Australian Runcinacea (Mollusca: Gastropoda)

By Robert Burn

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The coastlines of Australia are particularly rich in opisthobranchiate gastropod molluscs, those of Victoria and New South Wales being the best known. Hardly a collecting trip passes, however, without the discovery of one or more new species, or new records, for some particular zoogeographical area. The present two new species are such discoveries made recently by the writer and friends.

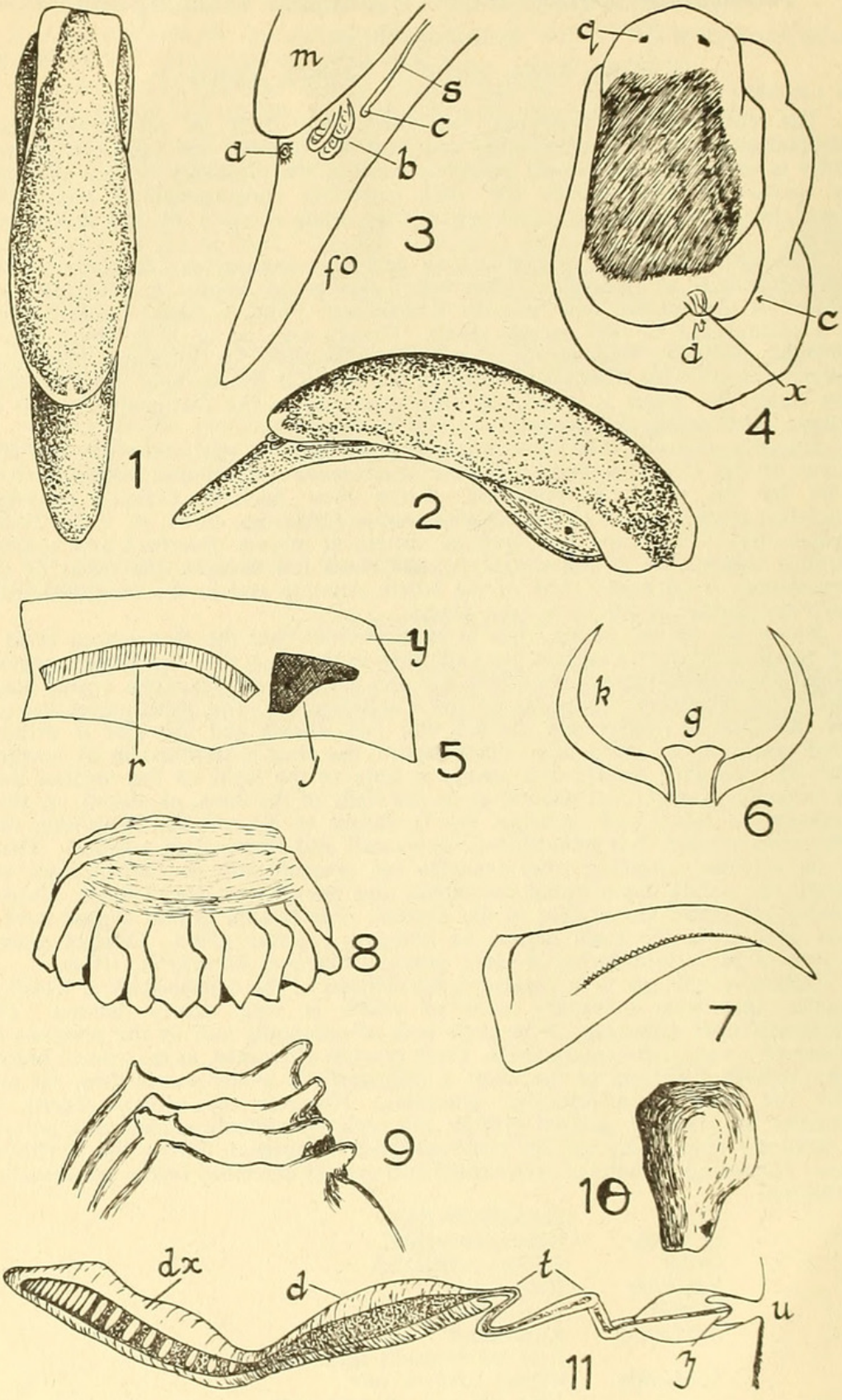
This work has been carried out as part of a comprehensive study of the Opisthobranchia of Australia. The writer wishes to thank in particular the Trustees of the Science and Industry Endowment Fund, C.S.I.R.O., Melbourne, for a grant-in-aid of this overall study. Thanks also go to Miss Joyce Shaw, Librarian, National Museum of Victoria, Melbourne, for unfailing help with references, and to Mr. Charles Gabriel, Melbourne, for similar help. The material upon which this paper is based has been presented to the National Museum of Victoria, Melbourne (referred to as N.M.V. in text).

Runcina australis spec. nov. and *Ilbia ilbi* gen. et spec. nov. are the first records of the Cephalaspidean suborder Runcinacea (= Peltacea; Odhner 1939, p. 6) for the whole of Australia. From New Zealand, Odhner described *Runcinella zelandica* as a new genus and species (1924, pp. 46-51, pl. 1, fig. 30-32, text-figs. 6-9). There are two Japanese species at present described and another has been found once at Mauritius. Beyond these few records, the range of the Runincinacea is on both coasts of the North Atlantic and in the Mediterranean, where five species in all have been found.

From this list of species, it is at once obvious that the Runcinacea form a very small suborder. Comparable with this is the fact that the largest species is only 8 mm. long *(Runcinida elioti)* and the majority are less than 4 mm. long. Unlike the remaining suborders of the Cephalaspidea, the Runcinacea do not have the dorsum transversely divided into two shields and the foot is without lateral extensions or parapodia. Furthermore, the anus is terminal in its position under the posterior mantle and always a little to the right of the median line. The branchia is small and around or to the right of the anus, or absent. A shell is present in *Ildica* and *Runcina* but is absent in *Runcinella, Runcinida* and *Ilbia;* when present it is haliotiform, very small and terminal in position. There are no cephalic tentacles; oral tentacles are present only in *Ildica.* Jaws are present; the radula has a broad rhachidian and one or two lateral teeth. Gastral (triturating) plates are present in the gizzard. The female genital organs have a bursa copulatrix, the male organs an elongate prostate gland. Opaline glands are present in various forms in three genera *(Runcina, Runcinella, Ilbia).*

Odhner (1939, pp. 6-7) suggested the division of the cephalaspidean Opisthobranchia into four suborders, each of which is very clearly defined. The Runcinacea were separated off by their lack of parapodia and by the presence or absence of a very rudimentary shell. Their greatest difference, as mentioned above, is the undivided dorsum of the body, a characteristic which stands them far and above the three more primitive suborders. However the genital organs, in particular the external seminal groove, are typically cephalaspidean and prevent the suborder from being too far removed from its position among the Cephalaspidea. According to Odhner's system the two species described below are classified as follows:

Class	GASTROPODA
Subclass	Opisthobranchia
Order	CEPALASPIDEA
Suborder	Runcinacea
Family	Runcinidae
Subfamily	Runcininae
	Runcina australis spec. nov.
Subfamily	Ilbinae subfam. nov.
	Ilbia ilbi gen. et spec. nov.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DESCRIPTION OF GENERA AND SPECIES

Runcina Forbes 1851

To this genus belong those Runcinacea with an internal shell, a reduced branchia consisting of a few (3-5) pinnulae just to the right of the anus, and a radula with a multidentate bicuspid rhachidian and one denticulate philinid lateral tooth each side (one species has a degenerate radula in which neither rows nor teeth can be counted, i.e. *R. setoensis* Baba, 1954, p. 373, fig. 1, F, G, H). An elongate prostate gland and a terminal seminal vesicle are present on the male copulatory organ. The colour of the known species is either black or dark green with a lighter marginal band around the dorsum and foot.

Type by monotypy: *R. coronata* (Quatrefages 1844) = *R. hancocki* Forbes 1851. *R. coronata* was originally described as the type (by monotypy) of *Pelta* Quatrefages (1844, p. 151), which was preoccupied by *Pelta* Beck (1837, Index Moll., p. 100).

Runcina australis spec. nov.

Figures 1-11

The living animal is elongate oval in shape, widest at mid-length and rather highly arched across the dorsum. The larger specimen measured 3.5 mm. long and 1 mm. broad. The foot is as wide as the dorsum, the anterior edge is thickened and minutely notched in the median line; the tail is a quarter of the total length, the tail tip is narrowly rounded. The dorsum is smooth, broadly rounded behind, narrower in front and shallowly concave in the truncate anterior margin. The overhang or mantle of the dorsum is very narrow but is continuous all round the body except in front where the dorsum curves down and back into the head and mouth. Oral tentacles are absent. The eyes are lateral (Fig. 2) and do not show dorsally as in *R. coronata* (Pilsbry, 1896, pl. 68, fig. 35, 37, 41) and *R. setoensis* (Baba 1954, p. 374, fig. 1, A).

The anus (Fig. 3, *a*) is just to the right of the median line in its terminal position between the mantle and the tail. The three minute pinnulae (3*b*) comprising the branchia are clustered together to the right of the anus; they do not encroach upon the anus as in *R. coronata* (Alder and Hancock, 1846, pl. 4, fig. 4) nor are they as large. Below and in front of the branchia is the common genital aperture (3*c*) and leading anteriorly from this the narrow seminal groove (3*s*). The anterior end of the seminal groove is in front of and below the right eye where it enters the male aperture (Fig. 11, *u*).

The body colour is greenish-black (like liquorice), the foot and mantle margins are an ashy yellow. The anterior corners of the dorsum and a small triangular area over the internal shell are similarly ashy yellow. There is no spotting whatsoever. The branchia is whitish, the sole of the foot is paler than the dorsum.

The preserved paratype is 1.5 mm. long and 1.2 mm. broad; the colour is opaque white with a subepidermally pigmented black dorsum. The large black eyes show through the anterior dorsum and a few larger cells with hyaline centres are visible from deep within the integument of the posterior part of the dorsum. The posterior of the dorsum is trilobed (Fig. 4) as a result of the forward

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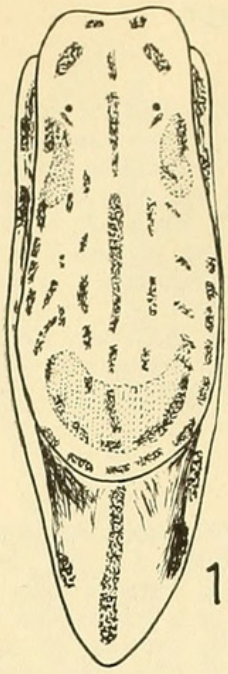
Fig. 1-11. *Runcina australis* spec. nov.

Fig. 1. Dorsal view of living animal, holotype specimen.
Fig. 2. Lateral view of same.
Fig. 3. Right lateral posterior of same.
Fig. 4. Dorsal view of preserved paratype.
Fig. 5. Buccal lining, jaws and radula.
Fig. 6. Radula from above.
Fig. 7. Lateral tooth.
Fig. 8. Gizzard plate.
Fig. 9. Detail of surface of same.
Fig. 10. Dorsal view of shell.
Fig. 11. Male copulatory organs.



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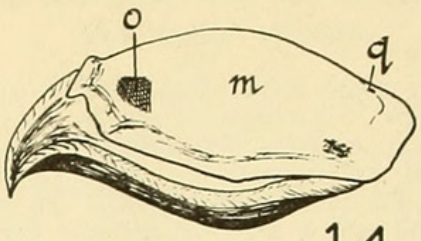

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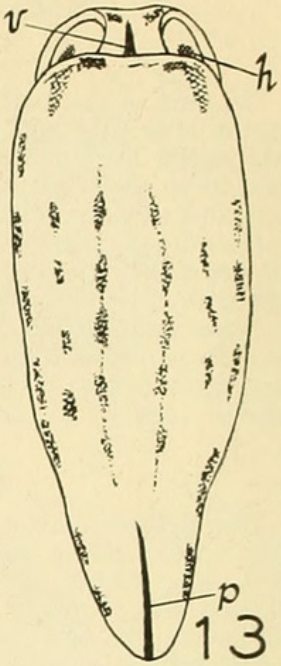

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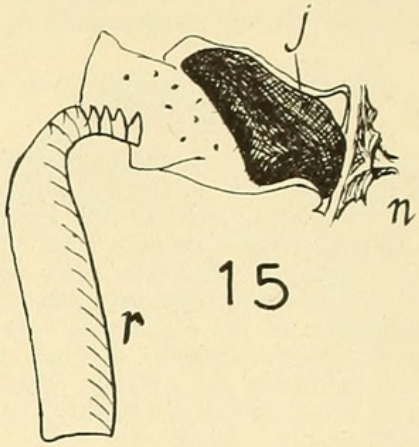

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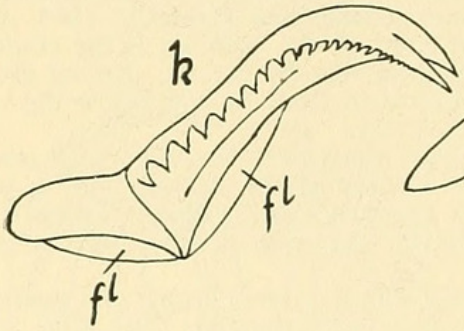

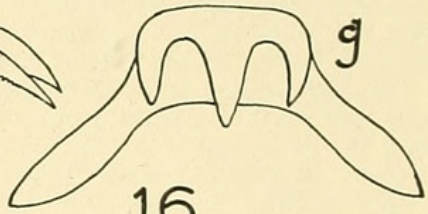

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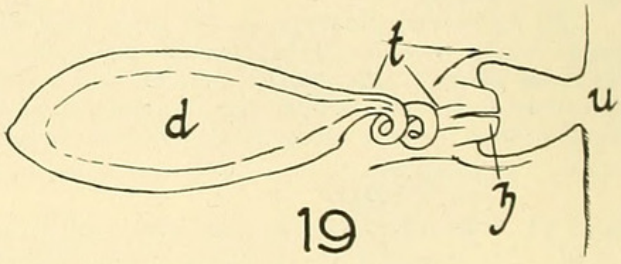

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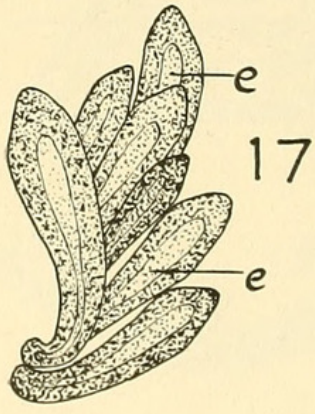

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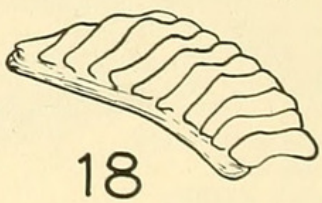

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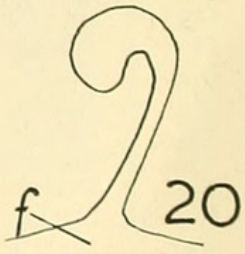

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contraction of the intestine and anus. With a large lobe either side of the smaller median one, the rear end of the paratype is now very similar to that of *R. prasina* (Morch 1863) (Bergh, 1872, pl. 24, fig. 27; Pilsbry, 1896, pl. 68, fig. 42) thus making this characteristic of the latter very suspect. In both the preserved material and *R. prasina* the tail is severely drawn forward until it is short and broadly rounded.

The buccal mass (Fig. 5) is enclosed within a cylindrical sheath of thin cuticle *(y)* and within this the jaws *(j)* and the radular strip *(r)* are readily observed. The jaws are dark red in colour, matt in texture from their composition of minute pointed elements; their shape is squatly triangular, not elongate flask-shaped as in *R. setoensis* (Baba 1954, p. 374, fig. 1, 4). The radular strip is dull yellowish and fairly evenly curved. When removed and flattened, about 30 rows of teeth were counted, each row with the formula 1.1.1. The rhachidian (Fig. 6, *g*) is narrow with a high bilobed cusp. The laterals (6 *k*) have broad bases with a somewhat philinid swan-necked cusp minutely denticulated along the inner edge.

The gizzard contains four hyaline plates (Fig. 8) each 0.1 mm. long within a muscular dilation of the alimentary tract. Their shape is not unlike that of *R. setoensis* (Baba loc. cit., fig. 1, C) but the base is not nearly so curved. There are 10-11 pairs of irregular denticles (Fig. 9) on each plate; these correspond with the plates in *R. calaritana* Colosi 1915 in the number of denticle-bearing laminae and the lateral shape but disagree in the less pronounced denticles.

The male copulatory organ (Fig. 11) is 1 mm. long; it extends from the right anterior male aperture to the left beneath the alimentary tract and then backwards to very near the female glands, thus occupying an even greater space than in *R. calaritana* (Pelseneer, 1894, pl. 7, fig. 59). Ectally the organ comprises a small atrium with a constricted aperture (*u*). Into the atrium projects a short conical penis *(z)* which surmounts the thick sphincter muscle at the ectal end of the duct from the prostate gland. This duct *(t)* is narrow and twisted and is absent from *R. calaritana* (Colosi 1915, p. 25, fig. 16; Vayssiére, 1883, pl. 2, fig. 13) but corresponds to that of *Ildica nana* (Bergh 1889, p. 872, pl. 82, fig. 37 *b*). The prostate gland *(d)* not cylindriform as in *R. calaritana* (loc. cit.), is fusiform with thick glandular walls and a narrow lumen. The inner end of the prostate gland narrows not to a sphincter as in *R. calaritana* but to a slender neck. Beyond the neck is the irregularly fusiform seminal vesicle *(dx)* with thinner softer walls and a larger lumen than the prostate. Its contents are yellowish viscid matters containing sectionally ovoid circular cells packed closely entally but further apart ectally. The seminal vesicle is very much larger than its counterpart in *R. calaritana* (loc. cit.; Pelseneer, 1894, pl. 7, fig. 59) and somewhat resembles the long prostate gland of *Runcinella zelandica* (Odhner 1924, pp. 49-50, fig. 8) in its shape and form of connection to the prostate gland.

The female gland mass has a single large white stalk-like cylindrical vesicle with a curled-over distal end. This is probably the bursa copulatrix (after Odhner, 1924, pp. 48-49, fig. 7-8, *b*) as it opens directly into the common genital aperture. (Fig. 3, *c*).

Fig. 12-20. *Ilbia ilbi* gen. et spec. nov.

Fig. 12. Dorsal view of living animal, holotype specimen.
Fig. 13. Ventral view of same.
Fig. 14. Lateral view of preserved holotype.
Fig. 15. Labium, jaws and radula.
Fig. 16. Radula.
Fig. 17. Opaline glandulae.
Fig. 18. Gizzard plate.
Fig. 19. Male copulatory organs.
Fig. 20. Bursa copulatrix.

From its terminal position over the anus (Fig. 4, *x*), the 0.1 mm. long shell was dissected out. Roughly shaped as in *R. setoensis* (Baba 1954, p. 373, fig. 1, B), the shell (Fig. 10) appears to be not as thin nor as elongate; it is calcareous.

Material examined: 1 specimen (holotype) from Point Danger, Torquay, Victoria, 2nd April 1960, collected by R. Burn, N.M.V. reg. No. F21,270; 1 specimen (dissected paratype) from the north side of Long Reef, New South Wales, 11th June 1961, collected by P. Colman, N.M.V. reg. No. F23,066.

Habitat: The holotype was found crawling among the roots of the green alga, *Caulerpa scalpelliformis,* and various minute brown seaweeds, on the side of a stone in a channel at the edge of the reef at Torquay. The paratype was found among the branches of a clumping green alga, *Valoniopsis,* which grows on the sides of rocks and walls exposed to the sea at Long Reef.

Discussion of *Runcina australis*

Odhner (1924, p. 51) listed five species as comprising the genus *Runcina.* To these Baba (1937, 1954) added two Japanese species, one of which (*R. elioti* Baba, 1937) is here removed from *Runcina* and made the type species of a new genus, *Runcinida,* for reasons given below. With the addition of the new species described above, the genus has seven species. Certain of these species, however, are undoubtedly identical. But the primary concern is the recognition of the characteristics of the valid type species of the genus and the correct name of the Mediterranean species. The type species is *R. coronata* (Quatrefages, 1844, p. 151, = *R. hancocki* Forbes, 1851, p. 612) from off the coast of Brittany and England. Unfortunately its anatomy is not known in detail but the excellent figures of the living animals (Alder and Hancock, 1846, pp. 289-292, pl. 4, fig. 1-7) provide a firm basis for the future recognition of the species.

However when the Mediterranean *R. coronata* (Vayssiére, 1883, pp. 6-28, pl. 1, fig. 1-12, pl. 2, fig. 13-22; 1885, pp. 104-106, pl. 5, fig. 126-129; Pelseneer, 1894, pp. 17-18, pl. 7, fig. 56-61, non text fig. F which is the type species) is compared with the type species, obvious differences are at once outstanding. Both Quatrefages' figure of *R. coronata* (Pilsbry, 1896, pl. 68, fig. 35) and those of Alder and Hancock show that a colour area extends across the anterior of the dorsum and backwards along either side until shortly behind the eyes where these colour areas turn medianly and join. Very definite colour areas encircle each eye and moreover the eyes show strongly through the dorsum. In the Mediterranean species (Vayssiére, 1883, pl. 1, fig. 1; 1885, pl. 5, fig. 126) the colour areas are limited to the anterior lateral corners of the dorsum only and do not join across the dorsum either in front of or behind the eyes, which it must be emphasised show very weakly dorsally. Another point of difference that is readily apparent is the shapes of the dorsa. In *R. coronata,* the sides of the dorsum are parallel from end to end while in the Mediterranean species the dorsum is widest at the second third and the anterior corners are a little expanded laterally. Of the internal anatomy only the gastral plates can be compared; *R. coronata* has six laminae (Alder and Hancock, 1846, p. 290, pl. 4, fig. 6) and the Mediterranean species has 10-11 laminae on each plate. Even with only these points of difference available, it is impossible to retain the use of the type name for the Mediterranean species. From the literature it is obvious that this latter species was re-described as *R. calaritana* (Colosi 1915, pp. 1-35, fig. 1-18); special agreement is shown in the gastral plates and the male copulatory organs, the former characterized by the sharp laminae and the latter by the short terminal seminal vesicle at the base of a long cylindriform prostate gland (loc. cit., p. 25, fig. 16). Pruvot-Fol (1954, p. 55) had already suggested that *R. calaritana* was a synonym of the Mediterranean species and pointed out that the earlier *R. capreenis* (Mazzarelli, 1893) could also be the same species. Unfortunately the original description of this last species is not available in Australia at the present time.

The valid species of *Runcina* are, then, as listed below:
R. coronata (Quatrefages, 1844). European Atlantic.
R. prasina (Morch, 1863). West Indies.
R. capreenis (Mazzarelli, 1893). Mediterranean.
R. inconspicua Verrill 1901. West North Atlantic.
R. calaritana Colosi 1915. Mediterranean.
R. setoensis Baba 1954. Japan.
R. australis spec. nov. South-eastern Australia.

R. australis must be grouped with those *Runcina* in which the dorsum is pyriform (broadest at the second third of its length) and the eyes show weakly dorsally. This group is typified by *R. calaritana,* from which the new species can be separated by a different colour pattern, details of the shape of the radula and a much longer seminal vesicle, shorter prostate gland and longer efferent duct. *R. coronata* typifies the second group of species with its strongly showing eyes and near parallel dorsum. To this group also belongs *R. setoensis* which differs in its very elongate shape, degenerate radula and 10-11 laminae. *R. inconspicua* has a broad foot much wider than the dorsum and *R. prasina* very prominent laminae upon the gastral plates. *R. prasina* and *R. inconspicua* have dorsally showing eyes and near parallel sides of the dorsum. Should both species be refound, it is not impossible that they will prove to be one and the same species. The trilobed posterior dorsum of *R. prasina* is as mentioned earlier, a very suspect characteristic in the light of preserved material of *R. australis;* fresh material would most likely reveal a rounded posterior dorsum as in *R. inconspicua* Verrill (1901, p. 28, pl. 3, fig. 6).

Ilbia gen. nov.

Runcinidae with a wide mantle all round and without any branchia or branchial vestige to the right or around the anus. Jaws present; radula with tricuspidate rhachidian and one denticulate bifid lateral tooth each side. Shell absent. Tail of foot with a conspicuous pedal furrow. Male copulatory organs with a short prostate gland. A large posterior dorsal opaline gland present.
Type species: *Ilbia ilbi* spec. nov.

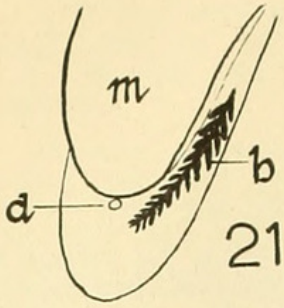
Ilbia ilbi spec. nov.

Figures 12-20

Alive the single specimen was 2.7 mm. long, 0.9 mm. broad and 0.75 mm. high. The dorsum (Fig. 12) is nearly square anteriorly although shallowly concave in the front margin, it is narrower than the foot and rounded posteriorly. The edge of the dorsum (mantle) is wide and overhangs all round except in front where the dorsum curves down into the head. The mantle has thickened edges which are curled downwards and touch the upturned foot edges, thus forming a funnel along either side of the body. The foot (Fig. 13) is rounded anteriorly and the actual front margin is shallowly concave; the edges are a little upturned; the tail comprises nearly one third the total length of the animal, it is narrowly rounded behind. The sole has a posterior middle-line groove, the pedal furrow *(p)* which extends forward from the tip to about the fourth fifth of the body length. The mouth *(v)* is a narrow vertical slit in the anterio-ventral dorsum. The small anus is high up under the posterior mantle, a very little to the right of the middle-line. There is no branchia. Anteriorly in the fold between the mantle and foot, there is on each side a distinctive elongate oval area of raised coloured flesh *(h)* which appears to be homologous with Hancock's organ in other suborders of Cephalaspidea. The eyes show dorsally and are small in size; immediately antero-laterally of each eye is a deep cylindrical pit leading to the eye. On the posterior right of the dorsum is a large quadrangular shallowly hollowed area (Fig. 14, *o*); this is the position of the opaline gland.

The entire dorsum, sides and sole of the foot are covered with vibratile cilia. This enables the animal to crawl along on a flat surface equally well either on the sole or the dorsum, or on the side when both surfaces are used. Apparently the cilia within the funnel-like fold on each side of the body divert the oxygen laden water to absorption areas within the lateral folds.

The body colour is pale purple, the viscera and eyes showing black dorsally.



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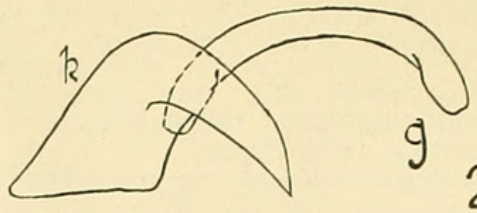

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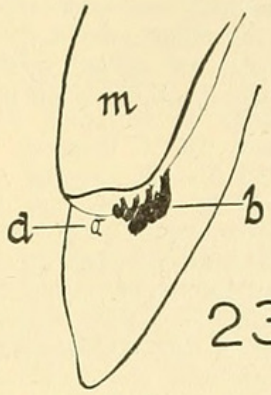

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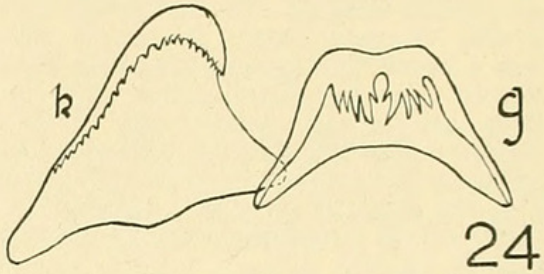

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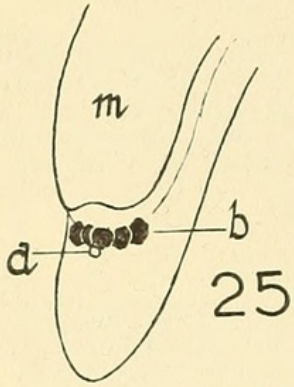

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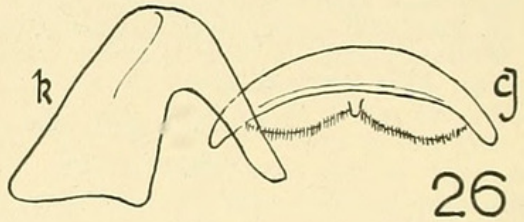

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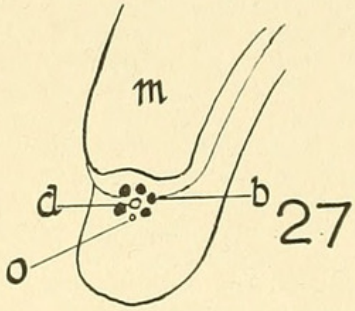

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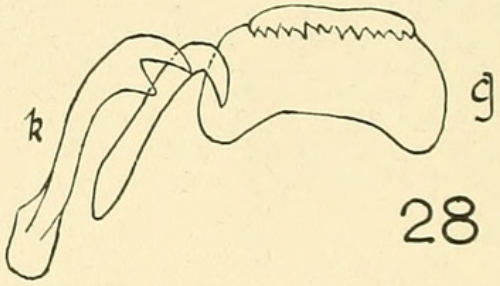

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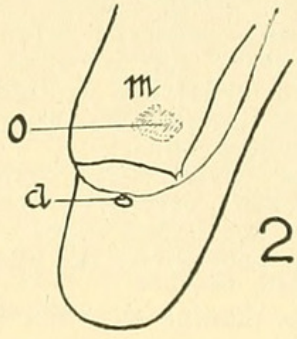

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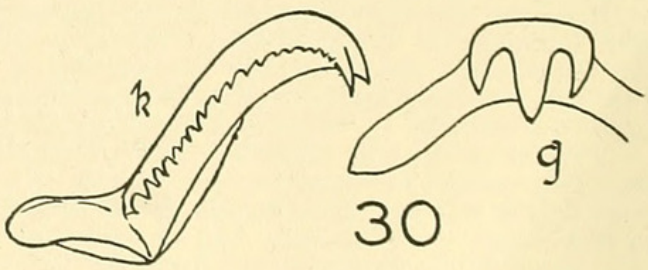

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The dorsum, sides of the foot and the sole are all patterned with yellow patches. On the dorsum there is a middle-line series of five longitudinal patches which attain neither the anterior nor the posterior edges of the dorsum. On either side of this but only in the rear part is a shorter series of smaller patches, again longitudinal. Lateral to these series is yet another series of patches, this time set obliquely to the longitudinal, across the posterior of the dorsum these series join and form an even curve. Around the very posterior of the dorsum is a row of patches which carry forward discontinuously along both lateral edges. Four pairs of patches are distinctively placed behind and in front of the eyes (Fig. 12). The sides of the foot have a few large patches, submarginally positioned around the edges and the tail crest bears a yellow streak. The sole (fig. 13) has patches submarginally (showing through from above) and four longitudinal series of epidermal patches, the median two series of which are connected subepidermally by a narrow strip of minute white pigment cells. Similar white pigment cells form areas on the dorsum, an elongate curved pyriform area rear lateral of each eye and a larger lunate area behind and above the black viscera. The anus is whitish at its aperture and the Hancock's organs are reddish orange.

Preserved specimen (Fig. 14) is 1.9 mm. long, 1 mm. broad and 1 mm. high. The colour is drab greyish-white, the tail and the sole are grey; the area around the right eye is black and both eyes show as an intense black spot. The shape has not altered a great deal overall, the tail has shortened a little. The pedal furrow (Fig. 13, *p*) is now more prominent. The edges of the foot and mantle are now more thickened, that of the foot curls over the mantle. The cilia of the skin are still visible through a medium power microscope, i.e. x40 and greater.

Fig. 21-22. *Ildica nana* Bergh 1889.
Fig. 21. Right lateral posterior of animal.
Fig. 22. Radula (both figures adapted from Bergh, 1889).

Fig. 23-24. *Runcina calaritana* Colosi 1915.
Fig. 23. Right lateral posterior of animal.
Fig. 24. Radula (both figures adapted from Vayssière, 1883).

Fig. 25-26. *Runcinida elioti* Baba 1937.
Fig. 25. Right lateral posterior of animal.
Fig. 26. Radula (both figures adapted from Baba 1937).

Fig. 27-28. *Runcinella zelandica* Odhner 1924.
Fig. 27. Right lateral posterior of animal.
Fig. 28. Radula (both figures adapted from Odhner, 1924).

Fig. 29-30. *Ilbia ilbi* gen et spec. nov.
Fig. 29. Right lateral posterior of animal.
Fig. 30. Radula.

ABBREVIATIONS

Figs. 1-30.

a — dorsum.
b — labium.
c — opaline gland.
d — pedal furrow.
dx — eye.
e — radula.
f — seminal groove.
fo — penial coils.
fl — atrium.
g — mouth.
h — shell area.
j — cuticularized buccal lining.
k — penis.
m — anus.
n — branchia.
o — common genital aperture.
p — prostate gland.
q — seminal vesicle.
r — lumen of opaline glandulae.
s — female gland mass.
t — foot.
u — flange.
v — rhachidian tooth.
x — jaw.
y — lateral tooth or teeth.

The labium (Fig. 15, *n*) is brown in colour, thickly cuticularized with about six strong radial grooves about its flange; it lines the inner wall of the mouth and is attached to the anterior edge of the cuticle bearing the jaws. The jaws *(j)* are 0.4 mm. long in the major axis, pale yellow in colour, elongate triangularly oval in shape and composed of large scale-like diamond-shaped elements set obliquely upon their bases. A few elements of various shapes and sizes are scattered over the cuticle between the jaws and the radula. The colourless radula *(r)*, crook-shaped with the neck foremost and 0.7 mm. in length, consists of 25-26 rows of teeth of the formula 1.1.1. The rhachidian is tricuspidate (Fig. 16, *g*) and has a broad base with wing-like arms; as a whole, the rhachidian is closer to that of the aplysiid *Phyllaplysia,* in particular that of *Ph. engeli* (Marcus 1955, pl. 4, fig. 33, *m*) and somewhat that of *Ph. lafonti* Crosse 1872 (Pilsbry, 1896, pl. 9, fig. 26). The lateral tooth *(k)* on each side of the rhachidian, is a combination of the denticulate philinid lateral of *Runcina* (loc. cit., pl. 68, fig. 36) and the bifidate cusp of the marginal tooth of *Runcinella zelandica* Odhner (1924, p. 46, fig. 6). A thin flange *(fl)* is present on the rear side of the tooth proper and its base. The 15-20 denticles on the leading edge of the tooth are larger and stouter nearer the base; upon the cusp they are smaller, narrower and closer together.

The gizzard plates (Fig. 18) are slightly curved and armed with 8-10 low blunt transverse laminae, each with two high points. The high points form two distinct series, one on each side of the middle-line. As usual in the Runcinacea (Thiele, 1935, p. 1050), four gizzard plates are present.

Anteriorly the genital organs comprise the male copulatory organ (Fig. 19) which occupies the anterior of the visceral cavity below the buccal mass. This organ consists of a relatively large atrium *(u)* into which the shallow seminal groove enters. Into the distal portion of the atrium projects the short cylindrical penis *(z)* the base of which is contained within the muscular walls of the atrium. The penis is connected from its basal part by a narrow duct *(t)* with lightly muscled walls and a double spiral in its course to a short dilated penial prolongation, the prostate gland *(d)*. The walls of this are thick and glandular, the cavity is spacious. A seminal vesicle, as present in *Runcina australis,* is lacking.

In the female gland mass, the yellow-orange granular follicles of the hermaphrodite gland are spread in clusters over the anterior of the colourless liver. As in *Runcina australis* and *Runcinella zealandica* (loc. cit., pp. 48-49, fig. 7-8 *b*), a bursa copulatrix (Fig. 20) opens directly into the common genital aperture; here it is similar to that of the former species in that it has a relatively short stalk and a curled-over distal end. From the anterior side of the common genital aperture the seminal groove issues forth and rises up towards the mantle. Its sides are low ridges rather far apart.

The opaline gland (Fig. 17) whose place of attachment has been mentioned previously (Fig. 14, *o*) in the description of the body, is a large, peculiar structure. Between 100 and 150 separate glands are present in a compact mass attached to the inner side of the posterior dorsal surface; many are twisted around others and all are apparently pervious through minute apertures in the dorsal surface. Each gland has thick yellowish glandular walls; the lumen of each *(e)* is narrow and filled with pale viscid fluid. In shape the glands are elongate fusiform with somewhat straight sides, the greatest diameter is just below the tip. The tip of each is bluntly conical. Overall the structure of the opaline gland is very similar to that of *Aplysia punctata* (Hoffman, 1932-1939, pp. 470-471, fig. 344, B, fig. 345, A, after Mazzarelli 1889) but is considerably narrower as in *Akera bullata* (loc. cit., fig. 344, D, after Perrier and Fischer 1911).

Material examined: 1 specimen (holotype) from Point Lonsdale, Victoria, 10th September 1961, collected by R. Burn and M. Pilbeam, N.M.V. reg. No. F23,062.

Habitat: The specimen was collected from the alga *Enteromorpha* (cf. *intestinalis)* which grows on the sides of a shallow sandy-bottomed rock pool near the highest part of the littoral zone.

Discussion of *Ilbia ilbi*

The striking body coloration and patterning of the living animal, the lack of a branchia, the tricuspidate rhachidian, the opaline gland and the pedal furrow are the characteristics to be used in distinguishing *I. ilbi* from all Runcinacean species. The undivided dorsum, posterior near middle-line anus, gizzard plates and genital organs unquestionably identify the genus and species as belonging to the Runcinacea. The lack of a branchia indicates that the genus deserves the highest position in the classification of the suborder (see discussion on systematic classification of the Runcinacea). The type of rhachidian and the dorsal opaline gland point to an even higher position for *Ilbia* than *Runcinella* which Odhner described as "a more advanced and specialized type . . . than *Runcina*" (1924, p. 51), and suggest a close affinity with the Anaspidea, particularly the Aplysiidae Dolabriferinae.

Both the generic and specific names of *Ilbia ilbi* are derived from the monogram of the writer's brother, Ian Lee Burn.

THE SYSTEMATIC CLASSIFICATION OF THE RUNCINACEA

Because of the small number of genera and species hitherto attributed to the Runcinacea, no systematic classification of the suborder has been felt necessary. Bergh (1889, pp. 868-869), Pilsbry (1896, pp. 170-171), Odhner (1924, p. 51), and Thiele (1931, p. 394) merely grouped *Runcina* and *Ildica* together in the case of the first two writers and in the case of the second two writers added *Runcinella* with the note that this latter genus is more advanced and specialized than *Runcina*. From the literature examined, it is evident that a clear and concise systematic classification based on several natural characteristics is readily available for the suborder. The following text indicates the reasonings for the various new proposals and is based largely on the ideas propounded by Nils Hj. Odhner in his works on the Opisthobranchia.

It is quite obvious that of all species of Runcinacea one stands apart. *Ildica nana* Bergh (1889, pp. 870-872, pl. 82, fig. 27-38) with an external shell, a long branchia on the rear right side and an arcuate rhachidian tooth is this species. As all other species have either an internal shell or none at all, an abbreviated branchia and a denticulate or tricuspidate rhachidian tooth, it is necessary to decide which is the more primitive, *Ildica* or the second group. Odhner's conceptions regarding evolutionary changes for the systematic classification of the Opisthobranchia (1939, pp. 3-25), i.e. that the degeneration of a part of an animal together with a strong tendency towards detorsion of both shell and animal among the more primitive forms is evidenced in a natural step forward, can well be applied to the Runcinacea. The presence of a relatively strong external shell in *Ildica* indicates that it is more primitive than *Runcina* which has an internal shell. Similarly *Runcina* has to be considered more primitive than those species (and genera) in which a shell is totally absent. Thus it is evident that *Ildica nana* is the most primitive Runcinacean and that the genus *Runcina* follows as next in succession.

However with the complete degeneration of the shell in the evolutionary scale above *Runcina,* this characteristic is of no value whatsoever. Therefore another characteristic, this time a little more subtle in its changes towards degeneration, is selected. The branchia offers everything desired for a complete classification.

Although it is already decided that *Ildica* is the most primitive genus and *Runcina* is the next most primitive genus, it serves well to use these genera as pointers to the succession of changes apparent within genera in the form of the branchia. In *Ildica* (Fig. 21) the branchia *(b)* is an elongate elegant plume with small pinnulae alternately placed on either side of the rhachis; its point of origin is the second third of the body length and it projects considerably beyond the right posterior margin of the dorsum. Generally speaking the branchia resembles that of the Pleurobranchacea both in shape and position. Between *Ildica* and *Runcina* considerable change in the shape, type and position of the branchia have occurred. Instead of the pinnulated plume the pinnulae arise separately from the body wall without any external interconnections. They are

also very severely reduced in number, e.g. three pinnulae in *R. australis* spec. nov. (Fig. 3, *b*) and *R. coronata* (Quatrefages 1844; Alder and Hancock, 1846, pl. 18, fig. 5), four pinnulae in *R. caloritana* Colosi (1915) (Fig. 23, *b*) and *R. setoensis* Baba (1954, p. 373). In the change of position, it is very evident that a terminal movement has begun. This is further confirmed from a study of the remaining Runcinids.

Among the species attributed to *Runcina,* one species (*R. elioti* Baba) deserves special attention because of its remarkable branchia and its type of radula. Although Baba's description of the branchia (1937, pp. 202-204) is very brief, the "several plumes arranged in a semi-circle, and lies in the median line beneath the posterior end of the mantle" (Fig. 25) indicates that it is not at all similar to the branchia of *Runcina.* Thus it can be seen that a definite movement has taken place in a posterior direction. The pinnulae apparently arise separately from the terminal body wall and they are spread evenly either side of the middle line (loc. cit., pl. 4, fig. 4). As the radula has non-denticulate lateral teeth in contradistinction to denticulate ones in *Runcina, R. elioti* cannot be accepted within the genus and deserves to be generically separated from that genus. *Runcinida* gen. nov. is proposed for this species and it is the type species by monotypy.

By the understanding of the change from the branchia of *Runcina* to that of *Runcinida,* the doridiform arrangement of the pinnulae (again arising separately from the terminal wall) in *Runcinella* Odhner (1924, pp. 48-49, fig. 7-8, *a;* Fig. 27) can be seen as the condition occurring after the lateral pinnulae move ventral-wards. There is also a reduction in the size of the pinnulae indicating another instance of the gradual degeneration of the branchia. The two lateral teeth on each side of the rhachidian in the radula and the presence of an infra-anal sac containing the glandulae of the opaline gland (loc. cit., p. 50, fig. 7, *e;* Fig 27, *o*) are the characteristics validating the genus. In *Ilbia* on the other hand, there is no branchia present at all but the cilia of the body walls within the funnels formed by the folding of the foot and mantle margins towards each other undoubtedly act as guides to respiratory absorption areas. Once more the details of the radula and the presence of an opaline gland distinguish the genus from other Runcinids.

The opaline glands of both *Runcinella* and *Ilbia* do not appear to differ at all morphologically. Although smaller and far more numerous in the latter, both genera have the individual glandulae similarly shaped and with walls composed of gland cells. The outer cutaneous sheath of the glandulae in *Runcinella* is no more than a deeply folded skin thus in both genera the glandulae are pervious to the surface although in *Runcinella* enclosed in an infra-anal sac. Colosi (1915) recorded the presence of an anal gland in *Runcina calaritana* (Hoffman, 1932-1939, pp. 494-495, Fig. 360, A); this appears to be the first indication of an opaline gland in the Rucinacea although it is vestigial in its extent as shown by the glandulae clustered around the central duct which is the only opening to the surface. It would appear that the Runcinacea are the systematically highest of all the Cephalaspidean suborders with some close similarities to the order Anaspidea where opaline glands are present in both families (Akeratidae and Aplysiidae). Hoffman (loc. cit.) calls the opaline glands of *Runcina calaritana* and *Runcinella zelandica* "analdrüsen" but through comparison with the glands of *Ilbia,* they must be considered as opaline glands.

Peculiarly enough the shape of the radular teeth shows some similarities throughout, particularly at generic level. *Ildica* (Fig. 22) with its arcuate rhachidian and non-denticulate hamate lateral is much the same as *Runcinida* but in addition the latter had an inner bilobed flange minutely denticulated along the edges and a small median cusp (Fig. 26). In *Runcina* (Fig. 24), *Runcinida* (Fig. 26) and *Runcinella* (Fig. 28) the rhachidian is medianly divided but in the latter two genera successively less strongly. The tricuspidate rhachidian of *Ilbia* appears to be derived from the multidentate bicuspidate rhachidian of *Runcina* and the median cusp of *Runcinida.* The lateral reduction of the denticles on each cusp of *Runcina* plus the building up and strengthening of the median cusp of *Runcinida* would result in the rhachidian of *Ilbia.* While the gastral plates of the Runcinacea are less strongly developed homologies of the gastral

plates of the Scaphandracean Cephalaspidea, family Atyidae (Pilsbry, 1896, p. 237, frontispiece, fig. 8; Marcus and Marcus, 1959, p. 882, fig. 9-12), only three plates are present in that family as compared with four throughout the Runcinacea. Gastral plates are also present in certain other families of Cephalaspidea (Phanerophthalmidae and Philinidae; loc. cit., pp. 884-892, fig. 23-24), but are again three in number and lacking in strong transverse denticulated laminae.

From the discussion of the Runcinacean genera and the evolutionary sequence of them, certain major divisions can be separated off. Primarily two divisions are seen in the external shell, pinnulate branchia and non-denticulate rhachidian of *Ildica* and the internal shell or lack of one, the branchia consisting of separate pinnulae or lack of same and the denticulate or cuspidate rhachidian of the remaining genera. For both divisions, family status is proposed, Ildicidae fam. nov. for the former and Runcinidae (Gray; Pilsbry, 1896, p. 17) for the latter. The second division (Runcinidae) can also be separated into two subfamilies, Runcininae for those genera with branchia and a denticulate rhachidian and Ilbinae for those without branchia and a cuspidate rhachidian. Briefly the suborder, families, subfamilies and genera can be diagnosed as follows:

Suborder RUNCINACEA

Cephalaspidea in which the dorsum is not divided transversely, the foot is without parapodia and the anal opening is terminal and just to the right of the middle line. The gizzard contains four laminated gastral plates. Jaws are present. Branchia when present posterior right or terminal in position between mantle and foot.

Family Ildicidae fam. nov.

Runcinacea with an external terminal shell, a pinnulated branchia and a non-denticulate rhachidian.

Genus *Ildica* Bergh (1889, pp. 869-870).

Branchia on posterior right of body wall. Minute oral tentacles present. Penis elongate cylindrical; prostate gland present. Radula with an arcuate rhachidian bearing a reduced denticle near each side and a smooth hamate lateral each side of the rhachidian.

Type species: *I. nana* Bergh (1889).

Family Runcinidae

Runcinacea with or without a terminal rudimentary internal shell, the branchia when present consisting of individual pinnulae and a denticulate or cuspidate rhachidian.

Subfamily Runcininae

Branchia present. Rhachidian bilobed, denticulate.

Genus *Runcina* Forbes (1851, p. 611)

Branchia consisting of 3-4 pinnulae to right of anus. Shell present. Prostate gland and terminal seminal vesicle present on male copulatory organ. Rhachidian deeply bilobed with each lobe denticulate, lateral tooth on each side of rhachidian denticulate, whole radula generate in one species. Opaline gland, composed of glandulae emptying into a central duct, present in one species at least.

Type species: *R. coronata* (Quatrefages 1844).

Genus *Runcinida* gen. nov.

Branchia consisting of a few pinnulae in a semi-circle beneath the posterior mantle. Shell not known, probably absent. Male copulatory organ not known. Radula with bilobed minutely denticulate rhachidian which also has a minute median cusp, and a smooth hamate lateral each side of the rhachidian. Opaline gland not known.

Type species: *R. elioti* (Baba 1937).

Genus *Runcinella* Odhner (1924, pp. 46-47).

Branchia consisting of 4-5 pinnulae doridiformly arranged around the anus. Shell absent. Male copulatory organ with prostate gland but lacking seminal vesicle. Rhachidian weakly bilobed, a simple hook-shaped tooth and a bicuspid larger tooth present on each side of the rhachidian. Opaline gland opening into an infra-anal sac.

Type species: *R. zelandica* Odhner (loc. cit.).

Subfamily Ilbiinae subfam. nov.

Branchia absent. Rhachidian tricuspidate.

Genus *Ilbia* gen nov.

Shell absent. Male copulatory organ with prostate gland but lacking seminal vesicle. Rhachidian with large cusps, the lateral tooth on each side of the rhachidian denticulate and bifidate. Opaline gland posterior dorsal, each glandula with its own aperture.

Type species: *I. ilbi* spec. nov.

SUMMARY

For the first time, Runcinacean gastropods are described and recorded from Australia. Two new genera are proposed, *Runcinida* for *Runcina elioti* Baba (1937) from Okinawa and Japan and *Ilbia* for *Ilbia ilbi* spec. nov. from Victoria, Australia. Two new species, *Runcina australis* and *Ilbia ilbi,* are described from Victoria and New South Wales. A systematic classification of the suborder Runcinacea is proposed with two families, Ildicidae and Runcinidae, the latter with two subfamilies, Runcininae and Ilbiinae. The five known genera are briefly described.

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