scott (1913) who placed the species in *Clavella.* Moreover Wilson in his key (1915. p. 702) characterizes *lophii* as having pear-shaped 'posterior processes'; reference to Milne Edwards's description and figure, however, indicates that these are the ovisacs.

Key to the South African species

1.	Two posterior processes; genital process short.	B. sp.?
2.	Four posterior processes; genital process long.	*macrura*

Brachiella sp.

Fig. 29 *a*.

Two ♀♀, without ♂♂, from the axil of the pectoral fin of *Mugil capito*, Table Bay, are not in good condition.

Head with carapace. Trunk longer than wide, with 2 short digitiform posterior processes and a small rounded genital process. 2nd maxillae separate, joined at tips, with minute bulla.

Cephalothorax 1·5 mm., trunk 1·5 mm.

Brachiella macrura Wilson

1920. Wilson, *Bull. Amer. Mus. N.H.*, xliii, p. 7, pl. 3, figs. 23–8.

1939. Brian, *Rev. Zool. Bot. Afr.*, xxxii, p. 196.

1953. Capart, *Bull. Inst. franç. Afr. Noire*, xv, p. 669.

♀—Trunk longer than wide; 2 dorsal and 2 ventral posterior processes of about equal length; genital process long, about half length of posterior processes. 2nd maxillae fused at base, then separate to the bulla. Ovisacs slender, elongate.

Cephalothorax, trunk, and posterior processes each about 4 mm., trunk width 2 mm., ovisacs 9 mm.

Localities. Mouth of Congo R., on gills of Snapper (*Neomaenis fulgens*) (Wilson); mouth of Congo R. (Brian): Senegal and Togo, on *Otolithus* (Capart).

Remarks. Brian considers that this should be a synonym of *chevreuxii* van Beneden 1891 (on an Elasmobranch); Capart, with some hesitation, maintains the two species.

Gen. *Parabrachiella* Wilson

1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 713.

1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 519 and (in key) 618, 619.

1933. Saby, *Proc. Zool. Soc. Lond.*, 1933, 4, p. 867, figs. (*insidiosa*, anatomy).

1945. Ringuelet, *Notas Mus. la Plata, zool.*, x, no. 86, p. 129.

♀—Large size. Cephalothorax separated from trunk by a distinct groove. Trunk cylindrical, without pits or grooves, with 1 or 2 pairs of posterior processes, and a minute genital process; no abdomen or anal lamellae. Antenna 1 4-jointed. Antenna 2 biramous, exopod 2-jointed. 1st maxillae bi- or tripartite. 2nd maxillae short, united only at their tips which are lobate, with small bulla.

♂—Body without trace of segmentation, no carapace, trunk swollen dorsally. A pair of small caudal rami. Antenna 1 3-jointed.

Remarks. Distinguished from *Brachiella* by the groove separating cephalothorax and trunk in ♀, and the unsegmented and unconstricted body in ♀.

Parabrachiella australis Wilson

Fig. 29 *b*, *c*.

1923. Wilson, *Medd. Goteb. Mus. zool. Avd.*, no. 19 (*Goteb. Vet. Handl.* (4), xxv, 6), p. 8, pl. 2, figs. 16–23 (♀ ♂).

♀—Trunk with 2 pairs of posterior processes, and a minute genital process. 2nd maxillae short, tips expanded like a hand, with 5 digitate or lobate processes (more or less separate), bulla attached to the 'palms'.

♀ trunk 6 mm., including processes 9 mm., ♂ 3 mm.

Localities. Cape Barracouda, on gills of Stockfish (*Merluccius capensis*) (Wilson); no locality, on gills of Stockfish (S. Afr. Mus. 1 ♀, 1 ♂).

Remarks. Closely allied to *insidiosa* (Heller 1865. 'Novara', Crust., p. 239, pl. 24, fig. 1), which is parasitic on *Merluccius vulgaris* in Europe.

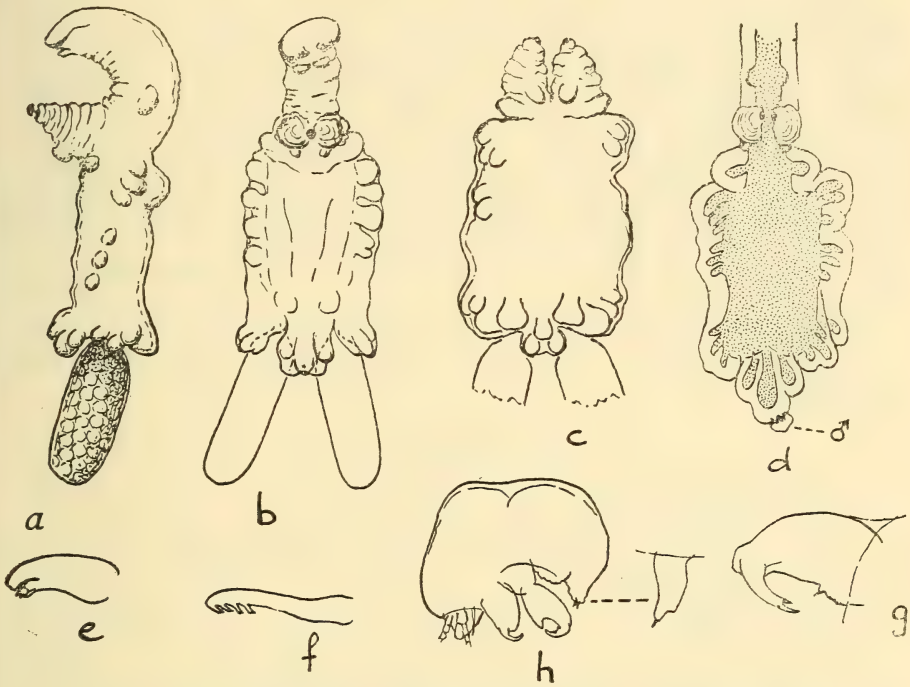


Fig. 30. *Eubrachiella sublobulata* n. sp. *a*, *b*, lateral and ventral views adult ♀; *c*, another specimen ♀ to show knobs at base of 2nd maxillae; *d*, juvenile ♀, with ♂ attached, to show subcuticular lobes; *e*, antenna 2; *f*, mandible; *g*, maxilliped; *h*, ♂ with caudal ramus further enlarged.

Gen. *Eubrachiella* Wilson

1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 716.
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 618, 619 (in key).

♀—Cephalothorax about as long as trunk, more or less flexed ventrally, no (distinct) dorsal carapace. Trunk stout, short, separated from cephalothorax by a groove, no (distinct external) processes. Ovisacs stout. Antenna 1 3-jointed. Antenna 2 biramous. 1st maxillae tripartite. 2nd maxillae short, stout, separate throughout their length, or united at tips by a bulla.

♂—Cephalothorax separated from trunk by a constriction, trunk posteriorly bent forwards. Antenna 1 3-jointed. Antenna 2 uniramous.

Remarks. This genus was established by Wilson to contain the two Antarctic species *antarctica* Quidor 1906, and *gainii* Quidor 1912. The present specimens, found on the subantarctic genus *Congiopodus*, appear to be congeneric.

Eubrachiella sublobulata n. sp.

Fig. 30.

♀—Cephalothorax thick, straight in juvenile, curved ventrally in ovigerous specimens, carapace indicated anteriorly, a lateral rounded protuberance (not very prominent) in front of 2nd maxillae. Trunk broad, but longer than wide, dorso-ventrally flattened; a medio-dorsal bifid knob at junction with cephalothorax and a medio-dorsal bifid knob (or two processes adnate at their base) on hind margin; both these bifid projections arise from the internal tissues, and each pair is united into a single knob by the external cuticle; similar lateral knobs covered by the cuticle along the sides, usually in groups of three: antero-laterally, laterally, dorso-laterally and ventro-laterally at the hind corners; a medio-ventral trifid knob on hind margin; no two specimens are exactly alike. Antenna 1 3-jointed. Antenna 2 biramous. 1st maxillae tripartite. 2nd maxillae short, stout, wrinkled, separate at base but united at tips, with a bulla; a knob on each ventrally, and another knob-like process at their bases projecting laterally; the latter appear to belong to the cephalothorax, but may belong to the trunk region (see fig. *d*, juvenile). Ovisacs short, stout.

♂—Body gibbous, with distinct constriction between cephalothorax and trunk.

♀ cephalothorax (if straightened) about 1·5 mm., trunk 1·5–2·5, ♂ 1 mm.

Locality. Table Bay, on gills of Horse Fish (*Congiopodus torvus*) (S. Afr. Mus. ♀♀, ♂♂).

INCERTAE SEDIS

Gen. *Medesicaste* Kröyer

1863. Kröyer, *Naturh. Tidsskr.* (3), 2, p. 386.

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 489.

1927. Oakley in Leigh-Sharpe & Oakley, *Parasitology*, xix, p. 464 (new definition).

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 495 and (in key) 614, 616.

♀—Head and neck cruciform, bulla on anterior part of head. Neck long and thin, enlarged at base. Body dorso-ventrally flattened, longer than broad, marked with faint transverse and longitudinal grooves. Thoracic appendages absent. Posterior processes convergent, enclosing a small 1-segmented abdomen. Ovisacs cylindrical.

♂—Very similar to ♂♂ of *Chondracanthus*. Antennal area marked off by a definite constriction.

Remarks. The above diagnosis is after Oakley (1927). He says that the general resemblance of the ♀ to that of the *Sphyriidae* is striking, and 'but for the shape of the posterior part of the genital segment of ♀, and the general characteristics of the ♂, it would be extremely tempting to remove it to that family'. Earlier in the same paper (pp. 457, 458) Leigh-Sharpe remarked about Heller's species *Medesicaste capense* [*sic*]: '. . . from the figure bears a striking resemblance to a *Rebelula* which has lost its posterior processes. . . . In particular the Copepod bears a strong resemblance to *Rebelula bouvieri* (Quidor) as described and figured by Wilson 1919 [*Proc. U.S. Nat. Mus.*, lv, p. 579, pl. 53, figs. 34-40, pl. 54, figs. 41-44]. One of Heller's figures of the ♀, however, indicates articulated appendages as well as knobs, and his figure of

the ♂, though little like those of the *Chondracanthidae*, is even less like those of the *Sphyriidae*.' He proposes (p. 459) that *M. penetrans* should be provisionally regarded as a synonym of *Rebelula bouvieri*.

The resemblance to *R. bouvieri* seems to be exaggerated; the ♂ and incomplete ♂ specimens described below confirm the validity of Heller's species and show that it cannot possibly be regarded as a *Rebelula*.

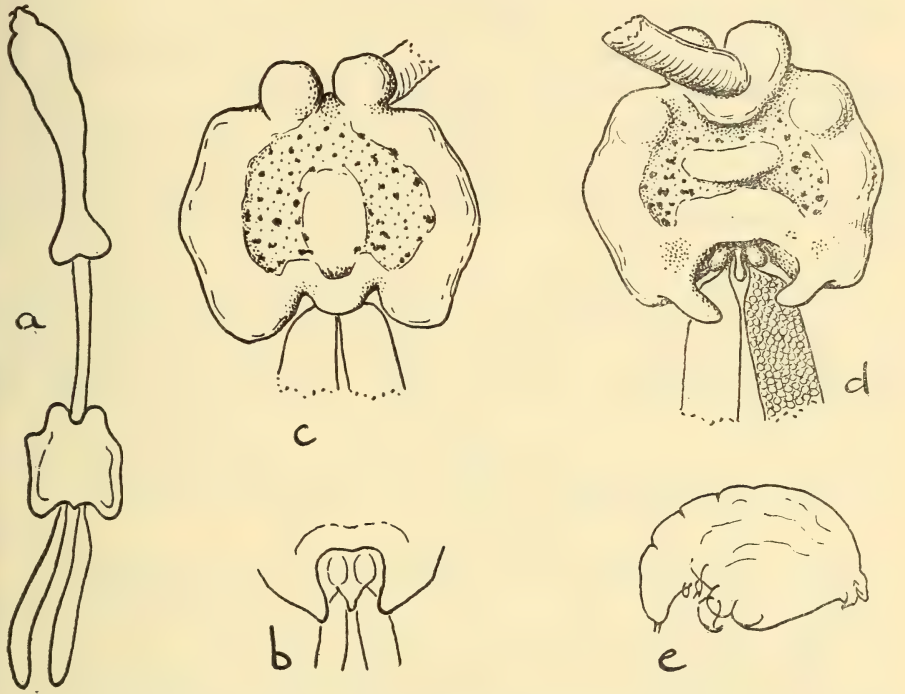


Fig. 31. *Medesicaste penetrans* Heller. *a*, whole animal ♀; *b*, ventral view of abdomen; *c*, *d*, dorsal and ventral views of genital segment ♀ (S. Afr. Mus. specimen); *e*, ♂ (*a* and *b* copies from Heller).

Medesicaste penetrans Heller

Fig. 31.

1865. Heller, '*Novara*', *Crust.*, p. 235, pl. 25, figs. 1, 2.
1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 560.

♀—(description after Heller). Head transversely ovate, separated by a constriction from the elongate cylindrical thorax which is bilobately expanded posteriorly; followed by a more slender elongate neck. Genital segment quadrangular, bilobed anteriorly and posteriorly; abdomen small.

(S. Afr. Mus. specimen.) The neck is broken off shortly before the genital segment. The latter approximately as broad as long; and more rounded-quadrate than Heller's figure; 2 knob-like anterior processes dorsally, continued ventrally into a collar-like thickening around base of neck. The hind margin is trilobate, the larger broadly rounded lateral lobes each with a narrower process ventrally. The short and slender 1-segmented abdomen is

concealed in dorsal view. The dorsal and ventral surfaces of the genital segment show a number of pits between the smooth swollen margins and the central area.

The ♂, attached ventrally at base of abdomen, closely resembles Heller's figure.

Heller: ♀ 28 mm., ♂ 0·5 mm. S. Afr. Mus. specimen: ♀ genital segment 4·5 × 4·5 mm., ovisacs 6·5 mm., ♂ 0·75 mm.

Locality. Cape, on *Trigla capensis* (Heller): Kalk Bay, in mouth of Gurnard (*Trigla*) 1903. (S. Afr. Mus. 1 mutilated ♀ with attached ♂.)

Remarks. There would seem to be no doubt that this specimen is referable to Heller's species; both were found at the Cape on gurnards.

The only other species is *M. triglarum* Kröyer, which was regarded as a synonym of *asellinum* (Linn.) by Scott (1913). Oakley, however, (loc. cit.) resurrected *Lernentoma* Baird for the latter species, keeping *triglarum* in *Medesicaste*, and defined the differences between these two genera and *Oralien* Bassett-Smith.

The shape of the cephalothorax of the present species can scarcely be called cruciform; and the genital segment shows no lateral indentations as are shown in Oakley's figure of *M. triglarum* (loc. cit., fig. 7 C). These differences, however, are not important enough to require the removal of *M. penetrans* to another genus.

Gen. *Strabax* Nordm.

1864. Nordmann, *Bull. Soc. Imp. Nat. Moscow*, xxxvii, p. 477.
1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 490.
1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 33.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 615, 616 (in key to genera).
1948. Barnard, *Ann. Mag. Nat. Hist.* (12), i, p. 251.

♀—Body divided into 3 distinct regions. Cephalothorax enlarged, more or less transverse to the neck-like trunk, with 6 fleshy knobs, 2 anterior, 2 ventral and 2 posterior, head small. Trunk cylindrical; genital segment transverse with large digitiform processes. Abdomen obsolete (unless the median dorsal process be regarded as the abdomen). Antennae and mouth-parts reduced in adult. Legs absent. Ovisacs cylindrical, multiseriate.

♂—Pygmy. Cephalothorax inflated, hinder part of body segmented. Caudal rami setiform. Antenna 1 4-5-jointed; antenna 2 prehensile. Mouth-parts see *infra*. Two (or three) pairs of minute 2-jointed, uniramose legs.

Remarks. The hammer-like cephalothorax, neck, and expanded genital segment with pits on dorsal surface (as in *Rebelula* and *Periplexus*) afford points of similarity with the *Sphyriidae*. In fact it is rather surprising to find that *Strabax* cannot be included in this latter family.

Oakley (1930. *Parasitology*, xxii, p. 185) considered that Wilson (1917, p. 34) intended to transfer this genus to the *Sphyriidae* but was deterred by the Chondracanthine ♂. As so few undamaged specimens were known, Oakley thought best to leave it in the *Chondracanthidae*, while recognizing the extreme doubtfulness of its position.

Wilson's key (1932) is very misleading. Of the four alternative methods of fastening to the host given in sect. 1 (loc. cit., p. 613), the present genus falls under the second (head and neck buried in tissues of host), which leads to sect. 60 and the Sphyriid genera.

As regards the processes of the genital segment, Bassett-Smith and Wilson (neither of whom presumably examined an actual specimen) state that there are eight; Brian (loc. cit., pl. 8, fig. 8) shows 9, the two ventral ones being bifurcate, and calls them all 'faisceaux abdominaux'. Bassett-Smith says 'abdomen pyriform $\frac{1}{3}$ as long as processes'. The present specimen, however, leads to the conclusion that all these processes arise from the genital segment and that the abdomen is so reduced as to be obsolete. If this be so, there are 5 dorsal processes, and 2 ventral bifurcate ones, i.e. counting the tips 9 in all in the present specimen, but 11 in Brian's figure. This raises the question whether Brian's specimen represents a different species, or whether the artist has perhaps shown too many processes.

Brian gives figures of the ♂ and its appendages. The present specimen does not fully correspond with his figures. Both antennae and the appendage labelled by Brian 'pmx 1' correspond in general, but that labelled 'pmx 2' is different, and I find no trace of the jointed appendage labelled 'p 1' (loc. cit., pl. 5, figs. 4 and 5). I have not seen Nordmann's paper, but Brian says the original description is incomplete, especially as regards the antennae and mouth-parts. Herein lies another possibility that the present specimen may correspond with the genotype, and Brian's specimen represent a different species.

A further point concerns the nomenclature of the ♂ appendages. Brian gives figures labelled mx, pmx 1, pmx 2, p 1, p 2, p 3. Omitting the jointed appendage p 1, which I do not find in my specimen, the stout appendage with bifid unguis (pmx 1) is presumably the 2nd maxilla, and the 2- or 3-jointed appendage (pmx 2) with falcate unguis in my specimen is the maxilliped.

One may also refer to the discrepancy in Wilson (loc. cit.). His fig. 298 *e*, pl. 38, fig. *f*, and pl. 39, fig. *e* all represent appendages similar in structure (2nd joint with a patch of spinules below unguis); the first is labelled '2nd maxilla', the second 'maxilla', and the third 'maxilliped'; and the descriptions of the first two do not correspond with their figures.

Very few specimens have been recorded, and a search for more material would be useful. All the recorded specimens are from Scorpaenid fishes.

Strabax monstrosus Nordm.

Fig. 32.

1864. Nordmann, loc. cit., p. 18 (*fide* Brian), pl. 5, figs. 1–10.
1912. Brian, loc. cit., p. 33, pl. 5, figs. 4, 5 (♂), pl. 8, figs. 7, 8 (♀).
1948. Barnard, loc. cit., p. 253, fig. 8 (♀ ♂).
1954. Nunes-Ruivo. *Vie et Milieu*, suppl. 3, p. 118, figs. 2 (♀), 3 (♂).

♀—Cephalothorax obliquely transverse to neck. The latter shows 4 pairs of pale longitudinal lines due to internal muscle strands; the posterior portion is

bent and shows 2 or 3 transverse grooves, none of which completely encircle the neck and do not represent segments. Genital segment dorsally with 3 pairs of pits. Digitiform processes slightly constricted near the bluntly rounded tips.

♂ attached ventrally near the vulva between the ventral bifurcate processes. 4 chitinous dorsal patches on posterior segments. Antenna 1 5-jointed; antenna 2 stout, prehensile. Maxilla 2 (?) stout, unguis with tooth on outer margin. Maxilliped 2-jointed, slender, with apical curved unguis. 1st and 2nd legs very small, 2-jointed, tipped with 2 setae; 3rd leg minute.

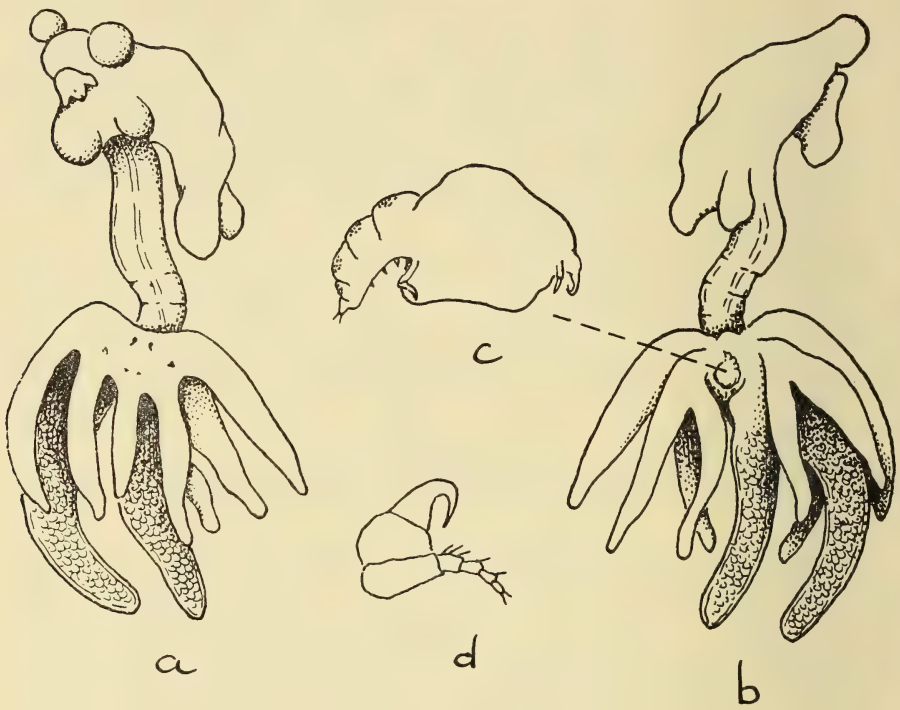


Fig. 32. *Strabax monstrosus* Nordm. *a*, *b*, dorsal and ventral views ♀, the latter showing attached ♂; *c*, ♂; *d*, 1st and 2nd antennae ♂.

♀ 'hammer' about 5 mm., neck 4 mm., processes 3–4 mm., ovisacs 5 mm.; ♂ 0·9 mm. Hammer and neck dark grey, the knobs pale, processes dirty buff, ovisacs yellow.

Locality. Port St. Johns, hammer embedded in the upper corner of the gill chamber of *Scorpaenodes guamensis*.

Distribution. Mediterranean and off north-west coast of Africa. On gills and palate of *Scorpaena porcus* and *scrofa*, and *Sebastes*.

Fam. Sphyriidae

1919. Wilson, *Proc. U.S. Nat. Mus.*, iv, pp. 549 sqq. (revision).
1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 524.

♀—Adult divided into 3 regions: expanded head, narrow neck, and dorso-ventrally flattened trunk. Abdomen minute, anal lamellae present. A pair of

posterior processes. Ovisacs long, cylindrical, multiseriate. Legs degenerate. In juvenile 2 pairs of antennae, the 2nd pair chelate; 2 pairs of maxillae, the 2nd pair uncinate, one pair uncinate maxillipeds.

♂—Curved or straight, unsegmented or feebly segmented. Two pairs of antennae, the 2nd pair chelate; 1st maxillae biramous, 2nd pair uncinate; maxilliped uncinate.

Exclusively on marine fishes. The females are usually attached near the dorsal fin, the vent, or in the gill chamber. The female in burrowing into the flesh of the host endeavours to reach one of the blood-vessels, usually the dorsal aorta. The males, having found the females, become more or less permanently attached to them.

Gen. *Sphyrion* Cuvier

1840. Milne Edwards, *Hist. Nat. Crust.*, iii, p. 525.
1900. Stebbing, *Mar. Invest. S. Afr.*, i, p. 59.
1912. Quidor, *Arch. Zool. Paris*, ser. 5, vol. 10, notes: pp. xxxix-xlii, figs.
1919. Wilson, loc. cit., p. 566.
1928. Leigh-Sharpe, *Parasitology*, xx, p. 179.
1932. Wilson, loc. cit., p. 530.
1914. Tyvold, *Bergens Mus. Aarb.*, 1914–15, pp. 1 sqq., figs.

♀—Head (cephalothorax) greatly expanded laterally, more or less hammer-shaped, but variable. Trunk much expanded, dorso-ventrally flattened, often pitted. Abdomen obsolete, anal lamellae knob-like. Posterior processes profusely branched.

♂—Body folded upon itself, unsegmented.

Remarks. Wilson admits only two species: *laevigatum* Guérin-Mén. and *lumpi* (Kröyer).

Both the *Preuss. Akademie Nomenclator* and Neave give Milne Edwards as the author of the genus. Stebbing and Wilson credit the genus to Cuvier; Stebbing quoting the French form 'Les Sphyrions', Wilson the Latin form. If Cuvier used the Latin form as well as the French, the case seems clear; but if not, the authorship of the genus should go to Guérin-Méneville whose work is referred to by Milne Edwards and therefore antedates Milne Edwards (viz. 1839, *vide* Wilson, 1919. loc. cit., p. 568) (see Stebbing, loc. cit., p. 62).

Key to the species

1. 'Hammer' knobbly, neck short, trunk broader than long. *laevigatum*
2. 'Hammer' smooth, neck long, trunk longer than broad. *lumpi*

Sphyrion laevigatum Guérin-Mén.

Fig. 33 *a*.

1871. Cunningham, *Tr. Linn. Soc. Lond.*, xxvii, p. 501, pl. 59, fig. 12 (*kingi*).
1900. Stebbing, loc. cit., p. 60, pl. 4 (♀).
1917. Brian, *Bull. Inst. ocean. Monaco*, no. 324, p. 3, text-figs. (♀).
1919. Wilson, loc. cit., p. 575.
1922. Philipps, *New Zeal. J. Sci. Tech.*, iv, p. 315, fig.
1928. Leigh-Sharpe, loc. cit., p. 182, fig. 3 (*kingi*).
1944. Brian, *An. Mus. Argent.*, xli, p. 199, pl. 9, figs. 76–81 (*kingi*).

♀—Hammer variously knobbed, no two specimens exactly alike, but knobs more or less symmetrically arranged. Neck relatively short, shorter than width of hammer in fully grown specimens; in one non-ovigerous specimen (S. Afr. Mus.), however, neck twice as long as width of hammer, and even if the hammer had grown wider the neck would have been relatively much longer than in normal specimens. Trunk in fully grown specimens broader than long.

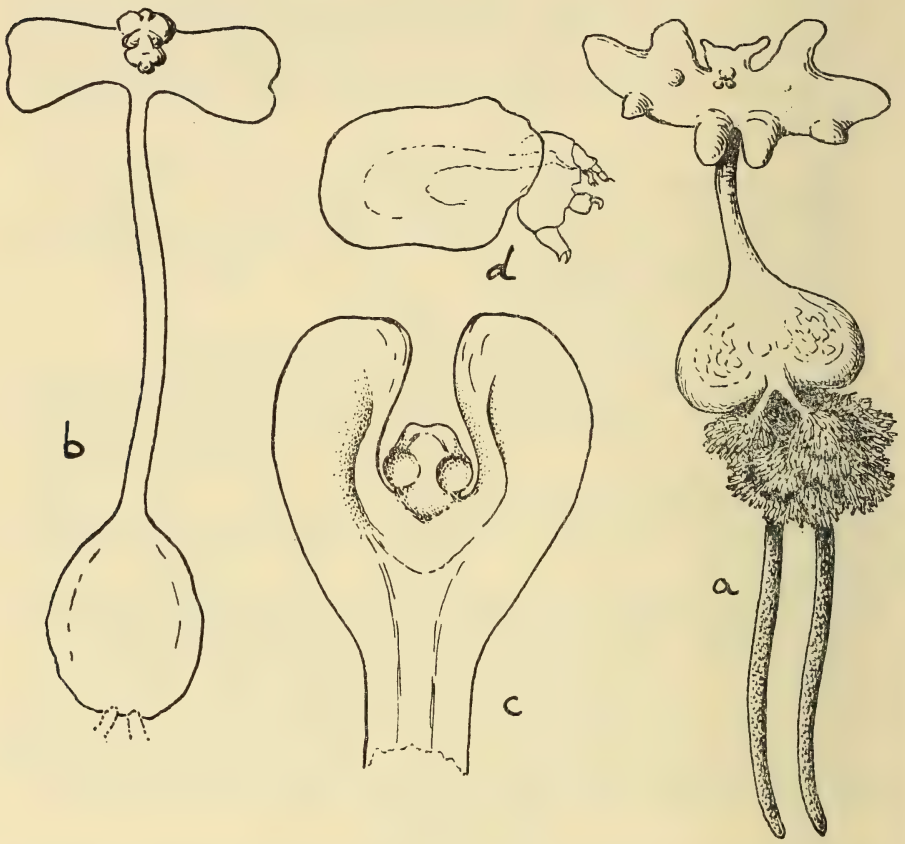


Fig. 33. *Sphyrion laevigatum* Guérin-Men. *a*, ♀. *Sphyrion lumpi* (Kröyer). *b*, ♀ from *Antimora*; *c*, anterior portion ♀ from *Cottunculoides*; *d*, ♂ (redrawn from Wilson).

Largest specimen: width of hammer 28 mm., length of neck 10 mm., width of trunk 18 mm., ovisacs 40–50 mm. In the exceptional specimen mentioned above: width of hammer 12 mm., length of neck 25 mm., width of trunk 15 mm.

Localities. Off Table Bay and Cape Point, near the dorsal fin or vent of Macrurid fishes and King Klip (*Genypterus*) (S. Afr. Mus.); Agulhas Bank, on 'Cape Salmon' (probably *Atractoscion*) (Natal Museum); Cape Town, host unknown (Brian).

Distribution. North Atlantic, Antarctic, New Zealand.

Remarks. The exceptionally long-necked specimen is interesting. It was embedded near the vent of a Macrurid fish, but there is no obvious reason for the length of the neck, other specimens similarly situated having typical short necks.

Leigh-Sharpe maintains *kingi* distinct from *laevigatum* on account of the nodulose (4 pairs of processes) head, the swollen neck where it joins the trunk, and the posterior processes not being arranged in three 'series'. I do not think any of these characters will be found to be constant and distinctive enough for specific differentiation. Quidor's (1912) species should probably also become synonyms.

Sphyrion lumpi (Kröyer)

Fig. 33 *b–d.*

1845. Kröyer, *Danmarks Fiske*, ii, p. 517 (*Lestes l.*).
1913. T. & A. Scott, *Brit. Parasit. Copep.*, p. 164, pl. 51, figs. 3, 4.
1914. Tyvold, loc. cit., p. 12.
1919. Wilson, loc. cit., p. 570, pls. 50–2.
1928. Leigh-Sharpe, loc. cit., p. 179, fig. 1.
1932. Wilson, loc. cit., p. 530, fig. 315.
1939. Nigrelli & Firth, *Zoologica.*, xxiv, pl. 1, figs. 1–3, and pls. 1–4.
1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 251.

♀—(large nearly complete specimen). Hammer smooth, head prominent, the ends of the hammer somewhat truncate and bilobed. Neck relatively very long. Trunk pear-shaped, longer than broad.

Width of hammer 25 mm., length of neck 35 mm., width of trunk 18 mm., length 22 mm.

(Anterior portion only.) Two lateral processes projecting forwards enclosing the head, which has 2 knobs on ventral surface but no indications of mouth-parts (cf. Leigh-Sharpe, fig. 1). Length 4 mm., width 3 mm.

Localities. Off Cape Point, on *Antimora australis* (Gadidae); (anterior portion) off Cape Point, 310-560 fathoms, behind pectoral fin of *Cottunculoides inermis.* (S. Afr. Mus.)

Distribution. Iceland (on *Cyclopterus*); Atlantic coast of North America (on *Sebastes*).

Remarks. The large specimen in the South African Museum had been named *laevigatum* by Stebbing, but not recorded by him. The specimen has been desiccated, and is not perfect, lacking the branched posterior processes. The smooth hammer and long neck seem to indicate its reference to this species.

The specimen consisting of only the anterior portion resembles fig. 3, in T. & A. Scott, but the horns of the hammer are relatively larger than the head.

Fam. Sphaeronellidae

1897. Hansen, *Choniostomatidae*, pp. 1–206, 13 pls.
1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 562.
1930. Monod, *Senckenbergiana*, xii, 6, p. 336.

Minute parasites on Malacostracan Crustacea (Caridea, Mysidacea, Cumacea, Isopoda, and Amphipoda).

Gen. *Sphaeronella* Salensky

1868. Salensky, *Arch. Naturg.*, xxxiv, p. 301.

1897. Hansen, loc. cit., pp. 4, 87 (in key), 98.

♀—Head small, more or less defined from the oval or globular trunk. Affixed to host by uncinate maxillae and maxillipeds. Abdomen absent. Legs small or wanting.

Parasitic in the brood-pouch of Cumacea, Isopoda, and Amphipoda.

Sphaeronella capensis Hansen

1897. Hansen, loc. cit., pp. 100 (in key), 131, pl. 5, figs. 4 *a–c*, pl. 6, figs. 1 *a–d*.

1910. Stebbing, loc. cit., p. 562.

Size about half a millimeter.

Locality. Cape of Good Hope, in marsupium of the Amphipod *Lemboides afer* (Stebb.).

List of South African hosts with the parasites recorded from them in South African waters. In some cases the parasites recorded from other parts of Africa are included in [ ], but the list is not intended to be a complete list of all the parasites recorded from each host.

MARINE

Polychaet Worms	
Bispira volutacornis	*Sabelliphilus bispirae*
Host ?	*Entobius euelpis*
Echinoderms	
Amphipholis squamata	*Cancerilla durbanensis*
Crustacea (Amphipoda)	
Lemboides	*Sphaeronella capensis*
Ascidians	
Amaroucium erythraeum	*Enterocola fulgens*
Ascidia sydneiensis	*Notodelphys allmani*
„ *canaliculata*	„ *weberi*
Macroclinum angolarum	*Botryllophilus africanus*
Microcosmus oligophyllus	*Doropygus pulex*
Polycitor renieri	*Botryllophilus* sp.
Pyura stolonifera ('Red Bait')	*Doropygus pulex*
	Gunenotophorus globularis
Styela hupferi	*Botryllophilus aspinosus*
Pterobranchiata	
Cephalodiscus gilchristi	*Zanclopus cephalodisci*
Fishes	
Acanthias (see also *Squalus*)	*Achtheinus dentatus*
	„ *pinguis*

Acanthopagrus berda	[*Caligus cossackii*]
Alopias vulpes	[*Dinemoura producta*]
	Nemesis pallida
	[,, *lamna*]
Anchoviella holodon	*Caligus engraulidis*
Antimora australis	*Sphyrion lumpi*
Arius dussumeiri	*Caligus arii*
Atractoscion	*Sphyrion laevigatum*
Austrosparus sarba	[*Caligus cossackii*]
Brama raii	*Hatschekia acuta*
Cantharus see *Pachymetopon*	
Carcharinus (*Carcharias*)	*Pandarus bicolor*
see also *Eulamia* and	,, *smithii*
Sharks unspecified	*Echthrogaleus coleoptratus*
	Achtheinus dentatus
	Anthosoma crassum
Carcharodon	*Alebion carchariae*
	Nesippus alatus
	Achtheinus dentatus
*Cetorhinus maximus**	[*Dinemoura producta*]
	[*Anthosoma crassum*]
	[*Nemesis lamna*]
Chrysophrys see *Austrosparus*	
Conger vulgaris	[*Congericola pallida*]
Congiopodus torvus	*Chondracanthus congiopodi*
	Eubrachiella sublobulata
Coryphaena hippurus	*Caligus coryphaenae*
Cottunculoides inermis	*Sphyrion lumpi*
Cymatoceps nasutus	*Clavellopsis fallax*
Dentex see *Petrus*	
Diplodus cervinus (*trifasciatus*)	[*Caligus ligusticus*]
,, *sargus* (*rondeleti*)	[*Clavellodes macrotrachelus*]
Echeneis naucrates	[*Lepeophtheirus longipes*]
Engraulis see *Anchoviella*	
Epinephelus fuscoguttatus	*Lernanthropus petersi*
Eulamia acuta	*Pandarus smithii*
Exocoetus species	[*Pennella exocoeti*]
Galeorhinus canis	*Pandarus bicolor*
	[*Pseudocaligus apodus*]
Genypterus capensis	*Sphyrion laevigatum*
Germo alalonga	[*Pennella orthagorisci*]
Gymnosarda pelamys	*Caligus pelamydis*
Isurus glaucus	*Anthosoma crassum*
Lepidion capense	*Acanthochondria lepidionis*
Lichia amia	[*Caligus mauritanicus*]
	Lepeophtheirus lichiae
	[*Nemesis lamna*]
Lophius piscatorius	*Chondracanthus lophii*

* 1948. Debouttéville, *Bull. Mus. Paris.*, xx, no. 5, pp. 446, 447.

Macrurus species	*Sphyrion laevigatum*
	,, *lumpi*
Merluccius capensis	*Chondracanthus merluccii*
	Parabrachiella australis
Mola mola and *lanceolata**	*Lepeophtheirus insignis*
	Cecrops latreillei
	Orthagoriscicola muricatus
	Philorthragoriscus serratus
	Pennella filosa
	,, *orthagorisci*
Mugil species	*Achtheinus dentatus*
	Lernanthropus paradoxus
	Brachiella sp.
Mustelus species	*Achtheinus dentatus*
	Lerneopoda galei
Myctophum species	*Cardiodectes medusaeus*
[*Neomaenis* (Congo)	*Brachiella macrura*]
Orthagoriscus see *Mola*	
Ostracion cornutus	*Ancistrotos ostracionis*
Otolithus	*Brachiella macrura*
Pachymetopon blochii	*Clavella pagelli*
Pagellus lithognathus	*Clavella pagelli*
	Clavellopsis fallax
,, *mormyrus*	[*Caligus ligusticus*]
	[*Clavellopsis fallax*]
Pagrus see *Cymatoceps*	
Pelamys sarda	*Caligus pelamydis*
Petrus rupestris	*Clavella denticis*
Pliotrema warreni	*Achtheinus pinguis*
Plotosus anguillaris	*Lepeophtheirus plotosi*
Polynemus	[*Argulus dartevellei*]
Pomatomus saltator	[*Caligus mauritanicus*]
[*Pseudotolithus*	*Argulus alexandrensis*]
Raia marginata	*Trebius caudatus*
Rhinobatus	*Lepeophtheirus* sp.
Sargus see *Diplodus*	
Sciaena aquila	[*Caligus mauritanicus*]
	[*Lepeophtheirus longipes*]
	[*Sciaenophilus tenuis*]
	[*Polyrhynchus sciaenae*]
	[*Lernanthropus gisleri*]
	[*Brachiella sciaenophila*]
Scoliodon	*Perissopus dentatus*
Scopelus see *Myctophum*	
Scorpaenodes guamensis	*Strabax monstrosus*
Scylliorhinus (*Scyllium*)	*Pandarus armatus*
	Achtheinus dentatus
	,, *pinguis*

* 1946. Dollfus, Essai de Catalogue des Parasites Poisson-lune *Mola mola* (L. 1758) et autres *Molidae*. *Ann. Soc. Sci. Nat. Charante-maritime*, n.s. III, fasc. 7. (Copepodes, pp. 70–2.)

Seriola lalandei	*Caligus lalandei*
Serranus goliath see *Epinephelus*	
Sharks unspecified	*Alebion carchariae*
	Perissopus dentatus
	Dinemoura producta
	,, *latifolia*
	Achtheinus dentatus
Skate unspecified	*Charopinus dubius*
Sparus see *Acanthopagrus*	
Sphyraena commersoni	*Argulus belones*
	[*Caligus affinis*]
	Pandarus cranchii
Sphyrna species	*Pandarus armatus*
	,, *cranchii*
	[*Nemesis robusta*]
Squalus acanthias	*Caligus coryphaenae*
	Achtheinus dentatus
Stegostoma fasciatum	*Pandarus cranchii*
Temnodon see *Pomatomus*	
Tetrodon hypselogeneion	*Caligus tetrodontis*
	Lepeophtheirus brachyurus
Thunnus thynnus	[*Pennella filosa*]
Trigla species	*Medesicaste penetrans*
Umbrina robinsoni	*Clavellopsis hostilis*
Xiphias gladius	[*Pennella filosa*]
	[,, *crassicornis*]
Zeus	[*Argulus zei*]
Zygaena see *Sphyrna*	
Mammals	
Balaenoptera acutorostrata	*Pennella crassicornis*
,, species	,, *balaenopterae*

Fresh Water

Amphibians	
Tadpoles	*Dolops ranarum*
Fishes	
Barbus sp.	*Lernaea barbicola*
Barbus gunningi and *swierstrae*	*Dolops ranarum*
Cichlidae	[*Chonopeltis inermis*]
	[*Lernaea*]
	[*Lamproglena*]
Eutropius	*Dolops ranarum*
Gnathonemus	*Chonopeltis inermis*
Heterobranchus	[*Dolops ranarum*]
Huro salmonoides (imported)	*Dolops ranarum*
Hydrocyon	[*Argulus*]
[*Lates*	*Dolops ranarum*]
Marcusenius	*Chonopeltis inermis*

[*Micropterus dolomieu* (imported)	*Achtheres micropteri*]
[*Polypterus*	*Lernaea haplocephala*]
Protopterus	[*Dolops ranarum*]
Sandelia capensis	*Argulus capensis*
Serranochromis thumbergi	[*Lamproglena*]
Synodontis melanostictus	*Chonopeltis inermis*
Tilapia mossambica and other species	*Dolops ranarum*
	[*Lernaea*]

11. *The Breeding and Growth of* Hymenosoma orbiculare Desm. (*Crustacea, Brachyura*). By G. J. Broekhuysen, Ph.D., Department of Zoology, University of Cape Town. (With 13 text figures.)

Introduction

The growth and reproduction of the South African shore crab *Cyclograpsus punctatus* was described earlier (Broekhuysen, 1941). The present paper deals with the Crown crab *Hymenosoma orbiculare*. Whereas *Cyclograpsus* lives on the upper part of the shore and is common among broken rocks, *Hymenosoma* lives on the lower part of the shore and is restricted to quiet areas where fine sands and mud accumulate. It is thus common in lagoons and estuaries. *Cyclograpsus* can withstand exposure to air for considerable periods and prefers this, but *Hymenosoma* either buries itself in damp sand covered by a shallow layer of

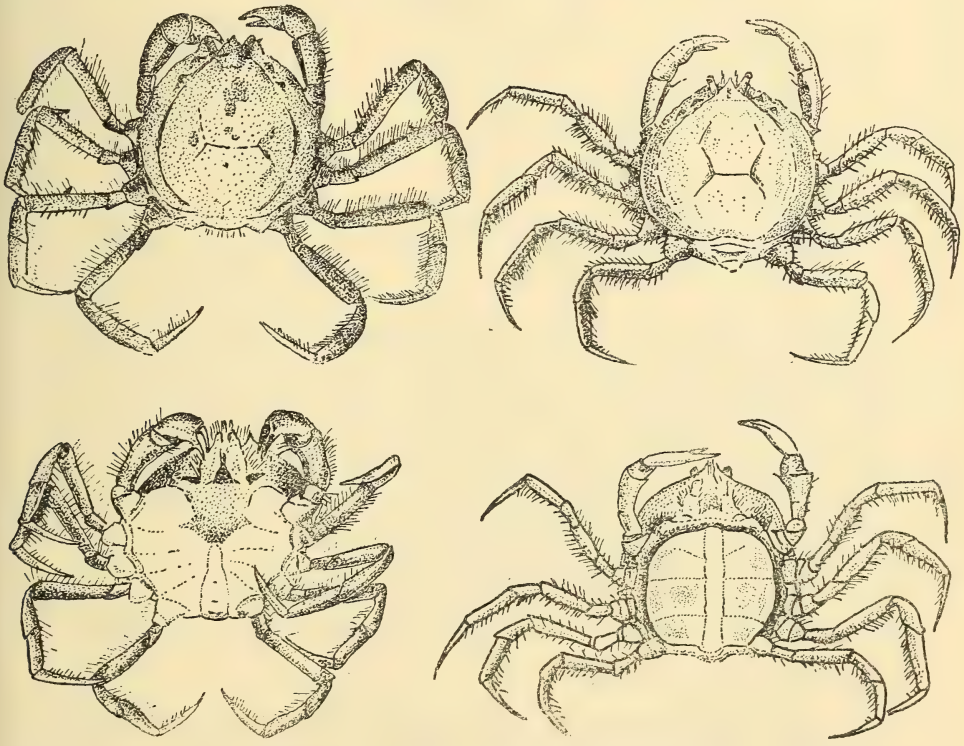


Fig. 1. *Hymenosoma orbiculare* Desm.
Large specimens from the Sand Vlei Estuary, natural size. Left: male; right: female.

water or moves down the shore with the ebbing tide and often extends below tide marks. Thus Barnard (1950) has recorded it from 45 fathoms. Nevertheless there are certain similarities between the two crabs: both tolerate a very wide range of temperature and salinity.

The ecological niche occupied by *H. orbiculare* shows much similarity to that occupied by *Carcinus maenas* of the Northern hemisphere (Broekhuysen, 1936). *Carcinus*, however, seems to prefer a more solid bottom than *Hymenosoma*, although the species was very common in the Wadden Sea, N.W. of Holland, where the bottom is sandy.

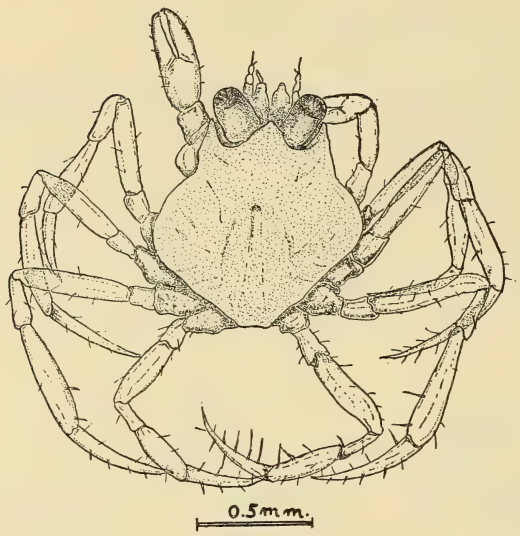


Fig. 2. *Hymenosoma orbiculare* Desm.
First crab (post-larval) stage. A Megalopa stage has not been observed.

Hymenosoma orbiculare Desm. has been described by Barnard (1950). The adult ♂ and ♀ are illustrated in fig. 1; and in fig. 2 an example of the first crab (post-larval) stage. During the course of the estuary survey carried out by the University of Cape Town, the species has been recorded from the following localities: Lambert's Bay, Steenberg's Cove, Berg River Mouth, Saldanha Bay, Langebaan Lagoon, Milnerton Estuary, Hout Bay, Sand Vlei Estuary, False Bay, Klein River Lagoon, Breede River, Great Brak River Mouth, Knysna Lagoon, Sundays River Mouth, Bushman River Mouth, Keiskamma River Mouth, The Haven, Port St. Johns, Durban Bay, St. Lucia Bay, Kosi Bay, estuaries near Inhambane (Portuguese East Africa). Balss recorded it from Lüderitzbucht and Barnard from Olifants River Mouth, so that its total distribution is from South West Africa around the Cape to Portuguese East Africa (see fig. 3). Also recorded from Zanzibar (Lenz, 1905).

Hymenosoma geometricum Stimpson was described from False Bay. Barnard (1950) considers this to be merely a deep-water variety of *H. orbiculare*. The identity of the two species will be discussed further in the present paper.

Material and Methods

The bulk of the material was collected in Sand Vlei Estuary at Muizenberg between the Vlei Bridge and the Foot Bridge (see fig. 4). During the course of the investigation the estuary was subjected to wide variations in salinity

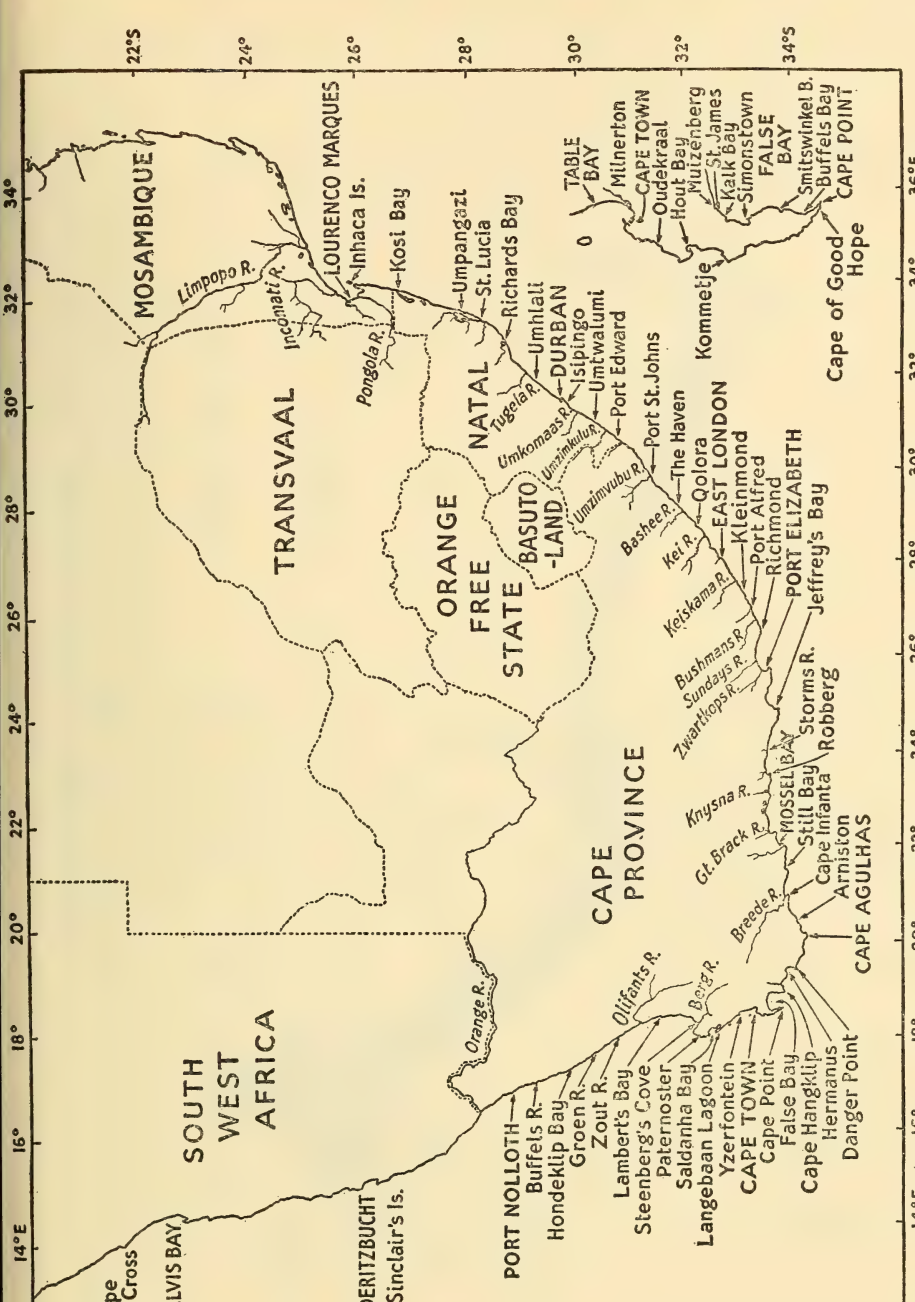


Fig. 3

A map of Southern Africa showing some of the stations from where *H. orbiculare* has been collected. (From Day, J. H., 'The Polychaet Fauna of South Africa.' *Ann. Natal Mus.*, XII, 3, 1953.)

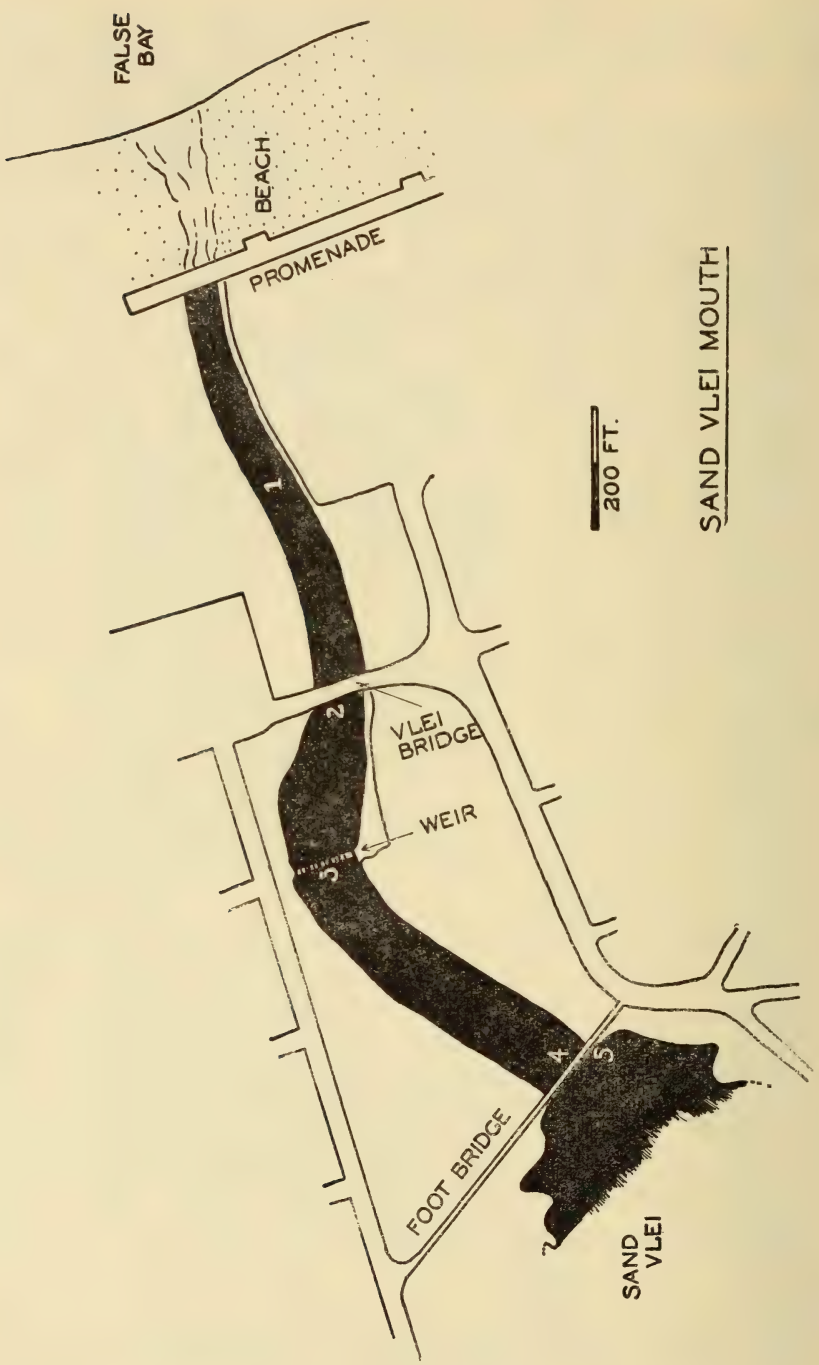


Fig. 4
The Mouth of Sand Vlei opening into False Bay.

indicated by a limited number of salinity determinations which have been tabulated in Table I.

Table I

Salinities determined in the Sand Vlei Estuary during the course of the investigation (see for stations fig. 4). The figures with an asterisk were bottom sample readings.

Station	*March*	*April*	*May*	*June*	*July*	*August*	*September*	*December*	*January*
1	—	8·31–9·0	7·4–7·6	3·3–31·8	0·5–5·8	—	33·7–34·3	—	—
2	7·7	8·4	7·2–7·5	2·8–25·0	0·4–5·7	0·5–0·6*	8·4–32·3	24·2	20·1
3	8·9	7·9	7·2–7·5	0·8–25·2	0·4–5·8	0·6	6·0–31·2		21·4
4		9·2	3·3–8·2 4·8*	2·0–23·1			1·5–28·9		21·5
5			2·8	3·3					

The salinites given in the above table are in $^{0}/_{00}$.

Random samples of crabs were collected at regular intervals from February 1947 to February 1948. The total was 1,494 females and 867 males. After sexing, the maximum width of the carapace was measured. The degree of maturity was judged from the shape of the abdomen, and the adults were dissected to determine the developmental stage of the gonads. Berried females were recorded and the developmental stage of the developing embryos noted.

During the course of the investigation a considerable number of *Hymenosoma* were kept in the laboratory. They were in glass dishes with a little water. Sand and shell fragments were provided as a substratum. These crabs were under constant observation.

The Reproductive Stages of the Male

A total of 752 males collected from Sand Vlei had a carapace breadth exceeding 14 mm. By dissecting, three stages could be distinguished in the reproductive system: (*a*) gonads undeveloped or small; (*b*) gonads developing; (*c*) gonads fully developed.

The monthly changes in the percentage of crabs which fell into these three categories is shown in Table II and text-figure 5.

Table II

Developmental Stages of the Gonads of Males from Sand Vlei during the period February 1947 to February 1948 (figures given are percentages).

Date	*Gonads undeveloped*	*Gonads developing*	*Gonads well developed*	*Total number of crabs*
February	1	38	61	94
March	5	26	69	175
April	4	13	83	78
May	10	24	65	78
June	4	26	70	23
July	0	28	72	25
August	2	37	61	41
September	–	–	–	1
October	–	–	–	3
November	67	2	31	52
December	21	54	26	39
January	8	41	51	143

No records are available for September and October as the water-level in the estuary was so high that collecting was difficult. It will be seen that most of the males had fully developed gonads between February and August. In November (and possibly October) they had small or resting gonads and in December to January they were growing.

It therefore appears that during spring and early summer most males were unable to copulate as their gonads were not mature. The breeding-season was in late summer and in winter, and covered a period of eight months. It must be stressed that these conclusions refer only to crabs in Sand Vlei Estuary and differences may well occur in crabs inhabiting other localities. Thus of 25 mature males caught at Lambert's Bay in October 1947, 4 per cent had undeveloped gonads, 12 per cent developing gonads, and 84 per cent well-developed gonads. As will be seen later, the developmental cycle of the male fits in rather well with that of the female.

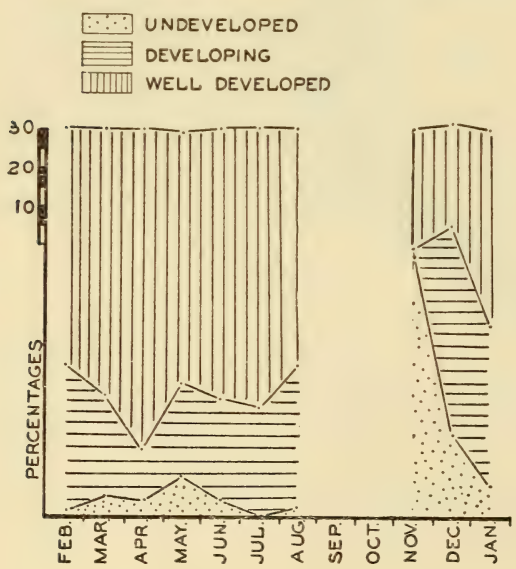


Fig. 5
The development of the gonads in males. During the months September and October too few males were obtained to make observations possible.

The Reproductive Stages of the Female

A total of 1,314 females with a carapace width exceeding 14 mm., were examined and of those which were not in berry,

687 were dissected and the state of the gonads recorded in the same three categories as was used for the males, namely: (*a*) ovary undeveloped or small; (*b*) ovary developing; (*c*) ovary well developed.

A total of 327 females were in berry, so that this represents a fourth phase in the reproductive cycle. In order to determine whether these berried females had resting or active gonads, 245 of them were dissected and their condition recorded under the same categories as before.

The results are summarized in Tables III and V and text-figures 6 and 7. The upper part of text-figure 6 shows the percentages of berried females, while the lower part gives the percentages of dissected females not in berry with gonads in one of the three different developmental stages.

Table III

The activity of the reproductive organs of female crabs at Sand Vlei during the period February 1947 to February 1948.

Date	*Females not in berry*				*Females in berry*	*Total number of crabs examined*
	Undeveloped ovaries	*Developing ovaries*	*Well-developed ovaries*	*Number of females larger than 14 mm. dissected*	*Percentage of females in berry*	
	%	%	%		%	
12·2. '47	71	28	1	93	1	136
11·3	96	4	0	112	0	152
25·3	100	0	0	47	0	67
15·4	100	0	0	37	0	40
6·5	68	30	1	47	0	50
27·5	3	26	71	35	52	67
6·6	11	56	33	9	33	27
19·20.6	44	22	33	9	64	25
18·7	17	0	83	6	85	39
30·7	0	33	66	12	78	54
12·8	13	25	63	8	79	39
26·8	8	25	67	12	76	51
23·9	33	33	33	3	94	54
13·10	10	20	70	10	55	22
13·11	25	33	42	12	20	25
25·11	54	31	15	52	30	77
16·12	64	29	7	41	10	49
9·1. '48	93	6	1	90	4	243
23·1	96	4	0	82	0	97

Table III and text-figure 6 show that there is a definite periodicity in the reproductive cycle of the female. The breeding-season is in the winter and the spring. During summer the ovaries are in a resting stage, but by May development starts to take place.

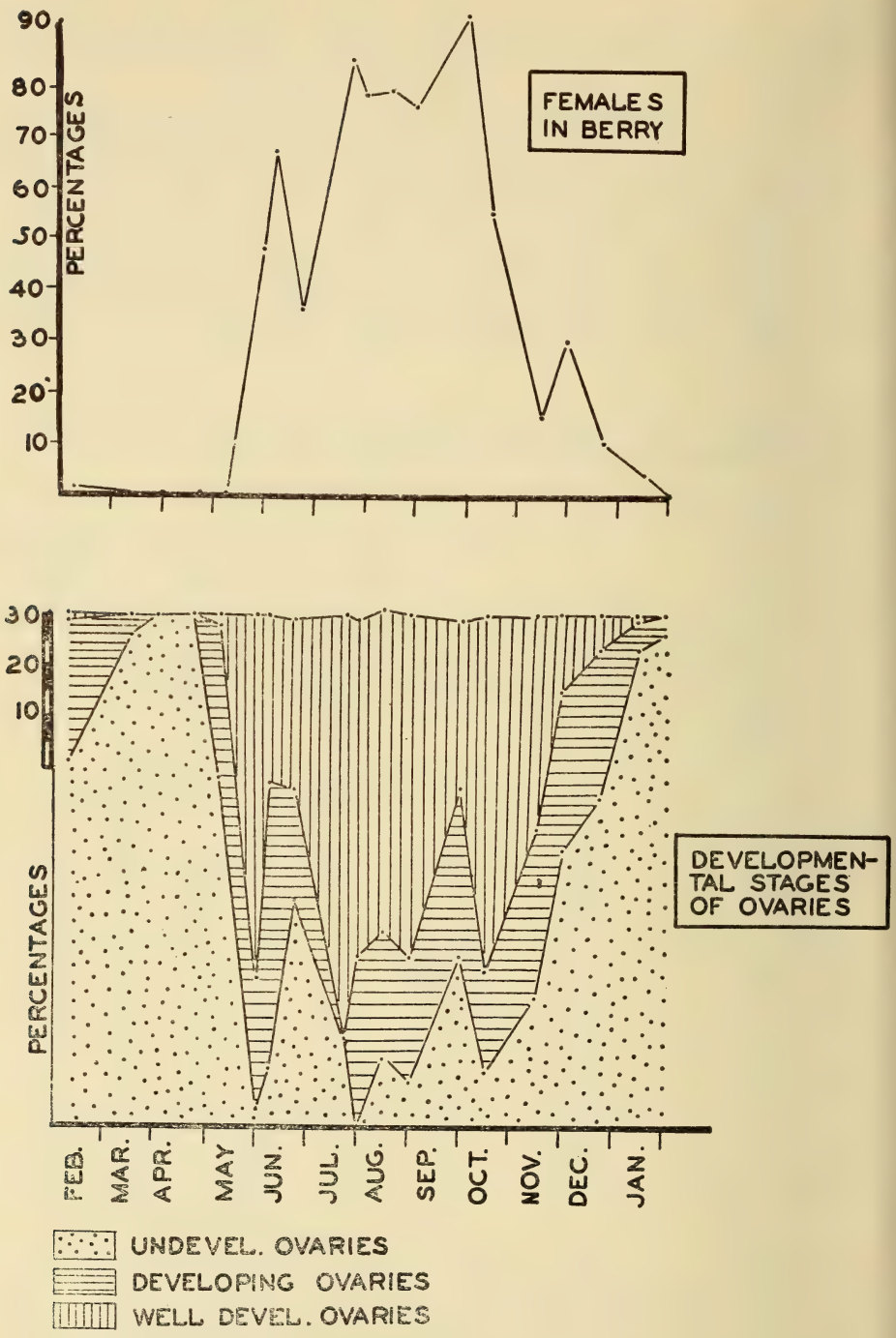


Fig. 6

The development of the gonads in females. The upper half gives the percentages of females in berry, while the lower half represents the percentages of dissected, not in berry, females with gonads in different developmental stages.

While the investigation was carried out plankton obtained in plankton netting in the Sand Vlei Estuary was also examined for the presence of larval stages. The results are given in Table IV.

Table IV

The occurrence of *Hymenosoma* zoeae in Sand Vlei Estuary.

Date	*June*	*July*	*August*	*September*	*October*	*November*	*December*
Quantity	some	some–many	some	many	many	few–some	few

As could be expected the presence of zoeae coincided with the months of the year that females were in berry.

As the breeding-season falls mainly in the winter, it coincides with the months of heavy rain and consequently Sand Vlei fills up with rain water. This eventually causes a strong current which flows into the sea so that large numbers of zoea larvae are lost to the estuary. As will be mentioned later the outflowing water will have a salinity too low for the zoeae to remain alive.

Table V

Analysis of samples of mature females from other localities.

	Total number of females	*Not in berry*	*In berry*
Lambert's Bay October 1946	226 = 100%	84 = 37% of these: 18% with undeveloped ovaries. 35% with developing ovaries. 48% with well-developed ovaries.	142 = 63%
Lambert's Bay December 1946	246 = 100%	192 = 78% of 117: 72% with undeveloped ovaries. 15% with developing ovaries. 14% with well-developed ovaries.	54 = 22%
Hermanus September 1947	160 = 100%	142 = 88% of 137: 2% with undeveloped ovaries. 37% with developing ovaries. 61% with well-developed ovaries.	18* = 11%
Berg River Mouth September 1949	94 = 100%	36 = 38% of 24: 54% with well-developed ovaries.	58 = 62%

* An additional 74 (46%) had still traces of hatched eggs.

Although there is a possibility that the tide sometimes may carry zoeae larvae into the estuary, those swept out will outnumber those swept in. The maintenance of the *Hymenosoma* population in the estuary must be in great part due to the limited number of zoeae which hatch when the mouth of the estuary is blocked by a sandbank, or when the mouth is still open while very little water flows out and the tide enters at high water. The possibility of crabs invading the estuary from False Bay cannot be completely ruled out.

As has been mentioned previously in addition to the crab material which was collected at Sand Vlei some was collected from other localities. *Hymenosoma* was extremely common in a small blind lagoon at Lambert's Bay, and in October and December 1946 material was collected and examined. In September 1947 material was collected from the large Hermanus lagoon and in September 1949 crabs were collected and examined from the Berg River Mouth.

The results are given in Table V. (See previous page.)

Many crabs were also kept in the laboratory. The salinity of the water in which these were kept varied from 2·7‰ to 30·9‰. This variation is not abnormal because under natural conditions the species occurs in places where large variations in salinity do take place. The temperature varied between 13° C. and 15° C. In seventy-one cases these crabs extruded egg-batches. In Table VI these have been tabulated according to the months in which they occurred.

Table VI

Egg-batches extruded by 34 crabs kept in the laboratory.

Month	*Number of egg-batches*	*Percentage of total number of egg-batches*	*Month*	*Number of egg-batches*	*Percentage of total number of egg-batches*
January	2	2·8	July	11	15·5
February	4	5·6	August	15	21·3
March	1	1·4	September	7	9·9
April	1	1·4	October	13	18·3
May	1	1·4	November	8	11·3
June	4	5·6	December	4	5·6

The information given in Table V indicates that the breeding-season for *Hymenosoma* females from Lambert's Bay, Hermanus, and the Berg River Mouth is similar to that from the Sand Vlei Estuary crabs. Table VI shows that under the stated laboratory conditions, egg-laying could take place in any month of the year, but mainly occurred from July to December. This also agrees with what was found at the Sand Vlei Estuary (see text-figure 6).

The Relationship between the Gonad Activity of the Two Sexes

If text-figures 5 and 6 are compared, it is clear that the short resting-period of the gonads of the males (from October to December) coincides with the

last half of the breeding-period of the females. This may be expected, because copulation during the egg-carrying period must be down to a minimum. A similar state of affairs was found to exist in *Cyclograpsus punctatus* (Broekhuysen, 1941).

Number of Egg-batches extruded by each Female during a Single Breeding-Season

In order to ascertain whether one female produces more than one batch of eggs in a breeding-season, berried females were dissected and the state of the gonads recorded. If only one egg-batch was produced, the gonads of berried females could be expected to be in a resting stage; if, however, more than one batch of eggs was extruded, the gonads could be expected to be in various stages of development.

A total of 245 females in berry were dissected and the results are tabulated in Table VII which is graphically expressed in text-figure 7.

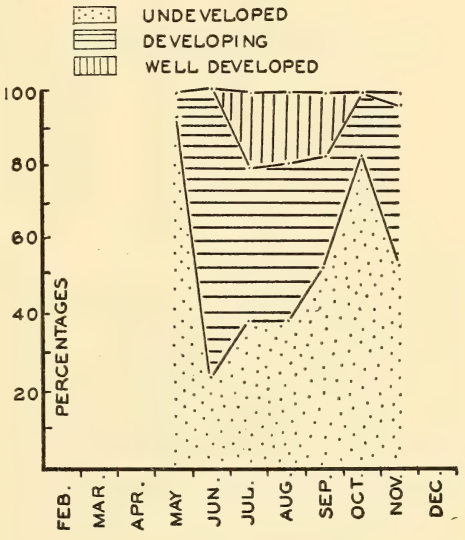


Fig. 7
Developmental stages of the gonads in females in berry.

Table VII

State of development of ovaries of berried females.

Date	*% females with undeveloped ovaries*	*% females with developing ovaries*	*% females with well-developed ovaries*	*Total number of crabs*
May	94	6	0	16
June	24	77	0	13
July	39	41	20	54
August	39	42	19	62
September	53	31	16	51
October	83	17	0	12
November	54	43	3	37

Table VII and fig. 7 show that in May most of the berried females had undeveloped or resting gonads. During the rest of the breeding-season (June to September) the ovaries were in various stages of development while the crabs were carrying developing embryos. This is strong evidence that more

than one batch of eggs is produced per breeding-season. As shown below (Table VIII) these results were confirmed by observations on crabs kept in the laboratory.

Table VIII

The interval between the hatching of one batch of eggs and the laying of the next in between consecutive moultings in laboratory cultures.

Interval in days	*Number of cases*	*Interval in days*	*Number of cases*	*Interval in days*	*Number of cases*
9	2	17	3	36	1
10	1	18	2	39	1
11	2	19	1	42	1
12	2	21	2	43	2
14	2	32	2	48	1
15	2	33	2		
				Average interval 23 days	

From Table X the average incubation time of eggs kept under the stated laboratory conditions appears to be 43 days. The average interval between batches was 23 days (see Table VIII). The total time from the attachment of one egg-batch until the attachment of the next during the breeding-season was therefore about 66 days. The breeding-season during the period of the investigation lasted from May until October covering approximately 150 days. Although information obtained on crabs kept in the laboratory under controlled conditions may differ to some extent from what is the case for crabs under natural conditions, the possibility of two to three batches of eggs in one breeding-season may be provisionally accepted.

The Development of the Eggs in the Egg-batches

In the eggs of the marine Brachyura the following ten developmental stages can be distinguished by external examination of the living eggs:

Stage I. No segmentation has occurred and no external cleavage can be detected.

Stage II. The first cleavages have taken place.

Stage III. A considerable number of cleavages have taken place.

Stage IV. The first indication of invagination has become visible.

Stage V. A distinct division between a yolk-free and a yolk-containing part can clearly be seen. This stage covers the whole period between the first indication of the forming of the germ-layers and the formation of the eye-pigment.

Stage VI. The first indication of the eye-pigment is externally visible.

Stage VII. The first indication of the chromatophores which will form pigment bands has become visible.

Stage VIII. The larvae are clearly pigmented, a fair amount of yolk remains, but is becoming reduced in quantity.

Stage IX. The yolk has nearly disappeared, the egg-shells are rupturing, and the larvae are emerging.

Stage X. Only dead eggs and empty egg-shells remain.

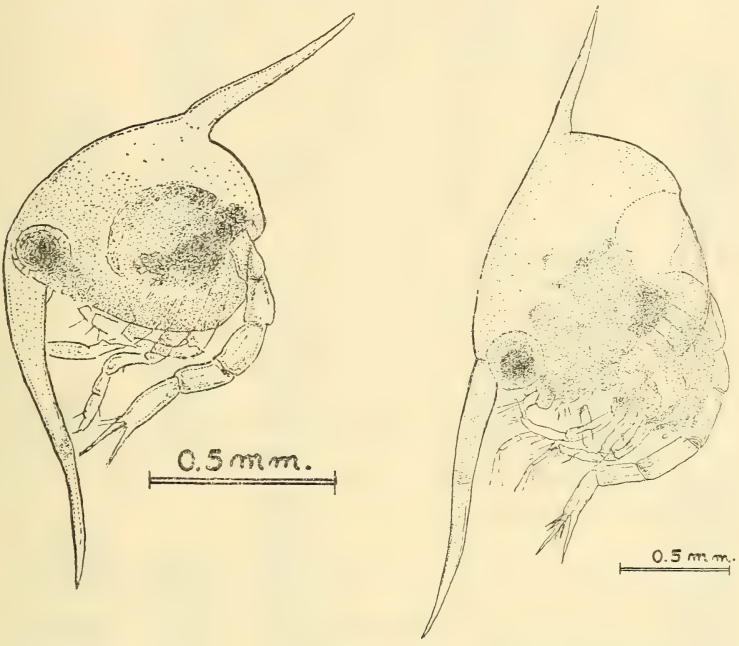


Fig. 8. *Hymenosoma orbiculare* Desm.
Left: first zoea stage; right: last zoea stage.

As in *Cyclograpsus punctatus* (Broekhuysen, 1941) it is the first zoea stage which escapes from the female abdomen (fig. 8, left).

During the period May 1947 to the first week of January 1948 a total of 323 egg-batches of berried females were examined and the stage of development of the embryos recorded. The results are given in Table IX. Individual variation in the development of one batch was slight and this was also found to be the case in other marine crabs (Broekhuysen, 1936, 1941). The duration of each stage was not the same and the laboratory experiments showed that the duration from stage I to beginning of stage IV was approximately the same as from stage IV to beginning of VII and stage VII to IX. In text-figure 9 stages I to III have been lumped together and the same has been done for IV to VII and VII to IX.

Table IX

The development of attached embryos during the 1947 breeding-season expressed in percentages.

Date	*Stage I*	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	*I*		*Dead eggs*	*Total number of crabs*
	%	%	%	%	%	%	%	%	%	%	%	
27·5	3	9	25	19	31	6	0	6	0	0		32
6·6	0	18	12	18	41	6	0	6	0	0		17
20·6	0	0	11	11	11	11	0	0	0	56		9
18·7	0	0	16	3	25	3	28	25	0	0		32
30·7	0	2	14	12	14	0	10	45	0	0	2	42
12·8	13	3	13	3	10	3	3	50	0	0		30
26·8	5	5	21	5	24	5	5	24	0	3	3	38
23·9	4	4	14	4	16	6	0	49	2	0	2	51
13·10	17	17	25	8	8	0	8	8	0	0	8	12
13·11	22	11	56	11	0	0	0	0	0	0		9
25·11	0	3	6	0	8	6	6	69	0	3		36
16·12	0	20	20	20	40	0	0	0	0	0		5
9·1	0	0	0	0	0	0	10	90	0	0		10

Fig. 9 indicates that the majority of females produced two and perhaps three batches of eggs during the breeding-season of 1947 at Sand Vlei. This, therefore, confirms what has been said on page 324. Fig. 9 also indicates a considerable individual variation.

Incubation Times of Eggs kept under Laboratory Conditions

As has been mentioned previously crabs were kept in the laboratory while the field-work was in progress. The salinity of the water in which the crabs were kept was known at the beginning and the water-level was marked on the glass. At intervals distilled water was added to compensate for evaporation. At the end of the experiment (in some cases lasting over a year) the water in some of the dishes was titrated and the salinity determined. In this way a rough estimate of the salinity conditions during the experiment was obtained. As will be shown further on, the developing eggs of *Hymenosoma orbiculare* are rather euryhaline and the limited salinity changes of the water in the dishes will probably not be very important. The glass dishes containing the crabs were kept in a controlled temperature room. Most of the time the temperature was 13° C. but sometimes the temperature went down to 12° and up to 15° for a short time. The development of 43 batches of eggs extruded by crabs kept under these conditions was studied. The incubation time of all 43 batches was determined with an accuracy of two days. The results are given in Table X.

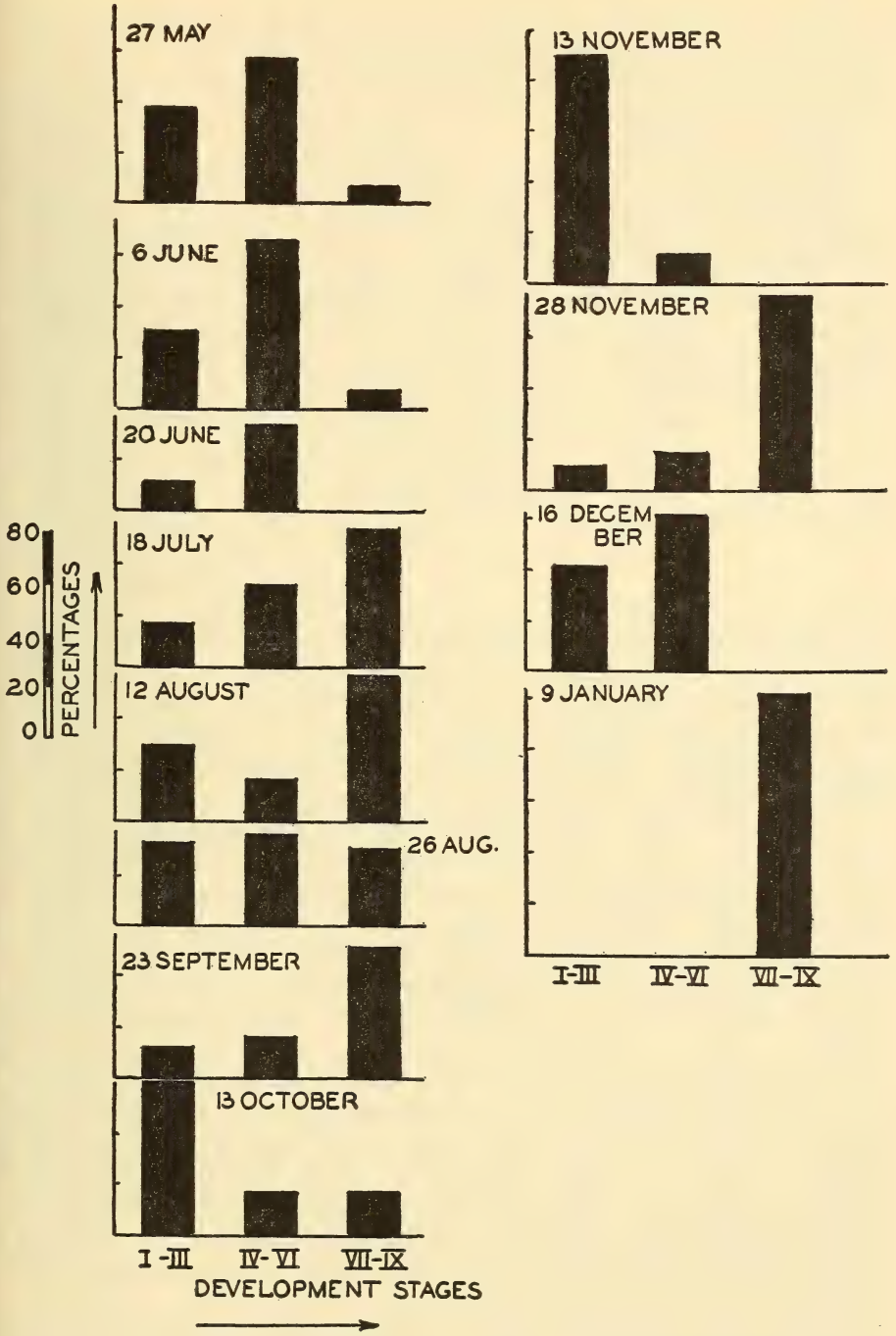


Fig. 9

The development of the attached embryos during the 1947 breeding-season expressed in percentages and three groups of development stages each of which takes about the same time. (The observations for 30 July are not graphed as they are practically the same as for 18 July.)

Table X

Incubation time of eggs under laboratory conditions.

Maximum temperature range	*Maximum salinity range*	*Incubation time in days*	*Average*
° C.	%		
12—13	15—29	49	49
12—14	14—29	43, 44, 47	45
	15—29	42, 43, 44, 44, 44, 44, 44, 45, 45, 47, 48, 48	45
	16—29	44	44
12—15	14—29	40	40
	15—29	43, 45	44
13—14	14—29	43	43
	15—29	39, 40, 41, 41, 42, 42, 42, 44, 44	42
	16—29	38, 39	39
13—15	14—19	41, 42	42
	15	41	41
	15—29	37, 38, 40, 41, 42, 43, 45	41
14	15—29	38	38
		Average of all observations	43

The figures in the above table show that 43 days was the average incubation time of the eggs of *H. orbiculare* at a temperature between 12° C. and 15° C. The figures also suggest that the more constant the temperature, the shorter the incubation time. A greater amount of variation of the temperature seems to increase the incubation time, as was also found to be the case for *Cyclograpsus punctatus* (Broekhuysen, 1941, p. 344).

In July 1947 a female with a carapace width of 18·7 mm., kept in a glass dish without any sand or shell fragments, extruded eggs which got attached to the hairs of the pleopods in the normal way. The presence of a soft substratum, therefore, seems not to be essential for a normal attachment of the eggs in this species. In this respect *H. orbiculare* seems to be different from *C. punctatus* and *C. maenas* (Broekhuysen, 1936, 1941) in both of which the extruded eggs did not get attached if sand and shell fragments were not supplied.

In laboratory cultures there were twelve cases of two batches of eggs being produced which developed normally although copulation had taken place only once, i.e. before the first batch of eggs. In two cases, three batches were produced after one copulation; the eggs of the first two batches developing normally while those of the third batch developed abnormally and never produced zoeae. There were four cases where three batches were extruded after one initial copulation and the eggs of all three batches developed normally into zoeae.

This shows that a female *H. orbiculare* can produce as many as three normal batches of eggs in succession although fertilized only by one initial copulation.

In some cases, however, the eggs of the third batch were not properly fertilized. The fact that one copulation suffices for the fertilization of more than one batch of eggs has also been found to hold good in other Brachyura (Gosse, 1852; Williamson, 1900; Churchill, 1917-18; Duncker, 1934; Broekhuysen, 1936, 1941).

In all the cases where small immature female crabs were put into the glass dishes and reared apart from males, the eggs developed only into an irregular cleavage stage and then died. In one instance four egg-batches were produced by such a female during a period of thirteen months. In this case none of the eggs developed further than into an irregular cleavage stage. In some cases females which had just moulted when caught were put into a glass dish. After some weeks these females moulted again, but as no male was in the dish, refertilization could not take place. Nevertheless the egg-batches produced later contained fertilized eggs, showing that the moulting process had not affected the spermatozoa stored in the female.

These cases also show that copulation is not essential for extrusion of eggs. The time between copulation and egg-extrusion varies considerably as can be seen from Table XI.

Table XI

The interval between moulting and the next egg-extrusion in the crabs kept in the laboratory.

Copulation took place after the moult				*No copulation took place*		
Date of moulting	*Date of copulation*	*Date of egg-laying*	*Interval in days*	*Date of moulting*	*Date of egg-laying*	*Interval*
14·3	17·3	31·5	77	25·3	3·6	59
30·4	30·4	about 24·6	54	1·4	6·8	126
22·5	22·5	5·7	43	6·4	1·7	85
25·5	25·5	7·8	73	13·4	6·7	83
19·6	21·6	29·7	39	27·4	19·6	52
21·6	21·6	27·8	66	27·4	10·8	104
3·8	?	7·10	64	28·4	25·7	87
3·8	?	22·10	79	6·5	about 2·7	57
11·8	11·8	8·10	57	12·5	10·8	89
11·8	11·8	26·11	106	15·5	4·7	49
22·8	22·8	about 15·11	84	15·5	18·7	63
9·11	11·11	28·1	78	19·5	18·8	90
9·11	11·11	12·2	94	26·5	31·7	65
15·11	17·11	5·2	81	26·5	23·9	118
1·12	1·12	9·2	69	4·6	4·8	60
	Average		71	10·6	10·8	60
				13·6	20·8	67
				17·6	7·11	142
				4·7	11·9	68
					Average	80

As shown later, copulation coincides with moulting of the female. If the two parts of Table XI are compared it will be seen that there is a difference of nine days between the average intervals, and copulation therefore seems to have a slight stimulating effect as regards egg-extrusion.

During the laboratory experiments several observations of the method whereby females with hatching eggs aided the zoea larvae to escape from underneath the abdomen were made. On such occasions females stood on their pereiopods and bent their abdomens backwards. The zoeae then poured from beneath the abdomen into the surrounding water.

Copulation

In *Hymenosoma orbiculare* copulation takes place between a hard male and a soft, newly moulted female. In this respect this species behaves in the same way as *C. maenas* and many other crabs. Copulation is preceded by an embrace of the female by the male, some time before she actually moults. The male holds the female underneath him with his pereiopods, but the female is in the normal position (i.e. dorsal side up). Actual copulation was observed several times in the laboratory. The following notes were taken on one of the occasions:

11·11. '47 Female recently moulted, leathery. Add male from dish 12. After a few seconds the male mounts the female. This male removed and substituted by male from dish 15. The latter, after a few seconds, approaches the female which is busy digging into the sand. Male is first on top of female, but then gets underneath the female. He then turns over on to his legs and in doing so keeps female underneath him and turns her over on to her back and copulation commences.

In the limited number of copulations observed, the process lasted more than half an hour and probably longer. After copulation had occurred, the female was kept embraced by the male for a considerable time, sometimes more than a day.

No actual experiments were carried out with a view to establishing the presence or absence of sex recognition. The general impression, however, was that sex recognition was poorly developed if present at all. The procedure in *H. orbiculare* seemed very similar to that suggested by Broekhuysen (1937) for *C. maenas*, i.e. the seasonal periodicity in copulation is only caused by the seasonal moulting act in sexually mature females, when the female due to its soft condition cannot evade or resist a male trying to copulate. These remarks, however, are tentative and more experimental work is necessary.

Growth

In order to obtain information on the rate of growth, the number of moults, the time required for hardening after moulting, the existence of sexual dimorphism and the average maximum age, all the crabs collected in Sand Vlei estuary were sexed and measured. The index of size used was the width of the carapace in millimetres. Crabs which were just about to moult, or had just moulted were noted. As has been mentioned a fairly large number of crabs

were kept in captivity in some cases for periods of over a year. The growth of those which were caught while still small was recorded in order to supplement the data obtained in the field.

Moulting

As shown earlier, moulting not only marks a stage of growth, but in the present species it also controls the possibility of successful copulation. Moulting is thus essential to the animal but is also a dangerous period, for the crab is practically defenceless and open to attack by predators, including its own species. It has been noted that males copulate with soft, just moulted females and this must decrease the danger of soft females being attacked by males, considerably to the advantage of the females. In some cases females which moulted in the laboratory were killed by males in the same dish. If this was not an abnormal occurrence due to captivity, it means that the moulting female is not altogether immune to attacks by males. *Hymenosoma orbiculare* and also the other species of Brachyura where males copulate only with soft females seem to have some advantage over species in which copulation occurs between two hard crabs.

The process of moulting in *H. orbiculare* is identical to what takes place in other Brachyura and has been described for *Carcinus maenas* and *Cyclograpsus punctatus* by Broekhuysen (1936 and 1941). One interesting difference between the hardening of the new shell of *C. punctatus* and that of *H. orbiculare* was found. While *H. orbiculare* always remained submerged during the process, it was found that in *C. punctatus* it is essential that the crab should only be submerged part of the time for the hardening process to proceed normally.

The duration of the hardening process was observed in the laboratory. For 52 crabs between 8 and 22 mm. carapace-width at a temperature between 12 and 15° C., the average time was four days and the extremes two and nine days. Unfortunately the records do not permit one to determine the effect of temperature or the size of the crab on the duration of the hardening process.

The increase in size after moulting was recorded for 99 crabs kept in captivity under fairly constant temperature. These records include a certain number of observations on crabs kept in very low salinities and some which were kept in water with a salinity of over $35^0/_{00}$.

As the increase in size of crabs kept in abnormal salinities was roughly the same as the increase for crabs in normal salinities, the records were combined. Also, no significant difference was found between males and females. A summary of all the records gave the following results:

Size range	*Number of crabs*	*Percentage increase in carapace width*
5—8 mm.	15	22%
9—12 mm.	18	24%
13—16 mm.	48	15%
17—22 mm.	18	11%

Thus also in *H. orbiculare* the rate of increase decreases as the crab gets bigger and older.

Periodicity in Moulting

As females only copulate after moulting, it was thought possible that mature females would show a distinct periodicity in moulting, correlated with the breeding-season.

In Table XII percentages of moulting females and males, and females in berry have been combined. Only crabs larger than 14 mm. have been considered. The information is expressed graphically in fig. 10.

Table XII

Date	*% of moulted females*	*% of females in berry*	*Total number of females*	*% of moulted males*	*Total number of males*
February 1947	3	1	136	5	108
March	37	0	119	14	184
April	35	0	40	5	78
May	21	27	117	5	78
June	19	52	52	13	31
July	8	81	93	13	30
August	4	78	90	2	43
September	13	94	54	0	1
October	5	55	22	0	3
November	13	27	99	6	53
December	4	10	49	5	39
January 1948	4	2	338	4	159

From Table XII and fig. 10 it can be seen that mature females can and do moult during the whole of the year, but that there is a definite maximum in moulting activities during the months March, April and May. Fig. 10 also shows that this increase in moulting precedes the breeding-season. The observations available for the males seem to indicate that there is no clear maximum for the moulting in this sex.

In fig. 11 the comparable figures for crabs kept in the laboratory have been graphed. If the two figs. 10 and 11 are compared it will be noticed that they differ little for the females but quite distinctly for the males. The females kept in captivity also show a sudden increase in the number of moulting crabs in March, April and May, the same as was found in the crabs at Sand Vlei. For the males the number of observations of captive crabs is limited but they do show a clear maximum of moulting in March. This was not found in the crabs at Sand Vlei.

It should be stressed that fig. 11 is based on crabs kept under rather uniform conditions and may therefore be more accurate in a comparison of the behaviour of females to males. In any case it is interesting to note that in these

laboratory crabs, the moulting activity of the males precedes the maximum moulting activity of the females, in other words the males have already moulted and become hard when the females moult and are ready for copulation. In the field where conditions are not uniform this adaptation apparently becomes less striking.

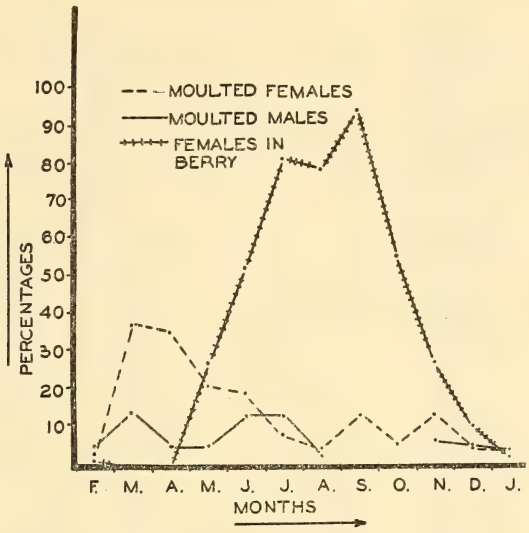


Fig. 10

The percentages of (*a*) moulted or moulting females, (*b*) moulted or moulting males and (*c*) females in berry, plotted against the months of the year. The crabs were collected at random at the mouth of Sand Vlei.

Sexual Dimorphism

In *Hymenosoma orbiculare* there is relatively little external difference between the two sexes except for the shape of the abdomen, and the development of the pleopods, which are adapted to carrying eggs in the female. The chelae, however, are somewhat bigger and broader in the case of the male (fig. 1).

In order to determine whether there was a consistent difference in size between males and females of the Sand Vlei population, a total of 1,417 females, of which 316 were females in berry, and 856 males were measured. The results are given in Table XIII and graphed in fig. 12.

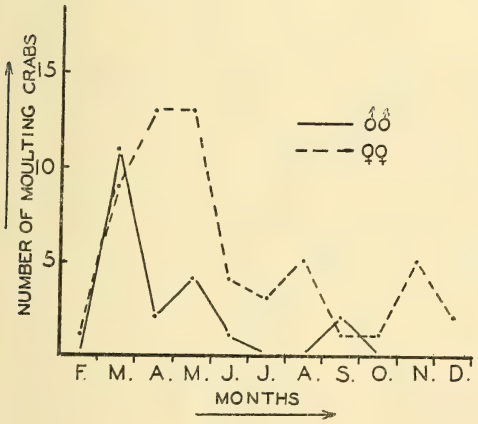


Fig. 11

The number of moultings taking place in the different months in crabs kept in captivity.

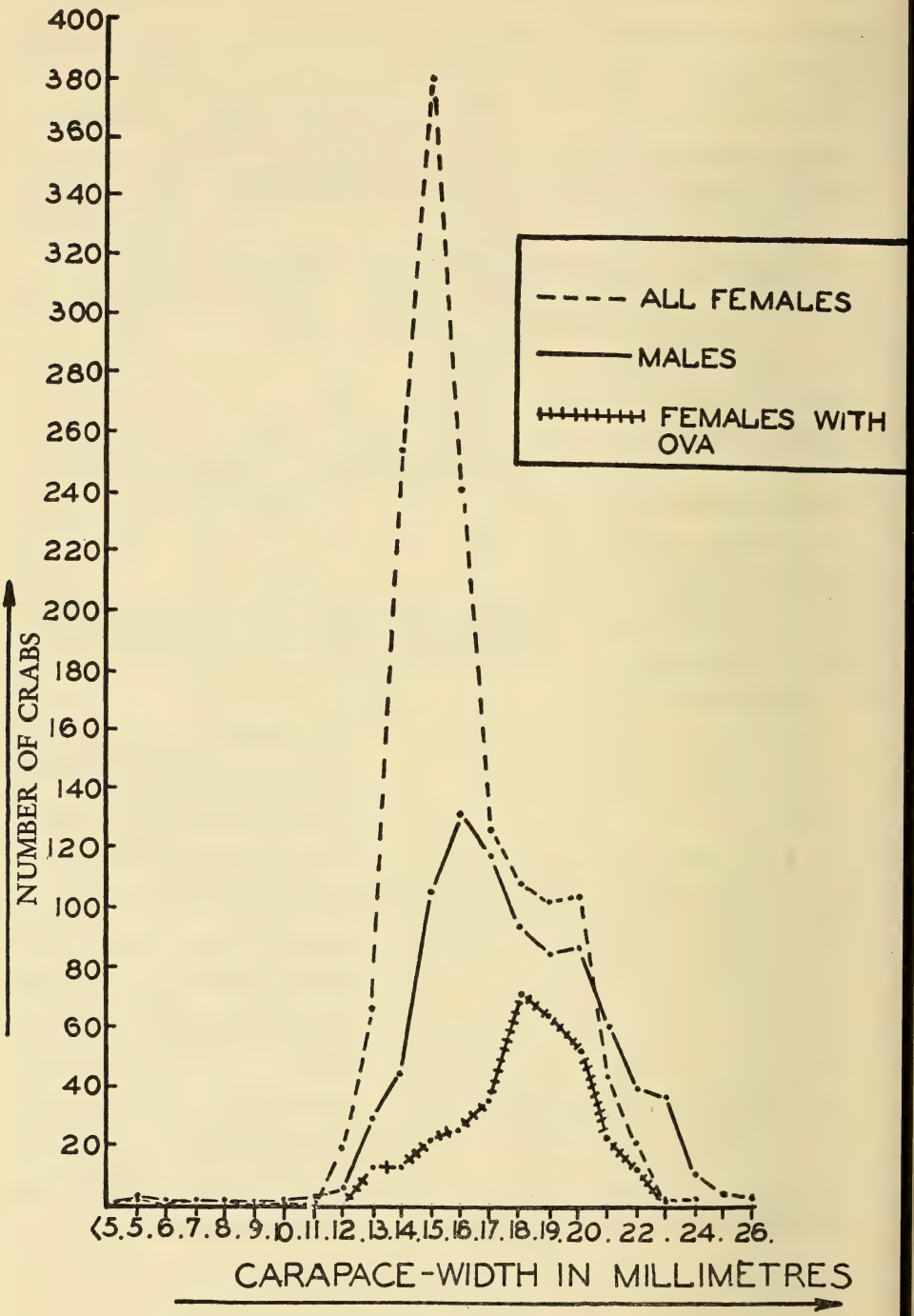


Fig. 12

The distribution of all the crabs measured over classes differing one millimetre. The size is expressed in carapace-width in mm. (females with ova means females in berry).

Table XIII

The carapace width in millimetres of crabs from Sand Vlei

Carapace width	*Females (those in berry included)*	*Females in berry only*	*Males*	*Mean carapace width for females*	*Mean carapace width for males*
5 mm.	–	–	1		
5	1	–	2		
6	–	–	1		
7	1	–	1		
8	1	–	1		
9	–	–	1		
10	1	–	1		
11	1	–	2		
12	19	–	5		
13	66	12	28		
14	254	12	44	16	18
15	381	21	105		
16	241	24	132		
17	126	35	118		
18	108	71	94		
19	101	64	84		
20	103	52	86		
21	43	22	60		
22	20	12	39		
23	2	1	36		
24	2	1	10		
25	–	–	3		
26	–	–	2		
Total	1,471	316	856		

The mean for females is 16 mm. and for males 18 mm. The difference is very small and was tested statistically. The *t*-test of significance showed that at the 1 per cent level of significance the estimated *t* was 2·819 and the 5 per cent level 2·074. The calculated value for *t* was 0·136. There was therefore no significant difference in size between the two sexes in the population of *H. orbiculare* at Sand Vlei at the time of the investigation.

The shape of the curves in fig. 12 may suggest the presence of two year-classes in both females and males.

The Rate of Growth

Since crabs can only increase in size when they moult the rate of growth is dependent on the increase at a moult and the frequency of the moults.

As has been mentioned before the experiments in the laboratory did not reveal any significant difference between males and females in the increase in size after a moult. The increase after moulting is mentioned on page 331. As regards the number of moults, or rather the duration of the interval between two successive moults, it is difficult, if not impossible, to obtain information on crabs living under natural conditions. The only information available, there-

fore, comes from crabs reared in the laboratory where conditions were not quite natural. This may or may not have affected the duration of the intervals between successive moults.

In Table XIV the available information has been tabulated. The females not in berry and those in berry as well as the sexes have been kept separate. The crabs have been divided into five size-classes.

Table XIV

Interval between successive moults in days, in crabs reared in the laboratory. (Extremes are given in brackets.)

Size in mm.	Females				Males	
	Not in berry		*In berry*			
	Average duration	*Number of cases*	*Average duration*	*Number of cases*	*Average duration*	*Number of cases*
5	40(18–58)	5			30(18–40)	5
5–8	33(25–45)	11			35(22–57)	4
9–12	52(30–90)	12			37(38–96)	5
13–16	89(59–139)	11	219(216–221)	2	32(81–214)	4
17–22	128(42–183)	5	174(109–221)	11	66(51–79)	4

This table reveals some interesting points:

(*a*) From the table it appears that the interval between successive moults, even in crabs of less than 5 mm., was considerable. For the smallest sizes this may be partly due to the young crabs taking some time to settle down to laboratory conditions after their capture.

(*b*) The interval between two successive moults even for crabs of the same size-class varied a lot.

(*c*) The table also shows that the intervals in the case of females in berry were considerably longer than those for females not in berry and males. The number of observations on males, however, may be too small to enable any positive conclusions, but they suggest that where the female growth can be affected adversely by breeding, this may not be the case for the males. This point will be mentioned again later.

(*d*) The interval gets longer as the crab gets older and therefore bigger and in this respect *H. orbiculare* behaves in the same way as other Brachyura.

In order to determine the development of the crabs at Sand Vlei, size/frequency graphs were plotted for each month of the year and for both sexes. These are given in fig. 13. While every attempt was made to obtain random samples, there is no doubt that a high proportion of the smallest size groups, particularly those under 7 mm., evaded capture. To this extent the samples and the graphs constructed from them are biased.

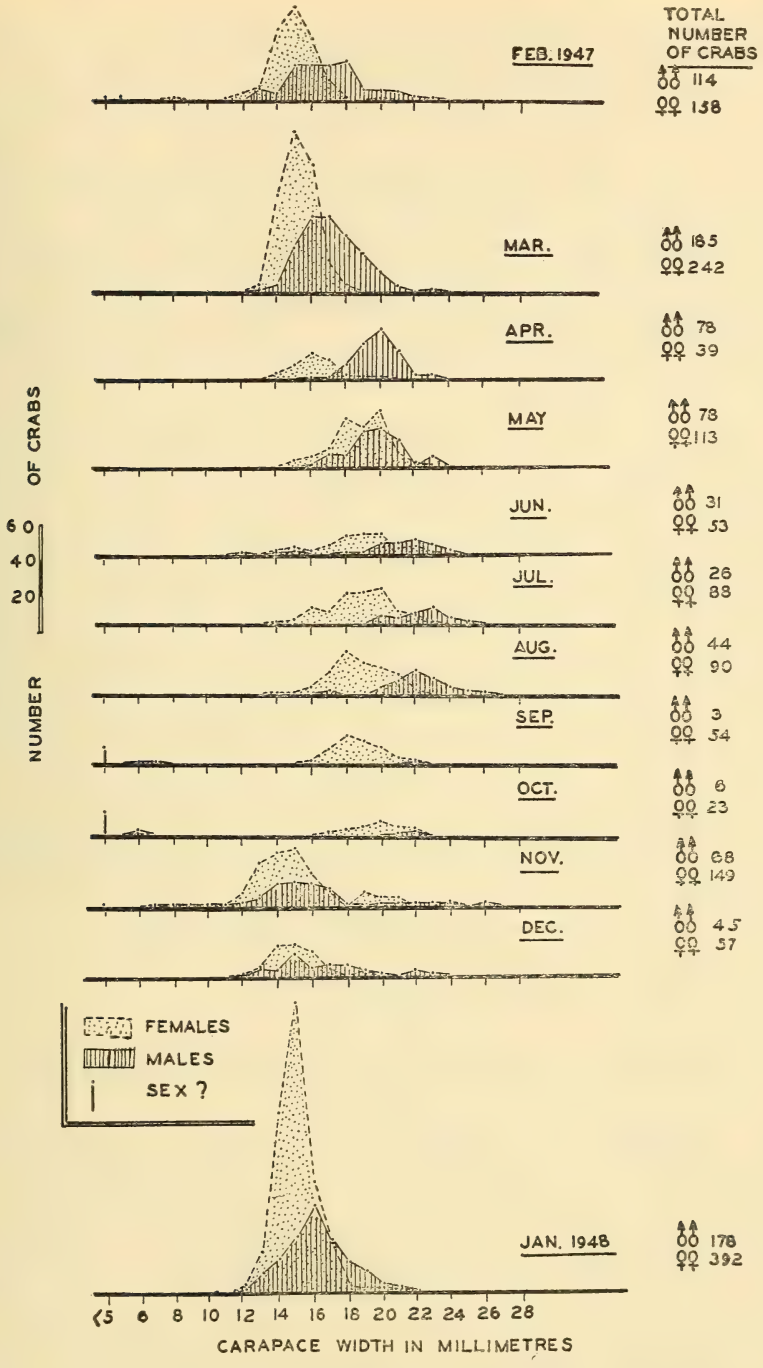


Fig. 13

Size/frequency of males and females for the different months. The crabs were all collected at the Sand Vlei mouth.

Even so the following important points are shown:

(*a*) In 1947 a considerable number of very small *H. orbiculare* made their appearance in the catches in September. These were the new generation of the year. In addition there were a considerable number of female crabs of 16 to 22 mm. carapace-width which were probably over 1 year old. Hardly any males were caught. In October the position had changed very little. In November a distinct group of female and male crabs of 12 to 18 mm. had appeared. It is unlikely that these consisted of crabs of the same season as they appeared too big for that. It is impossible to decide where these crabs came from, although the possibility of an invasion into the estuary from the shallow sea along the shore of False Bay cannot be ruled out. A certain number of crabs hatched in 1946 were still present, but by December most of these seemed to have vanished.

(*b*) If we examine fig. 13 we shall see that in November and December the curves for the males and the females more or less coincided. In January, February and March the males gained more and more so that by April there was a considerable difference in size between the males and the females, the former being the largest. In May, however, this difference suddenly disappeared due to a sudden increase in the size of the females. It should be remembered that March, April and May are months in which the females showed an increase in their moulting activity (see figs. 10 and 11), prior to the beginning of the breeding-season. During June, July and August the males again gradually gained on the females. This was the time when most females had egg-batches and therefore were not in a condition to moult. This did not affect the males (see Table XIV) which apparently continued to increase in size.

(*c*) In all months except April, there appeared to be more females than males and in September nearly all the males from the older generation had disappeared.

During the course of the investigation a number of very small *Hymenosoma* crabs were collected and reared in captivity. Some of the results of this part of the investigation have been combined in Table XV.

Table XV

Some small *Hymenosoma* crabs reared in captivity at 13° to 15° C.

Sex	*Increase in size in millimetres*	*Number of moults*	*Time in days**	*Salinity in parts per thousand*
♂	5 — 8	2	55	35
♂	4 to 5 — 13·5	5	230	35 — 36
♂	4 to 5 — 16	5	329	36 — 36
♀	4 to 5 — 13	4	169	31 — 35
♀	6·8 — 14·6	4	230	5 — 14
♀	4 to 5 — 13	4	252	5 — 10

* The number of days covers the period from the date of moult at which the smallest size mentioned was reached until the moult at which largest size mentioned was reached.

The above table indicates that crabs of about 14 mm. are more than 8 months old. It should be remembered, however, that these crabs were kept under unnatural conditions and fig. 13 seems to indicate that the crabs grow faster under natural conditions.

The size at which the crabs of the Sand Vlei population became adult

In males it was not easy to decide macroscopically when the crab had become mature. In females, however, the change in shape of the abdomen is an obvious indication of maturity. Moreover the development of the ovaries can usually be seen without the aid of a microscope. Extrusion of eggs is the surest sign of maturity having been reached. During the investigation the smallest females with 'adult'-shaped abdomen and the largest females with 'juvenile'-shaped abdomen were recorded and it soon became evident that a lot of variation occurred. Some females with a carapace-width as small as 12·2 mm. had 'adult' abdomens, while others as large as 17 mm. still had somewhat 'juvenile' abdomens. The smallest female carrying a batch of eggs was 12·6 mm. in the Sand Vlei population. Dissections showed that in one instance a female as small as 12·2 mm. had well-developed ovaries, indicating that she was mature. Dissections also revealed that some males of 12·3 mm. and 12·5 mm. had well-developed genital tubes, indicating that they were mature. In one instance a female of 15·5 mm. was collected that had a rather immature abdomen but dissection revealed well-developed ovaries. The shape of the abdomen, therefore, is not always decisive.

As will be seen later different environments may affect the minimum size at which maturity is reached.

Although the above data shows that *H. orbiculare* females from Sand Vlei could become mature at 12-13 mm., they were usually mature at 13-14 mm. carapace-width. This is confirmed in fig. 12 in which among others the size/frequency of berried females has been plotted.

Sex-Ratio

When all the sexable crab samples from Sand Vlei were added together it was found that 1,471 or 63·2 per cent were females and 856 or 36·8 per cent were males. It is interesting to note from fig. 13 that this predominance of females over males was specially marked in the January population. From then on the difference between males and females decreased gradually until in April the situation was such that there were more males than females. From April onwards the females again became predominant. No satisfactory explanation can be given for the large predominance of females over males. It is very unlikely that the males were overlooked during collecting. The increased predominance of females after May may be partly due to the fact, noticed during collecting of samples, that the females usually do not expose themselves so readily as the males and that, therefore, the chances of being swept away to the sea by the current are greater for the males.

Discussion

Although the fact that *H. orbiculare* is often found in estuaries indicates that the species is euryhaline, there seems to be a certain minimum salinity tolerance, as these crabs do not occur in waters with a constant very low salinity. In order to estimate this minimum salinity limit, crabs were kept in water of a low salinity and under controlled temperature conditions. These experiments showed that within a temperature range of 12°–15° C., a salinity of 5 per thousand interferes with the normal development of the eggs. Eggs extruded under these conditions did not develop beyond the first cleavage stages. However, when females carrying embryos in an advanced stage of development were kept under the same conditions, the embryos did hatch sometimes but the resulting zoea larvae died immediately. A salinity of 0·2–1·4 per thousand and a temperature of 12°–14° C. had the same effect on development.

Although salinities of 1–5 per thousand at a temperature of 12°–15° C. seriously affect the early development of this species if the crabs are exposed to these conditions long enough, it apparently has little or no effect if the crabs are only exposed to it for a short time. This is shown by the figures in Table I. From this table it can be seen that during part of June, July and August 1947 the salinity at the mouth of Sand Vlei fell well below 4 per thousand but this apparently did not affect the development of the larval stages in the egg, although it may have affected hatching zoeae and eggs freshly extruded. As the salinity in estuarine sands changes slowly, even when the water above is almost fresh, the habit of the females to dig into the surface layer of the sandy substratum may have saved the eggs from any adverse influence due to too low a salinity.

During the low-salinity experiments in the laboratory, several females extruded eggs. Low salinities, therefore, apparently do not prevent females from extruding eggs. Nothing definite can be said regarding the effect of prolonged exposure to high salinities, but there are strong indications that although the species may survive and even develop under these conditions, it has some effect.

Barnard (1950) in his Monograph on the South African Decapoda mentions a variety of *H. orbiculare* from deeper water in False Bay, which at first sight seems to be specifically distinct from the normal *orbiculare*. Although Barnard stresses the difference he does not consider it necessarily another species.

During the course of this investigation the present author had an opportunity of examining fairly large numbers of these deep-water *Hymenosoma* from False Bay. In addition to the extensive granulation, mentioned by Barnard, there was a striking difference in the size when compared with *H. orbiculare* from the mouth of Sand Vlei. In Table XVI the sizes of these deep-water crabs are compared with those of the Sand Vlei population.

Table XVI

Comparison of crabs dredged below 12 fathoms in False Bay with those from Sand Vlei estuary:

	False Bay (dredged)	*Sand Vlei*
Females		
Maximum carapace-width	10 mm.	24 mm.
Average carapace-width	7·9 mm.	18 mm.
Smallest ♀ with mature abdomen	6–7 mm.	13–14 mm.
Smallest berried female	6 mm.	12·6 mm.
Males		
Maximum carapace-width	12 mm.	26 mm.
Average carapace-width	7·6 mm.	18 mm.

The total number of deep-water crabs available was 96 ♀♀ and 85 ♂♂. The differences in size between the two populations are very striking. If the deep-water crab is the same species as *H. orbiculare* which populates the mouth of Sand Vlei, the difference must have been caused by external conditions. The factors which may be concerned are:

(*a*) constant high salinity in the case of the False Bay crabs, and a lower average salinity, but varying tremendously, in the case of the Sand Vlei population;

(*b*) considerable depth in the case of the False Bay crabs, and relatively shallow water in the case of the Sand Vlei crabs;

(*c*) a less variable temperature in the case of the False Bay crabs.

Without more detailed field-work and experiments, it is not possible to be certain which of these factors is or are the more important. There is some evidence, however, that salinity may be important. In 1948 during an investigation of the ecology of St. Lucia Estuary on the Zululand coast (Day, Millard and Broekhuysen, 1954) it was found that salinities in this estuary were very high (34–53 per thousand). Specimens of *H. orbiculare* were collected and measured, and it was found that females were becoming mature at 5 and 6 mm. carapace-width and one female of 4 mm. had a 'mature' abdomen. Several berried females were only 5 and 6 mm. These crabs were therefore comparable, at least as far as size, with those from False Bay. Although few measurements are available the *Hymenosoma* crabs inhabiting Langebaan Lagoon also seem to be of small size. The smallest mature female measured was 10 mm., while a female of 7 mm. carrying an egg-batch was collected in Saldanha Bay into which Langebaan Lagoon opens. The salinity in this lagoon is near the salinity of normal sea-water and therefore fairly high.

It seems, therefore, that high salinity is at least one factor which decreases the size of the mature crabs. It also increases the size of the chelae in the males and causes excessive granulation. There are also indications that there

is a difference in breeding habits between the deep-water *Hymenosoma* from False Bay and those from Sand Vlei.

When the *Hymenosoma* results are compared with those for *Cyclograpsus punctatus* (Broekhuysen, 1941) it is evident that there is a great deal of similarity between the two species. Both are winter-breeders. In *C. punctatus* breeding covers the period May to November and in *H. orbiculare* the period is from June to November. In both cases the females produce several egg-batches in the one breeding-season. Whereas *C. punctatus* has a second, minor breeding-season in the summer this is not evident in *H. orbiculare*. In both species the gonads of the male show a periodicity in their activity which is adapted to the rhythm in the females. There is also a great similarity as regards the incubation period of the eggs of the two species. The incubation time of the eggs of *C. punctatus*, at a constant temperature of 16·5° C., is little over a month, while at a temperature of 12°–15° C. it took the eggs of *H. orbiculare* 38 to 48 days to develop and hatch.

In *Cyclograpsus* copulation takes place between two hard crabs while in *Hymenosoma* it only takes place between a hard male and a freshly moulted female. In *C. punctatus* no seasonal difference between the moulting periods of the two sexes was observed, while in *Hymenosoma orbiculare* such a difference did seem to occur. This is probably related to the fact that in the latter copulation only takes place when the female has recently moulted. In neither species is there a significant difference in size between the two sexes. In *C. punctatus* from the shore of False Bay the majority attained an age of two to three years. The present investigation indicates that the majority of *H. orbiculare* die in their second year. In both species there were more females than males, although this appeared to be much more pronounced in the case of *Hymenosoma*.

Summary

(1) *Hymenosoma orbiculare* is a crab which occurs in the shallow waters of estuaries as well as in deeper water along the shore of South Africa and Portuguese East Africa. Most of the material on which this paper is based was collected in the False Bay area between February 1947 and February 1948.

(2) The population, showed a definite periodicity in the activity of the gonads and the breeding-season appeared to be the winter months.

(3) *Hymenosoma* females extruded two or three egg-batches during the breeding-season.

(4) The development of the eggs was followed in the field and in the laboratory.

(5) Females will only allow males to copulate after the female has moulted and is still soft.

(6) Although moulting may occur at any time of the year, the females showed a sudden increase in moulting a few months before egg-extrusion.

Under laboratory conditions males also showed a periodicity, which seemed to be adjusted to that of the females. Under natural conditions this was not so evident.

(7) Evidence is given that during the breeding-season males increase more rapidly in size than the females. This may be due to the fact that the majority of females are carrying eggs and therefore do not moult during that period.

(8) The percentage increase in size of the crab after each moult shows a gradual decrease as the crab grows larger.

(9) The size at which the female crabs became mature was established for the Sand Vlei population for the period of the investigation. In crabs from other localities it was found that the size varied according to environment.

(10) There was evidence that the majority of crabs, in the population studied, reached an age of somewhat over one year, after which a heavy mortality occurred.

(11) There are the usual Brachyuran sexual differences between the male and the female *Hymenosoma orbiculare*; but there is no significant difference between the sizes of the two sexes.

(12) Of all the crabs collected and sexed 63·2 per cent were females and 36·8 per cent males.

(13) The influences of low and high salinities are discussed and the life history of *H. orbiculare* is compared with that of *C. punctatus*.

Acknowledgement

I have pleasure in thanking Professor J. H. Day for his valuable criticism.

REFERENCES

Barnard, K. H., 'Descriptive Catalogue of South African Decapoda Crustacea (Crabs and Shrimps).' *Ann. S. Afr. Mus.*, XXXVIII, 1-864, 1950.

Broekhuysen, G. J., 'On Development, Growth and Distribution of *Carcinides maenas* (L.).' *Arch. Neerl. Zool.*, II, 257-399, 1936.

——, 'Some notes on Sex Recognition in *Carcinides maenas* (L.).' *Arch. Neerl. Zool.*, III, 156-64, 1937.

——, 'The Life-History of *Cyclograpsus punctatus*, M. Edwards: Breeding and Growth.' *Trans. Roy. Soc. S. Af.*, XXVIII, 4, 331-6, 1941.

Churchill, E. P., 'Life History of the Blue Crab'. *Bull. U.S. Bur. Fisher.*, 36, 1917-18.

Day, J. H., Millard, N. A., Broekhuysen, G. J. B., 'The Ecology of South African Estuaries, Part IV, The St. Lucia System.' *Trans. Roy. Soc. S. Af.*, XXXIV, 1, 129-56, 1954.

Duncker, H., 'Gefangenschaftsbeobachtungen an *Sesarma cinerea* Milne Edwards.' *Zool. Jahrb. Syst.*, 66, 285-90, 1934.

Gosse, P. H., 'On the Sloughing of the Spider-Crab (*Maia squinado*).' *Ann. Nat. Hist.*, X, 210-12, 1852.

Williamson, H. C., 'II. Contribution to the Life-History of the Edible Crab (*Cancer pagurus* Linn.), 18th.' *Rep. Fisher. Board Scotl.*, 3, Sci. Invest., 77-143, 1900.

The *ANNALS OF THE SOUTH AFRICAN MUSEUM* are issued in parts at irregular intervals as material becomes available. As far as possible each volume is devoted exclusively to a particular subject (Zoology, Botany, etc.). Two or more volumes may be in course of publication concurrently.

Most of the Geological and Palaeontological papers are issued in conjunction with the Geological Survey of the Union of South Africa.

Some volumes and parts are out of print, and others are only sold as parts of a set, or volume, respectively. The prices of parts published prior to 1940 have been increased.

Out of print: Vols. I, II, V (Parts 1, 2, 9), VII, VIII, IX (Part 1), XII (Part 7), XXII, XXIV (Part 2), XXXI (Parts 1, 2, 3).

Vol.			£	*s.*	*d.*
III.	1903–1905	Zoology	1	19	0
IV.	1903–1908	Palaeontology	3	7	0
V.	1906–1910	Geology, Palaeontology, Zoology, Anthropology	1	2	0
VI.	1908–1910	Zoology	3	3	6
IX.	1911–1918	Botany (excl. Part 1)	2	16	0
X.	1911–1914	Zoology	4	16	0
XI.	1911–1918	Zoology	3	1	6
XII.	1913–1924	Palaeontology and Geology (excl. Part 7)	3	13	0
XIII.	1913–1923	Archaeology and Zoology	3	10	6
XIV.	1915–1924	Zoology	3	6	6
XV.	1914–1916	Zoology	4	5	0
XVI.	1917–1933	Botany	3	11	0
XVII.	1917–1920	Zoology	3	10	0
XVIII.	1921	Zoology	4	5	6
XIX.	1924–1925	Zoology	3	7	0
XX.	1924–1926	Zoology	2	12	0
XXI.	1925–1927	Zoology	3	6	0
XXIII.	1925–1926	Zoology	1	15	0
XXIV.	1929–1938	Anthropology and Ethnology (excl. Part 2)	2	9	6
XXV.	1927–1928	Zoology	1	19	0
XXVI.	1928	Zoology	1	10	0
XXVII.	1929	Anthropology	1	10	0
XXVIII.	1929–1932	Palaeontology	2	12	0
XXIX.	1929–1931	Zoology	2	8	0
XXX.	1931–1935	Zoology	3	13	6
		INDEX of papers, authors, and subjects, published in Vols. I–XXX	0	1	6
XXXI.	1934–1950	Palaeontology (Part 4 only)	0	14	0
XXXII.	1935–1940	Zoology	3	3	6
XXXIII.	1939	Zoology	2	2	0
XXXIV.	1938	Zoology	2	8	0
XXXV.		Reserved for conclusion of monograph in Vol. XXXIV.			
XXXVI.	1942–1948	Zoology	2	11	0
XXXVII.	1947–1952	Archaeology	1	16	0
XXXVIII.	1950	Zoology	3	15	0
XXXIX.	1952	Zoology	2	14	6
XL.	1952–	Botany Part 1, 1*s.* Part 2, 17*s.* 6*d.* Part 3	0	5	0
XLI.	1952–	Zoology Parts 1 & 2, 7*s.* 6*d.* each. Part 3, 15*s.* Part 4	0	15	0
XLII.	1953–	Palaeontology Part 1, 12*s.* 6*d.* Part 2	0	15	0

Copies may be obtained from—

The LIBRARIAN, SOUTH AFRICAN MUSEUM, CAPE TOWN,

except the Geological and Palaeontological parts, which are obtainable from the GOVERNMENT PRINTER, PRETORIA.

ANNALS

OF THE

SOUTH AFRICAN MUSEUM

VOLUME XLI

PART VI, *containing:—*

ISSUED APRIL 1955 *PRICE* 15*s.* 0*d.*

PRINTED FOR THE

TRUSTEES OF THE SOUTH AFRICAN MUSEUM

BY THE RUSTICA PRESS (PTY.) LIMITED, COURT ROAD, WYNBERG, CAPE

12. *Neue Lamiinae aus dem South African Museum* (Coleoptera Cerambycidae). Von Dr. Stephan Breuning.

Dank dem freundlichen Entgegenkommen der Herren Dr. A. J. Hesse und Dr. H. Andreae konnte ich die Mehrzahl der unbestimmten Lamiinae des South African Museums untersuchen. Unter diesem interessanten Material fand ich eine Anzahl neuer Formen, deren Beschreibungen hier nachfolgen. Alle Typen befinden sich in dem oben angeführten Museum.

Prosopocera (*Dalterus*) *hessei* n. sp.

Sehr langgestreckt. Fühler um ein Drittel länger als der Körper (♀), das dritte Glied kaum länger als das vierte. Untere Augenloben etwas länger als die Wangen. Stirn etwas höher als breit, sehr dicht und sehr fein punktiert. Halsschild ziemlich dicht und fein punktiert und jederseits mit zwei wenig ausgesprochenen runden postmedianen Beulen bewehrt, je eine auf den Seiten der Scheibe und eine am Seitenrand. Schildchen trapezförmig. Flügeldecken im basalen Viertel dicht und ziemlich fein gekörnt, danach sehr dicht und fein punktiert.

Dunkelrotbraun, graulila tomentiert. Die zwei rückwärtigen Drittel der Flügeldecken mit sehr kleinen wenig deutlichen weisslichen Flecken übersäht.

Länge: 19 mm.; Breite: 6 mm.

Typ: 1 ♀ von Rhodesia: Sebakwe, leg. D. Dodd.

Diese Art unterscheidet sich leicht von allen anderen Arten des Subgenus *Dalterus* Fairm. durch das Fehlen eines Halsschildseitendornes sowie die gleichzeitige Anwesenheit einer dichten Granulierung auf dem basalen Viertel der Flügeldecken.

Prosopocera (*Dalterus*) *fossulata* Breuning.

Das Männchen dieser Art war noch nicht bekannt (1936, Nov. Ent., 3. Suppl., fasc. 24, p. 188). Nun liegt mir ein solches von Damaraland: Otjikondo, vor. Die Fühler sind um zwei Drittel länger als der Körper, die Glieder drei und vier in ganzer Länge verdickt. Die Stirn ist mit einem langen, schmalen, zweispitzigen Horn bewehrt. Sonst wie das ♀.

Falsotragiscus n. gen.

Sehr langgestreckt. Fühler fein, kaum kürzer als der Körper, unterseits nicht gefranst; das erste Glied dünn und ziemlich lang, das dritte merklich

länger als das vierte oder das erste. Fühlerhöcker weit auseinanderstehend, kaum vortretend. Augen fein facettiert, sehr stark ausgeschnitten. Stirn breiter als hoch. Halsschild quer, vor der Basis eingezogen und quer vertieft, mit zwei feinen Querfurchen—eine am Vorderrand, die andere am Hinterrand—und einem kleinen konischen Seitendorn bewehrt. Flügeldecken sehr langgestreckt, parallel, kaum breiter als der Halsschild, apikal verrundet. Kopf nicht rückziehbar. Prosternalfortsatz schmal, an seinem Vorderrand abgestutzt. Mesosternalfortsatz vorn senkrecht abgestutzt. Metasternum von normaler Länge. Mittelhüfthöhlen offen. Beine wenig lang, die Schenkel leicht gekeult, die Mittelschienen mit Dorsalfurche, die Klauen divergent.

Typ: *peritragoides* Breuning.

Diese Gattung gehört in den Tribus *Tragocephalini*, neben *Pseudotragiscus* Breun. Sie unterscheidet sich von letzterer Gattung durch ein nicht gekeultes erstes Fühlerglied, kaum vortretende Fühlerhöcker, nicht vortretende Schultern u.s.w.

Falsotragiscus peritragoides n. sp.

Untere Augenloben so lang als die Wangen. Die ganze Oberseite sehr fein und wenig dicht punktiert.

Dunkelbraun. Kopf und Halsschild ockergelb tomentiert. Eine dunkelbraune Querbinde verbindet die Fühlerhöcker. Eine ziemlich breite schwarze Längsbinde reicht vom Vorderrand des Scheitels bis zur Halsschildbasis. Jederseits des Scheitels eine schwarze Makel. Auf den Seiten der Halsschildscheibe jederseits drei hintereinander liegende runde schwarze Makeln und auf den umgeschlagenen Seitenteilen jederseits zwei hintereinander liegende runde schwarze Makeln. Schildchen schwarz tomentiert. Flügeldecken rot, fein gelb tomentiert; auf jeder Decke vier kleine schwarze Makeln: eine runde nahe dem Seitenrand hinter der Schulter, zwei preapikale, die eine nahe der Naht, schief gelagert, die andere rund, auf der Mitte der Scheibe gelegen, und eine apikale. Unterseite des Körpers graugelb tomentiert, jedes Abdominalsegment mit zwei seitlichen, nahe dem Vorderrand gelegenen, kleinen schwarzen Makeln. Beine fein gelb tomentiert. Fühler braunschwarz tomentiert.

Länge: 11 mm.; Breite: $3\frac{1}{2}$ mm.

Typ von Damaraland: Karibib, leg. A. Ullmann, 1917.

Pseudocharies thes transversevitticollis n. sp.

Sehr langestreckt. Untere Augenloben dreimal so lang als die Wangen. Flügeldecken parallel.

Rot. Oberseite gelb tomentiert. Halsschild mit zwei grauen Querbinden, die eine am Vorder-, die andere am Hinterrand, einer kurzen und schmalen Mittellängsbinde, die die gelb tomentierte Zone nicht überschreitet, und jederseit in der Mitte mit zwei kleinen, runden dunkelbraunen Makeln: die eine auf den Seiten der Scheibe, die andere an der Grenze der Scheibe und der

umgeschlagenen Seitenteile. Auf jeder Flügeldecke eine kleine dunkelbraune Makel am Hinterrand des Schildchens, eine schmale graue Nahtbinde, die die beiden vorderen Drittel durchläuft, und neun runde grau tomentierte und schmal dunkelbraun umrandete Makeln: eine auf der Schulter, eine am Seitenrand hinter der Schulter, eine an der Naht am Ende des ersten Drittels, eine premediane auf den Seiten der Scheibe, eine mediane am Seitenrand—letztere beiden seitlich miteinander verbunden—eine an der Naht am Beginne des apikalen Drittels, eine am Seitenrand am Beginne des apikalen Viertels, eine preapikale an der Naht, und eine apikale—letztere beiden miteinander vereinigt. Unterseite des Körpers, Beine und Fühler fein graugelb tomentiert.

Länge: 11½ mm.; Breite: 3½ mm.

Typ ohne Fundortangabe.

Diese Art steht besonders der *picta* Breun. nahe, unterscheidet sich aber von ihr wie auch von allen anderen Arten dieser Gattung durch das Vorhandensein zweier grauer Querbinden auf dem Halsschild.

Ceroplesis thunbergi Fahr. m. *supplementaria* nov.

Wie die Stammform, aber mit einigen kleinen roten Flecken zwischen der postmedianen Querbinder und der Apikalbinde.

Typ.: 1 ♂ von Maputaland, Nord-Zululand, leg. H. W. Bell-Marley, 1908. 1 Allotyp, ♀, ohne Fundortangabe.

Von *hamiltoni* Auriv. unterscheidet sich diese Form durch die breitere und regelmässigere postmediane rote Querbinde der Flügeldecken.

Oeax subaequalis n. sp.

Dem *inaequalis* Thoms. nahe stehend, aber die ganze Oberseite feiner punktiert, die postbasale Längscrista der Decken aus sechs kleinen Zähnchen gebildet.

Die Tomentierung ist recht ähnlich, aber der Hinterkopf ohne schwarze Pubescenz, die beiden schwarzen seitlichen Halsschildlängsbinden nach vorn bis zum Hinterrand der Augen verlängert, die dreieckige postmediane schwarze Seitenmakel der Decke im Nahtdrittel als schmale Querbinde bis zur Naht verlängert, die kurze schwarze Querbinde im apikalen Deckenviertel durch eine sehr kleine, schief gelagerte schwarze Makel nahe der Naht ersetzt, die preapikale schwarze Seitenrandmakel länger. Die ganze basale Hälfte der Fühlerglieder vom dritten ab, weiss tomentiert.

Länge: 12 mm.; Breite: 5 mm.

Typ von Natal: Durban, leg. H. W. Bell-Marley.

Idactus plurifasciculatus n. sp.

Sehr langgestreckt. Fühler merklich kürzer als der Körper; das erste Glied mässig lang, das dritte viel länger als das vierte. Untere Augenloben

etwas kürzer als die Wangen. Fühlerhöcker mässig hoch. Stirn so hoch als breit. Halsschild mit vier feinen Querfurchen, zwei nahe dem Vorderrand, zwei nahe dem Hinterrand, fünf kleinen Scheibenhöckern: ein kleiner konischer in der Mitte, die anderen vier kaum angedeutet, und einem ziemlich kleinen stumpf konischen Seitenhöcker. Schildchen halbrund. Flügeldecken sehr langgestreckt, gewölbt, apikal verrundet, wenig dicht und sehr fein punktiert. Jede Decke mit fünf kleinen Haarfaszikeln: zwei postbasale, eines auf der Scheibenmitte, das zweite seitlich davon, zwei postmediane auf der Scheibe, eines neben dem anderen, und ein preapikales, hinter dem inneren postmedianen gelegen.

Dunkelbraun, weisslich tomentiert und dicht braun marmoriert, besonders dicht auf den Schläfen und den Halsschildseiten. Auf jeder Decke zuweilen zwei hellbraune wenig scharf ausgeprägte Scheibenmakeln: eine postbasale hinter den beiden vorderen Haarfaszikeln gelegen und eine postmediane hinter den breiden postmedianen Haarfaszikeln gelegen.

Länge: 16 mm.; Breite: $5\frac{1}{2}$ mm.

Typ von Prince Albert, leg. C. West, 1 Paratyp von Namaqualand und 1 Paratyp von O'okiep, Namaqualand, 20. XII. 1885.

Diese Art steht dem *multifasciculatus* Breun. nahe, unterscheidet sich aber insbesondere durch das Fehlen von Kanten auf den Decken und die geringere Zahl von Haarfaszikeln.

Olenecamptus tesselatus Dist. m. *postobliteratus* nov.

Wie m. *vittatus* Breun., aber ohne weisse Preapikalmakel, so dass die weisse Scheibenbinde am Beginn des apikalen Viertels endigt; die Basalmakel bleibt von der Binde getrennt.

Typ.: 1 von Süd Rhodesia: Sebakwe, leg. D. Dodd, 1 Paratyp ditto.

Tambusoides n. gen.

Langoval, gedrungen. Fühler fein, etwas mehr als zweimal so lang (♂) oder etwas kürzer (♀) als der Körper, die drei ersten Glieder nicht gefranst, die weiteren deutlich gefranst, dichter beim ♂ als beim ♀, die letzten Glieder beim ♂ noch dichter gefranst; das erste Glied kurz und dick, das dritte so lang als das vierte, viel länger als das erste, merklich länger als eines der weiteren Glieder. Fühlerhöcker einander ziemlich genähert und hoch. Augen fein facettiert, sehr stark ausgeschnitten, die unteren Augenloben so hoch als breit. Halsschild quer, gewölbt, mit zwei hohen konischen Scheibenhöckern und einer nur schwach angedeuteten stumpfen postmedianen Seitenbeule. Flügeldecken lang, gewölbt, an den Schultern merklich breiter als der Halsschild, apikal verrundet. Jede Decke mit einem kurzen und hohen basalen Kamm auf der Scheibe und zahlreichen grossen Haarfaszikeln. Schultern eckig vortretend. Kopf rückziehbar. Prosternalfortsatz wenig breit, niedriger als die Hüften, regelmässig gerundet. Mesosternalfortsatz breit, an seinem

Vorderrand mit zwei kleinen vorstehenden nebeneinander gelegenen Höckern besetzt. Metasternum leicht verkürzt. Beine mässig lang, kräftig, die Schenkel gekeult, die Mittelschienen ohne Dorsalfurche, die Klauen gesperrt.

Typ: *multifasciculatus* Breun.

Diese Gattung gehört in den Tribus *Crossotini*. In meiner Bestimmungstabelle der Gattungen dieses Tribusses (1942, Nov. Ent., 3. Suppl., Fasc. 72, p. 8) reiht sie sich bei der Nummer 10 ein und unterscheidet sich von *Tambusa* Dist. durch die hohen Fühlerhöcker, das Fehlen eines Halsschildseitendornes, apikal verrundete Flügeldecken, u.s.w.

Tambusoides multifasciculatus n. sp.

Untere Augenloben viel kürzer als die Wangen. Kopf und Halsschild ziemlich dicht und grob punktiert. Schildchen quer trapezförmig. Flügeldecken dicht und sehr grob punktiert, die Punkte apikalwärts etwas feiner werdend. Der basale Kamm an seinem Vorderrand in einen vortretenden Höcker auslaufend und in seiner rückwärtigen Hälfte von einem grossen gelben Haarfaszikel überlagert. Auf jeder Decke ausserdem sieben grosse gelbe Haarfaszikel: eines hinter der Schulter, seitlich des den Kamm überragenden Faszikels, drei im mittleren Teil und drei im apikalen Drittel, die in Form zweier gewellter Querbinden angeordnet sind. Metasternum und Abdomen dicht und grob punktiert.

Dunkelbraun, Kopf braun tomentiert, mit rosa untermischt. Halsschild rosa tomentiert, hinter den Scheibenhöckern und auf den Seitenteilen mit braun untermischt. Schildchen braun tomentiert mit breiter ockergelber Mittellängsbinde. Flügeldecken und Unterseite des Körpers strohgelb tomentiert, die Punkte kahl bleibend. Beine feiner strohgelb tomentiert und mit braun untermischt, fast einfärbig braun in der apikalen Hälfte der Schienen. Fühler dunkelbraun tomentiert, die basale Hälfte der Glieder vom fünften ab und der apikale Teil des elften Gliedes weisslich tomentiert.

Länge: 16–20 mm.; Breite: 7–8½ mm.

Typ: 1 ♂ vom St. Johns River. Allotyp: 1 ♀ von Port St. Johns, VII. 1894.

Tetraulax rhodesianus n. sp.

Untere Augenloben kaum zweimal länger als die Wangen. Halsschild ausser den beiden kreisförmig angeordneten Furchen auf der Scheibe mit einer in Form eines Dreieckes angeordneten Furche. Flügeldecken sehr fein punktiert. Tomentierung anders.

Dunkelbraun, hellbraun tomentiert. Auf jeder Decke zwei breite weisse Querbinden: eine postbasale und eine mediane, die im Nahtviertel und im Seitenrandviertel in der Längsrichtung miteinander verbunden sind. Einige gekrümmte weisse Linien im apikalen Drittel. Metasternum weiss tomentiert.

Abdomen teilweise weisslich tomentiert. Basales Drittel der Fühlerglieder vom dritten ab weiss tomentiert.

Länge: 8 mm.; Breite: $2\frac{3}{4}$ mm.

Typ von Süd Rhodesien: Umtali.

Cloniocerus aureovittatus n. sp.

Dem *bohemani* White nahestehend, aber die Flügeldecken in ganzer Ausdehnung dicht punktiert, die Punkte sehr grob in den drei vorderen Vierteln, sowie die Tomentierung abweichend:

Schwarz, schwarz tomentiert. Halsschild mit zwei breiten goldfarbenen Längsbinden, deren je eine den Seitendorn deckt. Flügeldecken mit zwei goldfarbenen Querbinden: eine schmale premediane und eine breitere postmediane; das apikale Viertal mehr oder weniger dicht goldfarben marmoriert. Unterseite grösstenteils goldfarben tomentiert. Schenkel und Schienen im basalen Drittel golden geringt. Die basale Hälfte der beiden ersten Tarsenglieder sowie des vierten Tarsengliedes und die Basis des dritten Gliedes, rot und weisslich tomentiert. Die Fühlerglieder vom dritten (oder vom vierten) bis zum siebenten Glied nach der Basis gelbrot geringt, diese Ringe fein weisslichgelb tomentiert.

Länge: 10 mm.; Breite: 3 mm.

Typ von Gt. Winterhoek, Tulbagh, Cape Province, 1,500 m., XI. 1916, leg. Lightfoot. Ein Paratyp ditto.

Stathmodera reticulata n. sp.

Fühler etwas länger als der Körper, das erste Glied sehr dicht und fein punktiert, im dorso-apikalen Teil verdickt, das dritte Glied etwas kürzer als das vierte, etwas länger als das erste. Fühlerhöcker mässig vortretend. Untere Augenloben etwas länger als die Wangen. Halsschild mit einer kräftigen Mittellängsrinne und sehr zahlreichen (über 30) sehr feinen aber scharf eingeschnittenen Längsfurchen, die nach rückwärts gegen die Mittellinie zu konvergieren. Flügeldecken sehr dicht und tief punktiert, die Intervalle ein dichtes Netzwerk bildend. Auf jeder Decke ein feinen Längskamm, der den Seitenrand begleitet, und ein kurzer preapikaler Längskamm auf der Scheibenmitte. Die apikale Randecke in einen Zahn ausgezogen. Stirn ohne abstehende Haare.

Schwarz, sehr fein weisslichgrau tomentiert. Die Stirn, eine breite Längsbinde auf dem Scheitel, die umgeschlagenen Seitenteile des Halsschildes, das Schildchen, sowie drei Makeln auf jeder Decke (eine schief gelagerte hinter der Schulter, eine runde postmediane auf der Scheibenmitte und eine runde preapikale nahe der Naht), gelb tomentiert. Unterseite und Beine fein grau tomentiert. Fühler schwarzbraun tomentiert, der apikale Teil der Glieder drei bis zehn weisslich tomentiert.

Länge: 7–8 mm.; Breite: 2 mm.

Typ von St. Lucia Lake, X. 1934, leg. H. W. Bell-Marley. Ein Paratyp ditto.

Eunidia vagefasciata n. sp.

Fühler fast um die Hälfte länger als der Körper, das dritte Glied apikal in eine Spitze ausgezogen, das vierte so lang als das fünfte oder erste. Untere Augenloben weniger als zweimal so hoch als breit, viermal so lang als die Wangen. Halsschild fast zweimal so breit als lang, nicht punktiert. Flügeldecken apikal breit aber sehr schwach abgestutzt, durchwegs dicht und sehr fein punktiert.

Dunkelbraun. Kopf, Halsschild und Schildchen strohgelb tomentiert. Flügeldecken weisslichgrau tomentiert. Jede Decke mit zwei unscharf ausgebildeten braunen Querbinden: eine in der Mitte und eine gewellte am Beginn des apikalen Drittels, sowie mit drei unscharf ausgebildeten gelben Querbinden: eine basale, eine gewellte postbasale und eine apikale. Unterseite weisslichgrau tomentiert, diese Tomentierung gegen die Seiten der Sterna und der Abdominalsegmente in gelb übergehend. Beine graugelb tomentiert. Das erste Fühlerglied strohgelb tomentiert, die weiteren Glieder weisslichgrau tomentiert.

Länge: 11 mm.; Breite: 3 mm.

Typ von Transvaal: Leydsdorp, 1905, leg. J. Naughton.

Eunidia bifuscofasciata n. sp.

Fühler um ein Drittel länger als der Köper, das dritte Glied apikal in eine Spitze ausgezogen, das vierte so lang als das fünfte oder erste. Untere Augenloben zweimal so hoch als breit, sechsmal so lang als die Wangen. Halsschild quer, kaum punktiert. Flügeldecken apikal verrundet, durchwegs sehr dicht und sehr fein punktiert.

Dunkelrotbraun, weisslichgrau tomentiert. Zwei breite Querbinden auf den Flügeldecken: eine in der Mitte und eine preapikale ohne Pubeszenz, Schenkel sowie die drei ersten Fühlerglieder ziemlich dunkel braun tomentiert, die weiteren Fühlerglieder fein rotbraun tomentiert.

Länge: 6 mm.; Breite: $1\frac{2}{3}$ mm.

Typ von Süd Rhodesien: Sebakwe, 1902, leg. D. Dodd.

Eunidia subnigra n. sp.

Fühler um ein Drittel länger als der Körper, das dritte Glied apikal in eine Spitze ausgezogen, das vierte so lang als das fünfte, etwas kürzer als das erste. Untere Augenloben zweimal so hoch als breit, fünfmal so lang als die Wangen. Halsschild quer, nicht punktiert, vor der Basis und hinter dem Vorderrand stark eingezogen. Flügeldecken apikal verrundet, durchwegs dicht und sehr fein punktiert.

Schwarz, durchwegs sehr fein dunkelbraun seidenglänzend tomentiert.

Länge: 10 mm.; Breite: $2\frac{3}{4}$ mm.

Typ von Nord Rhodesien: Pemba, 1918, leg. Father Casset.

Mimogmodera n. gen.

Sehr langgestreckt. Fühler fein, unterseits vom vierten oder fünften Glied ab wenig dicht aber lang gefranst, um ein Drittel länger als der Körper; das erste Glied lang und dünn (aber immerhin merklich dicker als die weiteren Glieder), oberseitig konvex, das dritte Glied so lang als das vierte, etwas kürzer als das erste, das vierte etwas länger als das fünfte, die weiteren langsam an Länge abnehmend. Fühlerhöcker sehr klein, einander genähert und vorstehend. Augen grob facettiert, stark ausgeschnitten, die unteren Loben klein und quer. Stirn höher als breit. Halsschild gewölbt, merklich länger als breit, ziemlich weit vom Vorderrand sowie ziemlich weit vom Hinterrand merklich eingezogen, der mittlere Teil seitlich kräftig gerundet. Flügeldecken gewölbt, sehr lang, parallel, etwas breiter als der Halsschild, apikal ziemlich schmal verrundet. Kopf nicht rückziehbar. Prosternalfortsatz schmal, niedriger als die Hüften, gleichmässig verrundet. Mesosternalfortsatz schmal, zum Vorderrand allmählich abfallend. Metasternum von normaler Länge. Mittelhüfthöhlen offen. Beine kurz, ziemlich kräftig, die Schenkel gekeult, die Mittelschienen ausgeschnitten, die Klauen gesperrt.

Typ: *rufula* Breun. Diese Gattung ist der Gattung *Stenidea* Muls. verwandt.

Mimogmodera rufula n. sp.

Erstes Fühlerglied sehr dicht und sehr fein punktiert. Untere Augenloben etwas kürzer als die Wangen. Schildchen schmal, apikal verrundet. Die ganze Oberseite des Körpers fein und sehr dicht, die Unterseite sehr fein und dicht punktiert.

Rot, sehr fein weisslichgelb tomentiert. Flügeldecken mit einigen unscharf ausgebildeten dunkelbraunen Scheibenflecken.

Länge: $4\frac{1}{2}$–5 mm.; Breite: 1–$1\frac{1}{4}$ mm.

Typ. von Natal: Durban, B.B.-Bush, XI. 1908, leg. H. W. Bell-Marley. Ein Paratyp ditto. Weitere Paratypen im British Museum von Pondoland: Port St. Johns, und Natal.

Hyllisia albifrons n. sp.

Sehr langgestreckt. Fühler fast zweimal so lang als der Körper, das dritte Glied merklich länger als das vierte, kaum länger als das erste, die sechs ersten Glieder unterseits schütter und kurz gefranst. Untere Augenloben etwas kürzer als die Wangen. Kopf und Halsschild sehr dicht und sehr fein punktiert. Halsschild so lang als breit, seitlich leicht verrundet. Schildchen halbrund. Flügeldecken sehr lang, parallel, apikal verrundet, durchwegs sehr dicht und fein punktiert.

Dunkelbraun, weisslich tomentiert. Scheitel mit drei ockergelben Längsbinden. Halsschild mit sieben schmalen ockergelben Längsbinden. Flügeldecken rot, fein grau tomentiert, jede mit weisslichen Längsbinden: eine Nahtbinde, eine Seitenrandbinde und drei Scheibenbinden, und in der rückwärtigen Hälfte mit einer weiteren weisslichen Längsbinde zwischen der zweiten und der dritten (von der Naht aus gezählt) Scheibenbinde. Fühler dunkelbraun tomentiert, die drei basalen Viertel des dritten Gliedes, die basale Hälfte der Glieder vier bis zehn, sowie das basale Viertel und die apikale Hälftes des elften Gliedes rotweisslich tomentiert.

Länge: 10 mm.; Breite: 2 mm.

Typ von Rust en Vrede, Oudtshoorn District, Cape Province.

Anauxesis andreaei n. sp.

Fühler ungefähr zweieinhalbmal so lang als der Körper, das dritte Glied viel kürzer als das vierte, viel länger als das erste. Untere Augenloben um die Hälfte länger als die Wangen. Der ganze Körper sehr dicht und sehr fein punktiert. Halsschild zweimal so lang als breit. Schildchen fünfeckig. Flügeldecken apikal ausgeschnitten, die Nahtecke spitzig, die Randecke in einen ziemlich langen spitz-dreieckigen Lappen ausgezogen.

Dunkelbraun, sehr fein gelbbraun seidenglänzend tomentiert. Stirn, Wangen, Schildchen und jederseits eine Längsbinde, die die umgeschlagenen Seitenteile des Halsschildes deckt und dann auf den Seiten der Unterseite bis zum Ende des Körpers reicht, ziemlich dicht weisslich tomentiert. Die äusserste Basis des fünften Fühlergliedes, sowie die apikale Hälfte des siebenten Gliedes (mit Ausnahme des äussersten Endes dieses Gliedes) weiss und weiss tomentiert.

Länge: 18–20 mm.; Breite: $2\frac{1}{4}$–$2\frac{1}{2}$ mm.

Typ von Zululand: N'kandhla Forest, I. 1937, leg. R. F. Lawrence. Zwei Paratypen: Zululand: Mfongosi, leg. W. E. Jones.

Anauxesis nigroantennalis n. sp.

Fühler mehr als zweimal so lang als der Körper, die Glieder drei bis fünf unterseits sehr schütter und kurz gefranst, das dritte Glied viel kürzer als das vierte, viel länger als das erste. Untere Augenloben um die Hälfte länger als die Wangen. Der ganze Körper äusserst dicht und sehr fein punktiert. Halsschild zweimal so lang als breit. Schildchen fünfeckig. Flügeldecken apikal schwach, schief, ausgeschnitten, die beiden Ecken spitzig.

Schwarzbraun, schütter weisslichgrau tomentiert, die Tomentierung dichter auf den Wangen sowie auf je einer schmalen Längsbinde, die die umgeschlagenen Seitenteile des Halsschildes und die Seiten der Sterna bis zum Hinterrand der Metepisternen durchläuft.

Länge: 10½–11 mm.; Breite: 1–1¼ mm.

Typ ein ♀ von Portugiesisch Ost-Afrika: Masiene, leg. R. F. Lawrence. Ein Paratyp ditto.

Obereopsis meridionalis n. sp.

Langgestreckt. Fühler etwas kürzer als der Körper, das dritte Glied so lang als das vierte, etwas länger als das erste. Untere Augenloben merklich länger als die Wangen. Stirn um die Hälfte breiter als einer dieser Loben. Kopf und Halsschild dicht und fein punktiert. Halsschild so lang als breit, mit zwei breiten aber seichten Querdepressionen, eine premediane und eine postmediane. Schildchen dreieckig. Flügeldecken langgestreckt, apikal ziemlich breit verrundet, grob punktiert, die Punkte gereiht. Hinterschenkel das zweite Hinterleibssegment kaum überragend.

Gelbrot, sehr fein gelblich tomentiert. Die umgeschlagen Seitenteile des Halsschildes grösstenteils schwarz. Auf jeder Flügeldecke eine breite schwärzliche Längsbinde am Seitenrand, die sich im premedianen Teil nahtwärts stark verbreitert (sich hierbei aber etwas aufhellt) und die dann, sich ebenfalls aufhellend, fast das ganze apikale Viertel deckt. Drei schwarze Flecken auf dem Mesosternum: ein mittlerer und je ein seitlicher. Zwei kleine schwarze Flecken auf dem Hinterrand des Metasternums. Hinterschienen, ausser basal, ziemlich dunkelbraun. Tarsen braun. Fühler dunkelbraun.

Länge: 8 mm.; Breite: 1½ mm.

Typ von Cape Town, Rondebosch, X. 1883.

Obereopsis pseudocapensis n. sp.

Sehr langestreckt. Fühler ziemlich fein, um ein Viertel länger als der Körper, das dritte Glied so lang als das vierte, merklich länger als das erste. Untere Augenloben zweimal so lang als die Wangen. Stirn merklich breiter als einer dieser Loben. Kopf und Halsschild sehr dicht und sehr fein punktiert. Halsschild merklich länger als breit, seitlich fast gerade. Schildchen schmal dreieckig. Flügeldecken sehr lang, in der Mitte sehr leicht eingezogen, apikal schief abgestutzt (beide Ecken deutlich aber stumpf), sehr dicht und mässig fein punktiert, die Punkte mehr ober weniger regelmässig gereiht. Sterna sehr dicht, Abdomen dicht und sehr fein punktiert. Hinterschenkel das zweite Abdominalsegment kaum überragend.

Gelbrot, fein gelblich tomentiert. Auf dem Halsschild eine mässig breite schwarze Mittellängsbinde, die sich basalwärts leicht verbreitert; die umgeschlagenen Seitenteile schwarz tomentiert. Auf jeder Flügeldecke eine schwarze Längsbinde, die von der Schulterbeule abgeht, am Ende des basalen Viertels den Seitenrand erreicht um sich apikalwärts langsam zu verlieren. Sterna schwarz. Eine grosse schwarze Quermakel auf der Mittel des ersten, zweiten und dritten Abdominalsegmentes. Die zwei ersten Fühlerglieder dunkelbraun, die weiteren Glieder rot.

Länge: 9–10 mm.; Breite: $1\frac{1}{2}$–2 mm.

Typ von Cape Town, leg. Péringuey.

Diese Art hatte ich, irregeführt durch eine falsche Determination hierhergehöriger Exemplare im British Museum, mit *Nitocris capensis* Péringuey identifiziert, weshalb ich von letzterer Art sagte (1951, *Ent. Arb. Mus.*, Frey, p. 3), sie gehöre in die Gattung *Obereopsis*. In Wirklichkeit weicht *Nitocris capensis* Per. stark von der vorliegenden Art ab und reiht sich in die Gattung *Phytoecia* Muls. ein. Ich gebe von letzterer Art hier nachfolgend die Beschreibung auf Grund eines Paratyps von Péringuey in der Sammlung des Cap-Museums.

Phytoecia (*Blepisanis*) *capensis* (Péring.)

Nitocris capensis Péringuey, 1888, *Trans. S. Afr. Philos. Soc.*, IV, p. 184.

Sehr langgestreckt. Fühler um ein Viertel länger als der Körper, mässig dick, das dritte Glied etwas länger als das vierte, merklich länger als das erste. Untere Augenloben mehr als dreimal so lang als die Wangen. Stirn merklich breiter als einer dieser Loben. Kopf und Halsschild sehr dicht und ziemlich fein punktiert. Halsschild so lang als breit, cylindrisch. Schildchen dreieckig. Flügeldecken sehr lang, apikal verrundet, dicht und grob punktiert, die Punkte gereiht. Hinterschenkel das zweite Abdominalsegment wenig überragend.

Gelbrot, fein gelblich tomentiert. Die umgeschlagenen Seitenteile sowie eine mässig breite Mittellängsbinde auf dem Halsschilde sind schwarz. Auf jeder Flügeldecke eine schwarze Längsbinde am Seitenrand, die sich vor der Mitte nahtwärts merklich verbreitert und dann das ganze apikale Viertel deckt. Sterna (ausser entlang der Mittellinie) sowie der mittlere Teil der beiden ersten Abdominalsegmente schwarz. Der apikale Teil der Tibien braun. Tarsen dunkelbraun. Die drei ersten Fühlerglieder dunkelbraun, die weiteren rot.

Länge: 7–10 mm.; Breite: $1\frac{1}{2}$–$1\frac{3}{4}$ mm.

Cape Town, Rondebosch, X. 1883, leg. Péringuey.

In der Bestimmungstabelle der Untergattung *Blepisanis* (1951, *Ent. Arb. Mus.*, Frey, II, p. 30) schiebt sich diese Art bei der Nummer 69 ein, wobei sie von *disconotaticollis* Breun. durch ganz rotgelb gefärbten Kopf, schwarze umgeschlagene Seitenteile des Halsschildes etc. abweicht.

Phytoecia (*Blepisanis*) *holonigra* n. sp.

Sehr langgestreckt. Fühler wenig stark, merklich länger als der Körper, das dritte Glied kaum länger als das vierte, merklich länger als das erste, das vierte etwas länger als das fünfte. Untere Augenloben um die Hälfte länger als die Wangen. Stirn fast um die Hälfte breiter als einer dieser Loben. Kopf dicht und sehr fein punktiert. Halsschild so lang als breit, wenig dicht und sehr fein punktiert, mit vier kleinen Scheibenbeulen besetzt: zwei vor der Mitte der Mittellinie genähert und zwei hinter der Mitte mehr seitlich gelagert. Schildchen gross, apikal verrundet. Flügeldecken sehr lang, in der Mitte

leicht eingezogen, apikal verrundet, durchwegs sehr dicht und fein punktiert. Hinterschenkel den Hinterrand des zweiten Abdominalsegmentes kaum erreichend.

Schwarz, fein hellgrau tomentiert. Die Wangen, das Schildchen sowie eine unscharf ausgebildete Längsbinde auf dem Scheitel und dem Halsschild, dichter weiss tomentiert. Unterseite und Beine fein dunkelgrau, die Fühler schwarz tomentiert. Die abstehenden Haare weisslichgrau gefärbt.

Länge: 9 mm.; Breite: $1\frac{2}{3}$ mm.

Typ: 1 ♂ ohne Fundort.

In meiner Bestimmungstabelle der Untergattung *Blepisanis* (1951, *Ent. Arb. Mus.*, Frey, II, p. 27) schiebt sich diese Art bei der Nummer 17 ein, weicht aber von *moreana* Breun. und *ciliciae* Breun. durch viel schlankere Gestalt, viel weniger dichte Punktierung des Halsschildes etc., ab.

Phytoecia (*Blepisanis*) *pseudolateralis* n. sp.

Langgestreckt. Fühler etwas länger als der Körper, wenig stark, das dritte Glied so lang als das vierte oder fünfte, merklich länger als das erste. Untere Augenloben zweimal so lang als die Wangen. Stirn fast zweimal so breit als einer dieser Loben. Kopf und Halsschild sehr dicht und sehr fein punktiert. Halsschild so lang als breit, fast cylindrisch. Schildchen halbrund. Flügeldecken sehr lang, in der Mitte kaum eingezogen, apikal verrundet, dicht und ziemlich grob punktiert, die Punkte gereiht. Hinterschenkel den Hinterrand des zweiten Abdominalsegmentes kaum erreichend.

Gelbrot, fein gelblich tomentiert. Jede Flügeldecke mit einer dunkelbraunen Längsbinde am Seitenrand, die auf der Schulterbeule beginnt und sich nach hinten allmählich verbreitert um das ganze apikale Fünftel zu decken. Das erste Fühlerglied dunkelbraun, die weiteren Glieder rot, dunkelrotbraun tomentiert.

Länge: $8\frac{1}{2}$ mm.; Breite: $1\frac{1}{2}$ mm.

Typ: ein ♀ von Süd West Afrika, Kaokoveld: Kaross.

In meiner Bestimmungstabelle der Untergattung *Blepisanis* (1951, *Ent. Arb. Mus.*, Frey, II, p. 29) schiebt sich diese Art bei der Nummer 51 ein, wobei sie von *fervida* Pasc. m. *rufinitibialis* Breun. durch feine Flügeldeckenpunktierung, rotgelbe Färbung der umgeschlagenen Halsschildseitenteile und der Sterna etc., abweicht.

Phytoecia (*Blepisanis*) *argenteosuturalis* n. sp.

Der *latesuturalis* Breun. sehr nahe stehend, aber die Fühler etwas dicker, die unteren Augenloben zweimal so lang (♂) oder etwas länger (♀) als die Wangen, die Stirn um die Hälfte breiter (♂) oder mehr als zweimal so breit (♀) als einer dieser Loben, sowie die Tomentierung abweichend.

Stirn ganz oder wenigstens grösstenteils schwarz. Halsschild ohne vordere schwarze Makel; die rückwärtige Halsschildmakel, das Schildchen, sowie

eine schmale Nahtbinde auf den Flügeldecken silbrig tomentiert. Das vierte Abdominalsegment sowie die Beine einfärbig rotgelb. Die Fühlerglieder vier bis elf rot.

Typ: 1 ♂ von Upper Sources of Olifants River, Ceres Division, Cape Province, XII. 1949. Ein Allotyp (♀) ditto.

In meiner Bestimmungstabelle der Untergattung *Blepisanis* (1951, *Ent. Arb. Mus.*, Frey, II, p. 29) schiebt sich diese Art bei der Nummer 58 ein, wobei sie von *latesuturalis* Breun. und von *neavei* Aur. m. *aurosternalis* Breun. durch grösstenteils schwarze Stirn, silbrig tomentierte Flügeldecken-Nahtbinde etc., abweicht.

Scapogoephanes n. gen.

Langgestreckt. Fühler fein, um ein Drittel länger als der Körper, unterseits ziemlich kurz und schütter gefranst; das erste Glied kurz und ziemlich dick, das dritte so lang als das vierte, etwas länger als das erste, das vierte viel länger als eines der folgenden Glieder. Fühlerhöcker weit auseinanderstehend, nicht erhaben. Augen ziemlich grob facettiert, sehr stark ausgeschnitten. Halsschild schwach quer, gewölbt, seitlich verrundet. Flügeldecken lang, etwas breiter als der Halsschild, in den vorderen drei Vierteln parallel, vor der Mitte leich niedergedrückt, apikal verrundet; jede Decke mit zwei kaum angedeuteten Beulen auf der Scheibe: eine postbasale und eine postmediane. Kopf nicht rückziehbar. Prosternalfortsatz schmal, niedriger als die Hüften, verrundet. Mesosternalfortsatz nach vorn allmählich geneigt. Metasternum von normaler Länge. Mittelhüfthöhlen geschlossen. Beine mässig lang; Schenkel gekeult, Mittelschienen dorsal ausgeschnitten, Klauen gesperrt. Der ganze Körper und die Beine mit abstehenden Haaren besetzt.

Typ: *pusillus*. Breun. Die Gattung kommt neben *Acartus* Fahr. zu stehen.

Scapogoephanes pusillus n. sp.

Untere Augenloben etwas kürzer als die Wangen. Schildchen halbrund. Flügeldecken sehr dicht und sehr fein punktiert.

Dunkelrot, schütter strohgelb tomentiert. Die Flügeldecken zum Teil, die basale Hälfte der Schienen, das zweite Fühlerglied und die basale Hälfte des dritten und vierten Gliedes, sowie der basale Teil der weiteren Glieder hellrot. Die abstehenden Haare der Oberseite schwarz, die auf dem Flügeldeckenseitenrand und den Beinen fahlgelb.

Länge: $3\frac{1}{2}$ mm. Breite: $1\frac{1}{4}$ mm.

Typ von Südafrika: Blauberg (20 km. nördlich von Kapstadt).

13. *Beitrag zur Kenntnis der Malacodermata (Col.) Afrika's.* Von W. Wittmer, Buenos Aires. (Mit einer Abbildung im Text.)

Die in der vorliegenden Arbeit beschriebenen Arten entstammen Bestimmungssendungen, die ich vom South African Museum, Cape Town und vom Transvaal Museum, Pretoria erhalten habe. Den Herren Dr. A. J. Hesse, Cape Town and C. Koch, Pretoria danke ich verbindlichst für die freundliche Überlassung von Dubletten für meine Sammlung.

Malachiidae

Dinometopus humeropictus nov. spec.

♂ Schwarz, Kopf gelb, Hinterrand der Stirn bis zum Hinterrand der Augen schmal schwarz gesäumt; Fühler gelb, vom 5. oder 6. Gliede an gebräunt; Basalrand des Halsschildes in der Mitte kurz und äusserst schmal weisslichgelb; Seiten der Flügeldecken mit einer langen, weisslichgelben Makel, an der Basis beginnend, ca. 3/4 der Länge einnehmend, (Naht schwarz), auf den Schultern eine kleine, längliche, isolierte, schwarze Makel. Vorderbeine gelb, nur die Schenkel auf der Oberseite dunkel, Mittelschienen leicht aufgehellt.

Kopf (fig. 1) mit den Augen breiter als der Halsschild, Interokularaushöhlung breit, von Auge zu Auge reichend, Vorderstirn eine fast dreieckige Platte, welche zahnartig nach oben, zwischen die Augen gerichtet ist, Spitze breit abgerundet, davor deutlich eingeschnürt, in der Mitte gegen den Clypeus kaum eingedrückt, jederseits über den Fühlerwurzeln mit einer kleinen, länglichen, schwach erhabenen Beule. Fühler kräftig, fast so lang wie der ganze Körper, 2. Glied knötchenförmig, 3. so lang wie das 4. Halsschild nur wenig breiter als lang, Seiten vorne, fast bis zur Mitte, fast parallel, dann verengt und vor der Basis etwas eingeschnürt, Scheibe in der Mitte leicht aufgewölbt, Basis leicht quer eingedrückt und Basalrand etwas aufgeworfen, Oberfläche mikroskulptiert, fein staubartig behaart. Flügeldecken nach hinten kaum verbreitert, Oberfläche fast glatt mit feinen, zerstreuten Haarpunkten.

Länge: 2 mm.

Fundort: South West Africa, Abachaus, Otjivarongo 12. 1949, leg. G. Hobohm. Holotypus in der Sammlung des Transvaal Museum, Pretoria.

Neben *D. cavifrons* Boh. und *andreaei* m. zu stellen, die eine ähnlich geformte Vorderstirn haben; durch die eigentümliche Zeichnung der Flügeldecken ist die neue Art leicht von den beiden anderen Arten zu unterscheiden.

Dinometopus swellendamensis nov. spec.

♂ Schwarz, äusserste Kante des Seitenwalles der Interokularaushöhlung schmal braun gesäumt, der mediane Zahn gegen die Spitze verschwommen, schwach aufgehellt, ebenso die beiden Seitenplatten an der Basis des medianen Zahnes über den Fühlerwurzeln. Fühlerglied 1 auf der Unterseite, 2 und 3 fast ganz, 4 etwas aufgehellt. Flügeldecken mit einem ziemlich breiten, gelblichbraunen, durchgehenden Querbande, an den Seiten etwas breiter als an der Naht. Spitzen der Vorderschienen kaum aufgehellt.

Kopf (fig. 2) mit den Augen so breit wie der Halsschild, Interokularaushöhlung nicht sehr breit, die Augen nicht erreichend, Zwischenraum zwischen Auge und Interokularaushöhlung mit einem länglichen Eindruck, medianer Zahn an der Basis sehr breit, fast dreieckig, fast in einer Fläche mit der Vorderstirn liegend, Spitze mit wenigen, längeren Haaren besetzt, Seitenplatten über den Fühlerwurzeln wenig stark erhöht, flach, leicht eingedrückt, durch einen tiefen, punktförmigen Eindruck voneinander getrennt. Fühler ziemlich lang, fast von Körperlänge, 2. Glied so lang wie das 3. Halsschild breiter als lang, Seiten stark gerundet verengt, gegen die Basis stärker als nach vorne, Basalrand bis zur Mitte der Seiten deutlich abgesetzt, Scheibe leicht gewölbt, Punktierung kaum wahrnehmbar. Flügeldecken nach hinten kaum erweitert, erloschen punktiert.

Länge: 2 mm.

Fundort: South Africa, Tradouw Pass 4,000 ft., Swellendam District, Oct. 1925, leg. K. H. Barnard. Holotypus in der Sammlung des South African Museum, Cape Town.

Durch die gelbbraune, durchgehende Quermakel auf den Flügeldecken, welche an der Naht nicht unterbrochen ist, und den vollständig schwarzen Halsschild von den anderen Arten leicht zu unterscheiden.

Colotes hessei nov. spec.

♂ Kopf gelborange, Augen und eine längliche, quere Makel, vom Halsschildvorderrand teils verdeckt, schwärzlich. Fühler gelb, äusserste Basis des 1. Gliedes leicht angedunkelt, grösster Teil des 5., fast die ganze Oberfläche des 6., 7. und 8. mit einem immer kleiner werdenden Flecken, schwarz. Halsschild, Vorder- und Mittelbeine gelb; Hinterbeine und Abdomen schwarz. Flügeldecken tiefblau, leicht grünlich schimmernd, Seiten in der Mitte ziemlich breit, weisslichgelb gesäumt, unter den Schultern beginnend bis vor den Spitzen.

Kopf (fig. 3) mit den Augen etwas breiter als der Halsschild, Stirne stark verdickt, in der Mitte zwischen den Augen mit einem deutlichen Längs-

eindruck, Stirne neben und unter den Augen ausgerandet, wodurch dieselben stark vom Kopf abstehen, Oberfläche fein gewirkt, matt. Fühler nicht sehr lang, 1. Glied länglich, gegen die Spitze allmählich verdickt, ungefähr so lang wie das 3. und 4. zusammengenommen, fast länger als breit, 3. etwas länger als das 4., 5. eine Spur länger und etwas breiter als das 4., 6. und folgende unter sich gleich lang und gleich breit. Halsschild breiter als lang, Seiten vorne zuerst fast parallel, dann gegen die Basis fast geradlinig verengt, Oberfläche fast noch feiner als der Kopf chagriniert, matt. Flügeldecken nach hinten leicht erweitert, Oberfläche fein chagriniert, matt, dazwischen fein, zerstreut punktiert.

Länge: 2,2 mm.

Fundort: South Africa, Mfongosi, Zululand. Holotypus in der Sammlung des South African Museum, Cape Town. Herrn Dr. A. J. Hesse gewidmet.

Die Bildung des Kopfes erinnert etwas an *C. bigibbosus* m., doch ist die Stirne bei der neuen Art noch viel stärker angeschwollen und neben den Augen ausgerandet. Die Färbung ist vollständig verschieden.

Colotes nasifrons nov. spec.

♂ Kopf schwarz, vordere Hälfte des Längswulstes auf der Stirne und Wangen um die Fühlergruben herum, weisslichgelb. Fühler gelb, vom 5. oder 6. Gliede an leicht gebräunt. Halsschild und Beine gelborange, ersterer mit einer schwarzbraunen, kaum längeren als breiten Makel, den Vorderrand berührend, die Basis nicht erreichend. Flügeldecken blaugrün metallisch, Seiten in der basalen Hälfte schmal, weisslichgelb gesäumt.

Kopf (fig. 4) mit den Augen etwas schmäler als der Halsschild, kurz nach der Basis bis zum Clypeus mit einem ziemlich breiten, stark erhaben Längswulst in der Mitte, der vor den Augen am stärksten erhaben ist, in der Mitte auch etwas breiter als an den Enden, Oberfläche des Kopfes fein mikrochagriniert, matt. Fühler etwas länger als der halbe Körper, 1. Glied länger als das 2. und 3. zusammengenommen, an der Basis sehr schmal, gegen die Spitze knötchenartig verdickt, 2. etwas länger als breit, viel schmäler als das 1. an der Spitze, 3. ungefähr so lang wie das 4. und folgende, unter sich gleich dick. Halsschild gut um die Hälfte breiter als lang, Seiten stark gerundet, Basalecken etwas stärker verrundet als die vorderen, Rand in den Basalecken etwas deutlicher, Oberfläche fein mikrochagriniert, matt. Flügeldecken fein, ziemlich dicht punktiert.

Länge: 2 mm.

Fundort: South Africa, Algoa Bay, Capland, leg. Dr. Brauns. Holotypus in de Sammlung des South African Museum, Cape Town.

Neben *C. frontalis* Champ. zu stellen, von dem die Art durch die verschiedene Färbung der Fühler und Bildung des Kopfes zu unterscheiden ist.

Attalus kochi nov. spec.

♂ Einfarbig schwarz mit schwachem grünlichem Schimmer, erste 2 bis 3 Fühlerglieder, manchmal auch die Basis des 4. und 5, Vorderschienen, oft auch alle Tarsen, Mittel- und Hinterschienen seltener, rötlich oder gelblichrot.

Kopf mit den Augen kaum breiter als der Halsschild, Stirne fast flach, zwischen den Augen, nach vorne, zwei erloschene Eindrücke, Oberfläche fein mikroskulptiert. Fühler die Schulterbeulen überragend, Glieder vom 3. an stumpf gezahnt, vom 4. an etwas breiter als lang, Halsschild breiter als lang, Seiten gegen die Basis stark verrundet verengt, Basalecken mit der Basis vollständig verrundet, Scheibe leicht gewölbt, mikroskulptiert, fein, ziemlich lang, spärlich, weisslich behaart. Flügeldecken 1 bis 2 Abdominalsegmente unbedeckt lassend, nach hinten nur wenig verbreitert, erloschen punktiert, fast glatt, weisslich, leicht abstehend, wenig dicht behaart.

♀ Fühler etwas kürzer, weniger stark gesägt.

Länge: 2,2 mm.

Fundort: South West Africa, Otjiwarongo 4.1950 leg. C. Koch (Holo-, Allo- und Paratypen); Abachaus (Damaraland) 12.1951 leg. G. Hobohm (Paratypen) in der Sammlung des Transvaal Museum, Pretoria.

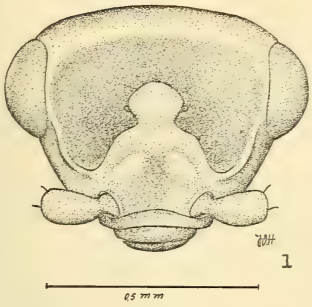
Neben *A. sulcicollis* Champ. zu stellen, die Fühler der neuen Art sind stärker gezahnt, die Flügeldecken weniger stark metallisch glänzend, die Gestalt kleiner, weiss behaart, bei *sulcicollis* schwarz.

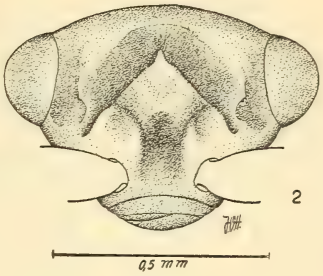
Hedybius (s.str.) *hobohmi* nov. spec.

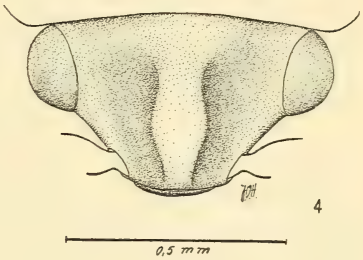
♂ Schwarz, Kopf gelb, äusserste Basis des Scheitels, meist vom Halsschildvorderrand verdeckt, seitlich bis zum Hinterrand der Augen vorstossend, schwarz; Fühler ebenfalls schwarz, erste 4 Glieder gelb, 1., 3. und 4. mit einem mehr oder weniger grossen, dunkeln Flecken auf der Oberseite.

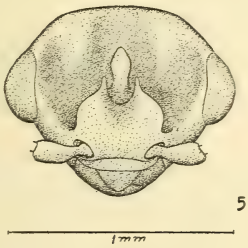
Kopf (fig. 5) mit den Augen so breit wie der Halsschild an seiner breitesten Stelle, zwischen den Augen tief und breit ausgehöhlt, in der Mitte eine lange, schmale, ziemlich spitz auslaufende, schräg aufstehende Lamelle, Vorderstirn fast herzförmig, stark abstehend, in der Mitte tief längsgefurcht, jederseits in einen dünnen, etwas kürzeren Fortsatz ausgezogen als die Mittellamelle. Fühler länger als der halbe Körper, Glieder vom 4. an schwach, stumpf gezahnt, 3. etwas länger als das 4. Halsschild breiter als lang, etwas vor der Mitte am breitesten, Seiten an dieser Stelle schwach stumpfwinklig vorspringend, Oberfläche leicht gewölbt, fast glatt, fein greis behaart. Flügeldecken nach hinten kaum verbreitert, Punktierung zerstreut, wenig tief, Behaarung ziemlich dicht, grob, schräg abstehend. Vordertibien leicht gekrümmt und vor der Basis innen, schwach ausgerandet.

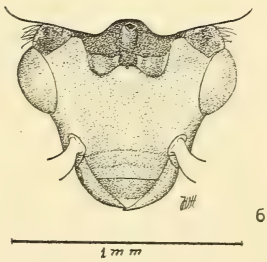
♀ Einfarbig schwarz, nur der Clypeus und die Unterseite der ersten 2 bis 3 Fühlerglieder gelblich. Kopf einfach, zwischen den Augen erloschen,











Erklärungen zu den Abbildungen:

Fig. 1 , Kopf von *Dinometopus humeropictus* n. sp. ♂. Fig. 2, Kopf von *Dinometopus swellendamensis* n. sp. ♂. Fig. 3, Kopf von *Colotes hessei* n. sp. ♂. Fig. 4, Kopf von *Colotes nasifrons* n. sp. ♂. Fig. 5, Kopf von *Hedybius* (s. str.) *hobohmi* n. sp. ♂. Fig. 6, Kopf von *Philhedonus minutedentatus* n. sp. ♂.

hufeisenförmig eingedrückt. Halsschildseiten weniger stark vorstehend in der Mitte als beim ♂. Vorderschienen einfach.

Länge: 2,7–3 mm.

Fundort: South West Africa, Abachaus, Damaraland 12.1951 leg. G. Hobohm, Holo- Allo- und Paratypen; Abachaus, Otjivarongo 12.1949 leg. G. Hobohm. in der Sammlung des Transvaal Museum, Pretoria. Dem Entdecker gewidmet.

Durch die einfarbig schwarze Färbung von Halsschild und Flügeldecken von allen anderen bisher beschriebenen Arten der Gattung verschieden.

Hedybius (Subg. *Hedybiinus*) *simpliciceps* nov. spec.

♂ Kopf schwarz, vom Vorderrande der Augen an, in gezackter Linie, orangerot. Fühler schwarzbraun, erste 2 Glieder vollständig orange, 3. bis 5. auf der Unterseite orange, oben und seitlich mit zunehmender, schwarzbrauner Färbung, dunkle Färbung nicht scharf abgetrennt von der hellen, allmählich ineinander übergehend. Halsschild orangerot mit breitem, durchgehendem, schwarzem Längsband oder mit schwarzer Makel, die Basis nicht berührend. Schildchen schwarz. Flügeldecken mit dunkelgrünem oder bläulichem Metallschimmer. Beine gelb, nur der Kamm am 2. Gliede der Vordertarsen schwarz, manchmal die Hintertarsen angedunkelt.

Kopf mit den Augen kaum so breit wie der Halsschild, Stirne ziemlich flach und glatt, nur die Seiten der Stirn am Augenoberrand ein wenig erhöht, zwischen den Augen ein schwacher Quereindruck, der in der Mitte durch einen kleinen dreieckigen Eindruck unterbrochen ist; der quere Eindruck zwischen den Augen trennt gleichzeitig den glatten oberen Teil der Stirne vom leicht körniggewirkten unteren, gegen den Clypeus wird die Vorderstirn wieder ganz glatt. Fühler die Koxen der Hinterbeine knapp erreichend, Glieder stumpf gezahnt, 3. so lang wie das 4. Halsschild breiter als lang, Seiten gerundet verengt, Basalecken mit der Basis vollständig verrundet, Scheibe leicht gewölbt, glatt, mit einzelnen aufrechtstehenden, langen Haaren besetzt. Flügeldecken dicht, nicht sehr grob punktiert, Behaarung dicht, schwarz, aufstehend.

Länge: 4 mm.

Fundort: South Africa, Richmond District, Cape Province 3. 1931 leg. Museum Staff. Holo-, Allo- und Paratypus in der Sammlung des South African Museum, Cape Town, 2 Paratypen in meiner Sammlung.

Die Art gleicht in der Färbung etwas dem *H. aulicus* F., nur dass die Beine bei der neuen Art gelb sind. Sie kann mit keiner anderen Art verwechselt werden, weil der Kopf fast keine Geschlechtsmerkmale aufweist.

Philhedonus minutedentatus nov. spec.

♂ Kopf, Beine und Fühler schwarz, nur bei letzteren ist die Spitze des 1. Gliedes und die Unterseite des 2. und 3. mehr oder weniger aufgehellt.

Halsschild orangerot mit einer schwarzen Makel in der Mitte, den Vorderrand berührend, basal ein Drittel freilassend. Flügeldecken dunkelgrün mit schwachem bronzefarbenem Schimmer.

Kopf (fig. 6) mit den Augen schmäler als der Halsschild, Stirnbasis in der Mitte unter und etwas vor dem Halsschildvorderrand ausgehöhlt und mit einem kleinen Zahn versehen, der in der Mitte in einer Ausbuchtung des Vorderrandes des Halsschildes steht, davor jederseits ein kleiner Zahn (nicht immer gut zu erkennen). Seitlich zieht sich die mediane Aushöhlung gegen die Schläfen und verbreitert sich über den Augen stark, den Oberrand derselben berührend. Oberfläche fein mikroskulptiert, matt, mit vereinzelten kurzen, dicken, silberweissen Haaren besetzt. Fühler kurz, stark gezahnt, 3. Glied länger als breit, 4. und 5. eher breiter als lang, folgende ungefähr so lang wie breit. Halsschild breiter als lang, Seiten gegen die Basis gerundet verengt, Basalecken vollständig mit den Seiten verrundet, Vorderrand in der Mitte ausgerandet und etwas eingedrückt, Oberfläche fein mikroskulptiert, matt, mit vereinzelten, kurzen, silbrigweissen Haaren. Flügeldecken schwach erloschen gerunzelt skulptiert, stärker als der Halsschild behaart.

Länge: 3,5 mm.

Fundort: South Africa, Bushmanland, leg. Alston. Holotypus in der Sammlung des South African Museum, Cape Town, Allotypus in meiner Sammlung.

Dasytidae

Dasytes crenicollis nov. spec.

Schwarz, Halsschild und Flügeldecken oft mit sehr schwachem, grünlichem oder bläulichem Schimmer, Spitze des 1. Fühlergliedes, 2. bis 4., Spitze der Schenkel, Tibien und Tarsen rotgelb.

Kopf mit den Augen eher etwas schmäler als der Halsschild, Stirne mit zwei seichten Längseindrücken zwischen den Augen, Oberfläche dicht mit kleinen, runden, narbenartig erhöhten Punkten bedeckt, die in der Mitte eingedrückt sind. Behaarung spärlich, kurz, silberig. Fühler die Schulterbeulen nicht ganz erreichend, 1. Glied ziemlich stark verdickt, um die Hälfte länger als breit, 2. kaum kürzer als das 1., aber schmäler, 3. und 4. lang und schmal, 3. länger als das 4., vom 5. an gegen die Spitze etwas verdickt, 6. und folgende etwas stärker verdickt als das 5., 10. nur wenig länger als breit, 11. fast doppelt so lang wie das 10. Halsschild schmäler als die Flügeldecken an den Schultern, etwas breiter als lang, Seiten gerundet, gegen die Basis etwas stärker verengt als nach vorne, Seitenrand fein gekerbt, Scheibe gewölbt, Oberfläche wie der Kopf, jedoch weniger stark skulptiert, Haare kurz, wie auf dem Kopfe, etwas nach dem Zentrum des Halsschildes gerichtet. Flügeldecken nach hinten kaum verbreitert, ziemlich tief, dicht, verworren punktiert, Behaarung kurz, nicht sehr dicht, gelblichweiss. Tarsen lang und dünn, fast so lang wie die Schienen.

Länge: 2–3 mm.

Fundort: South Africa, Seven Weeks Poort, Ladismith, Cape Province, Nov. 1935. Holo- und Allotypus in der Sammlung des South African Museum, Cape Town, 2 Paratypen in meiner Sammlung.

Die Art stelle ich provisorisch in die Gattung *Dasytes*, da sie wie die meisten bisher aus Südafrika beschriebenen Formen dieser Gattung einer Revision bedürfen, sobald mehr Material vorliegt. Der kleine Halsschild, dessen Seiten gekerbt sind, erinnert etwas an *Danacaea*.

14. *Some new Caddis Flies (Trichoptera) from the Western Cape Province—I.* By K. M. F. Scott, Ph.D., F.R.E.S., Department of Zoology, University of Cape Town. (With six text-figures.)

Summary

A new species, *Petroplax curvicosta* (family Sericostomatidae, genus *Petroplax* Barnard), is described, together with its larva and pupa. The young stages of *P. prionii* Barnard are also described, and a fuller account given of the larva and pupa of *P. caricis* Barnard (briefly described by Barnard, 1934, p. 319). The generic diagnoses of the larvae and pupae are revised, and the wing venation of the imagos discussed. A key to the five known species of *Petroplax* (based on ♂ imagos) is appended, also a series of sketches to facilitate the identification of the females (of which only four are known).

Introduction

During the past three years a survey of the Great Berg River was carried out from the Zoology Department of the University of Cape Town by Mr. A. D. Harrison of the Council for Scientific and Industrial Research. The author was associated with some of this work, and has pleasure in acknowledging grants from the C.S.I.R. (first a Research Assistantship and recently a Senior Bursary) which made this possible and which have enabled her to continue work on some of the animals collected, particularly the Trichoptera and Chironomidae. Grateful thanks are also due to Mr. Harrison for much assistance; to Professor Day of this Department for criticism and advice, and also to Dr. K. H. Barnard for his kindly interest in this work, as well as for the loan of specimens and literature in the South African Museum.

In the course of the survey a considerable amount of caddis material accumulated; this includes many larvae and pupae as well as imagos caught in the vicinity of the river. Several of the caddis appear to be new species; in other cases known species have been correlated by breeding them out from larvae or pupae in the laboratory. The new forms will be described in this and subsequent papers.

Two papers by Dr. K. H. Barnard (1934 and 1940) provide a firm foundation for further studies of South African caddises, and have been used as a basis for the present work. Reference should be made to these papers for a complete bibliography of earlier and contemporary work; also for descriptions

of families, genera and known species and keys, none of which will be repeated here unless they have been altered to cover new species. Barnard's techniques have been used for the denudation of wings and clearing of genitalia, and the same terminology has been used, though in the case of the male genitalia the terms used by Mosely and Kimmins (1953) have been added in parentheses. The wing notation used is also the same: that of Tillyard.

The holotypes of new species will be added to the South African Museum collection, and paratypes will be sent to the British Museum (Natural History) wherever possible.

Genus *Petroplax* Barnard

1934. *Petroplax* Brnrd, *Trans. Roy. Soc. S. Afr.*, vol. XXI, Part 4, p. 316.

Remarks. The new species described, *P. curvicosta*, agrees with the generic characters except in certain aspects of the wing venation. In the generic diagnosis the venation is described as follows: 'In forewing apical forks, 1,2,5, in ♀ also fork 3, i.e. M simple in ♂, forked in ♀. Thyridial cell very long. 1A and 2A in ♂ joining distally near hind margin, in ♀ proximally. No cross vein between Cu2 and 1A in ♀. In hind-wings forks 1,2,5. Discoidal cell open.'

In *P. curvicosta* (fig. 1A, B, C) forks 1 and 2 are present in the ♂ fore-wing, fork 5 is, however, absent as Cu1 does not reach the margin but joins an anastomosis connecting the arculus to M3 + 4. In the ♀ fore-wing forks 1, 2 and 3 are present, and a false 5 between Cu1 and Cu2. Thus M1 and M2 are separate in the ♀ but not in the ♂, and M3 + 4 is present in both sexes. Cu1 is not branched in either sex. The thyridial cell is long, and 1A and 2A join proximally in the ♀, as in the generic diagnosis; in the ♂ however 2A runs into the hind margin midway to the arculus. There is no cross-vein between Cu2 and 1A in the ♀; there are, however, indications of a cross-vein between Cu1 and Cu2 in both ♂ and ♀. In the hind-wing forks 1, 2 and 5 are present in both sexes as in the generic diagnosis, but there are definite indications of the presence of a cross-vein closing the discoidal cell, also of one joining M3 + 4 to Cu1a.

In consequence of these differences a careful examination was made of specimens of *P. prionii* Brnrd and *P. caricis* Brnrd from our collection, as well as specimens kindly loaned by the South African Museum of both these species and of *P. phleophila* Brnrd. It appears from this examination that in the ♂ fore-wing in these species Cu1 and Cu2 do not normally reach the hind margin but, together with 1A, join an anastomosis running from the arculus to M3 + 4; thus only forks 1 and 2 are present. The only other known species of *Petroplax* is *P. anomala* Brnrd, whose venation (Barnard 1940, fig. 12a) is quite different; in it forks 1, 2 and 4 are present, and the base of 3 (M1 and M2 are separate but M2 joins M3 and fails to reach the margin); Cu1 does reach the margin but remains unbranched, so that fork 5 is absent in this species too. In the fore-wing of the known females forks 1,2 and 3 are always present, also a false 5 between Cu1 and Cu2. There is no cross-vein between Cu2 and 1A. In the

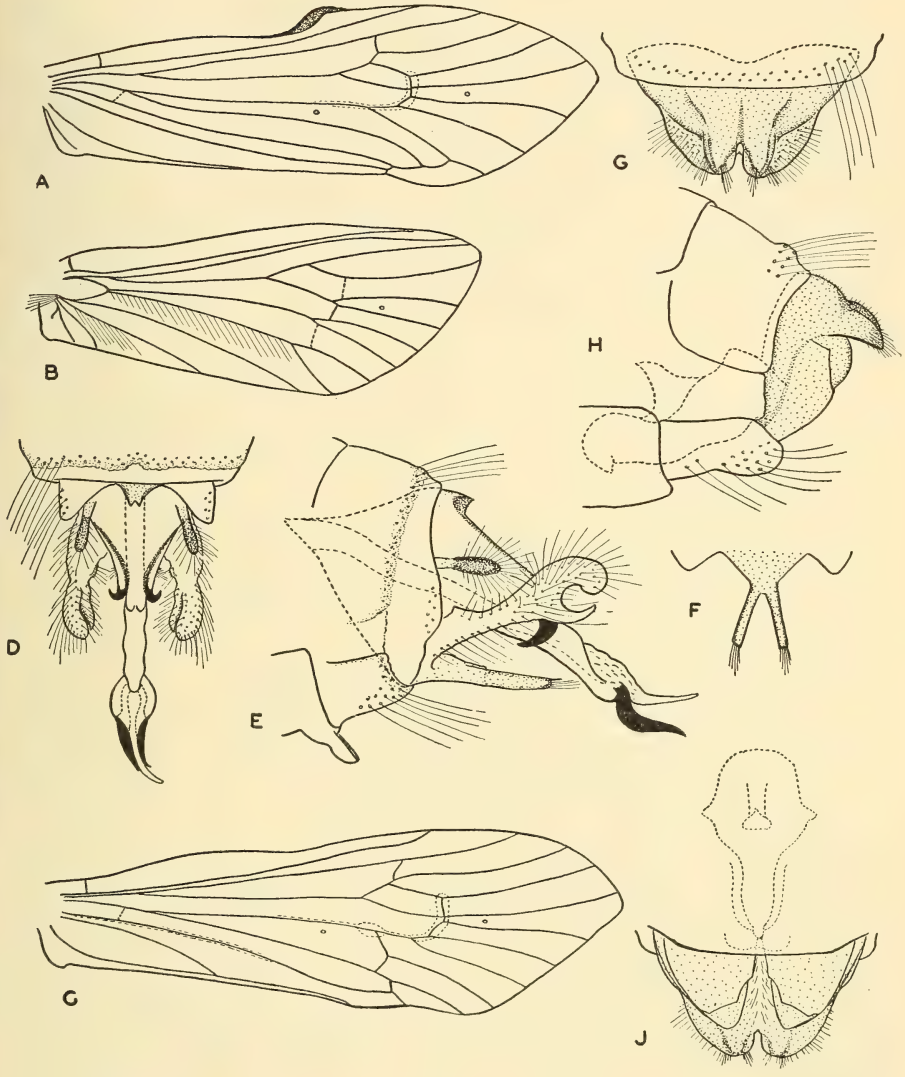


FIG. 1. *Petroplax curvicosta* sp. n., ♂ and ♀ imagos.

A,B, Fore and hind-wings of ♂. C, fore-wing of ♀. D,E, dorsal and lateral views of ♂ genitalia. F, ventral view of 9th sternite of ♂. G,H,J, dorsal, lateral and ventral views of ♀ genitalia.

hind-wing forks 1,2 and 5 are always present, and the discoidal cell is usually closed, either faintly or distinctly; it is, however, open in ♂♂ of *P. caricis* and *P. prionii*. A cross-vein is usually present between Cu1a and M3 + 4.

It is therefore suggested that in the generic diagnosis the description of the wing venation should be amended as follows: 'In fore-wing apical forks 1 and 2 always present, in ♀ also fork 3 and a false 5. Thyridial cell very long. 1A and 2A in ♀ join proximally, in ♂ 2A may join 1A distally or may run into margin before reaching arculus. No cross-vein between Cu2 and 1A in ♀. In hind-wing forks 1,2,5. Discoidal cell may be open or closed in ♂ but is closed in ♀.'

In examining the specimens it was noticed that a pair of eversible membranous processes occurs on the face of the ♂, between the maxillary palps, in *P. prionii*, *P. phleophila* and *P. caricis*. These were not seen in *P. curvicosta*, but may possibly be present though not everted in the three males available.

Key to species of Petroplax (♂♂)

1. Bend in fore-wing; fur-like sensory patch on basal joint of antenna; androconia absent: P. *curvicosta* sp. n.
   No bend in fore-wing; no fur-like sensory patch on antenna; androconia present or absent: . . . . 2.
2. Cu2 and 1A suppressed in fore-wing; Cu1 reaches margin; large patch of androconia. *P. anomala* Barnard.
   Cu2 and 1A present in fore-wing (though Cu1 and Cu2 do not usually reach the margin) . . . . 3.
3. Upper penis cover short, not deeply cleft; 2 recurved spines at sides as well as pair on penis; no androconia. *P. phleophila* Barnard.
   Upper penis cover long and deeply cleft; no recurved spines at sides (pair present on penis as usual); small patch of androconia . . . . 4.
4. Strong brush of setae on claspers; spines on penis rather short (less than one-third length of upper penis cover). *P. prionii* Barnard.
   No brush of setae on claspers; spines on penis very long (as long as upper penis cover). *P. caricis* Barnard.

Larvae and Pupae of *Petroplax* species

Barnard (1934, pp. 318 and 319, fig. 13 j-q) gave brief descriptions of the larva and pupa of *P. caricis* Brnrd. These were accompanied by drawings of some of the parts, but the whole larva was not drawn. The greater part of the larval and pupal descriptions was given in the generic diagnosis, as this was the only species whose young stages were known. Thus no full description of any larva or pupa of the genus has so far been available. Since the identification of larvae and pupae without the necessity of breeding out adults is of great importance for the work of the stream survey, it seemed desirable to include a full description of the young stages of both *P. curvicosta* and *P. caricis* in this paper. In the case of *P. prionii* the description of the larva is necessarily brief as it is based on larval remains extracted from the pupal cases. Whole larvae of *P. curvicosta* and *P. caricis* were, however, available, and pupae or pupal

pelts and cases of all three species. The young stages of *P. phleophila* and *P. anomala* are as yet unknown.

The study of these additional larvae and pupae makes it desirable to amend the generic diagnosis slightly as follows:

Generic diagnosis of larva of Petroplax *Barnard* (1934, p. 316, emend.) Mandibles with internal tufts, may be feeble in left mandible. No prosternal spine. Mesonotum less strongly chitinized than pronotum, metanotum membranous. Hind leg longest. Dorsal tubercle on abdomen segment 1 obsolete.

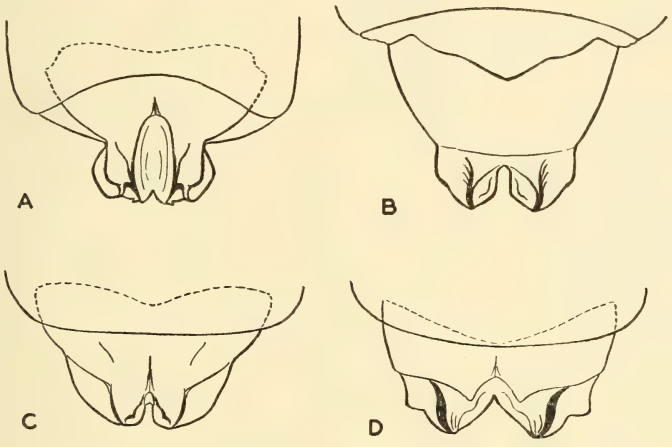


FIG. 2. Semi-diagrammatic sketches of ♀ genitalia of Petroplax spp. (Dorsal views drawn to same scale with the aid of a micrometer eye-piece.)
A, *P. caricis* Brnrd. B, *P. phleophila* Brnrd. C, *P. curvicosta* sp. n. D, *P. prionii* Brnrd.

Simple filiform gills on segments 2–8 (dorsal, lateral and ventro-lateral). Lateral line represented only by minute sclerotized tubercles on segments 3–8. Anal holdfast small. Case tubular, widening slightly towards mouth, composed of fine sandgrains with a few larger grains at one or both ends.

Generic diagnosis of pupa of Petroplax *Barnard* (1934, p. 316, emend.) Labrum nearly as long as broad, rounded. Mandible strong, serrulate on inner margin. Mid-tarsus fringed. First abdominal segment with transverse thickening, sometimes followed by a band of minute scabrosities. Simple presegmental gills present on segments 2–8 (dorsal, lateral and ventro-lateral). Lateral line present on segments 6,7,8 and posterior part of 5. Presegmental dorsal plates on segments 3–6, postsegmental also on segment 5, the latter smaller than the former. Anal appendages lanceolate, apices acute and upturned. Case somewhat similar to that of the larva, but apparently usually added to at the front and cut down at the hind end; anchored fore and aft to stones by silken threads. Membrane closing posterior end partly covered

with sand-grains and perforated by a narrow slit (the pupa lies with its ventral surface towards the concave side of the case, and the slit at the hind end is vertical, i.e. dorso-ventral). Front end of case closed by a convex lid more or less covered with sand-grains and perforated by a narrow, curved slit which lies at right angles to the one at the base.

Petroplax curvicosta sp. n.

Fig. 1 A–J.

A golden-brown species with a bend in the costa of the fore-wing and a fur-like patch of setae on the basal joint of the antenna in the male imago.

Imago (in alcohol). Characters as given in the generic diagnosis (Barnard 1934, p. 316) except as indicated above in the remarks. *Head*: face yellowish, vertex dark brown, head bearing warts from which spring long thickened yellow or brownish setae; a few of the setae are black and spine-like. Antennae annulate, brown and yellow; basal joint in ♂ broad, almost triangular in lateral view, densely clothed on three sides with a fur-like mass of stout sepia-coloured setae. *Maxillary palp* ♂ 2-jointed, setose, short and upturned; basal joint bulbous, brownish; 2nd joint very small, pale, attached to the dorsal side of the first. *Maxillary palp* ♀ 5-jointed, pale yellowish-brown. *Labial palps* pale yellowish-brown. *Thorax*: prothorax fuscous, bearing hairy warts; meso- and metathorax dark chestnut brown, shining, nearly hairless except for two pairs of raised patches in the centre of the mesothorax; membranous parts cream. *Legs*: tibial spurs 2,2,4; femora and tibiae brownish-yellow; tarsi annulate yellow and brown; tibiae and tarsi bear a number of short dark spines. *Abdomen*: tergites light sepia, sternites paler, pleura cream.

Wings: ♂ 5·5–6·5 mm.; ♀ 6·0–6·7 mm. (fig. 1 A–C). Fore-wing: membrane pale brown with darker neuration, except for costa which is white in ♂; hyaline areas indicated by dotted lines in figure (not as clear as in the other species as the membrane is paler). Wings densely pubescent. In the ♂ short thickened pale gold setae form two broad streaks, one over the cubitals, the other along the anterior border of the wing; the rest of the wing is covered with longer brown and gold hairs. Fringe brown and gold. ♀: whole fore-wing mingled brown and gold; many erect hairs on the proximal part of the wing. Pterostigma present in both sexes, also two faint white patches of hair over the hyaline areas. Hind-wings: iridescent, fuscous, thinly pubescent, with long hairs along Cu1 as far as fork and along proximal part of 1A, also a tuft at base of 1A. Fringe long. An oval bare patch at the base of M, proximal to the junction with Cu. Venation: ♂ fore-wing (fig. 1A) with costa thickened and bent near the middle; forks 1 and 2 only. ♀ fore-wing (fig. 1C) with forks 1,2,3 and (5). Hind-wings (fig. 1B) show a faint vein closing the discoidal cell, and one joining M3 + 4 and Cu1a; forks 1,2,5, present; ♂ and ♀ hind-wings similar.

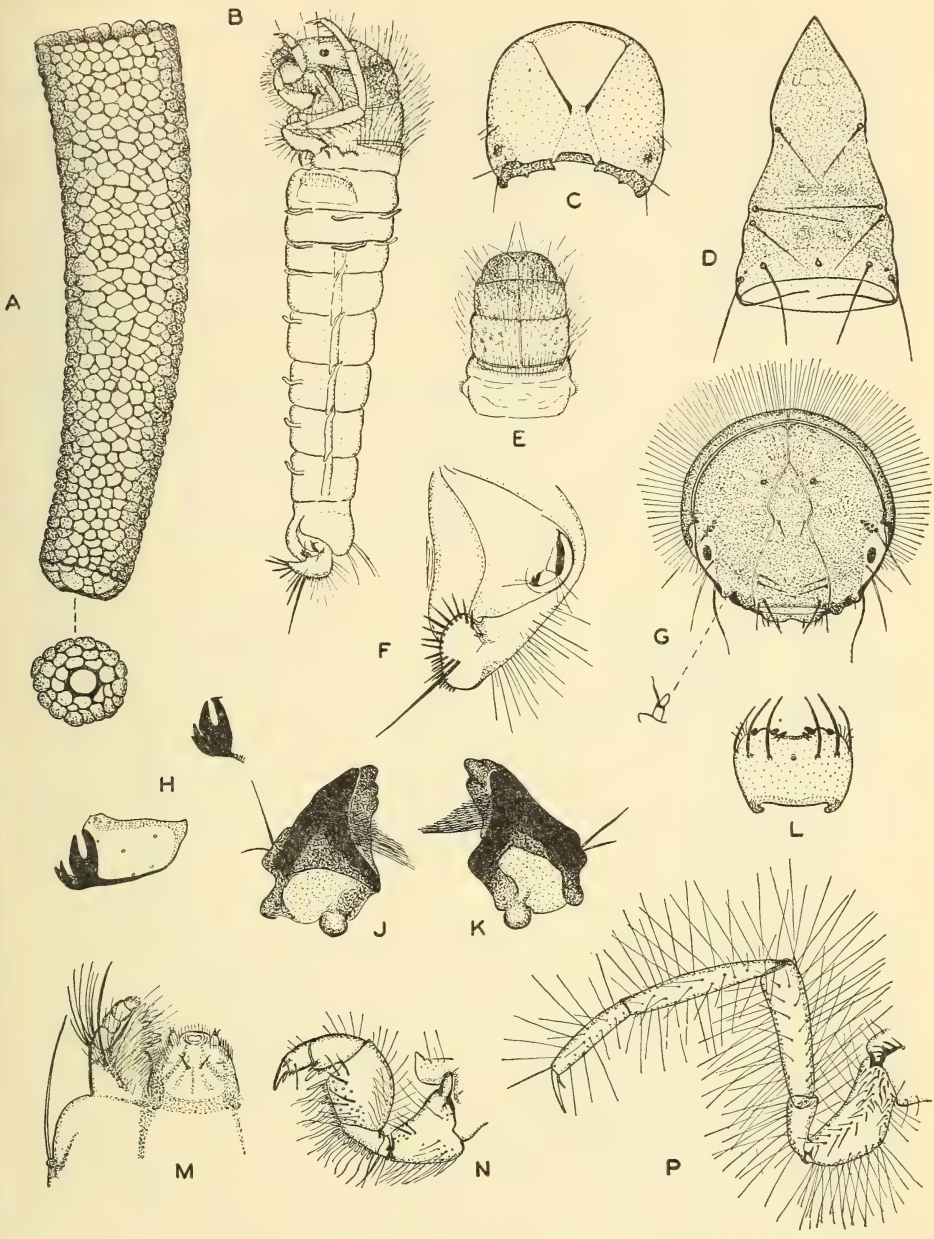


FIG. 3. Larva of *P. curvicosta* sp. n.

A, Case of larva. B, lateral view of whole larva. C, head capsule from behind, showing gular sclerite. D, clypeus and anteclypeus. E, dorsal view of anterior end of larva. F, posterior end of larva (left side). G, head and pronotum from front, with antenna enlarged. H, anal claw, showing variations. J,K, left and right mandibles. L, labrum. M, labium and maxilla. N, prothoracic leg, with plaque d'appui. P, metathoracic leg.

Genitalia: ♂ (fig. 1 D–F). Pre-anal (superior) appendages club-shaped, dark, setose; dorsal plate triangular, the apex bifid to form two short points. Upper penis cover apically slightly cleft, apices rounded; a pair of downwardly directed, recurved, strongly chitinized processes at the sides and slightly proximal to the cleft; proximal to each of these a tuft of setae. Penis with 2 long stout sub-terminal chitinized processes; tip of penis slender. Claspers (inferior appendages) with 2 branches, the upper lobate, the lower narrower, both incurved and setose. 9th sternite (ventral plate) with two long narrow processes. A spatulate ventral process on the 7th sternite, almost semicircular in shape. ♀ (fig. 1 G,H,J). Supra-anal plate cleft, lobes apically rounded and with a slight dorsal keel; cleft narrow. Vaginal structure strongly chitinized.

Locality: Great Berg River, Groot Drakenstein (A.D.H. and K.M.F.S.) November 1953, 2 ♂♂ and 4 ♀♀, bred out in laboratory from pupae collected under stones near margin out of the main current, found in the deeper pools and not in very shallow water. Also 1 ♂ imago caught in the vicinity. Larvae were collected at Groot Drakenstein and at Driefontein, higher up the Berg River; of these one larva was bred out to a ♀ imago. Imagos emerge on the surface of the water.

Remarks: In general features this species belongs to the genus *Petroplax* Barnard, but is quite easily distinguished from the other four known species. The ♂ may be identified at once by the bend in the wing and by the fur-like patch of setae on the basal joint of the antenna; the genitalia are very similar to those of *P. phleophila* but are more heavily chitinized. The ♀ genitalia show a general resemblance to those of the other species, but the four known species are easily separable by comparing the proportions of the supra-anal lobes and the width of the cleft between them. (See fig. 2 A–D.)

Larva (fig. 3 A–P): Described from entire larvae and compared with larval remains extracted from pupal cases. Larva eruciform; head hypognathous; body slightly arched; legs and thorax very hairy. Length up to 6½ mm. (pupae up to 8 mm. were however found, so that 6½ mm. is probably not the maximum length); widest at metanotum and first abdominal segment. *Head* rounded, chestnut brown in colour with a pattern of paler marks, surface of chitin pitted in places; anterior margin yellowish, ridged, the two lateral ridges each bearing a small upright antenna. Clypeus with one large and two smaller pairs of lateral indentations and 13 bristles. Eyes prominent, surrounded by pale areas. Gular sclerite triangular, fused with the genae except at the oral margin, sutures visible. *Mouthparts*: labrum with a shallow central excision and a transverse row of 6 long pale-coloured bristles; 3 pairs of blade-like bristles along the anterior margin. Mandibles each with a broad cutting-edge with 3 blunt teeth at one end; a brush of hairs on the inner side and a pair of bristles on the ridged outer side; the left mandible bears an additional central brush of short hairs. Maxilla bristly, maxillary palp 4-segmented and tipped with papillae; maxillary lobe armed with knobs and sword-shaped spines and

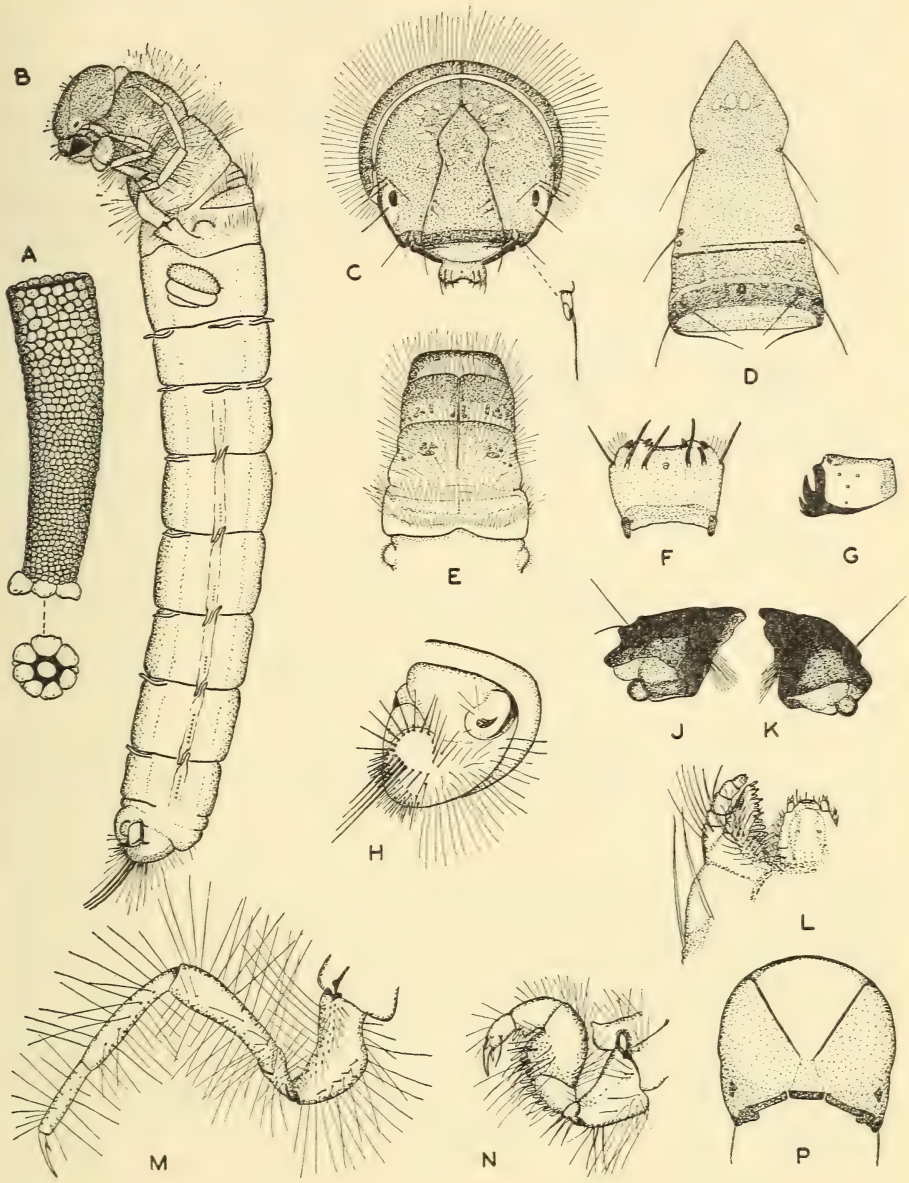


FIG. 4. Larva of *P. caricis* Brnrd.

A, Case of larva (actual size slightly longer than larva). B, lateral view of whole larva. C, head and pronotum from front, with antenna enlarged. D, clypeus and anteclypeus. E, dorsal view of anterior end of larva. F, labrum. G, anal claw. H, posterior end of larva (left side). J,K, left and right mandibles. L, labium and maxilla. M, metathoracic leg. N, prothoracic leg and plaque d'appui. P, head capsule from behind showing gular sclerite.

bristles. Labium conical, bearing 2 short palps. *Thorax*: pronotum hairy, anterior part sclerotized, chestnut-coloured, posterior part yellowish with darker chitinized spots; mesonotum hairy, only slightly chitinized, yellowish with brown spots; metanotum membranous, with a yellow transverse bar on each side of which is a row of long hairs. *Legs*: prothoracic legs short, heavily built, hairy (except tarsus), edged ventrally with strong spines; plaque d'appui oblong, truncate, with an upturned point. Meso- and metathoracic legs long, slender and very hairy, metathoracic legs longest. *Abdomen*: white; flattened lateral tubercles on segment 1. Simple filiform gills present as shown in fig. 3 B (dorsal and lateral gills on segments 2 and 3; ventro-lateral on 2–8; there also appear to be rudimentary lateral gills as shown—presegmental on segments 4–7 and postsegmental on 3–7). Abdomen ends in a pair of raised 'foot-like' oval lobes, each bearing a single long strong black spine flanked by 2 or 3 smaller ones, the 'foot' edged along the ventral and inner borders with short black spines. Anal claws with 3 barbs, the two smaller ones being variable in size.

Case: A wide curved tube neatly made of sand-grains; posterior end a truncated cone with a circular central aperture.

Pupa (fig. 6 D, G, K, N): Labrum rounded; mandibles with outer edge angular, a pair of setae near the angle; articular condyle on outer corner of base. Antennae as long as body. Each dorsal plate may bear either two or three hooks; minute scabrosities are scattered over the dorsal surface but not concentrated in any particular part. Simple pre-segmental gills present on segments 2–8 as in table I. Anal appendages fairly stout, hairy, apex short, slender and upturned, armed with several long black spines.

Case tubular, up to 8 mm. in length, neatly formed of small sand-grains, with a number of larger grains attached round each end; apertures in basal membrane and lid have serrated edges. The size and number of stones on the lid and round the ends of the case seems very variable, and several large grains may be attached round the anterior end as in *P. caricus* (fig. 6 M); the type of sand-grain used for the walls, and the shape of the slits, seem however to be constant.

TABLE I

	D	L	V
I			
II	X	X	X
III	X	X	X
IV		X	X
V		X	X
VI		X	X
VII		X	X
VIII			X

Petroplax caricis Barnard

Figs. 4 A–P and 6 A,C,F,J,M.

1934. Barnard (larva and pupa: pp. 316 and 319, fig. 13 j–q). Larvae and pupae collected by Dr. K. H. Barnard from Platteklip stream, 500 ft., Table Mountain, Cape Peninsula.

Larva: Eruciform, head hypognathous, body strongly arched; legs and thorax very hairy. Length up to 8 mm.; body widest at metanotum and 1st abdominal segment. *Head* rounded, chestnut brown in colour, patterned with paler marks, surface of chitin pitted, anterior margins dark, heavily chitinized, ridges, a small antenna on each lateral ridge. Clypeus with one pair of lateral indentations and indications of a second pair; 13 (in one case 14) bristles. Eyes prominent, surrounded by pale areas. Gular sclerite small, triangular, largely fused with the genae. *Mouthparts*: labrum with a shallow central excision, a transverse row of 6 long yellowish bristles, and 2 or 3 pairs of short peg-like

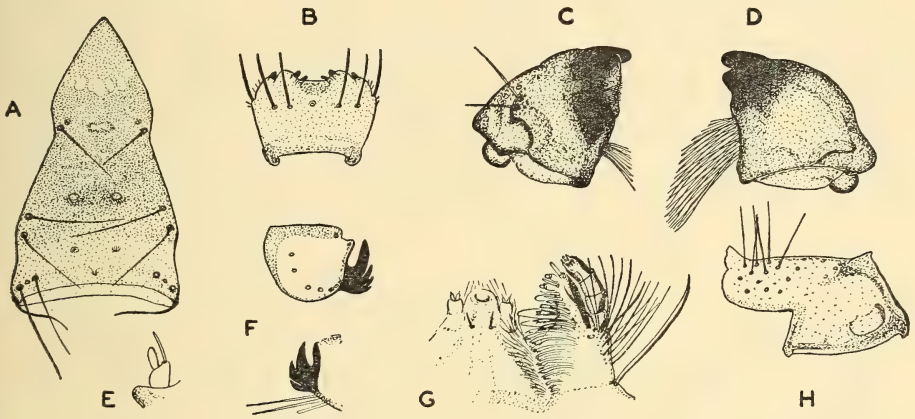


Fig. 5. Larva of *P. prionii* Brnrd.

A, clypeus and anteclypeus. B, labrum. C,D, left and right mandibles. E, antenna. F, anal claw, showing variations. G, maxilla and labium. H, plaque d'appui.

bristles along the anterior margin. Mandibles each with a broad cutting-edge rising to a single apical tooth, a short brush of hairs on the inner side (also a smaller brush on the left mandible), and a pair of bristles on the ridged outer side. Maxilla and labium similar to those of *P. curvicosta*. Thoracic nota also much as in *P. curvicosta*, but pattern of chitinized spots slightly different. *Legs* and plaque d'appui also very like those of *P. curvicosta*. Abdomen whitish, lateral protuberances on 1st abdominal segment flattened. Simple filiform gills present as shown in fig. 4 B: dorsal and lateral on segments 2 and 3; ventro-lateral on 2–8; also rudimentary lateral gills as indicated—presegmental on segments 4–8 and postsegmental on 3–7. Abdomen ends in a pair of oval lobes, each bearing a tuft of 3–4 long strong black spines, and ringed with smaller spines and hairs. Anal claws with 3 barbs (the third may be minute).

Case: A wide curved tube made of small sand-grains, with a few larger grains attached to the membrane closing the posterior end and forming a ring round a circular central aperture.

Pupa: Labrum rounded; mandibles with outer margin rounded and sinuous, ending in condyle; one pair of lateral setae. Transverse thickening on 1st abdominal segment followed by a patch of small rounded scabrosities (smaller scabrosities occur scattered over most of the dorsal surface; these are more prominent than in *P. curvicosta*). Simple presegmental gills as in table II. Dorsal plates each bear 2 hooks. Anal appendages not as stout as in *P. curvicosta*, apices short, acute and upturned, bearing a few long black spines, also smaller spines and hairs.

Case tubular, made of sand-grains of two sizes, smaller ones in the basal half and larger ones in the apical half; a number of large sand-grains attached round the posterior end partly covering the basal membrane. Lid convex and partly covered with sand-grains; apertures in lid and bottom of case have smooth edges. A few very large grains may be attached round the anterior end of the case.

TABLE II

	D	L	V
I			
II			X
III	X	X	X
IV		X	X
V		X	X
VI		X	X
VII		X	X
VIII			X

Petroplax prionii Barnard

Figs. 5 A–H and 6 B,E,H,L,P.

1934. Barnard (imago: p. 319 and figs. 14 h–l).

No identifiable larvae were included in the Berg River collection, but several pupae were collected from the Berg River at Groot Drakenstein, together with those of *P. curvicosta*, and bred out in the laboratory; the imagos which emerged (2 ♂♂, 1 ♀) were identified as *P. prionii* Barnard. Larval remains were extracted from the pupal cases and drawings (fig. 5 A–H) and the following brief description made from them.

Larva: Head sclerites chestnut brown with paler markings, area round eye pale, anterior margins yellowish; the sclerites are very similar to those of *P. curvicosta*. Small vertical antennae on the lateral ridges. Clypeus with 2 pairs of lateral indentations and 13 bristles. *Mouthparts*: labrum with a shallow central excision flanked by 3 pairs of strong blade-like setae, on the dorsal side a transverse row of 6 setae. Mandibles rather rounded, with a broad cutting edge rising to a single tooth; a slight lateral ridge flanked by a pair of setae; the left mandible with two small brushes of setae, the right mandible with one large brush. Maxilla very bristly, setae thickened and with serrated tips; maxillary palp 4-segmented and tipped with papillae; maxillary lobe with strongly developed spines of several types; labrum conical, bearing 2 short palps. *Legs*, *thoracic nota* and plaque d'appui very similar to those of the other two species. *Abdomen* appears to end in lobes studded with heavy spines and setae much as in the other species. Anal claws with 3 or 4 barbs; the smallest barb may be closely applied to the others and difficult to see.

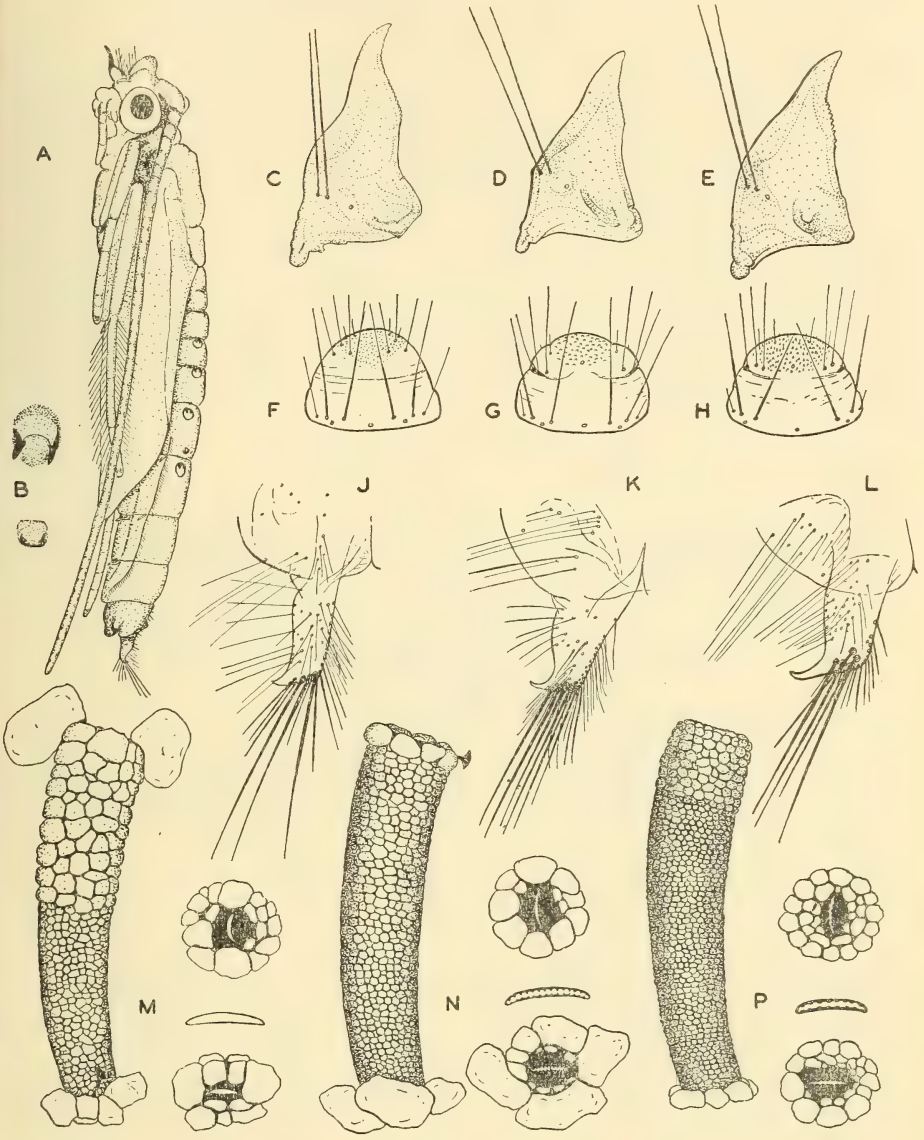


FIG. 6. Pupae of Petroplax spp. (Mandibles, labra and anal processes all drawn to same scale with the aid of a camera lucida attachment.)

A, lateral view of pupa of *P. caricis* Brnrd. B, pre- and post-segmental dorsal plates from 5th abdominal segment of *P. prionii*. C,D,E, mandibles of *P. caricis*, *P. curvicosta* and *P. prionii*. F,G,H, labra of *P. caricis*, *P. curvicosta* and *P. prionii*. J,K,L, anal processes of *P. caricis*, *P. curvicosta* and *P. prionii*. M,N,P, pupal cases of *P. caricis*, *P. curvicosta* and *P. prionii* showing also membranes from hind ends of cases, lids, and slits in lids enlarged.

Pupa: Labrum rounded; mandibles with outer margin rounded, ending in condyle, one pair of setae. Antennae as long as body. Transverse thickening on 1st abdominal segment followed by a patch of small scabrosities, smaller scabrosities scattered over the dorsal surface (these are smaller than in *P. caricis*, but larger than in *P. curvicosta*). Simple presegmental gills on segments 2–8 as in table III. Each dorsal plate normally bears 2 hooks, but occasionally one hook is double. Anal appendages stout, bearing long black spines, shorter spines and hairs. Apices acute and upturned, longer than in the other 2 species.

Case: Tubular, length up to 8 mm., neatly formed of small sand-grains, usually with a band of larger grains round the upper end; a number of large sand-grains attached to the basal membrane closing the posterior end; slit straight with crenate edges. Lid convex, made of sand-grains neatly fitted together with silk, central slit curved and with crenate edges. As in the other species several very large sand-grains may be attached round the anterior end of the case.

TABLE III

	D	L	V
I			
II	x		X
III	X	X	X
IV		X	X
V		X	X
VI		X	X
VII		X	X
VIII			X

x is rudimentary.

REFERENCES

Barnard, K. H., 1934. 'South African Caddis Flies (Trichoptera).' *Trans. Roy. Soc. S. Afr.*, XXI, Part 4, pp. 291-392, 52 text-figs.

Barnard, K. H., 1940. 'Additional Records, and Descriptions of New Species, of South African Alder-flies (Megaloptera); Mayflies (Ephemeroptera); Caddis flies (Trichoptera); Stone flies (Perlaria), and Dragonflies (Odonata).' *Ann. S. Afr. Mus.*, XXXII, Part 6, pp. 609-61, 19 text-figs.

Hickin, N. E., 1946. 'Larvae of the British Trichoptera.' *Trans. R. Ent. Soc. Lond.*, vol. 97, Part 8, pp. 187-212, 15 text-figs.

Hickin, N. E., 1949. 'Pupae of the British Trichoptera.' *Trans. R. Ent. Soc. Lond.*, vol. 100, Part 11, pp. 275-89, 10 text-figs.

Hickin, N. E., 1952. *Caddis, a short account of the biology of British caddis flies with special reference to the immature stages.* London, Methuen & Co. Ltd., pp. 1-50, 47 text-figs, 4 plates.

Mosely, M. E., 1939. *The British Caddis Flies (Trichoptera).* London, G. Routledge & Sons. Ltd., pp. 1-320, 631 text-figs.

Mosely, M. E., and Kimmins, D. E., 1953. *The Trichoptera (Caddis Flies) of Australia and New Zealand.* British Museum, London, pp. 1-550, 364 text-figs.

15. *Two new species of* Boriomyia *from South Africa* (Neuroptera, Hemerobiidae). By Bo Tjeder, Falun, Sweden. (With fifteen text-figures.)

This paper forms the first report of a study of material of the order *Neuroptera*, belonging to the South African Museum, Cape Town. My thanks and acknowledgements are tendered to the Director and Dr. A. J. Hesse for their confidence in entrusting to me the study of the rich collections of their Museum.

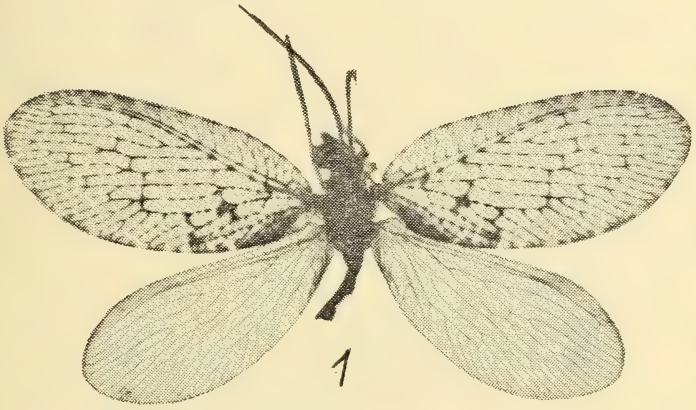


Fig. 1. *Boriomyia barnardi* n. sp. Holotype ♂.

Boriomyia barnardi n. sp.

Figs. 1–9

Holotype ♂. A dried and pinned specimen in good condition.

The frons is shining black. The vertex is yellowish brown. The mouth-parts and the antennae are pale yellowish brown.

The pro- and mesonotum have a broad, yellowish brown median longitudinal stripe, bordered laterally with blackish-brown. The metanotum is blackish-brown; its scutellum a little paler, brownish. The legs are testaceous. The tibiae of the anterior legs have three elongate, dark spots on their anterior surface: one below the knee, one near the middle and one before the apex.

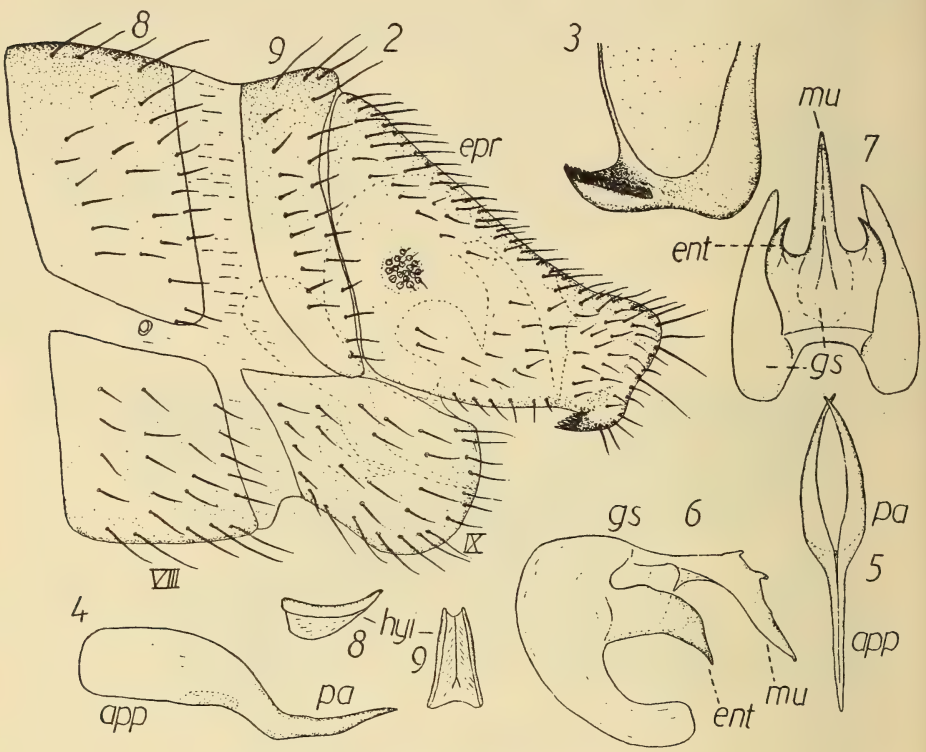
The fore-wings are elongate-oval. Their membrane is pale, with pale fuscous sagittate markings and with large fuscous patches as indicated in fig. 1.

The anal region is heavily dark coloured. The veins are blackish with pale interruptions.

The hind-wings are pale with pale venation.

The abdomen has brownish tergites and pale testaceous sternites.

The ♂ genitalia (figs. 2–9).[1] The 9th sternite (IX) is large and prominent, rounded. The parameres (pa) are narrow with very acute apices, without



FIGS. 2–9. *Boriomyia barnardi* n. sp. Holotype ♂.
2, apex of abdomen, lateral; 3, apex of right ectoproct, inside, in obliquely lateral aspect; 4, parameres, lateral; 5, ditto, dorsal; 6, gonarcus, lateral; 7, ditto, dorsal; 8. hypandrium internum, lateral; 9, ditto ventral.

superprocessus. Their apophysis proximus (app) appears very broad (high) when viewed laterally. The hypandrium internum (hyi) appears in dorsal view nearly parallel-sided. The gonarcus (gs) has a very long mediuncus (mu), the dorsal margin of which has two prominent teeth. Its apex is downwards directed and acute. The entoprocessus (ent) are large and end each in a downwards and a little inwards directed very acute apex. The ectoprocts (epr) are band-like, rather short and very broad in their proximal portion. Their apex

[1] The terminology used here is that which I have recently brought forward in a paper 'Genital structures and terminology in the order Neuroptera' (*Ent. Meddelelser*, Copenhagen, p. 22, 1954).

is produced downwards-inwards and bears an internal, straight row of short but strong teeth. The callus cerci is small and bears 18 trichobothria.

Size: length of body about 7 mm., of fore-wing 7,5 mm., of hind-wing 6,6 mm.

Female unknown.

Habitat: Cape Province, Kleinmond, February 1927; holotype ♂, leg. Dr. K. H. Barnard. In the South African Museum.

I have much pleasure in naming this species in honour of its discoverer.

This species belongs to the *nervosa*-group, represented in South Africa also by *B. nubila* Kimm. from Natal (*Ann. & Mag. of Nat. Hist.*, Ser. 10, vol. III, p. 127, f. 2, 3, 1929). *B. barnardi* n. sp. is similar to *B. nubila* Kimm. but easily distinguished by the ♂ genitalia.

Boriomyia fumosa n. sp.

Figs. 10–15

Holotype ♀. A dried and pinned specimen in less good condition (the head, the intermediate and the hind-legs are lacking).

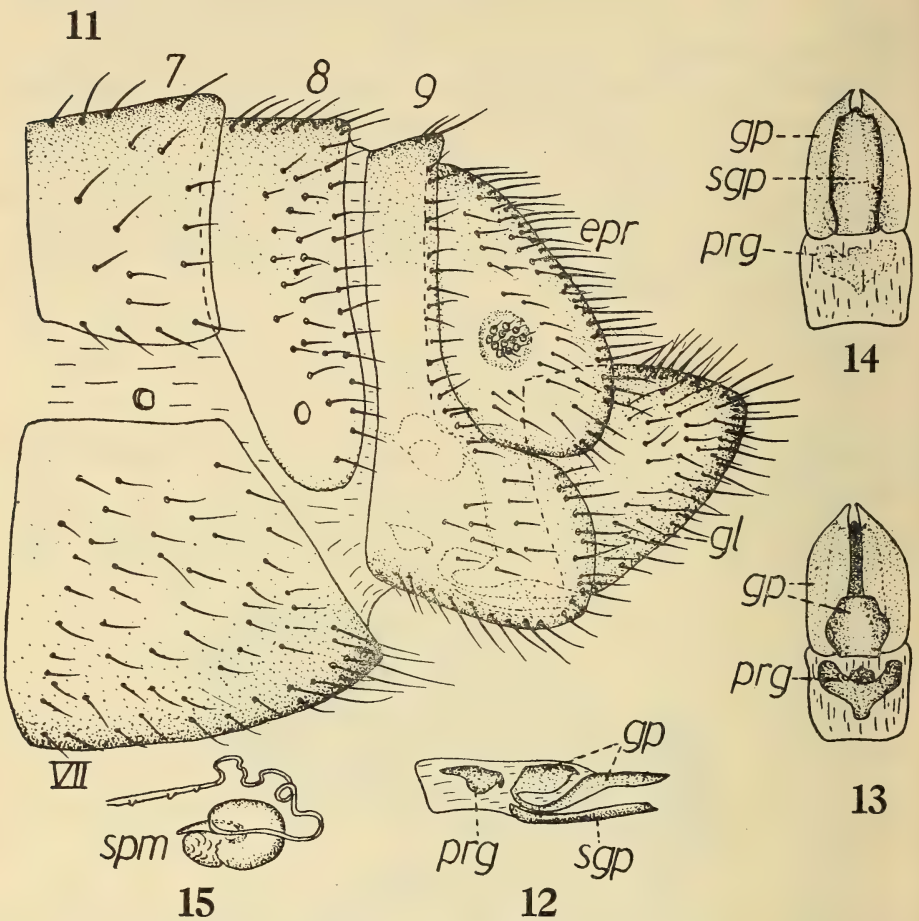
The pro- and mesonotum have a broad, yellowish median longitudinal stripe, which is blackish punctured. Their lateral borders are black. The

Fig. 10. *Boriomyia fumosa* n. sp. Holotype ♀.

metanotum is brownish black. The anterior legs are yellowish; their femora have a distinct reddish-brown longitudinal stripe along the anterior surface; their tibiae have a brownish ring below the knee and an ante-apical reddish-brown elongate spot on the anterior surface.

The fore-wings are oval. Their membrane is smoky, the sagittate markings being to a great extent confluent, especially in the distal portion and along the

hind margin. There are dark brown shadings and spots as indicated in fig. 10. The anal region is heavily dark-coloured. The venation is brownish black with pale interruptions.



FIGS. 11–15. *Boriomyia fumosa* n. sp. Holotype ♀.
11, apex of abdomen, lateral; 12, praegenitale and subgenitale with gonapophyses posteriores, lateral; 13, ditto, dorsal; 14, ditto, ventral; 15, spermatheca.

The hind-wings are pale with pale venation.

The abdomen is uniformly brownish.

The ♀ genitalia (figs. 11–15). The 9th tergite—viewed laterally—is in its upper portion band-like; on level with the spiracle of the 8th segment it suddenly broadens into a large and projecting lower portion. The subgenitale (spg) is parallel-sided and has a small, triangular apex. The gonapophyses posteriores (gp) are broad and pale, each ending in a rather acute apex. Proximally they are united into a plate, lying over their bases. A small praegenitale (prg) is present, the shape of which is indicated in the figs. 12–13.

The shape of the spermatheca (spm) is given in fig. 15. It should be noted that its duct has three tooth-shaped extensions. The gonapophyses laterales (gl) are almost triangular, their apex being rather narrow and subacute. The ectoprocts (epr) are elongate with rather smoothly rounded apex. Their cercal callus bears only 12 trichobothria.

Size. Length of body approximately 6 mm., of fore-wing 8 mm., of hind-wing 7 mm.

The ♂ is unknown.

Habitat: Cape Province, Grahamstown, February 1933; holotype ♀, leg. Dr. R. F. Lawrence. In the South African Museum.

Boriomyia fumosa n. sp. is a species of considerable interest because the presence of a praegenitale has never been noted before in this genus. In other respects the ♀ genitalia resemble those of the *subnebulosa*-group. *B. fumosa* n. sp. cannot, I am sure, be the female of *B. barnardi* n. sp. or *B. nubila* Kimm., which both belong to the *nervosa*-group, in which group the subgenitale and the gonapophyses posteriores of the females are differently shaped. It is to be hoped that South African entomologists will succeed in finding the ♂ of *B. fumosa*. Only when the ♂ has been studied can the definite position of the species be stated.

16. *Four new species of Gregarines from Mountain Cockroaches of the Cape Peninsula.* By A. D. Harrison. (With eleven text-figures.)

The Gregarines described in this paper were taken from the following cockroaches indigenous to the mountains of the Cape Peninsula:

Aptera cingulata (Burm.) 'Table Mountain Cockroach', *Temnopteryx phalerata* (Sauss.) and *Melanosilpha capensis* (Stäl.).

Method of Study

The alimentary canal was removed from freshly killed insects, slit open and extracted on a slide in 0·75 per cent solution of NaCl, in which all but one of the species remained viable long enough for examination and measuring. Only mature individuals were measured and, in cases where the gregarines were associated in syzygy, only the anterior partner or primite was measured as the protomerite of the posterior partner, or satellite, is flattened.

Permanent whole mounts of the species examined could not be prepared using absolute alcohol, xylol and balsam as the specimens shrank badly during the dehydrating process; glycerine-jelly mounts were fairly satisfactory but not permanent. The best aqueous mounting medium was found to be 'Gum Chloral'. In this medium specimens were completely cleared without shrinkage; in fact, specimens which had already shrunk during staining, resumed the original shape when the slide was gently warmed. This medium sets hard.

Specimens were fixed in either Schaudin's or Bouin's fixative and stained in Heidenhain's iron haematoxylin which did not wash out in the aqueous medium used.

It was found necessary to cut sections of gregarines *in situ* in the gut of the host so that the epimerite and other features could be studied. The mid-gut was removed from a freshly killed host and put immediately into fixative. After fixing it was treated in hydrofluoric acid, to remove sand-grains, and finally embedded in wax using the methyl benzoate-celloidin method. Sections were stained in Delafield's or Heidenhain's iron haematoxylin and counter-stained.

When sections were stained by the Feulgen method the nuclei of the gregarines did not react though those of the host's gut cells reacted strongly and stained a dark purple. This supported the findings of previous workers.

As cysts of three of the species were discovered it was possible to study their dehiscence. Previous workers have been very definite in stating that cysts

do not dehisce under normal atmospheric conditions but only in air saturated with moisture; some even keep them in a drop of water in a sealed cell while others keep them in a moist chamber. Acting on the advice of Sprague, the cysts were kept in sealed petrie dishes containing just enough water to keep the air saturated; the cysts themselves were not in contact with the water. Under these conditions the cysts dehisced satisfactorily. In the case of two of the species they also dehisced in the open air of the laboratory which was fairly humid, these investigations being carried out during winter and spring when rain was frequent.

Classification

M. E. Watson (1916) gives a very full synopsis of the then-known Families and Genera of the Tribe *Cephalina*, Delage (syn. Legion *Septata*, Lankester), of the Sub-order *Eugregarinae*, Léger, based on the classification of Minchin and Poche. In this synopsis she gives all the essential diagnostic points of each genus. This table was used for classifying these gregarines.

All the species fell into the family *Gregarinidae* Labbé, for which Watson gives the following characteristics: associative or solitary, satellite with septum, epimerite symmetrical and simple, cysts with or without spore ducts. Three definitely, and one almost certainly, fell into the genus *Gregarina* Dufour, for which Watson gives the following characteristics: biassociative, epimerites small and globular or cylindrical, spores dolioform to cylindrical, cysts dehisced by spore ducts.

For differentiation of species Watson gives the following characteristics: size, both medium and average; ratio of length of protomerite to total length; ratio of width of protomerite to width of deutomerite; general shape of the body; shape of the protomerite and of the deutomerite; character of the interlocking device between the sporonts in syzygy; size and shape of the nucleus; colour and character of the protoplasm, and the shape of the cysts and their method of dehiscence.

A species can only be fixed by the above characters when a large number of individuals are considered as there is a great deal of variation between individuals. For instance, mature individuals taken from a heavily infected or from a starved host are not only smaller but also narrower than those taken from lightly infected or from well-fed hosts. (See discussion on the dimensions of *Gregarina gibbsi* from *T. phalerata*.) Also, the protoplasm of starved gregarines is far less dense and less granular than that of well-fed ones.

A far more constant feature that does not vary with nutrition, etc., and which can be used for the differentiation of species, is the structure of the nucleus as it appears when stained in Heidenhain's iron haematoxylin or in other haematoxylin strains. As far as is known, this character has not been used before in the case of this genus.

When stained the nucleus appears to be vesicular and contains a number of clearly visible, darkly staining nucleoli or 'karyosomes'. In the gregarines

described here the number of these varies from one to three in one species, to almost twenty in another; however, in any actual species the number was fairly constant or lay between well-defined limits when mature individuals were considered. Moreover, it appears that these nucleoli vary in staining properties in different species; in three of the species they stained very darkly, almost black, but in the fourth, though clearly visible, they were hardly darker than the rest of the nuclear substance, though the same technique was used. These differences in the distribution of nucleoprotein appeared to be very characteristic, and it would seem probable that other variations would be discovered if more species were to be studied in a similar manner.

The different appearances of the nuclei of the four species are illustrated in figure 11 and further discussed in the descriptions. The use of the nuclear appearance was found most useful in relating starved and well-fed individuals of the same species and also in distinguishing between individuals of the two different species which were found in *Melanosilpha capensis*, especially in serial sections.

Watson, in her general description of the *Gregarinidae*, states that, as the gregarines increase in size, the nucleoli increase in number and decrease in size until they are scattered irregularly throughout the nucleus and cannot be counted. In these species, however, it was found that, though the nucleus of a very small cephalont starts with only one nucleolus which divides up as it grows, it ceases to do so at a fairly early age and each species develops its own characteristic number.

Watson goes on to make the suggestion that this supposed breaking-up of the nucleoli into large numbers before gamete formation, hastens this process and reduces the time that cysts take to develop. She also states that the time taken for cysts to develop and dehisce in the Genus *Gregarina* is two days. In the case of one of the present species the cysts took twelve days to develop and this was the species with over fifteen nucleoli, whereas in the species with one to three nucleoli, the cysts took five days to develop. The time taken for cysts to develop was found to be very constant for each species.

Gregarina fastidiosa n. sp.

Host: *Aptera cingulata* (Burm.)

Figs. 1–3, 11a.

Specimens of *Aptera cingulata* were collected on the lower slopes of the mountain at St. James, Cape Peninsula; most of the specimens found were females and only three males were captured during the whole period (March to June 1943). Nymphs of most instars, except the very earliest, were captured and examined.

These cockroaches live under dense bushes, in crevices in rocks or in any sheltered place into which they can crawl. They are usually found singly but occasionally two or three are found together; the males discovered were with

females. Very young nymphs are sometimes found in groups of four or five, but even these usually occur singly.

All the mature females examined were heavily infected to a greater or lesser degree. In all cases there must have been well over a hundred parasites in the gut; one specimen in particular must have had many hundreds in the mesenteron and hepatic caeca. This specimen died in captivity after a few hours and, when examined 24 hours after death, the gregarines were all alive and in a very active condition. Another interesting case was that of a female which was examined after it had been dead for some days at least as the gut and organs were in an advanced state of decay and were quite unrecognizable;

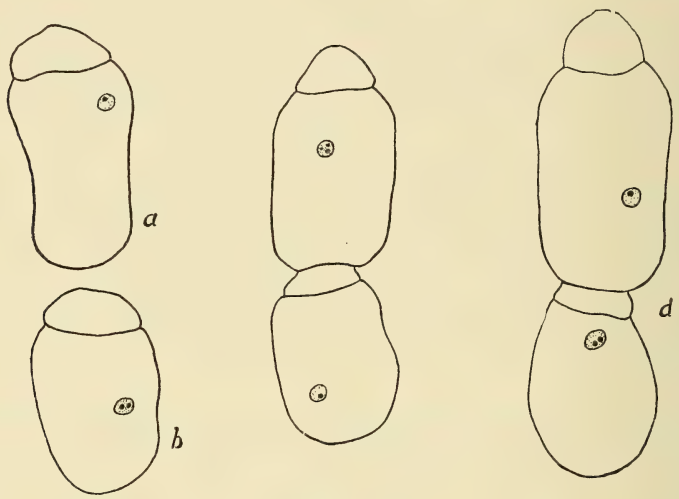


FIG. 1.

Gregarina fastidiosa n. sp., outlines from life, nuclei inserted from sections. × 46.

here many dead gregarines were found but in moist places there were many still alive.

Cysts were only taken from females and older nymphs.

Of the males examined two were heavily infected but all the parasites were very immature and only cephalonts (i.e. individuals with epimerites) were found.

The guts of the males seemed very empty and it would appear that they do not feed when mature.

The third male examined had very large testes filled with actively motile spermatozoa; the gut in this case seemed to have degenerated and was filled with air bubbles. No parasites were discovered.

All nymphs examined were infected. The earlier instars were lightly infected with young cephalonts while the later instars also contained mature sporonts in syzygy and even had gametocysts in the posterior gut.

Gregarines were found in all parts of the gut except the crop and the gizzard. The hepatic caeca and anterior mesenteron contained mostly cephalonts; the caeca were frequently packed tight with them. Mature sporants, mostly in syzygy, occurred in the middle and posterior mesenteron, a few occurred in the hind gut and some passed out in the faeces.

Cysts were occasionally found in the anterior parts of the mesenteron but there were more in the middle and posterior parts; most cysts, however, were found in the hind gut and in the faeces.

Description

This gregarine is fairly large, quite white in colour, the body is divided into protomerite and deutomerite by means of a well-formed septum and there is a well-marked constriction at the septum. The sporonts are biassociative when in syzygy. The cephalont bears a small, knob-shaped epimerite on a short stalk.

Mature Sporonts (fig. 1*a–d*). These lie free in the mesenteron, often in syzygy. Dimensions were taken from live specimens but this involved certain difficulties, the chief one being that very few of the specimens on a slide were in a suitable position for measuring as they were either undergoing bending movements, were lumped together, or were adhering to débris. Also specimens did not remain long in the 0·75 per cent NaCl but soon died and became distended; this difficulty was overcome by keeping them in the fluid contents of the gut and by adding as little saline as possible. The forward movement of the gregarines was not very troublesome as this species is very sluggish.

The following figures were obtained from thirty specimens taken from different hosts.

	Average	*Medium*	*Range*
Total length ..	.. 594 microns	582 microns	743–443 microns
Length of protomerite	.. 120 ,,	119 ,,	143–87 ,,
Width of protomerite	.. 218 ,,	187 ,,	229–214 ,,
Length of deutomerite	.. 474 ,,	463 ,,	600–400 ,,
Width of deutomerite	.. 352 ,,	314 ,,	357–300 ,,

Ratios required for species determination, based on average figures:

$$\frac{\text{Length of Protomerite}}{\text{Total Length}} \;..\;.. \;1 : 4{\cdot}9$$

$$\frac{\text{Width of Protomerite}}{\text{Width of Deutomerite}} \;..\;.. \;1 : 1{\cdot}6$$

The greatest variation is in the length of the deutomerite (200 microns). The most constant feature is the width of the protomerite—a variation of only 15 microns.

General Shape. The *deutomerite* is more or less oval with the anterior end flattened where it joins on to the protomerite. The greatest width is usually towards the anterior end but not always. The deutomerite often has a very slight waist in the middle and the posterior end is rounded.

The *protomerite* is over twice as broad as it is long.

Cross-sections are quite circular showing that the gregarine is not flattened.

There is a rather unusual variation in the structure of the septum between the protomerite and the deutomerite: thin strands of the septal cytoplasm run forward from the septum into the protomerite and they tend to converge at

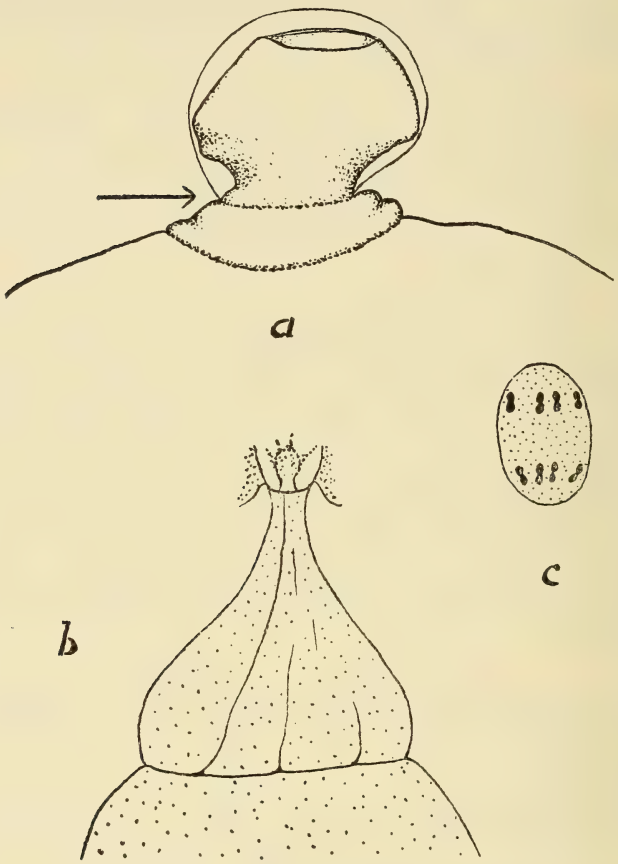


FIG. 2.

Gregarina fastidiosa n. sp. *a.* epimerite surrounded by remains of host cell, arrow indicates point of breakage. × 430. *b.* section showing strands running forward from septum. *c.* stained developing spore from smear, showing eight dumbell-shaped nuclei. × 2000.

the anterior end. (Fig. 2*b*.) These are only obvious in sections and usually only one appears but occasionally two or three.

The Epicyte. This is rather thick, and thickest in the position of the septum where there is a well-marked constriction. The usual longitudinal ridges appear as well as the myonemes just underneath it.

The Nucleus. This occurs in any position in the deutomerite. It is fairly large and the diameter averages about 60 microns. It contains from one to three nucleoli which stain very darkly in haematoxylin. (Fig. 11*a*.) Most individuals have two nucleoli; when three are present, one is larger than the other two.

The Interlocking Device. This consists of a raised ridge round the top of the protomerite of the satellite which fits on to the posterior part of the deutomerite of the primite, rather like a sucker. The deutomerite is slightly squeezed out of its normal shape to take it. A characteristic feature of this species is the weakness of this interlocking device; even the gentlest handling separates the sporonts.

The Epimerite. This is knob-like with a short stalk and the entire structure, both knob and stalk, is inside one of the cells of the gut wall. The effect on the host cell is as follows: the cell, normally oblong, becomes round, its striated border disappears and the contents degenerate entirely, neighbouring cells also become shortened, the extent of this depending on their nearness to the epimerite which thus fits into the base of a small pit in the gut wall. (Fig. 3.) In sections the shape of the epimerite is usually obscured by darkly staining degenerated cell contents.

When cephalonts are freed from the gut wall the epimerite is usually left behind but those taken from a host which had been dead for 24 hours came away easily with the epimerite intact surrounded by the gut wall cell which had assumed a spherical shape. The epimerite could be seen inside and appeared to have a slight ridge around the top (fig. 2*a*); specimens were also found with the epimerite half broken away and the point of breakage is shown in the same figure. The fact that the rounded cell was not the epimerite was not obvious unless specimens were examined very carefully; this could easily lead to erroneous descriptions.

Cysts. These are found in the faeces, hind-gut and a few in the mesenteron. They are oval in shape and shining white in colour; a few spherical cysts were discovered but these did not develop and, when artificially ruptured, were found to contain no spores.

The average size of 20 cysts selected at random from various hosts was 730 × 438 microns (major and minor diameters). The measurements ranged from 910 × 450 microns to 500 × 440 microns. The thinnest cyst was 640 × 400 microns.

The cysts dehisce by means of from 7 to 12 spore ducts which are from 120 to 140 microns long; the majority of the spore ducts are functional, the spores push through the ducts and form chains often 2 cm. long. In a cyst ruptured artificially after 24 hours, fully formed ducts were formed which stained very darkly in haematoxylin.

It was noticed that when a drop of water collected around a cyst, the cyst burst by means of a simple rupture and released the spores in a cloud which dried into a solid mass.

Cysts dehisced in five days after extraction from the host. They dehisced in the sealed petrie dish and seven out of fourteen cysts exposed to the atmosphere also dehisced. Cysts placed in a sealed petrie dish containing anhydrous calcium chloride failed to dehisce.

Spores. These are barrel-shaped and very uniform in size, the dimensions being 7·1 × 4·2 microns. The barrel shape is given by an exterior coat of mucus, and when this was removed in glacial acetic acid, the spores appeared oval. The spore wall could not be penetrated by ordinary fixatives and stains so that sporozoites could not be seen; however, very young spores were obtained by rupturing a cyst artificially after 48 hours; these had no resistant wall and,

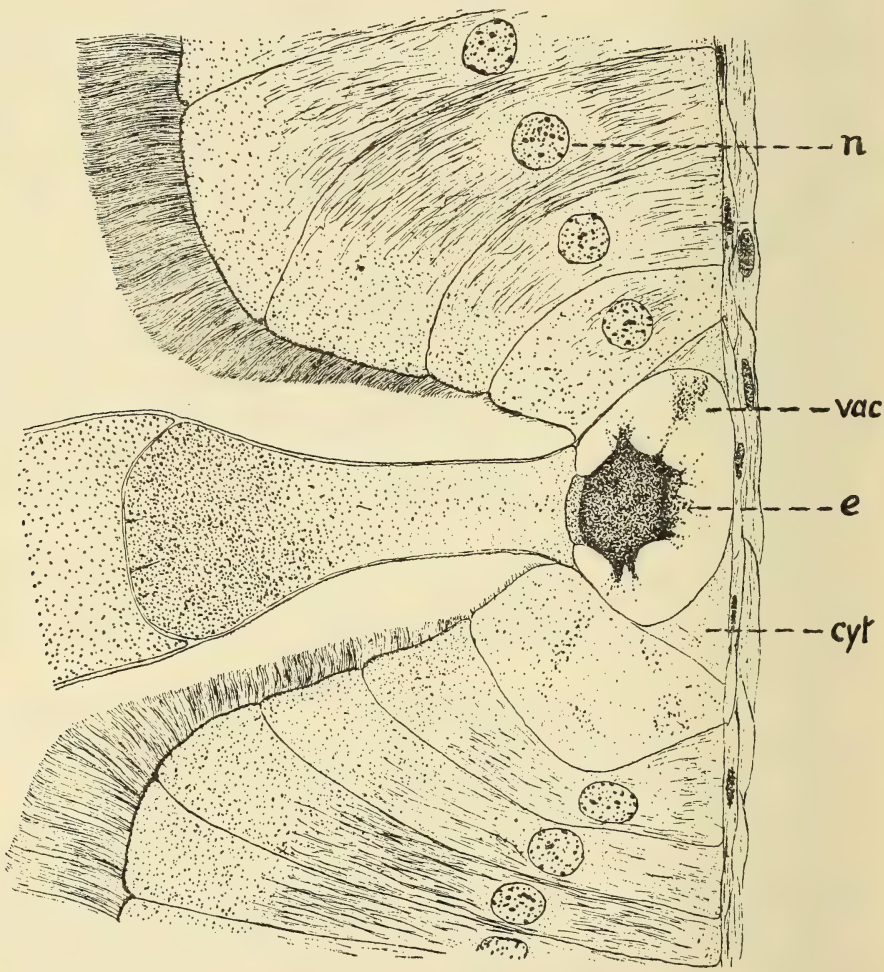


Fig. 3.

Gregarina fastidiosa n. sp., epimerite *in situ* showing effect on host tissues. *cyt.* undegenerated cytoplasm. *e*, epimerite. *n.* nucleus. *vac.* vacuole with degenerated cytoplasm.

when stained, were found to contain eight bilobed nuclei arranged in two rows of four, one row at each pole. (Fig. 2*c*.)

Gregarina gibbsi n. sp.
Host: *Temnopteryx phalerata* (Sauss.)
Figs. 4–6, 11*b*.

Specimens of *T. phalerata* were collected on the slopes and summit of St. James mountain during the late autumn and winter. These cockroaches were found under loose stones, pieces of wood and other objects and usually occurred in small groups of three or four and sometimes more.

There appeared to be no striking differences between males and females, as in *A. cingulata*, and, as the degree of infection in both sexes appeared to be much the same they were not dealt with separately as regards statistics.

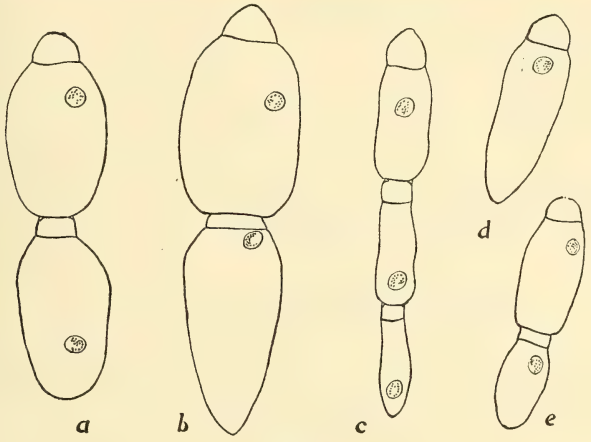


Fig. 4.
Gregarina gibbsi n. sp., outlines from life, nuclei inserted from sections. × 46.

Although these cockroaches were found together in groups, the infection rate was not heavy; 32 per cent of all hosts were infected and only 10 per cent heavily.

The gregarines were found in the anterior mesenteron but none in the hepatic caecae. All cysts were discovered in the hind-gut or rectum.

Description

G. gibbsi is of medium size and is white in colour; it embodies all the general features of the genus. There is a slight constriction at the position of the septum.

Sporonts are biassociative when in syzygy but one unique case was seen where three had associated in line (fig. 4*c*).

Mature Sporonts. These lie free in the mesenteron and are nearly always in syzygy. Dimensions were taken from live individuals and no difficulty was

experienced in keeping specimens alive in 0·75 per cent saline. Only the primite was measured.

When this species was first studied and the dimensions and ratios examined, it was found that those from heavily infected hosts were much thinner than those from lightly infected hosts. Before this relationship between proportions and infection rate was noticed it was thought that two species, at least, were involved as the ratios of width of protomerite/width of deutomerite varied from 1 : 1·1 to 1 : 2·6. However, a complete range, linking these two values, was later obtained and the nuclear structure was found to be the same in all individuals. Thus it was concluded that they were all conspecific.

The following figures were obtained from specimens from both heavily and lightly infected hosts.

	Average	*Medium*	*Range*
Total length ..	.. 477 microns	442 microns	614–371 microns
Length of protomerite	.. 77 „	71 „	100–57 „
Width of protomerite	.. 105 „	86 „	114–86 „
Length of deutomerite	.. 400 „	371 „	514–314 „
Width of deutomerite	.. 171 „	114 „	227–114 „

Ratios required for species determination, based on average dimensions:

$$\frac{\text{Length of Protomerite}}{\text{Total Length}} \quad .. \quad .. \quad 1 : 6$$

$$\frac{\text{Width of Protomerite}}{\text{Width of Deutomerite}} \quad .. \quad .. \quad 1 : 1.6$$

The greatest variation is in the length of the deutomerite (200 microns) and the least variation is in the width of the protomerite (28 microns).

General Shape. The shape of the *deutomerite* may vary greatly. In the larger specimens it may be more or less oval and twice or one and one half times as long as broad; in the smaller specimens it may be more elongated and three times as long as broad. The posterior end may be rounded or slightly pointed (fig. 4*a–e*).

The *protomerite* is dome-shaped and may bear a slight papilla at its anterior end at the position where the epimerite was attached.

The Epicyte. This is moderately thick and tough enough to make handling of live specimens easy. The usual longitudinal ridges are present and myonemes are visible below.

The Nucleus. This occurs anywhere in the deutomerite. The nucleoli stain darkly and are often clumped together so that they are difficult to count. Mature sporonts have from 12 to 20, but the majority have 15. Young cephalonts usually have fewer, 8 or 6 or less (fig. 11*b*).

The Interlocking Device. This is similar to that described for *G. fastidiosa.* However, here the syzygy is very firm and individuals do not come apart with normal handling and can be easily mounted together.

The epimerite is knob-shaped and is borne on a very short stalk. When studied in whole mounts it appears to be slightly flattened at the top around which there appears to be a very distinct ridge (fig. 5). Serial sections showed that in this case not only one host cell was destroyed, as in the previous species, but also several surrounding cells were completely broken down with the apparent disappearance of cell walls (fig. 6).

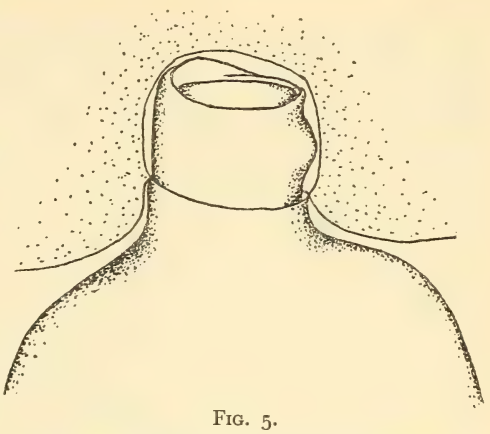


FIG. 5.

Gregarina gibbsi n. sp., epimerite (drawn from whole mount). × 360.

Cysts were found in the hind-gut and faeces. They are oval, white and glistening. They were not very numerous and few were discovered and only five measured. These gave average dimensions of 428 × 311 microns and ranged from 457 × 392 to 400 × 300 microns.

A characteristic feature is that there is a very thick gelatinous layer outside the true cyst wall; this layer is present in the other species also but is much thinner and hardly noticeable.

The cysts dehisced in 12 days. Dehiscence took place normally both under normal atmospheric conditions and also in the damp chamber. Six cysts were placed in drops of water in a damp chamber and, after twelve days, only one had dehisced; the rest were removed and allowed to dry, these dehisced after two days (fourteen days in all). The inhibiting effect of the water is probably linked with the presence of the thick, gelatinous coat.

Cysts dehisce by means of from 8 to 12 operational spore ducts which are quite normal in shape. However, when they dehisce there appear two or three extraordinary ducts of unusual length. These are thinner than usual and appear flattened and no spores are released through them, although the drop of oil that invariably passes up the normal spore ducts just ahead of the spores, also passes up these and hangs on the end. The normal ducts are approximately 250 microns long, while the abnormal ducts are 3,600 microns long.

The spores are exuded in chains, although a few cases were observed where they collected in a large clump at the end of a duct.

The spores are barrel-shaped and very uniform in size. They were 8·5 × 4·2 microns.

Species of *Gregarina* from host: *Melanosilpha capensis* (Stäl.)

Specimens of *M. capensis* were collected from the top of St. James mountain during the winter months of 1943. This small, black cockroach was found only

on the top of the mountain in dry situations, usually under loose stones or small rocks perched on top of boulders. They were found usually in small groups of about half a dozen adults, mostly females, with large numbers of small nymphs. The females are apterous but the males, which are few in number, are winged. (Only 7 out of 100 individuals examined were males.)

Two distinct species were found in this host which have been named *Gregarina sandoni* and *Gregarina impetuosa.*

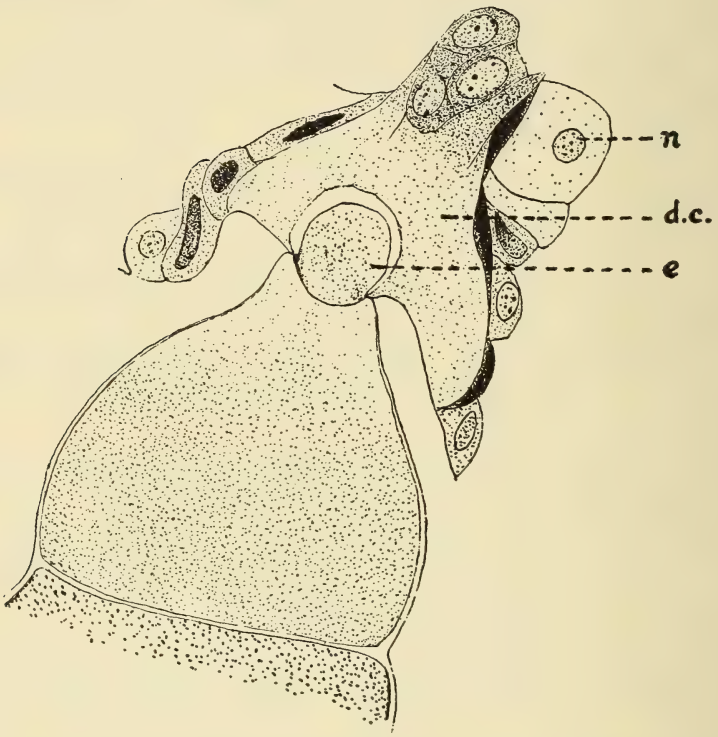


FIG. 6.

Gregarina gibbsi n. sp., section of epimerite *in situ* showing effect on host tissues. *d. c.* degenerated cells. *e.* epimerite. *n.* nucleus. × 360.

Infection. These statistics were obtained from 100 individual hosts:

	Gregarina sandoni	*Gregarina impetuosa*
Adult of both sexes infected ..	38 per cent	6 per cent
Males infected	29 per cent	14 per cent
Females infected	39 per cent	5 per cent

As will be seen *G. sandoni* was found more often than *G. impetuosa.* Only one host was at all heavily infected with *G. impetuosa* and that was a male. Only 13 per cent of the hosts infected with *G. sandoni* were heavily infected.

Gregarina sandoni sp. nov.

Figs. 7, 11*c*.

This was found in the anterior and middle parts of the mesenteron and very young cephalonts in the hepatic caeca.

It is a fairly large gregarine, quite white in colour, with a clearly marked septum; there is no marked constriction of the epicyte at the septum but merely a slight dent. The species is extremely sluggish and hardly moves at all.

The sporonts are biassociative, and very characteristic of this species is the very early age at which they form syzygies: young sporonts, only half or even less than half the size of mature sporonts, are commonly to be found in syzygy. These are liable to be mistaken for specimens of *G. impetuosa* but can easily be distinguished by their sluggishness, the structure of their nuclei and the presence of extra-nuclear bodies (which will be discussed later).

Mature Sporonts (fig. 7*a–c*) were found in the anterior or middle parts of the mesenteron. Dimensions were taken from live specimens and no difficulty was experienced in keeping them alive in 0·75 per cent saline. Only primites were measured.

The following were the dimensions:

	Average	*Medium*	*Range*
Total length ..	.. 498 microns	451 microns	642–357 microns
Length of protomerite ..	80 „	86 „	100–57 „
Width of protomerite ..	134 „	114 „	157–114 „
Length of deutomerite ..	418 „	443 „	542–300 „
Width of deutomerite ..	274 „	257 „	357–214 „

Ratios for species determination based on average figures:

$$\frac{\text{Length of Protomerite}}{\text{Total Length}} \;..\;.. \;1 : 6.2$$

$$\frac{\text{Width of Protomerite}}{\text{Width of Deutomerite}} \;..\;.. \;1 : 2$$

The greatest variation is in the length of the deutomerite (242 microns) and the most constant feature is the width of the protomerite (43 microns variation).

General Shape. The *deutomerite* is more or less oval in shape but it is slightly pointed at the posterior end. The greatest width is usually towards the posterior end in adults but in younger individuals the anterior is usually the widest part.

The *protomerite* is usually two-thirds as long as it is wide.

The Epicyte. This is very thin and mature sporonts are very easily ruptured even when handled very gently. This feature is not so noticeable in immature specimens. The usual longitudinal ridges and circular myonemes are present.

The nucleus occurs anywhere in the deutomerite. It is fairly large and averages about 50 microns in diameter. It contains 4 or 5 nucleoli which are rather characteristic as they stain only slightly darker than the rest of the nucleus in

Heidenhain's iron haematoxylin and are often difficult to see. Nevertheless, when viewed in section under an oil immersion lens, they appear as very definite structures with definite outlines. They are often clumped together at one side of the nucleus. (Fig. 11*c*.)

Apart from the nucleus there is, in the deutomerite, a most characteristic *extra-nuclear body*. This is usually about a quarter the size of the nucleus and is spherical with a very smooth surface. Occasionally it is broken into two, three

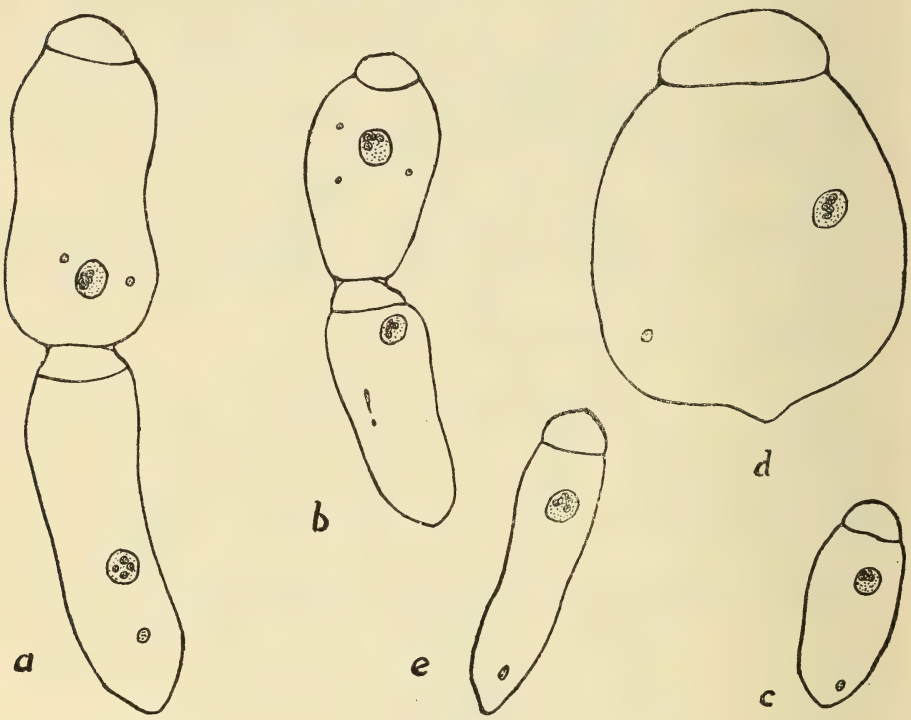


FIG. 7.

Gregarina sandoni n. sp., outlines from life. *a-c*. from normal host. *e*. from starved host. *d*. the only individual in a well-fed host. × 76.

or more smaller bodies and may be elongated instead of spherical. The body stains fairly darkly in haematoxylin but not at all by the Feulgen method. No similar structure was found in the other species nor was any reference found to it, or any similar structure, in the literature. (Typical examples have been inserted in the outline drawings, fig. 7*a–e*.)

The interlocking device is similar to that described for *G. fastidiosa*. In this species the syzygy is fairly firm and the primite and satellite are not easily separated with normal handling.

The epimerite is of the normal type found in this genus. The whole structure is inside a cell of the gut-wall against which the protomerite is applied. The con-

tents of the cell, including the nucleus, break down and the effect on the surrounding cells is the same as that described for *G. fastidiosa.*

Few specimens were obtained in whole mounts with the epimerite still intact; in fact, this structure seems to be exceptionally easily shed and this may explain why so many immature sporonts are found free in the gut with the early formation of syzygy.

Cysts are oval and are white or light buff in colour. They are found in the faeces and hind-gut. The average dimensions for the shortest and longest diameters are 330 and 500 microns respectively. The cysts range from 282 × 420 to 420 × 670 microns. The largest cyst recorded here was very much bigger than the average size but most of the cysts did not vary very much from this average.

Cysts dehisced in three days after they were removed from the gut. They did not dehisce when exposed to the atmosphere but only in the damp chamber. Dehiscence was by 7 or 8 spore ducts most of which seemed to be operational. However, when a cyst was artificially ruptured just prior to dehiscence it was found to contain 20 ducts. It would seem that all ducts are not extruded simultaneously and, after the first 7 or 8 ducts are extruded the pressure inside is too low to force the others out.

Spores are dolioform and are extruded in long chains. They are very regular in size and are 7·1 microns long and 3·55 microns wide (measured under an oil immersion lens), exactly twice as long as broad. No success was obtained in attempts to make them exsporulate by putting them in fluid from the mesenteron and hepatic caeca.

An interesting example of the dependence of the gregarines upon the nutrition of their host was discovered when a specimen of *M. capensis* was starved for a month and then opened. The mature sporonts were well below average in size and much thinner, especially the deutomerites. Their average dimensions were:

Total length	464	microns
Length of protomerite	64	,,
Width of protomerite	104	,,
Length of deutomerite	400	,,
Width of deutomerite	133	,,

One of these starved individuals is illustrated in figure 7*e*. The endoplasm of these starved gregarines was less dense than normal. Cysts of normal size and shape were discovered but their contents appeared to be coagulated into dense lumps leaving the rest of the cyst transparent. These cysts did not dehisce and no spores were formed in them.

Figure 7*d* was the only parasite in an apparently well-fed host and provides an interesting contrast to 7*e*.

Gregarina impetuosa n. sp.

Figs. 8–10, 11*d*.

All specimens of this species were found in the anterior mesenteron of the host.

It is a small gregarine with a well-marked septum, at the position of which there is a slight constriction of the epicyte.

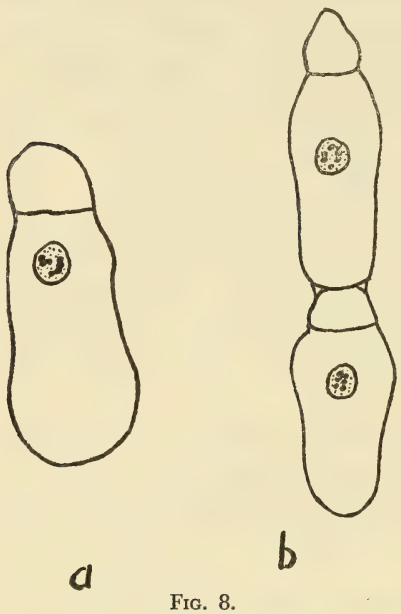


Fig. 8.

Gregarina impetuosa n. sp., outlines from life, nuclei inserted from sections. × 100.

The mature sporonts are bi-associative and the cephalonts bear a knob-shaped epimerite on a short stalk.

Most characteristic of this species is its activity; the sporonts glide forwards across a slide covered in gut debris at about 500 microns per minute, pushing the débris aside as they move. This activity made measuring and drawing difficult but it was possible on rare occasions when the gregarines were slowed down by some exceptionally dense obstruction.

Mature Sporonts (fig. 8). These lie free in the mesenteron and are usually associated in pairs. They are unaffected by the 0·75 per cent saline and remain alive in it for long periods.

The following dimensions were taken from the primite only:

	Average	*Medium*	*Range*
Total length	291 microns	300 microns	357–228 microns
Length of protomerite ..	57 „	57 „	72–43 „
Width of protomerite ..	66 „	71 „	86–43 „
Length of deutomerite ..	234 „	243 „	286–185 „
Width of deutomerite ..	126 „	114 „	171–71 „

Ratios based on averages:

$$\frac{\text{Length of Protomerite}}{\text{Total Length}} \;..\;.. \;1 : 5$$

$$\frac{\text{Width of Protomerite}}{\text{Width of Deutomerite}} \;..\;.. \;1 : 1{\cdot}9$$

The feature that shows the least variation is the length of the protomerite (28·7 microns) while the greatest variation is in the length of the deutomerite (101 microns).

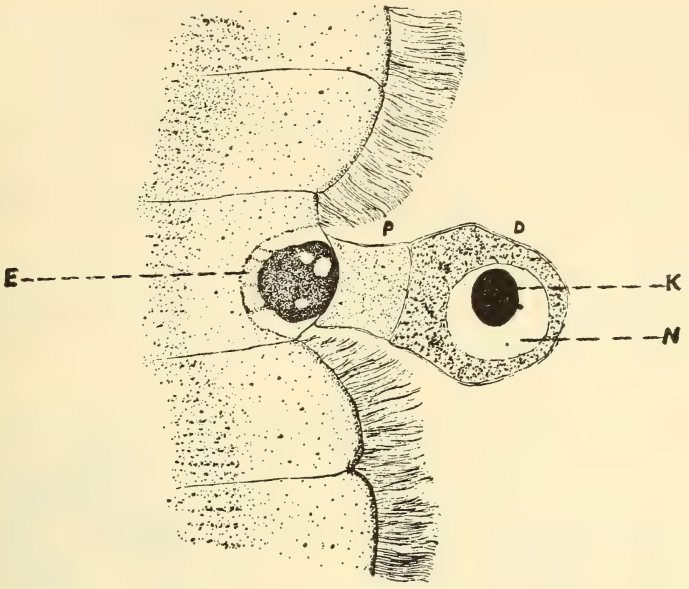


FIG. 9.

Gregarina impetuosa n. sp., showing early development of karyosomes and effect on parasitized cells. This shows the youngest parasite discovered. *d.* deutomerite. *e.* epimerite. *k.* karyosomes or nucleoli. *n.* nucleus. *p.* protomerite. × 800.

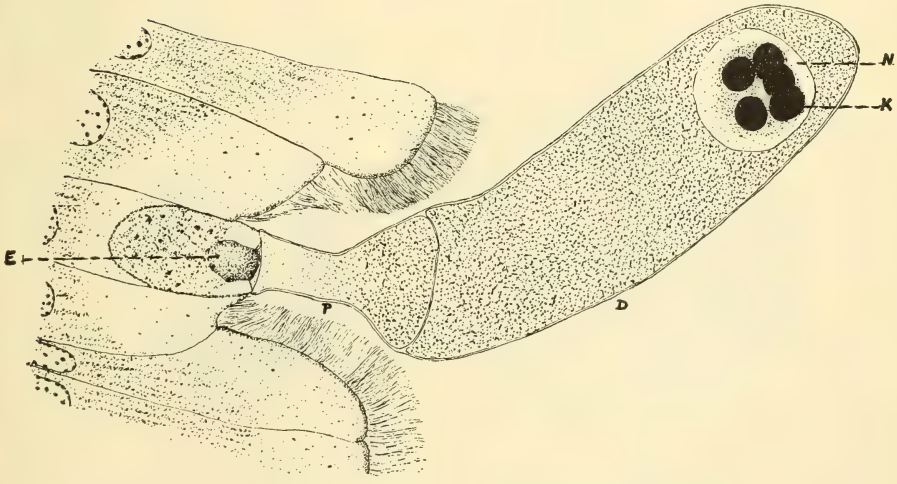


FIG. 10.

Gregarina impetuosa n. sp., a later stage. Lettering as in fig. 9. × 570.

General Shape. The *deutomerite* is approximately oval in shape and the greatest width is usually towards the posterior end, though not always. The deutomerite has a slight waist in the middle.

The *protomerite* is only slightly wider than it is long. There is usually a papilla on the anterior end where the epimerite was attached.

The epicyte is fairly thick and the gregarines are seldom, if ever, ruptured with normal handling. The usual longitudinal ridges and circular myonemes are present.

The nucleus (fig. 11*d*) occurs in any position in the deutomerite and is, on the average, 34 microns in diameter. In the mature sporont there are from 6 to 8 nucleoli which stain darkly with haematoxylin though a few cases were

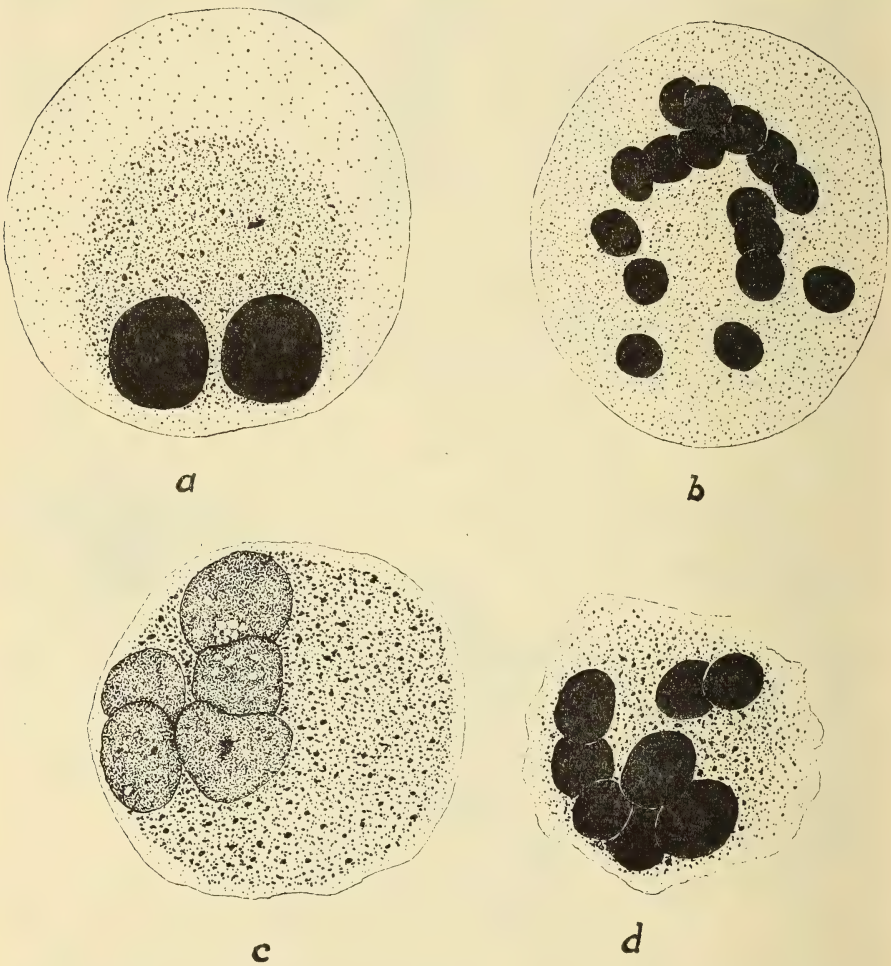


FIG. 11.

Nuclei stained in Heidenhain's iron haematoxylin showing 'karyosomes' or nucleoli.
a. G. fastidiosa. b. G. gibbsi. c. G. sandoni. d. G. impetuosa.

observed where some of the nucleoli in a single nucleus stained a much lighter colour than the others. In the youngest cephalont (fig. 9) there was only one nucleolus; this specimen was the smallest cephalont encountered in any of these four species. The nucleolus must divide up at a very early stage as in a somewhat larger but still very young cephalont it had already divided up into five (fig. 10).

The epimerite was only seen in sections and all cephalonts examined were very young. It was knob-shaped and borne on a very short stalk and the whole structure was inside a cell of the gut-wall.

The interlocking device is similar to that described for *Gregarina fastidiosa*. In this species the syzygy is very firm and the pairs are not easily separated by normal handling.

Cysts. Although well over 100 specimens of *M. capensis* were examined no cysts of this species, and, consequently, no spores were discovered.

Although the mode of dehiscence of the cysts and the shape of the spores of this species are not yet known, the known features, such as the knob-shaped epimerite and the biassociation of the sporonts well before cyst formation, have led to this species being placed in the genus *Gregarina* Dufour.

Diagnostic differences between *Gregarina sandoni* and *Gregarina impetuosa*

	Gregarina sandoni	*Gregarina impetuosa*
(*a*)	Large gregarine.	Small gregarine (see average dimensions).
(*b*)	Very sluggish.	Very active.
(*c*)	Nucleus with 4 or 5 nucleoli.	Nucleus with 6 to 8 nucleoli.
(*d*)	Nucleoli stain only slightly darker than rest of nucleus.	Nucleoli stain much darker than the rest of the nucleus.
(*e*)	Extra-nuclear body present.	No extra-nuclear body.

This paper was originally written in 1943 and presented in part fulfilment of the degree of M.Sc. at the University of Cape Town. Thanks are due to Dr. H. Sandon, then Senior Lecturer in Zoology, for help and guidance, and to Dr. A. J. Hesse of the South African Museum for his help in identifying the cockroaches. A set of slides has been deposited in the South African Museum.

References

Bhatia, B. L., 1938. *Fauna of British India, Protozoa* (*Sporozoa*).

Bhatia, B. L., and Setna, S., 1924. 'On some new cephaline gregarines.' *Parasitology*, XVI, pp. 279-88.

Bush, S. F., 1928. 'A study of the gregarines of the grasshoppers of Pietermaritzburg, Natal.' *Ann. Nat. Mus.*, VI, pp. 97-169.

Gibbs, A. J., 1946. '*Stylocephalus ingeri*, sp. nov., a cephaline gregarine found in the gut of *Gonocephalum arenarium* (Coleoptera).' *Trans. Roy. Soc. S. Afr.*, XXXI (2), pp. 169–80.

Sprauge, V., 1941. 'Studies on *Gregarina blattarum* with particular reference to the chromosome cycle.' *Illinois Biol. Monogr.*, XVIII, No. 2.

Watson, M. E., 1916. 'Studies in gregarines.' *Illinois Biol. Monogr.*, II, No. 3.

Watson-Kamm, M., 1922. 'Studies in gregarines.' *Illinois Biol. Monogr.*, VII, No. 1.

17. Fünf *Dactylispa*-Typen Péringuey's.

165. Beitrag zur Kenntnis der *Hispinae* (*Coleopt. Chrysomelidae*). Mit einer Abbildung.

Von Erich Uhmann, Stollberg-Sachsen.

Wenn man die südafrikanischen *Dactylispa*-Arten nach den Beschreibungen Peringuey's bestimmen will, so steht man vor einer schwer lösbaren Aufgabe. Seine Beschreibungen reichen bei weitem nicht mehr aus, weil, wegen der Fülle der *Hispinae*-Arten des südafrikanischen Raumes, eine Betrachtung der Objekte nach Gesichtspunkten erfolgen muss, von denen Péringuey nichts wissen konnte. Es war damals, 1898 und 1908, nicht vorauszusehen, wie gross die Artenzahl sein könnte. Auch heute wissen wir noch nicht, wie viele Arten eine genaue Durchforschung Südafrikas liefern wird.

Herrn Dr. H. Andreae vom Südafrikanischen Museum in Kapstadt ist es zu danken, dass wir heute über die *Dactylispa*-Arten Péringuey's gut unterrichtet sind. Sein ausserordentlich grosses Entgegenkommen ermöglichte mir das Studium von Typen, und wo das nicht anging, hat Herr Kollege Andreae durch genauestes eigenes Studium zur Klärung der gestellten Fragen beigetragen. Seine Studien haben es ermöglicht, dass die Arten Péringuey's in meinem Schlüssel der *Dactylispa*-Arten Afrikas, der in einer belgischen Zeitschrift erscheinen soll, mit ziemlicher Sicherheit untergebracht werden konnten. Ihm und dem Südafrikanischen Museum in Kapstadt sage ich hiermit nochmals meinen herzlichsten Dank.

Dactylispa capicola (Péring.)

1898. *Ann. S. Afr. Mus.*, i, p. 121. (*Hispa c.*)

Die Untersuchung des Materials ergab folgendes: 'Bei *capicola* sind ausser dem eigentlichen Typ (mit rotem Zettel) zwei solche Stücke vorhanden.' Eins davon habe ich gesehen aus Natal: Durban. 'Der Typus ist fein weisslich behaart. Auf den Decken stehen die Haare zwischen den Punkten; oft verschmutzt und schwer sichtbar.' Péringuey: 'nearly glabrous'. Die Decken sind aufrechtstehend behaart. 'Der Halsschild ist mit Ausnahme der Flächen anliegend behaart, wenig dicht, die Haare am Seiten- und Hinterrand nach der Seite, am Vorderrande nach vorn gelagert, nur zwischen den Vorderranddornen halb aufgerichtet. Die Stirn ist niedergedrückt und längsrunzlig. Die

Halsschildflächen sind gross, sie nehmen etwa ein Viertel bis ein Fünftel der Oberfläche ein.' Seitenbewehrung deutlich 2,1. 'Fühlerglied 1 (von der Seite gesehen) vorn leicht abgeschrägt, die untere Kante etwas vorgezogen, die Aussenecke (von oben gesehen) leicht vorspringend. Der Unterschied zwischen den Seitenranddornen und den Spitzenranddornen der Decken ist deutlich, aber viel schwächer als bei *gracilis*.' Die Seitenbewehrung ist halb so lang wie der Halsschild breit. 'Der Abstand der Punktreihen voneinander ist grösser als der Abstand der Punkte in den Reihen, deshalb treten die Zwischenräume in der Längsrichtung mehr hervor. Rippen kann man das eigentlich nicht nennen.' Péringuey: 'elytra costulate'.

Bei dem Stück von Durban ist die Oberfläche der Decken so stark skulptiert, dass zwischen den einzelnen Dornen in der Längsrichtung tatsächlich erhabene Rippenteile erscheinen.

Dactylispa congrua (Péring.)

1898. *loc. cit.*, p. 123. (*Hispa c.*)

Typus: Natal, Durban.

Der Typus ist gut erhalten, es fehlt ihm aber die rechte Decke. Färbung: Kopf, Halsschild, Schildchen und Unterseite schwarz, Fühler gelbbraun, 1. und 2. Fühlerglied schwarz, 3. schwärzlich-braun, Beine gelbbraun, Decken dunkelbraun mit schwachem Bronzenschimmer, mit schwarzen Dornen. Behaarung: Innenseite der Augen mit hellem Haarsaum, Wangen deutlich behaart, Halsschild auf der Scheibe und auf dem Abfall neben den Vorderdornen goldgelb behaart, die beiden kleinen glatten Flächen kahl; Decken deutlich behaart, jeder Punkt mit einem goldgelben Härchen vom Durchmesser eines Punktes. Stirn zwischen den Fühlern mit kurzem Kiel, in der Mitte etwas eingedrückt, hinten mit kurzer, schwacher Furche, etwas schmäler als eine Augenbreite, vom glatten Hals fein abgesetzt, nur wenig höher als dieser. Fühler bis hinter die Schultern reichend, schlank, etwas schmäler als die halbe Stirn, zur Spitze nur schwach verdickt. Glied 1 etwas kräftiger als die anderen, 2 schmäler, ellipsoidisch, 3 so lang wie 1, schmäler als 2, zylindrisch, 4-5 zylindrisch, jedes kürzer als 3, 6 kurz, so lang wie 2, 7-11 eine schwache Keule bildend, 7 konisch, etwas so lang wie 5, 8-10 schwach quer, jedes so lang wie 6, 11 eiförmig, um die Spitze länger als 10. Alle Glieder fein behaart, die Keule pubeszent. Halsschild auf der Scheibe dicht punktiert, mit sehr feinem Mittelkiel, mit je einer kleinen, runden, kahlen Fläche beiderseits, dahinter mit seichtem Quereindruck. Neben den Vorderranddornen mit recht kleinem Borstenkegel, Hinterecken mit vorgezogenem Borstenkegel. Bewehrung schlank, Vorderranddornen mit fast gleichen Aesten, diese kürzer als eine Halsschildbreite, Seitendornen 2,1, das vordere Paar so lang wie die Vorderdornen, mit kurzem, breiten Stiel, der freie Dorn entfernt, etwa halb so lang wie einer der Seitendornen. Antebasalrand fein. Schildchen dreieckig, schagriniert. Decken glänzend, hinter den Schultern wenig eingezogen, ohne

betonte Zwischenräume II, IV, VI, VIII. Punktreihen gut zu verfolgen, 7. hinter dem Schulterdorn 3 beginnend, 9. und 10. in der Mitte vereinigt. Eindruck schwach. Dornen ziemlich lang, schlank, ohne verdickte Basis. Naht hinter den schlanken Schliessdörnchen fein bedornt. Raum I mit einer Reihe von Zusatzdornen; Raum II mit II 1-5, II 5 dünn; IV mit IV 1,3,5 und einigen dünnen Zusatzdornen; VI auf der Schulter mit den Achseldornen 1,2,3, dann mit VI 2,3,4; VIII mit VIII 4 und 5. Letzterer mit verstärkter Basis, vorn und hinten mit einem Zusatzdorn. Randdornen der linken Decke 17, die längsten kaum länger als die langen Scheibendornen, nach dem Hinterwinkel zu und zur Naht allmählich kürzer. Jede Klaue mit einem Basalzähnchen. 4. mm.

Zur Beschreibung Péringuey's: 'thorax pubescent, narrowly grooved longitudinally in the centre. . . .' Die vermeintliche Längsgrube ist der Mittelkiel. 'elytra . . . glabrous' stimmt nicht. '(elytra) having on each side three dorsal rows of moderately long spines' ist recht summarisch, vielleicht meint er mit der 1. Reihe die Dornen des II. Raumes, mit der 2. Reihe die des IV. Raumes und mit der 3. Reihe die Dornen des VI. Raumes mit VIII 5. 'a few short spines along the suture' ist richtig beobachtet.

Dactylispa gratula (Péring.)

1898. *loc. cit.*, p. 123. (*Hispa g.*)

Herr Kollege Dr. Andreae, der den Typus untersucht hat, stellt das Folgende fest (von mir etwas geändert). Die Art ist durch die Bildung der Stirn besonders ausgezeichnet. Die Stirn hat zwei weitläufig punktierte und behaarte Höcker, die in ihrer ganzen Länge durch eine glatte, dreieckige, vorn zu beiden Seiten des Stirnkieles flach auslaufende Grube getrennt sind. Die deutlich, aber nicht hoch abgesetzten Hinterränder der Höcker schliessen ein stumpfwinkliges Dreieck ein, das ebenso glatt und glänzend ist wie der Hals und mit ihm in einer Ebene liegt, aber durch eine feine Linie abgetrennt ist. Fühler ebenso lang und schlank wie bei *D. pubicollis* Chap. Alle Glieder länger als breit, das 1. noch länger als bei *D. pubicollis*, etwas vor der Mitte am breitesten, zur Spitze schwach verjüngt, am Vorderrande weniger scharf abgestutzt, etwas länger als das 3.

Glied 3-6 an Länge allmählich abnehmend, 7 deutlich länger als 6, 7-10 an Länge langsam abnehmend, 11 um zwei Drittel länger als 10, aber etwas schmäler, etwa zweimal so lang wie breit. Halsschildscheibe matt, dunkel, Bewehrung und Flächen dunkel-gelbbraun, kurz pubeszent, nach meiner Lesart (Uh.) in der Mitte mit sehr feinem Längskiel ('very faintly grooved longitudinally in the middle' bei Péringuey). Seitenflächen des Halsschildes klein und schmal, deutlich gewölbt, glatt und glänzend. Sie heben sich von der sonst punktierten, matten, dunklen Oberfläche scharf ab. Sie umschliessen eine fast halbkreisförmige Fläche. Schildchen mit ovaler, tiefer, an der Basis scharf begrenzter, zur Spitze hin flach auslaufender Grube, die den

grössten Teil des Schildchens einnimmt. In den Punkten der Decken stehen feine, farblose Haare, etwa so lang wie der Durchmesser eines Punktes. Bei schlechter Beleuchtung kaum erkennbar. Naht im basalen Drittel mit kurzen Dornen, in der Spitzenhälfte mit feinen, nach hinten geneigten Dörnchen von etwa 0,05 mm. Länge. Raum I mit kurzen Dornen im mittleren und Spitzendrittel; Raum II mit starken Dornen, die zwei ersten basalen und der letzte apikale kürzer; Raum IV kurz hinter der Mitte und am Absturz mit einem Dorn, der ebenso stark ist wie die Dornen des II. Raumes; and der Basis, vor und zwischen den starken Dornen mit je einem kurzen Dorn; Raum VI mit starken Dornen, die in der Basalhälfte länger als die des II. Raumes sind; Raum VIII links mit einem kleinen Dorn kurz hinter der Mitte, einem starken am Absturz (VIII 5), rechts mit je einem starken hinter der Mitte und am Absturz, je einem kleinen vor dem ersten starken, unmittelbar vor und hinter dem zweiten (VIII 5), und vor der Spitze. Rand links mit 13 Dornen, so lang wie die von VI, aber dünner, rechts mit 17. In der Basalhälfte sind die Dornen länger, die Spitzenranddornen nach der Naht zu stark verkürzt. Hinter der Schulter messen sie 0,4 mm., am Nahtwinkel 0,1–0,15 mm. 4 × 2 mm. Natal (Malvern), G. A. K. Marshall.

Über die Scheibendornen schreibt Péringuey: 'having two dorsal series of moderately long dark spines, set at some distance from one another [nach meiner Deutung sind das die Dornen von II und VI], with two shorter spines on the posterior part, between the first and second rows [bezieht sich auf die Bedornung von IV]; the suture is also spinulose [wie oben].'

Dactylispa inanis (Péring.)

1898. loc. cit., p. 124. (*Hispa i.*)

Typus: Natal, Malvern, VI, 1897 (7893).

Dem Typus fehlt die rechte Decke, sonst ist er gut erhalten. Gelbbraun, schwarz: Augen, auf dem Hals ein Fleck hinter jedem Auge, ein Saum um jede Halsschildfläche, ein kleines Fleckchen in jeder Ecke der Schildchenbasis, das scheinbar auch ein wenig auf den Hinterrand des Halsschildes übergreift (vielleicht dort nur durchscheinend), die Dornen der Deckenscheibe mit Ausnahme von Achseldorn 1, ein Streifen auf der Schulterfläche innen, ein Fleck auf dem II. Zwischenraum an der Basis, am Hinterwinkel einige Randdornen (angedunkelt) und die Seiten der Hinterbrust. Behaarung: dünn, wenig auffallend, hellgelb, ein Saum am Innenrande der Augen, die Mitte der Scheibe des Halsschildes, aber undicht, jeder Punkt der Decken mit einem dünnen Härchen. Fühler ziemlich dicht behaart. Stirn in der Mitte eingedrückt, mit kurzen Kiel zwischen den Augen, vom glänzenden Hals abgeschnürt, allmählich zu ihm hinabgewölbt. Fühler bis hinter die Schultern reichend, kräftig, zur Spitze nur ganz allmählich verdickt. Glied 1 gross, stark, ellipsoidisch, Glied 2 fast kuglig, etwa ein Drittel so lang wie I, Glied 3 so lang wie 1, aber schmäler, zylindrisch, wenig länger als 4, Glied 4-6 einander

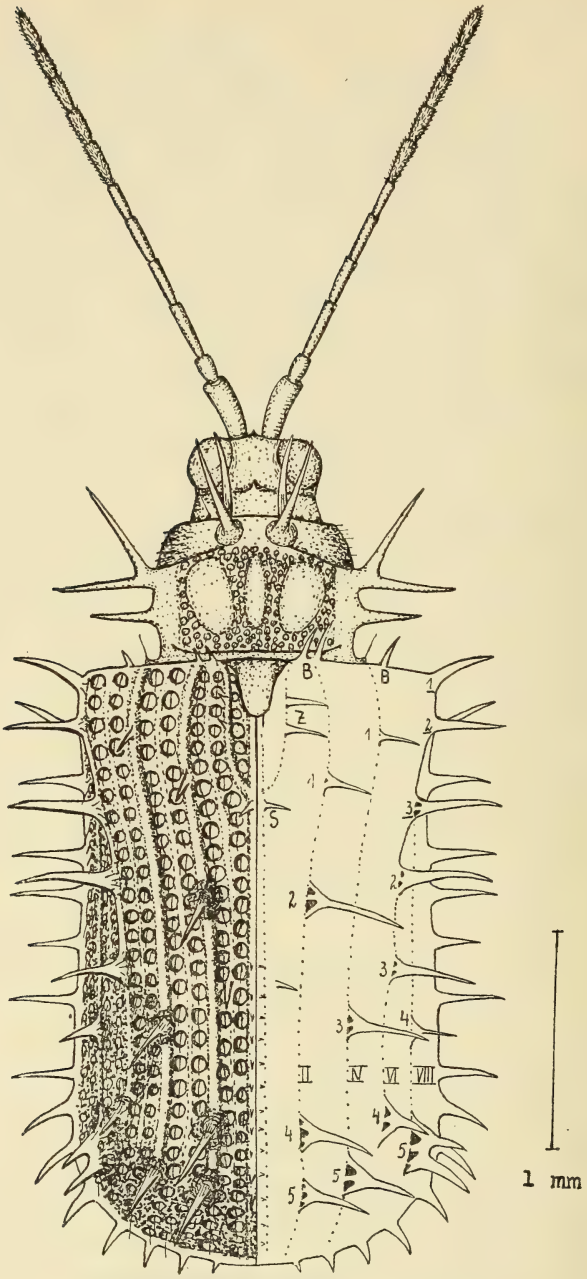
ähnlich, von abnehmender Länge, 7 schwach konisch, ein wenig verdickt, so lang wie 4, 8-10 unter sich fast gleich, etwas länger als breit, 11 wenig länger als 10. Halsschild in der Mitte der Scheibe gewölbt, punktiert, beiderseits stark niedergedrückt, mit feinem Mittelkiel, beiderseits mit gewölbter, glatter Querfläche, der niedergedrückte Teil unpunktiert, unbehaart, Antebasalrand fein, davor flach quergefurcht. Vordere Borstenkegel klein, auf dem Vorderrande neben den Vorderdornen, hintere Borstenkegel an der Spitze der rechtwinkeligen Hinterecken. Bewehrung stark, kräftig. Vorderast der Vorderdornen kürzer als der Hinterast. Seitenbewehrung 2,1, der Seitenrand dort konvex erweitert, der mittlere Dorn etwas länger als der vordere, der freie Dorn etwa halb so lang wie der mittlere. Schildchen dreieckig, mit abgerundeter Spitze. Decken parallel, Raum II, IV, VI teilweise schwach rippenförmig. Punktreihen regelmässig, die intrahumeralen an der Spitze nach aussen gebogen. Dornen kräftig, mit verdickter Basis. Naht mit sehr kleinen Zähnchen, die nach dem Hinterrande zu etwas grösser werden, Schliessdörnchen etwas grösser. Raum I vor der Mitte mit einem einzelnen Dörnchen; Raum II mit II 1–5 (II 2 grösster Scheibendorn, II 5 klein); IV mit IV 1,3,5; VI mit 3 ziemlich gleichen Achseldornen, mit VI 2,3,4; VIII mit VIII 2,3 (beide klein), 4 und 5 (Doppeldorn). 3 Basaldörnchen und ein Schildchen-Zusatzdörnchen. 17 Randdornen, die vom Hinterwinkel bis zur Naht an Länge abnehmen, die Spitzenranddornen recht kurz. Klauenzähnchen undeutlich.

Zur Beschreibung Péringuey's: 'faintly grooved longitudinally in the middle', muss 'carinate' heissen. Nach der Beschreibung der Dornenverteilung auf den Decken ist die Art nicht zu erkennen. Péringuey meint, es seien 2 Reihen Dornen da, das wären die auf Raum II und IV, 'with two isolated ones in the second interval' bezieht sich auf IV 3 und IV 5; 'two set close to one another, etc.' bezieht sich auf den Doppeldorn VIII 5.

Dactylispa pretiosula Péring.

1908. *Ann. S. Afr. Mus.*, 5, p. 337.

2 Typen. Malvern, Oct. 22, 1907. Beide Typen sind sehr gut erhalten. Sie sind auf ein Stück Karton geklebt. Ich wähle das grössere, rechte Stück als Lectotypus (Abb. 1). Färbung: Glänzend, gelbbraun, schwarz: Augen, Umgebung der drei glatten Halsschildflächen, Randdornen des Aussenwinkels und die Dornen der Deckenscheibe mit jeder Basis, auf der Scheibe selbst die Schulter auf der Innenfläche, die Schulterkehle, Aussenwinkel um VIII 5 herum und einige Längsstreifen auf den Zwischenstreifen, z.B. ein Fleckchen hinterm Schildchen auf der Schildchenreihe, die Naht (angedunkelt), der III. Zwischenraum im 2. Zwischenstreifen, auf dem 3. Zwischenstreifen der V. Raum im Anschluss an die Schulterschwärzung, eine Querbinde zwischen den Dornen II 5 bis VIII 5 (das Schwarz zuweilen stellenweise mit schwachem Metallschein). Angedunkelt ist der glatte Hals und die beiden



Dactylispa pretiosula Péring. Lectotypus.

B = Basaldörnchen. S = Schliessdörnchen an der Naht. Z = Schildchen-Zusatzdörnchen. 1,2,3, = Achseldornen. 1,2,3, VI 2 = Schulterdornen. II, IV, VI, VIII = gerade (Zwischen) räume. Von den Dornen sind auf der rechten Decke in ihrer wahren Grösse gezeichnet: II 1.2.4.5; IV 1.3.5.; VI 1.2.3. VI 2.3.4.; VIII 4,5.

Basalglieder der Fühler und noch einige Stellen auf den Decken. Die helle und die dunkle Färbung sind nicht scharf abgegrenzt.

Unterscheide: Zwischenräume oder Räume liegen zwischen den einzelnen Punktreihen; Zwischenstreifen oder Streifen liegen zwischen den Rippen, zwischen Naht und I. Rippe (II. Raum), oder zwischen I. und II. Rippe (das ist zwischen II. und IV. Raum) und so weiter.

Behaarung. Innenrand der Augen mit hellem Haarsaum, Scheibe des Halsschildes mit einzelnen Härchen, jeder Punkt der Decken mit einem langen, gekrümmten, hellen Härchen. Auf dem Halsschild sind die Härchen sicher zum Teil abgerieben. Fühler fein behaart. Stirn mit den gewölbten Augen in einer Flucht verrundet, erstere zwischen den Fühlern mit kurzem Kielchen. Kopf vom glatten Hals abgeschnürt, Stirn zum Hals hinabgewölbt. Hals mit mattem Fleck in der Mitte (Stridulationsapparat?). Fühler die Schultern erreichend, dünn, Glied 7-11 nur unmerklich verdickt. Glied 1 von der üblichen Stärke, 2 ellipsoidisch, länger als breit, 3-5 zylindrisch, unter sich fast gleich, 3 so lang wie 1, 6 wie die vorhergehenden, etwas kürzer als 5, 7 so lang wie 5, 8-10 doppelt so lang wie breit, 11 um die Spitze länger als 10. Halsschild auf der Scheibe niedergedrückt und dicht gerunzelt-punktiert, mit glattem Mittelstreifen (Kielchen) und einer schrägen, ovalen, gewölbten Fläche beiderseits. Antebasalrand fein. Vordere Borstenkegel klein, unweit der Vorderdornen, hintere Borstenkegel an den spitz vorspringenden Hinterecken. Bewehrung kurz und kräftig, der freie Dorn etwas kürzer als die anderen, unter sich fast gleich langen Dornen. Schildchen breit, dreieckig, mit schwachem Eindruck. Decken hinter den Schultern nicht eingezogen, zur Spitze etwas verbreitert, mit regelmässigen Reihen und Räumen. 9. und 10. Reihe in der Mitte kurz vereinigt. Schildchenreihe und gerade Räume rippenartig, der VIII aber nur schwach konvex. Naht mit einem Paar senkrechter Schliessdörnchen und einer Reihe winziger Zähnchen; Raum I mit einem einzelnen Dörnchen hinter der Mitte; II mit II 1,2,4,5; IV mit IV 1,3,5; VI auf der Schulter mit den Achseldornen 1,2,3, dann VI 2,3,4,; VIII mit VIII 4 und dem Doppeldorn VIII 5 auf erhabener Basis. Randdornen beiderseits 14, die des Seitenrandes so lang wie die Dornen der Scheibe, am Hinterwinkel und bis zum Nahtwinkel von abnehmender Länge, die nahe am Nahtwinkel recht kurz. Eindruck deutlich. Klauenglied mit einem Zähnchen an jeder Klaue. Lectotypus 3,5 × 2 mm. (vor der Spitze), Paratypoid etwas kürzer und schmäler, $3\frac{1}{3} \times 1\frac{1}{2}$ mm.

Es ist nicht ausgeschlossen, dass *D. pretiosula* Péring. und *D. hirsuta* Gest. identisch sind. Die ausführliche Beschreibung Gestro's passt ganz auf unsere Art, vielleicht haben unsere beiden Typen auf den Decken etwas mehr schwarze Streifen. Eine Synonymierung muss aber bis zum Vergleich der Typen unterbleiben. Bei *D. hirsuta* gibt es gewisse Abweichungen, auf die ich schon in früheren Arbeiten hingewiesen habe. Man weiss nicht, ob sie individuell oder artbedingend sind. Vielleicht handelt es sich hier um einen Formenkreis einander sehr ähnlicher Arten.

Zur Beschreibung Péringuey's: (1) 'Pallide straminea', die Typen sind nachgedunkelt. (2) 'fere glabra', nur auf den Vorderkörper zu beziehen. (3) 'Caput punctulatum', die Stirn ist nicht punktuliert, aber schagriniert. (4) 'striga', bezieht sich auf den kurzen Mittelkiel des Halsschildes. (5) 'interstitiis vix distincte albido setulosis', bei × 22 ist die Behaarung deutlich.

The *ANNALS OF THE SOUTH AFRICAN MUSEUM* are issued in parts at irregular intervals as material becomes available. As far as possible each volume is devoted exclusively to a particular subject (Zoology, Botany, etc.). Two or more volumes may be in course of publication concurrently.

Most of the Geological and Palaeontological papers are issued in conjunction with the Geological Survey of the Union of South Africa.

Some volumes and parts are out of print, and others are only sold as parts of a set, or volume, respectively. The prices of parts published prior to 1940 have been increased.

Out of print: Vols. I, II, V (Parts 1, 2, 9), VII, VIII, IX (Part 1), XII (Part 7), XXII, XXIV (Part 2), XXXI (Parts 1, 2, 3).

Vol.			£	s.	d.
III.	1903–1905	Zoology	1	19	0
IV.	1903–1908	Palaeontology	3	7	0
V.	1906–1910	Geology, Palaeontology, Zoology, Anthropology	1	2	0
VI.	1908–1910	Zoology	3	3	6
IX.	1911–1918	Botany (excl. Part 1)	2	16	0
X.	1911–1914	Zoology	4	16	0
XI.	1911–1918	Zoology	3	1	6
XII.	1913–1924	Palaeontology and Geology (excl. Part 7)	3	13	0
XIII.	1913–1923	Archaeology and Zoology	3	10	6
XIV.	1915–1924	Zoology	3	6	6
XV.	1914–1916	Zoology	4	5	0
XVI.	1917–1933	Botany	3	11	0
XVII.	1917–1920	Zoology	3	10	0
XVIII.	1921	Zoology	4	5	6
XIX.	1924–1925	Zoology	3	7	0
XX.	1924–1926	Zoology	2	12	0
XXI.	1925–1927	Zoology	3	6	0
XXIII.	1925–1926	Zoology	1	15	0
XXIV.	1929–1938	Anthropology and Ethnology (excl. Part 2)	2	9	6
XXV.	1927–1928	Zoology	1	19	0
XXVI.	1928	Zoology	1	10	0
XXVII.	1929	Anthropology	1	10	0
XXVIII.	1929–1932	Palaeontology	2	12	0
XXIX.	1929–1931	Zoology	2	8	0
XXX.	1931–1935	Zoology	3	13	6
		INDEX of papers, authors, and subjects, published in Vols. I–XXX	0	1	6
XXXI.	1934–1950	Palaeontology (Part 4 only)	0	14	0
XXXII.	1935–1940	Zoology	3	3	6
XXXIII.	1939	Zoology	2	2	0
XXXIV.	1938	Zoology	2	8	0
XXXV.		Reserved for conclusion of monograph in Vol. XXXIV.			
XXXVI.	1942–1948	Zoology	2	11	0
XXXVII.	1947–1952	Archaeology	1	16	0
XXXVIII.	1950	Zoology	3	15	0
XXXIX.	1952	Zoology	2	14	6
XL.	1952–	Botany Part 1, 1*s*. Part 2, 17*s*. 6*d*. Part 3	0	5	0
XLI.	1952–	Zoology Parts 1 & 2, 7*s*. 6*d*. each. Parts 3, 4, & 5 each	0	15	0
XLII.	1953–	Palaeontology Part 1, 12*s*. 6*d*. Part 2	0	15	0

Copies may be obtained from—

The LIBRARIAN, SOUTH AFRICAN MUSEUM, CAPE TOWN,

except the Geological and Palaeontological parts, which are obtainable from the GOVERNMENT PRINTER, PRETORIA.