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Decapoda, Pantopoda

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Order DECAPODA

By  
V.A. Yashnov

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(328)\*

The Decapoda consist primarily of marine organisms which lead a benthic, much less commonly pelagic, mode of life. A large number of species inhabit tropical and temperate seas; a comparatively small number of species is encountered in the northern seas of the USSR.

The body of Decapoda consists of a cephalothorax and abdomen (fig. 34). All the segments of the cephalothorax are covered with a carapace which is fused with them at the top; in rarer cases one or two of the last thoracomeres remain separate. In many species, primarily natatory ones, the anterior part of the carapace turns into a rostrum, the armature of which is of great taxonomic significance; in bottom-dwelling species the rostrum is often reduced or absent altogether. The exterior of the carapace is usually covered with spines, teeth or hairs, particularly in species with highly calcareous integuments. The abdomen in the Macrura group is elongate, with well-developed and mobile segments bearing epimera along the sides;

(329)

\* The numbers in the right-hand margin are the pages of the Russian text - translator.

in the Brachyura group it is contracted and bent under the cephalothorax; the abdomen of hermit crabs (Paguridae) resembles a soft, unsegmented sac, mostly spiral-shaped. The anterior end of the cephalothorax carries paired, stalked eyes, antennules and antennae. The antennules consist of a 3-segmented stem and two, less commonly three, flagella.

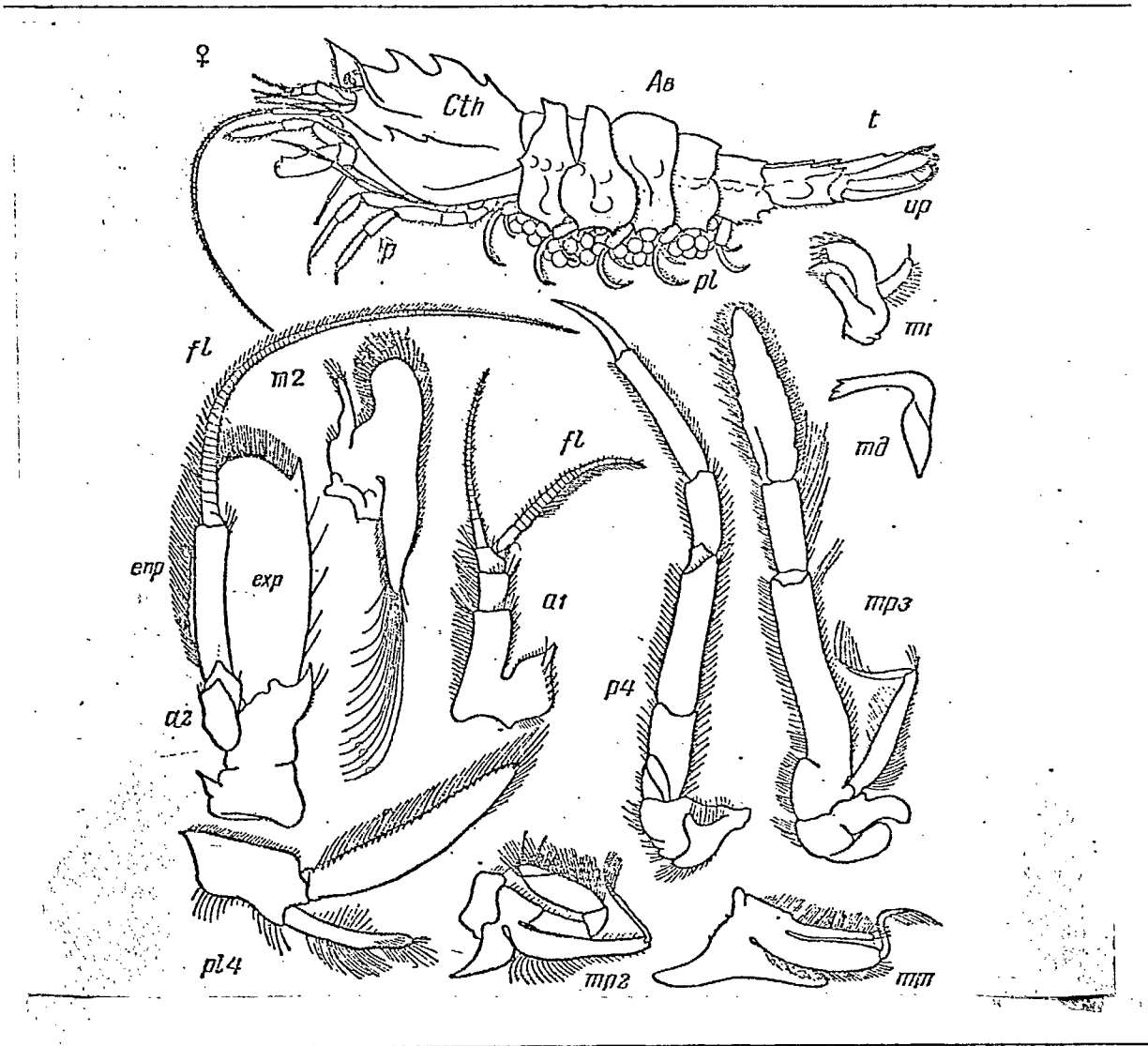


Fig. 34 Decapoda (*Sclerocrangon ferox*).

♀ - side view of female, Ab - abdomen, Cth - cephalothorax, a1 - antennule, a2 - antenna, enp - endopodite, exp - exopodite, fl - flagellum, m1 - maxillula, m2 - maxilla, md - mandible, mp1 - first maxilliped, mp2 - second maxilliped, mp3 - third maxilliped, p - thoracopods, p4 - fourth thoracopod, pl - pleopods, pl4 - fourth pleopod, t - telson, up - uropods.

The antennae consist of a stem in 2-5 segments and a multiarticulate flagellum; in many species a process (exopodite) called the scaphocerite or squama, which resembles a spine or broad plate with a thickened outer edge bearing a tooth on the distal end, extends from the second segment of the stem. The mouth parts are formed by the mandibles, maxillulae, maxillae and three pairs of maxillipeds. The last five pairs of appendages of the cephalothorax are pereopods. In a typical case, e.g., in members of the *Macrura* group (fig. 34), they consist of seven segments; the most clearly demarcated articulation is observed between the meropodite and carpopodite. In the majority of *Anomura* and *Brachyura* the basipodite and meropodite of the pereopods are fused together, due to which the legs consist of six segments. The pereopods of mature individuals are almost always uniramous, exopodites (330) being present only in a very small number of species. Gill appendages extend from the basal segments of the pereopods; gill appendages may also be present on the lateral surface of the thoracic segments. The first pair of pereopods are almost always supplied with chelae (chelipeds); in many species chelae are present on other legs as well. In structure we distinguish between the true chela and the false chela. The true chela (chela) is formed by two parallel fingers of equal length, of which the movable one is the last segment of the leg (dactylopodite) and the immovable one is formed by a long process (pollex) of the second last segment (propodite). The proximal part of the propodite from its base to the line passing through the articulation of the propodite with the dactylopodite is called the palma. In the false chela (sub-chela) the immovable finger is represented by a short process stemming from one of the corners of the anterior margin of the expanded propodite; the movable finger (dactylopodite), which is articulated to the opposite corner of the propodite, pushes against its anterior edge when bent, touching the immovable finger

only with its tip. The abdominal appendages of Macrura consist of five pairs of biramous pleopods which are used for swimming and one pair of uropods. The pleopods of Anomura are reduced and are present on only some of the abdominal segments; uropods are almost always present. In Brachyura uropods are lacking altogether.

All Decapoda are dioecious, hermaphroditism being observed in rare cases only. The eggs that the females carry on their pleopods for a more or less lengthy period of time develop into larvae which lead a free mode of life. During the development of decapods, various larval stages are formed, among which we distinguish the stage of nauplius, metanauplius, "protozoëa", "zoëa", the mysis stadium and decapodite stadium. However, the development process does not always include all these stages, some are bypassed. Below (p. 24) we present keys to the larval stages of Decapoda and descriptions of the larvae of certain species.

The order Decapoda falls into four suborders which are characterized by the following features:

Suborder Macrura natantia (shrimps). Body more or less highly compressed laterally; abdomen longer than cephalothorax, with well-developed epimera. Rostrum almost always present. Antennae with large scaphocerites and long flagella. Pereopods long and slender. Pleopods biramous, adapted for swimming. Body integuments slightly calcareous. Suborder includes the best swimmers among decapods.

Suborder Macrura reptantia (lobsters and crayfish). Similar to members of preceding suborder in form of body. Distinguished by highly calcareous body integuments, as well as by strongly developed chelipeds (those encountered in northern seas of the USSR). Lead benthic mode of life.

Suborder Anomura. Form of body diverse. Abdomen elongate, or

flattened and bent under cephalothorax, or ~~sac~~ular and thin-walled. Scaphocerites usually present. First pair of pereopods bear chelae; fifth pair of pereopods always differs from third pair in size. Uropods usually, though not always, present. Crabs belonging to suborder Anomura (Lithodidae) distinguished from true crabs by the fact that the last pair of pereopods are highly reduced and bent under the cephalothorax, which gives these crabs (sometimes called craboids\*) the appearance of having four pairs of legs; this feature makes it easy to distinguish "octopod" craboids from true decapod crabs.

Suborder Brachyura (crabs). Cephalothorax highly expanded and flattened. Abdomen small, flattened, lacking uropods, bent under cephalothorax and, therefore, invisible from above. Antennules and antennae poorly developed. Body integuments highly calcareous. Typical bottom dwellers, only a few species able to swim.

The Decapoda of the northern seas of the USSR have been studied more or less in detail. The Barents Sea is the most abundant in decapods.

Decapoda are an important food for various types of organisms, including commercial species of fish. The diet of cods consists primarily of shrimps (Pandalus borealis and Sabinea septemcarinata); bottom fish feed on crabs and hermit crabs.

Key to genera of Decapoda encountered (331)  
in northern seas of the USSR

- 1 (2) Abdomen soft, unsegmented; organisms live in mollusk shells.....  
.....Pagurus
- 2 (1) Abdomen segmented..... 3

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\* This word, coined by L. G. Vinogradov, has not achieved popular acceptance, so the species below are more likely to be called "crab" (Russian-English Dictionary for Students of Fisheries and Aquatic Biology by W.E. Ricker).

- 3 (38) Abdomen elongate, with well-developed uropods..... 4
- 4 (5) Last four pairs of pereopods with exopodites.....Hymenodora
- 5 (4) Pereopods lacking exopodites..... 6
- 6 (7) Third pair of pereopods with chelae; organisms similar in appearance to freshwater crayfish.....Nephrops
- 7 (6) Third pair of pereopods lacking chelae..... 8
- 8 (35) Abdomen considerably longer than cephalothorax; epimera of second abdominal segment expanded and partially cover epimera of first and third abdominal segments..... 9
- 9 (12) First pair of pereopods cuspidate..... 10
- 10 (11) Rostrum not shorter than carapace..... Pandalus
- 11 (10) Rostrum not longer than half of carapace..... Pandalina
- 12 (9) First pair of pereopods with well-developed chelae..... 13
- 13 (26) First pair of pereopods terminate in true chelae with two parallel fingers..... 14
- 14 (15) Carpopodite of second pair of pereopods divided into two secondary segments.....Caridion
- 15 (14) Carpopodite of second pair of pereopods divided into large number of secondary segments..... 16
- 16 (17) Rostrum broad and short, with three cuspidate spines (one median and two lateral) on end..... Bythocaris
- 17 (16) Rostrum narrow, without lateral spines..... 18
- 18 (19) Terminal segments of last three pairs of pereopods smooth along lower edge..... Spirontocarella
- 19 (18) Terminal segments of last three pairs of pereopods bear spines along lower edge..... 20
- 20 (23) Anterior part of carapace bears one or several supraorbital spines on each side..... 21



- 21 (22) Carapace bears two supraorbital spines on each side (sometimes the one on the edge of the orbit is small and barely visible).....Spirontocaris
- 22 (21) Carapace bears one supraorbital spine on each side.....Hetairus
- 23 (20) Anterior of carapace lacking supraorbital spines (spines present only at base of scaphocerites and on anterior lower corners of carapace)..... 24
- 24 (25) Rostrum long, not less than  $\frac{3}{4}$  length of scaphocerites....Eualus
- 25 (24) Rostrum short, not longer than one-third of scaphocerites.....  
.....Heptacarpus
- 26 (13) First pair of pereopods terminate in subchelae (movable finger bends toward anterior edge of expanded propodite)..... 27
- 27 (28) Eyes almost concealed in tubular sheath formed by expansions of frontal margin of carapace.....Nectocrangon
- 28 (27) Eyes free..... 29
- 29 (30) Second pair of pereopods lacking chelae.....Sabinea
- 30 (29) Second pair of pereopods terminate in small chelae..... 31
- 31 (32) Second pair of pereopods considerably shorter than first pair..... Pontophilus
- 32 (31) Second pair of pereopods do not differ in length from first pair..... 33
- 33 (34) Dorsal surface of carapace lacking ornament, smooth.... Crangon
- 34 (33) Dorsal surface of carapace with more or less sharply defined ornament..... Sclerocrangon
- 35 (§) Abdomen approximately equal in length to cephalothorax; epimera of second abdominal segment not expanded..... 36
- 36 (37) Rostrum triangular, with three pairs of lateral spines..... Galathea (332)

- 37 (36) Rostrum subulate, with one long supraorbital spine on each side..... Munida
- 38 (3) Abdomen bent under cephalothorax; uropods lacking..... 39
- 39 (40) Fifth pair of pereopods very short, concealed under carapace, due to which organisms appear to have four pairs of legs...Lithodes
- 40 (39) Fifth pair of pereopods do not differ greatly in size from other pairs of legs..... 41
- 41 (42) Rostrum long and sharp..... Macropodia
- 42 (41) Rostrum short and obtuse.. . . . . 43
- 43 (44) Length of carapace considerably greater than width..... Hyas
- 44 (43) Length of carapace approximately equal to width.....Chionoecetes

Suborder Macrura natantia

Family H o p l o p h o r i d a e Faxon

Genus H y m e n o d o r a Sars

Hymenodora glacialis (Buckholz) (plate LXXXVII, 1)

Rostrum short; flagella of antennae very long. Length 50-80 mm.

Bathypelagic species. Encountered in Polar basin, as well as in

Bering Sea and Sea of Okhotsk.

Family P a n d a l i d a e Bate

Genus P a n d a l u s Leach

Key to Pandalus species encountered in northern seas of the USSR

- 1 (2) End of rostrum lacking teeth along top for not more than one-third of its length.....P. borealis
- 2 (1) About one-half of rostrum lacking teeth..... 3
- 3 (4) Third segment of abdomen smooth..... P. annulicornis
- 4 (3) Third segment of abdomen with ridge..... P. goniurus

Pandalus borealis Krøyer (plate LXXXVII, 2)

Rostrum narrow, almost straight, slightly curved upward; more than  $\frac{1}{2}$  length of carapace. Number of teeth on upper edge, including teeth of

dorsal ridge of carapace, which begins slightly before its middle, varies from 12 to 16; last 4-5 teeth belong to carapace. Only most terminal part of rostrum (not more than one-third of its length) lacks teeth. Lower edge of rostrum bears 7-8 teeth which diminish in size distally, 2 small denticles on its end. Posterior end of third abdominal segment bears obtuse process. Telson carries longitudinal row of teeth (varying in number from 7 to 12) on each side; of the four apical teeth present both inner ones shorter than outer ones. Eyes large; black spot ("accessory eye") observed near inner edge of faceted part on dorsal side. Antennules bear two approximately equal flagella; proximal part of outer flagellum considerably thicker than distal part. Antennae with long flagellum exceeding length of entire body, highly brittle and so easily broken off. Supraorbital spines lacking, spines present only at base of scaphocerites and on anterior lower corner of carapace. First two pairs of maxillipeds lamellose, biramous. Third pair of maxillipeds without exopodites, resemble walking legs. First pair of pereopods with sharp ends formed by cuspidate fingers of microscopically small chelae. Second pair of pereopods differ in length; left pereopod with carpopodite of approximately 50 secondary segments is considerably longer than right pereopod with approximately 20-24 secondary segments in carpopodite. Living specimens usually red; antennal flagella with alternating red and white parts. Length up to 125-145 mm. (333)

P. borealis belongs to group of boreo-arctic species. Frequently encountered in vast numbers in deeper layers of water in Barents Sea. Reproduces in winter. Extremely rare in White and Kara seas.

Variety P. borealis var. edenticulatus Retowsky, characterized by absence or poor development of teeth on upper edge of rostrum, observed in northern part of Kara Sea.

Pandalus annulicornis Leach (= P. montagui Leach)

(plate LXXXVII, 3)

Distinguished from preceding species by armature of rostrum, having 9-12 spinelike teeth on top and 5-6 teeth below; almost entire anterior half of upper edge of rostrum without teeth, only end bears two denticles. Telson with 6 pairs of lateral spines. Length 70-90 mm (up to 160 mm).

Boreal species, encountered in Barents and White seas. Variety P. annulicornis var. tridens Rathbun encountered in Bering Sea.

Pandalus goniurus Stimpson (plate LXXXVII, 4) Boreal, Pacific species. Encountered in Chukch<sup>;</sup> and in Far Eastern seas.

Genus P a n d a l i n a Calman

Pandalina brevirostris (Rathke) (plate LXXXVII, 5) Carpopodite of right pereopod of second pair divided into four secondary segments. Length up to 33 mm. Boreal species. Encountered in western part of Barents sea.

Family H i p p o l y t i d a e OrtmannGenus S p i r o n t o c a r i s BateKey to Spirontocaris species encounteredin northern seas of the USSR

- 1 (2) Upper plate of rostrum located above axis considerably narrower than lower plate..... S. turgida
- 2 (1) Width of upper plate of rostrum equal to or greater than that of lower plate..... 3
- 3 (4) Axis of rostrum straight; upper plate of rostrum finely serrate..  
.....S. murdochi
- 4 (3) End of axis of rostrum curved upward; upper plate of rostrum with more or less large teeth..... 5
- 5 (6) Teeth of carapace and upper edge of rostrum do not form regular arcuate line in profile ..... S. arcuata

- 6 (5) Teeth of carapace and upper edge of rostrum do not form regular arcuate line..... 7
- 7 (8) Teeth of carapace begin almost at very posterior edge of cephalothorax..... S. spinus
- 8 (7) Teeth of carapace begin approximately one-third of length of cephalothorax away from posterior margin of latter....S. securifrons  
Spirontocaris (Hippolyte) spinus (Sowerby)

(plate LXXXVII, 6)

Rostrum knifelike, expanded in the form of a plate at the top and bottom, with median axis curved upward at end and commonly projecting in the form of a distinct peak, below which there is a fairly large semicircular notch. Ridge of carapace, which begins almost at the very posterior edge of cephalothorax, bears 4-5 high teeth curved anteriorly like a sickle and frequently with fine serration along upper edge; cephalothorax highly convex in profile. Upper edge of rostrum with small teeth or fine serration; lower edge smooth or with few teeth. Nature of serration and shape of rostrum end highly variable. Anterior of carapace with four spines on each side, of which two supraorbital ones are located behind the eye orbit, the third at the base of the scaphocerite and the fourth on the anterior lower corner of the carapace. Posterior edge of third segment of abdomen on dorsal side bears uncinata process overlapping adjacent segment. Length up to 50-60 mm. (334)

Arctic, sublittoral species. Frequently encountered in Barents and White seas.

S. spinus var. intermedius Makarov (plate LXXXVII, 7) encountered in Chukcha, Bering and Okhotsk seas. Distinguished by lower carapace, the teeth of which form an almost regular straight line, and by the small size of the notch at the end of the rostrum under the axial spine.

Spirontocaris (Hippolyte) securifrons (Norman)(=S. lilljeborgi Danielssen) (plate LXXXVII, 8)

Very similar to preceding species with which it was previously confused. Distinguished by following features. Teeth of carapace begin approximately one-third of length of cephalothorax away from posterior edge of latter instead of at the very edge; these teeth are sharp and usually smooth, smaller than in S. spinus, and gently curved toward the anterior. Posterior edge of third abdominal segment without large process.

Boreal species. Encountered in western part of Barents Sea.

Spirontocaris (Hippolyte) turgida (Kröyer)(=S. phippi Kröyer) (plate LXXXVII, 9)

Rostrum straight, knifelike, slightly narrowed toward base. Lower plate considerably wider than upper one. Ridge of carapace, which begins approximately at middle of cephalothorax, bears 3-4 narrow teeth obliquely directed toward the anterior. Upper edge of rostrum with 6-9 teeth, lower edge with 4-7 teeth. Each side of carapace carries four spines arranged similarly to those in S. spinus; anterior supraorbital spine at edge of orbit small and barely visible. Telson with 5-6 pairs of spines. Males distinguished by narrow rostrum and almost complete absence of teeth on carapace. Length up to 52 mm.

S. turgida belongs to group of Arctic, circumpolar species. Encountered in coastal areas of all northern and Far Eastern seas of USSR.

Spirontocaris arcata Rathbun (plate LXXXVII, 10)Spirontocaris murdochi Rathbun (plate LXXXVII, 11)

Both Pacific, boreal species encountered in Chukcha and Far Eastern seas (besides these, several other Spirontocaris species are encountered in Far Eastern seas).

Genus H e t a i r u s BateHetairus (Spirontocaris=Hippolyte) polaris (Sabine)

(plate LXXXVIII, 1)

Rostrum equal to carapace in length; upper edge almost straight, teeth of lower edge closer to end of rostrum. Anterior of carapace with three spines on each side, first spine behind eye orbit, second at base of scaphocerite, third on anterior lower corner of carapace. Telson with 6-8 pairs of spines. Males distinguished by absence of teeth on upper edge of rostrum. Length up to 40-70 mm.

Arctic-boreal species, widely distributed in sublittoral of all northern and Far Eastern seas of USSR (several other Hetairus species encountered in Far Eastern seas). Reproduces in Barents Sea in July-August.

Genus E u a l u s ThallwitzEualus (Spirontocaris=Hippolyte) gaimardi

(335)

(Milne-Edwards) (plate LXXXVIII, 2-4)

Rostrum knifelike, slightly curved upward, begins in the form of a ridge in anterior third of carapace. Front of carapace with two spines on each side, first spine at base of scaphocerite, second spine on anterior lower corner of carapace; supraorbital spines lacking.

Among the most common members of the family Hippolytidae encountered in northern seas of the USSR. Two varieties differing in a number of characteristics from type-form distinguished.

Eualus gaimardi typ. (plate LXXXVIII, 2)

Rostrum in females usually shorter, scaphocerite longer in males. Carapace with 2-3 dorsal teeth; rostrum with 3-6, mostly 4 teeth, at the top, 2-6 teeth at the bottom. Telson usually with 5-6 pairs of lateral spines. Posterior edge of third abdominal segment lacking process in females, in rare cases with insignificant process in males. Length of

females up to 58 mm, length of males up to 41 mm.

Encountered in sublittoral of Barents and White seas.

Eualus gaimardi var. gibba (Kröyer) (plate LXXXVIII, 3)

Rostrum in females approximately equal in length to scaphocerites, rostrum in males longer than scaphocerites. Carapace with 2-3 dorsal teeth; rostrum with 4-6, mostly 5 teeth, at the top, 2-4 teeth at the bottom. Telson usually with 5-7 pairs of lateral spines. Posterior edge of third abdominal segment in females without process, obtuse process present in males. Length of females up to 66 mm, length of males up to 55 mm.

Encountered along Spitsbergen coast and western shores of Novaya Zemlya.

Eualus gaimardi var. belcheri (Bell)

(plate LXXXVIII, 4)

Rostrum in females and males usually considerably longer than scaphocerites. Carapace with 2-4 dorsal teeth; rostrum with 4-10, mostly 6 teeth, at the top, 3-6 teeth at the bottom. Telson usually with 7-9 pairs of lateral spines. Posterior edge of third abdominal segment with well-developed process in females, with sharp unciniate process in males. Length of females up to 70 mm, length of males up to 57 mm.

Encountered in eastern part of Barents Sea and in all seas along northern coast of Siberia.

Several other Pacific species, besides E. gaimardi, are encountered in the Chukcha<sup>1</sup> Sea [E. suckleyi (Stimpson), E. fabricii (Kröyer), E. camtschatica (Stimpson)].

Genus H e p t a c a r p u s Holmes

Heptacarpus (Spirontocaris=Hippolyte) pusiola

(Kröyer) (plate LXXXVIII, 5)

Rostrum spinelike, shorter than eyestalks, with broad base and ridge beginning on anterior  $\frac{1}{4}$  of carapace. Carpopodite of second pair of



pereopods subdivided into seven secondary segments. Supraorbital teeth lacking on carapace. Distal end of basal segment of antennular stem bears spine on top. Telson with 6 pairs of spines. Length up to 20-25 mm.

Amphiboreal species. Encountered in Barents, Chukcha and Far Eastern seas.

Genus S p i r o n t o c a r e l l a Brashnikov

Spirontocarella macilenta (Kröyer) (plate LXXXVIII, 6)

Length up to 40 mm. Common form in Chukcha Sea, also encountered in Far Eastern seas.

Genus C a r i d i o n Goës

(336)

Caridion gordonii Bate (plate LXXXVIII, 7)

Mandibular palp 3-segmented. Supraorbital teeth lacking on carapace. Length up to 27 mm.

Boreal species. Encountered in western part of Barents Sea.

Genus B y t h o c a r i s Sars

Key to Bythocaris species encountered in

northern seas of the USSR

- 1 (2) Median spine of rostrum longer than lateral spines...B. simplicirostris
- 2 (1) Median spine of rostrum not longer than lateral spines...B. payeri

Bythocaris simplicirostris Sars (plate LXXXVIII, 8)

Median spine of rostrum longer than eyestalks. Ridge on carapace begins near middle of latter, bears two small denticles. Carpopodite of second pair of pereopods subdivided into 12 secondary segments. Length up to 40 mm.

Encountered in western part of Barents Sea and Spitsbergen region.

Bythocaris payeri (Heller) (plate LXXXVIII, 9)

Rostrum shorter than eyestalks. Ridge of carapace poorly developed and lacking denticles. Carpopodite of second pair of pereopods subdivided into 9 secondary segments. Length up to 50 mm.

Rare, deep-sea species, encountered in Barents Sea, Spitsbergen region and in vicinity of Franz Josef Land.

One specimen of Bythocaris irene Retowsky encountered in northern part of Kara Sea. Distinguished from other species by presence of highly undeveloped, obtuse rostrum and by absence of spine on outer edge of scaphocerites.

Family C r a n g o n i d a e Bell

Genus C r a n g o n Fabricius

Key to Crangon species encountered in

northern seas of the USSR

- 1 (2) Sixth segment of abdomen on dorsal side smooth.....C. crangon
- 2 (1) Sixth segment of abdomen on dorsal side with two sharp longitudinal ridges..... 3
- 3 (4) Rostrum equal in length to scales confining eye orbits externally..... C. allmanni
- 4 (3) Rostrum noticeably longer than scales..... C. dalli

Crangon crangon (Linné) (= C. vulgaris

Fabricius) (plate LXXXIX, 1)

Rostrum equal to eyestalks in length. Carapace bears three spines, one dorsal and two lateral, inserted at the same level. Length up to 55-75 mm.

Frequently encountered in freshened areas of coastal region of White Sea, less common in Barents Sea. Boreal species.

Crangon allmanni Kinahan (plate LXXXIX, 2)

Rostrum extends only to midlength of eyestalks. Carapace bears three spines, one dorsal spine and two lateral ones slightly anterior to the first. Length up to 100 mm.

Boreal species. Encountered in sublittoral of Barents and White seas.

Crangon dalli Rathbun (plate LXXXIX, 3)

(337)

Length up to 50 mm. Boreal, Pacific species. Encountered in Chukcha and Far Eastern seas.

Genus N e c t o c r a n g o n BrandtNectocrangon lar (Owen) (plate LXXXIX, 4)

Length up to 95 mm. One of the most common species of Chukcha Sea, also encountered in Far Eastern seas. Pacific species.

Genus S c l e r o c r a n g o n SarsKey to Sclerocrangon species encountered innorthern seas of the USSR

- 1 (2) Median ridge of carapace with two teeth.....S. communis
- 2 (1) Median ridge of carapace with 3-5 teeth..... 3
- 3 (4) Epimera of second and third abdominal segments with two teeth on lower margin on each side ..... S. ferox
- 4 (3) Epimera of second and third abdominal segments with one tooth inserted on posterior corner of lower margin on each side....S. boreas

Sclerocrangon boreas (Phipps) (plate LXXXIX, 5)

Rostrum broadly triangular, slightly longer than eyestalks, with rounded process directed downward between eyes at the bottom. Top of carapace bears large ridge with 3-4 large and obtuse teeth in old individuals and 4-5 sharp, anteriorly directed teeth in young forms; one smooth ridge terminating in sharp spine at front extends along each side of carapace. Posterior corners of epimera of second and third abdominal segments terminate in short teeth. Length up to 90 mm.

Arctic, widely distributed species. Encountered in Barents, White, Kara, Chukcha and in Far Eastern seas.

Sclerocrangon ferox (Sars) (plate LXXXIX, 6, fig. 34)

Rostrum narrow, considerably longer than eyestalks, expanded in the shape of a knife, but without a process, at the base between the eyes. Top

of carapace bears ridge with three broad and sharp teeth; one ridge ending in two spines at the front extends along each side of carapace. Epimera of second, third and fourth abdominal segments with two teeth on lower margin, epimera of fifth segment with 3-4 sharp teeth. Length up to 130 mm. Arctic species. Encountered in Barents and Kara seas.

Sclerocrangon communis (Rathbun) (plate LXXXIX, 7)

Length up to 50 mm. Encountered in Chukch<sup>i</sup> and in Far Eastern seas (several more Pacific species of the genus Sclerocrangon are encountered in Far Eastern seas).

Genus P o n t o p h i l u s Leach

Pontophilus norvegicus (M. Sars) (plate LXXXIX, 8)

Rostrum slightly longer than eyestalks. Top of carapace bears five longitudinal ridges; median ridge with three large teeth, median lateral ridges each with two teeth, external lateral ridges each with one tooth. Length up to 75 mm.

Boreal species, encountered in western part of Barents Sea and Spitsbergen region. Deep-sea species.

Genus S a b i n e a Owen

(338)

Key to Sabinea species encountered in  
northern seas of the USSR

- 1 (2) Rostrum obtuse..... S. septemcarinata  
2 (1) Rostrum sharp..... S. sarsi

Sabinea septemcarinata (Sabine) (plate LXXXIX, 9)

Rostrum somewhat longer than eyestalks. Carapace with seven longitudinal serrated ridges, median ridge usually bears 4-5 teeth directed anteriorly. Telson rounded on end, with several spinules along edge. Length up to 70-80 mm.

Widely distributed Arctic species. Encountered in sublittoral of all northern seas of USSR. Reproduces in Barents Sea in June-July.

Sabinea sarsi Smith (plate LXXXIX, 19)

Rostrum noticeably longer than eyestalks, with longitudinal costella tapered to a point at upper end. Carapace with seven longitudinal ridges, median ridge usually bears 7-8 teeth directed anteriorly. End of telson spinelike. Length up to 72 mm.

Boreal species. Encountered in Barents Sea and Spitsbergen region.

Suborder Macrura reptantia

Family N e p h r o p s i d a e Stebbing

Genus N e p h r o p s Leach

Nephrops norvegicus (Linné) (plate LXXXIX, 11)

Chelae of first pair of pereopods elongate, prismatic. Scaphocerites lamellose. Length of females 160-180 mm, length of males 120-140 mm.

Encountered in western part of Barents Sea.

Suborder Anomura

Family G a l a t h e i d a e Dana

Genus G a l a t h e a Fabricius

Galathea strigosa (Linné) (plate XC, 1)

Rostrum triangular, with 3-4 teeth on each side. Surface of carapace with transverse grooves bearing short hairs. Chelipeds spined and hairy. Fifth pair of pereopods small, with small chelae. Telson with deep notch. Length up to 44 mm.

Extremely rare species, encountered in western part of Barents Sea.

Genus M u n i d a Leach

Munida bamffica (Pennant) (=M. rugosa Sars)

(plate XC, 2)

Rostrum resembles sharp spine; shorter supraorbital spines along

sides. Chelipeds very long and narrow. Fifth pair of pereopods small. Telson with notch. Length up to 48 mm.

Rare boreal species. Encountered in Barents Sea.

Family P a g u r i d a e Dana

(339)

Paguridae, the hermit crabs, which live in mollusk shells, are distinguished by a soft, asymmetrical abdomen, most commonly spiral-shaped. Pleopods developed only on one side. Uropods have verrucous surfaces which serve to keep the organism within the shell. Fourth and fifth pairs of pereopods rudimentary.

Species of only one genus, Pagurus, are encountered in northern seas of the USSR.

Genus P a g u r u s Fabricius

Key to Pagurus species encountered in

northern seas of the USSR

- |   |     |  |                        |
|---|-----|--|------------------------|
| 1 | (2) | Upper surface of palma of right chela covered with long sharp spines and long hairs.....   | <u>P. capillatus</u>   |
| 2 | (1) | Upper surface of palma of right chela covered with short spines; hairs short or lacking.....   | 3                      |
| 3 | (4) | Upper surface of palma of right chela covered with small and obtuse granules which give it a shagreen appearance; hairs barely noticeable..... | <u>P. bernhardus</u>   |
| 4 | (3) | Upper surface of palma of right chela covered with prickly granules; hairs almost lacking or short, arranged in bundles.....                   | 5                      |
| 5 | (6) | Entire surface of carapace hard.....   | <u>P. splendescens</u> |
| 6 | (5) | Only front part of carapace hard.....  | 7                      |
| 7 | (8) | Fingers of left chela not curved downward.....   | <u>P. pubescens</u>    |
| 8 | (7) | Fingers of left chela strongly curved downward on distal ends.....   | <u>P. rathbuni</u>     |

Pagurus (Eupagurus) pubescens Kröyer (plate XC, 3)

Front part of carapace greater in length than width. Eystalks almost cylindrical, with very weakly defined coarctation in middle. Top of right chela covered with prickly granules, with bundles of short hairs anterior to their bases. Length of right chela almost twice greater than its maximum width. Propodite of left chela with longitudinal ridge, carpopodite with two longitudinal rows of spines along edges of upper surface. Tips of all segments of walking legs red. Length up to 100 mm. Lives in shells of Buccinum, Neptunea and other mollusks.

Amphiboreal species. Encountered in Barents, White, Chuk<sup>ca</sup><sub>4</sub> and also Far Eastern seas; extremely rare in Kara Sea.

Pagurus (Eupagurus) bernhardus (Linné) (plate XC, 4)

Length and width of front part of carapace usually the same. Eye-stalks short, sharply defined coarctation in middle. Surface of right chela covered with tiny obtuse granules which imparts shagreen appearance; in middle of palma larger granules form two oblique lines converging at base of movable finger. Length of right chela approximately  $1\frac{1}{2}$  times greater than its maximum width. Propodite of left chela lacking longitudinal ridge. Length up to 100 mm.

Boreal species. Encountered in western half of Barents Sea.

Pagurus splendescens Owen

Pagurus rathbuni (Benedict)

Pagurus capillatus (Benedict)

All three species encountered in Chukcha Sea and in Far Eastern seas.

Family L i t h o d i d a e Bouvier

Genus L i t h o d e s Latreille

Lithodes maja (Linné) (plate XC, 5)

Body crab-shaped, highly calcareous. Carapace broad, covered with spines. Rostrum long, bears eight spines, biramous on end. Scaphocerites

rudimentary. Pereopods with long spines. Right chela larger than left (340)  
 one. Body of young individuals covered with numerous spines, traces of  
 which remain in the form of tubercles on carapace in mature individuals.  
 Abdomen short and broad, bent under cephalothorax, asymmetrical in females.  
 Pleopods in females rudimentary, paired on first abdominal segment, present  
 only on left side of other segments; uropods lacking. Pleopods and uropods  
 lacking in males. Length of carapace up to 145 mm.

Largest member of Decapoda encountered in northern seas of USSR,  
 boreal species. Encountered in sublittoral of Barents Sea and Spitsbergen  
 region.

Suborder Brachyura

Family Majidae Alcock

Genus Hyas Leach

Key to Hyas species encountered in northern  
seas of the USSR

- 1 (2) Cephalothorax barely expanded behind external corners of  
 eye orbits..... H. araneus
- 2 (1) Cephalothorax highly expanded behind external corners of eye  
 orbits, as a result of which a deep coarctation is formed in  
 upper third of carapace.....H. coarctatus

Hyas araneus (Linné) var. hoekii Birula

(plate XCI, 1)

Cephalothorax gradually expands posteriorly; outer edges behind eye  
 orbits slightly expanded and curved somewhat. Length of rostrum, consist-  
 ing of two closely contiguous lobes, equal to or less than its width at  
 base (rostrum longer in type form). Length of palma of chelipeds from its  
 base to articulation with movable finger always less than latter. Pereopods  
 cylindrical. Red in colour. Length of cephalothorax up to 70-100 mm.



H. araneus var. hoeki belongs to group of Arctic-boreal species. Encountered in Barents and White seas, eastward to Karskiye Vorota and Yugorskiy Shar.

Hyas coarctatus Leach (plate XCI, 2)

Cephalothorax highly expanded posteriorly; outer edges behind eye orbits resemble spherical expansions; behind these cephalothorax very narrow, a deep coarctation separating head from thoracic part. Length of palma of chelipeds from its base to articulation with movable finger may be greater (usually in males) or smaller than latter.

Type form, H. coarctatus typ. (plate XCI, 2), with carapace up to 35-40 mm in length, encountered in Barents Sea.

Variety H. coarctatus var. alutaceus Brandt (plate XCI, 3) distinguished from type form by larger body size (length of carapace up to 50-80 mm) and shorter rostrum equal to 1/7-1/9 length of carapace (1/4-1/6 length of carapace in typical form). Encountered from New Siberian Islands to Chukcha Sea, as well as in Far Eastern seas.

Genus C h i o n o e c e t e s Kröyer

Chionoecetes opilio (Fabricius) (plate XCI, 4)

Cephalothorax spherical. Rostrum with two lobes separated by wide triangular notch. Pereopods long, flattened. Length of cephalothorax up to 126 mm, width up to 128 mm.

Encountered in Chukcha and in Far Eastern seas.

Genus M a c r o p o d i a Leach

(341)

Macropodia (Stenorhynchus) rostrata (Linné)

(plate XCI, 5)

Carapace triangular, drawn out in long rostrum anteriorly. Eyes on long stalks, protruding far out of almost parallel orbits. Front part of cephalothorax separated from posterior part by coarctation. Top of carapace

bears two spines, one in front of coarctation, the other at posterior end of carapace.

Rare, boreal species. Encountered in Barents Sea.

Key to larval stages of Decapoda encountered in  
northern seas of the USSR<sup>1</sup>

- |    |      |  |                          |
|----|------|--|--------------------------|
| 1  | (4)  | Carapace with one dorsal and two lateral spines.....   | 2                        |
| 2  | (3)  | Telson notch deep; each lobe holds three setae and two<br>spines.....  | Hyas (p. 344)            |
| 3  | (2)  | Telson notch shallow; each lobe holds five setae....   | <u>Chionoecetes</u>      |
| 4  | (1)  | Carapace lacking dorsal and lateral spines.....  | 5                        |
| 5  | (8)  | Abdomen with one or several (unpaired) long dorsal spines.....   | 6                        |
| 6  | (7)  | Abdomen with one long dorsal spine.....  | <u>Pontophilus</u>       |
| 7  | (6)  | Abdomen with several (unpaired) long dorsal spines...  | <u>Nephrops</u>          |
| 8  | (5)  | Abdomen lacking long dorsal spines (only short dorsal spines<br>present in some species).....                          | 9                        |
| 9  | (16) | Posterior margin of carapace with more or less deep notch.....   | 10                       |
| 10 | (13) | Inner edge of notch of carapace smooth.....  | 11                       |
| 11 | (12) | Rostrum not less than $\frac{1}{2}$ length of carapace.....  | <u>Pagurus</u> (p. 343)  |
| 12 | (11) | Rostrum less than $\frac{1}{2}$ length of carapace.....  | <u>Lithodes</u> (p. 343) |
| 13 | (10) | Inner edge of notch of carapace with spines.....   | 14                       |
| 14 | (15) | Lateral ends of notch of carapace drawn out into long spines,<br>reaching at least end of third abdominal segment..... | <u>Munida</u>            |
| 15 | (14) | Lateral ends of notch of carapace extend at most to end of second<br>abdominal segment.....                            | <u>Galathea</u>          |
| 16 | (9)  | Posterior end of carapace straight or slightly concave.....  | 17                       |

<sup>1</sup>Development of Bythocaris simplicirostris Sars and Sclerocrangon boreas (Phipps), which have large eggs, takes place without metamorphosis.

- 17 (18) All segments of abdomen with one or two pairs of lateral spines..... Sabinea (p. 343)
- 18 (17) Lateral spines lacking or present only on last abdominal segment..... 19
- 19 (22) Supraorbital spines lacking at all stages..... 20
- 20 (21) Last abdominal segment with short lateral spines....Crangon (p. 342)
- 21 (20) Abdomen without spines ..... Sclerocrangon (p. 343)
- 22 (19) Supraorbital spines present (lacking in first stage only in certain species)..... 23
- 23 (24) Endopodites of front pairs of legs with expanded terminal segments..... Caridion
- 24 (23) Terminal segments of endopodites of legs not expanded..... 25
- 25 (26) Fifth abdominal segment without dorso-lateral spines.....  
.....Pandalus (p. 342)
- 26 (25) Fifth abdominal segment with dorso-lateral spines (lacking in Heptacarpus) ..... Spirontocaris s.l. (p.342)

Description of larval stages of some species  
of Decapoda encountered in northern seas of the USSR

(342)

Larval stages of Pandalus borealis Kröyer

(plate LXXXVII, 2 lar. 1, 3, 7)

Apparently, seven larval and several postlarval stages in all. 1st stage: rostrum without teeth; eyes immovable; supraorbital spines lacking; antennules 2-segmented, antennae with 1-segmented endopodites; endopodites of second pair of maxillipeds unsegmented, those of third pair 5-segmented; all pereopods rudimentary, curved at base, first three pairs biramous, last two pairs uniramous; telson expanded on end, bilobed, not separated from last abdominal segment. Length approximately 5 mm. 2nd stage: eyes movable, supraorbital spines present; antennules with 3-segmented stem and rudimentary

flagella; antennae with 2-segmented endopodites; first three pairs of pereopods long, long, with multiarticulate endopodites, last two pairs short, without exopodites; pleopods rudimentary. Length approximately 8 mm. 3rd stage: rostrum with two small teeth at base; all pereopods well developed, with rudimentary gills at base; uropods with short endopodites; telson separated from last abdominal segment. Length approximately 10 mm. 4th stage: rostrum with four teeth at base; pleopods biramous, with unsegmented rami; uropods with almost equal rami; telson with almost parallel lateral edges, with three pairs of lateral and five pairs of apical spines. Length approximately 12 mm. 5th stage: rostrum with 11-12 teeth (4-5 on carapace); flagellum of antennae multiarticulate; all pereopods of equal length; second pair of pereopods with rudimentary chelae; pleopods with setae. Length approximately 14 mm. 6th stage: rostrum with 14 teeth; last three pairs of pereopods considerably longer than front ones; second pair of pereopods with well-developed chelae; telson with almost straight posterior margin. Length approximately 15 mm. 7th stage (or 1st postlarval stage): top of rostrum with 15 teeth, bottom with 5 teeth; supraorbital spines lacking; left pereopod of second pair longer than right one; exopodites of first three pairs of pereopods reduced; telson with two pairs apical spines. Length approximately 17 mm.

Larval stages of Pandalus annulicornis Leach

(plate LXXXVII, 3 lar. 3, 7)

Similar to developmental stages of preceding species. Distinguished by smaller size, as well as shorter rostrum and longer exopodites on pereopods. Length of 1st stage about 5 mm, 2nd stage 5-6 mm, 3rd stage 7-8 mm, 4th stage 9 mm, 5th stage 10 mm, 6th stage 12-13 mm.

Larval stages of Spirontocaris s. l.

The larval stages of Spirontocaris species, as well as those of related genera Eualus, Hetairus and Hepatacarpus as encountered in northern

seas of the USSR are almost completely unknown; descriptions have been carried out for only certain developmental stages which cannot always be applied to a given species with full certainty.

The general characteristics are as follows: rostrum short, not longer or only slightly longer than eyes; carapace with small supraorbital spines; fifth abdominal segment with dorso-lateral spines (lacking in larvae of Heptacarpus pusiola); anal spine present; telson usually expanded distally, with seven pairs of different-length spines on end (spines of equal length in larvae of Hetairus polaris); endopodite of antennae spinelike (endopodite with additional spine stemming from outer edge in larvae of Spirontocaris securifrons, additional spine lacking in larvae of Eualus gaimardi); exopodites present on two, three (in larvae of Spirontocaris turgida) or four pairs of pereopods. First stage does not exceed 3-4 mm. Up to nine larval stages in certain species, development shorter in northern species.

Larval stages of Crangon crangon (Linné)

(plate LXXXIX, 1 lar.)

Five larval (mysid) stages and one postlarval stage in all. Larval stages characterized by presence of small but sturdy dorsal spine directed posteriorly on posterior end of third abdominal segment; fifth abdominal segment elongated into cuspidate teeth along sides; rostrum sharp and thin; lateral edges of carapace with 1-3 denticles in front; long exopodites of maxillipeds and first pair of pereopods used for swimming. 1st stage: pereopods lacking. 3rd stage: first pair of pereopods with exopodites, remaining pairs rudimentary; uropods present. 4th stage: pleopods rudimentary. 5th stage: pleopods biramous. Postlarval stages distinguished by absence of exopodites on pereopods and spines on abdomen. Length (Norwegian Sea): 1st stage 1.8-2.2 mm, 2nd stage 2.8 mm, 3rd stage 3.4 mm, 4th stage 3.8 mm, 5th stage 4.5-4.7 mm. (343)

Larval stages of Crangon allmanni Kinahan

(plate LXXXIX, 2 lar.)

Distinguished from corresponding larval stages of preceding species by absence of dorsal spine on third abdominal segment and by small size of lateral spines on fifth abdominal segment.

Larval stages of Sclerocrangon ferox (Sars)

(plate LXXXIX, 6 lar.)

Larvae emerging from eggs have highly inflated and smooth cephalothorax and perfectly smooth abdomen, all pairs of pereopods and pleopods present. Dactylopodites of last two pairs of pereopods highly developed and used for attachment to maternal organism. Length (Norwegian Sea) 11 mm. Larva with spines on abdominal segments forms after moult.

Larval stages of Sabinea septemcarinata (Sabine)

(plate LXXXIX, 9 lar.)

Two larval stages. Characterized by presence of sharp lateral spines on abdominal segments; two pairs of spines on second abdominal segment; spines of last abdominal segment directed posteriorly. 1st stage: maxillipeds with long exopodites; all pairs of pereopods and pleopods rudimentary. 2nd stage: first pair of pereopods with exopodites; uropods present. Size (Barents Sea) of 1st stage 11.0-11.7 mm, 2nd stage 13.0-14.5 mm.

Larval stages of Pagurus bernhardus (Linné)

(plate XC, 4 d, e)

Apparently, only two larval stages and one postlarval stage. Larval stages characterized by presence of notch on posterior end of carapace and long rostrum exceeding length of carapace. 1st stage: two pairs of maxillipeds, uropods lacking. 2nd stage: three pairs of maxillipeds, uropods present. Postlarval stage (stage of glaucothoe) distinguished by presence of asymmetrical chelipeds and uropods, leads planktonic mode of life at night. Length (Norwegian Sea) of 1st stage 3.5 mm, 2nd stage 8 mm,

postlarval stage 4 mm.

Larval stages of Pagurus pubescens Kröyer

(plate XC, 3 c)

Larval stages similar to corresponding stages of preceding species. Distinguished by shorter rostrum, as well as by presence of long lateral spines on fifth abdominal segment; posterior edges of carapace elongated into long spines.

Larval stages of Lithodes maja (Linné)

(plate XC, 5 b)

1st larval stage: carapace with large lateral lobes directed toward posterior and exterior; rostrum short, not exceeding  $\frac{1}{2}$  length of carapace; abdominal segments with spines on posterior margin; two pairs of maxillipeds used for swimming. Last larval stage: three pairs of maxillipeds used for swimming, rudimentary pleopods. Length (Norwegian Sea) of 1st stage 6 mm, last stage 8 mm.

Larval stages of Hyas coarctatus Leach (plate XCI, 1 c) (344)

Two larval stages (zoëa) and one postlarval stage (megalopa). 1st zoëa: rostrum, dorsal and both lateral spines covered with spicules. Antennae with rudimentary endopodite and long process covered with spicules equal in length to rostrum; exopodite of antennae less than  $\frac{1}{2}$  length of prickly process. First two pairs of maxillipeds used for swimming, remaining appendages rudimentary. 2nd zoëa: endopodite of antennae developed. Megalopa: crab-shaped body, compressed dorsoventrally, with straight abdomen. Rostrum consists of three spines, median one twice longer than lateral ones. Dorsal spine of carapace long, reaches third abdominal segment. All limbs developed, pleopods used for swimming. Length (Atlantic) of 1st zoëa 1.8 mm, 2nd zoëa 3.5 mm, megalopa 3.4 mm.

Larval stages of Hyas araneus (Linné)

(plate XCI, 1 c)

Stage of zoëa similar to corresponding stages of preceding species. Megalopa distinguished by shorter dorsal spine of carapace and by less distinct differences in length of rostrum spines.

#### CLASS PANTOPODA - PYCNOGONIDS

By Z.S. Bronshtein

A highly distinctive class of purely marine Arthropoda which stand out among the other arthropods.

The body of pantopods consists of a trunk bearing a proboscis and appendages, and abdomen.

The trunk is either distinctly segmented, in which case it is clearly seen that it is separated into four segments, or else the demarcation between the segments is completely or partially obliterate. The anterior ocular segment of the trunk, unlike all the others, is formed as a result of the fusion of several segments. The dorsal side of this segment carries an ocular tubercle which usually bears four small eyes. The constriction which separates the anterior segment from the second one is called the neck.

The massive cylindrical proboscis which extends anteriorly from the trunk terminates in a mouth. The abdomen is unsegmented, poorly developed, rod-shaped or slightly expanded distally, in the region of the anus.

The class is characterized by extremely long and powerful appendages (as compared with the trunk) and by the fact that the digestive and reproductive systems extend from the trunk into the appendages.

The body of pantopods has a maximum of 8 pairs of appendages; there are no appendages on the abdomen.

1st pair - chelicerae, consist of three or two segments and usually bear chelae; they may be rudimentary or absent altogether (fig. 35, 1, 2).

2nd pair - palps. Number of segments varies; maximum number 10. Like the chelicerae, they may be rudimentary or absent altogether.



3rd pair - ovigerous legs (ovigers). Frequently supplied with flat spines arranged in 1-2 or several rows or randomly on 7-10 segments of these legs. The male carries the egg masses emitted by the female in the ovigerous legs. The eggs remain on these legs until the larvae hatch out.

4th -7th pairs (8th pair an exception). Attached to special extensions of the trunk and consist of 8 segments.

The legs often bear various types of spines and hairs. The spines on the lower side of the segments (primarily applicable to the eighth segment only, on the sole and closer to the base of the segments are called basal spines; those on the middle part of the sole are median spines, and those on the end of it terminal spines. The eighth segment sometimes has a special process known as a heel.

There is a tarsal claw consisting of a main claw and accessory claws on the end of the eighth segment.

The length of the animal is measured from the anterior end of the proboscis to the posterior end of the abdomen; the width is measured between the ends of the longest pair of legs when extended. (345)

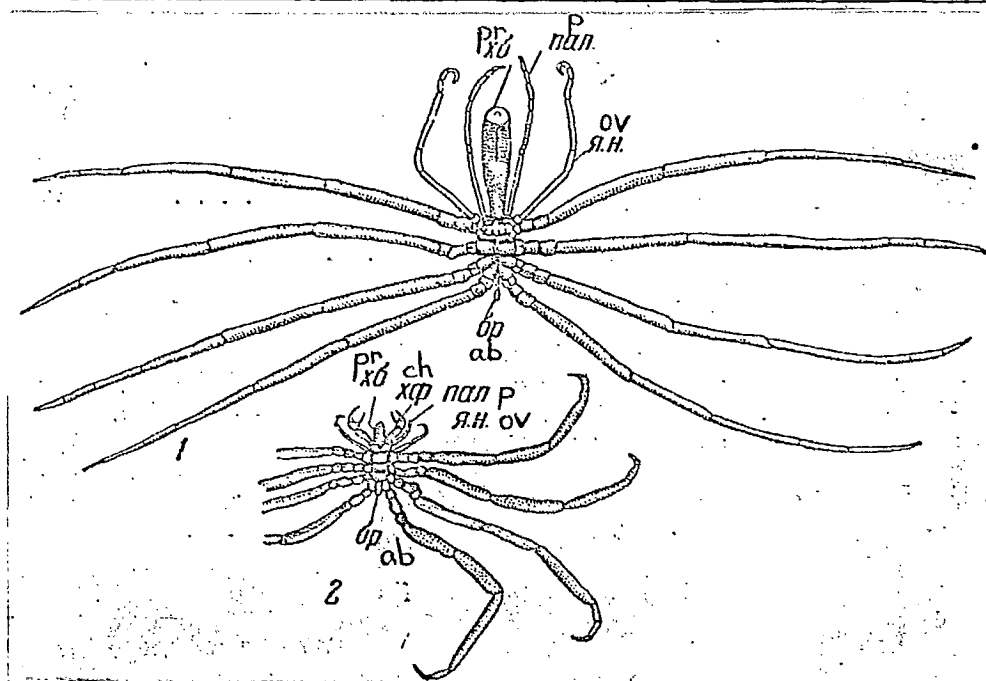


Fig. 35. 1 - Colossendeis proboscidea; 2 - Boreonymphon robustum; pr - proboscis, ch - chelicerae, p - palps, ov - oviger, ab - abdomen

Pantopoda are benthic arthropods. Many of them live only at more or less considerable depths (up to 2000 m and more), but some are exclusively littoral species.

Pantopods feed on the polyps of hydroids and anemones which they wrench off with the chelicerae and suck up with the proboscis.

Key to families of the class Pantopoda

encountered in northern seas of the USSR

- |    |      |   |                  |
|----|------|---|------------------|
| 1  | (8)  | Chelicerae (1st pair of appendages) present.....  | 2                |
| 2  | (5)  | Palps (2nd pair of appendages) consist of not less than 5 segments.....   | 3                |
| 3  | (4)  | Chelicerae and their chelae well developed; palps 5- or 7-segmented; third pair of appendages 10-segmented in both sexes.....   | Nymphonidae      |
| 4  | (3)  | Chelicerae poorly developed with underdeveloped chelae or chelae absent altogether; palps in 6-10 segments, third pair of appendages present in both sexes.....   | Ammonotheidae    |
| 5  | (2)  | Palps consist of less than 5 segments or absent altogether.....   | 6                |
| 6  | (7)  | Third pair of appendages in both sexes 10-segmented. Chelicerae well developed, 2- or 3-segmented; palps in 1-4 segments or absent altogether.....  | Pallenidae       |
| 7  | (6)  | Third pair of appendages present only in males, in 5-9 segments. Chelae on chelicerae well developed; palps lacking.....  | Phoxichilidiidae |
| 8  | (1)  | Chelicerae lacking.....   | 9                |
| 9  | (10) | Palps lacking. Third pair of appendages present only in males, 9-segmented.....   | Pycnogonidae     |
| 10 | (9)  | Palps present, well developed, 10-segmented, longer than proboscis. Chelicerae absent altogether or in the form of rudimentary tubercles. Third pair of appendages present in both sexes, 10-segmented..... | Collossendeidae  |

Family N y m p h o n i d a e Wilson

(346)

Key to genera of the family Nymphonidae

encountered in northern seas of the USSR

- 1 (4) Ocular tubercle usually well defined. Eyes developed..... 2
- 2 (3) Body elongate, slender, smooth, legs long, slightly pubescent.....Nymphon
- 3 (2) Body broad, pupescent on top; legs highly pubescent...Chaetonymphon
- 4 (1) Ocular tubercle rudimentary. Eyes lacking.....Boreonymphon

Genus B o r e o n y m p h o n G.O. Sars

Boreonymphon robustum Bell (fig. 35, 2)

(only species)

Body thick, sturdy, expanded medially, segments distinct. Neck short, narrow. Ocular tubercle very small, paddle-shaped. No trace of eyes. Fingers of chela highly curved, forming an almost regular circle. Length 22 mm, width 154 mm. Encountered at depths of 120-150 m and greater. Primarily Arctic, almost circumpolar form. Most common in Kola Gulf, encountered in vast numbers at depths of 32-170 m. Not observed in White Sea.

Genus N y m p h o n Fabr.

Key to groups and species of Nymphon encountered

in northern seas of the USSR

Pycnogonids belonging to the genus Nymphon can be divided into the following four groups depending on the form and location of the spines on the sole of the eighth segment of the legs:

- 1 (2) Only small hairlike spines cover entire surface of sole of 8th..... segment.....3rd group
- 2 (1) Besides small spines, sole of 8th segment also bears large spines..... 3

- 3 (4) Basal part of sole of 8th segment of legs (propodus) bears large spines; similar spines present on median part of sole of 8th segment. Distal part of 8th segment (farthest from body with small spines only.....1st group
- 4 (3) Large spines only on median or distal part of sole of 8th segment of legs..... 5
- 5 (6) Only median part of sole of 8th segment of legs bears large spines, spines small on distal and basal part.....2nd group
- 6 (5) Large spines on distal part of sole of 8th segment, sometimes also present on median part; only small spines present on basal part.....4th group

Species of 1st group

- 1 (10) Main claw of legs equal to approximately  $\frac{1}{2}$  of eighth segment in length..... 2
- 2 (3) Seventh segment of legs short, proboscis very short, ocular tubercle obtusely conical. In palps second segment equal to or less than 3rd segment ( $2 \leq 3$ ); 4th segment considerably smaller than 5th one ( $4 \ll 5$ ). Length 2.5-3 mm, width 15-17 mm.....N. brevirostre Hodge (plate XCII, 1b, c, e). Boreal form. Listed for Murman Coast and Kanin Nos.
- 3 (2) Seventh segment fairly long, slightly shorter than eighth one; proboscis of average length..... 4
- 4 (5) Ocular tubercle flatly spherical. Neck short. Palps:  $2 \geq 3$ ;  $4 \leq 5$ . Length 3 mm, width 20 mm..... N. brevitarse Kröyer (plate XCII, 2 a, b, f). Arctic, almost circumpolar form. Encountered at depths of 12-1504 m.
- 5 (4) Ocular tubercle conical, sharply conical or with elongate sharp apex..... (347) 6

- 6 (7) Ocular tubercle sharply conical, neck long. Palps:  $2 = 3$ ;  $4 \ll 5$ .  
Length up to 4.5 mm, width up to 22 m.....N. rubrum  
Hodge (plate XCII, 3 a, b, d, f). Boreal form, but distributed in  
northern regions. Encountered at depths 6-164 m. Listed for White  
Sea (amidst Rhodophyceae and Phaeophyceae in vicinity of Solovets-  
kiye Islands).
- 7 (6) Ocular tubercle conical or with elongate sharp apex..... 8
- 8 (9) Ocular tubercle conical; neck of average length. Palps:  $2 < 3$ ;  $4 \ll 5$ .  
Length up to 6 mm, width 54 mm.....N. grossipes (Fabr.)  
(plate XCII. 4) Arctic, circumpolar form. Encountered at depths  
of 4-1466 m. Listed for White Sea.
- 9 (8) Ocular tubercle with elongate sharp apex; neck elongate. Palps:  
 $2 \leq 3$ ;  $4 \leq 5$ .....N. mixtum Kröyer (plate XCI, 5 b, c e).  
Arctic-boreal form. Common in Kola Gulf, also listed for White Sea.
- 10 (1) Main claw of legs long (slightly shorter than 8th segment), access-  
ory claws small, 7th segment longer than 8th one. Flat spines of  
ovigers with basal teeth and numerous tiny denticles. Neck of  
average length. Ocular tubercle sharply conical. Palps:  $2 < 3$ ;  
 $4 < 5$ . Length 7-8 mm, width 66 mm.....N. sluiteri  
Hoek (plate XCIII, 1b, c, d) Arctic form. Encountered at depths  
of 40-1444 m. Listed for Kola Gulf.

Species of 2nd group

- 1 (2) Seventh segment of legs almost twice longer than 8th segment. Neck  
long. Ocular tubercle on apex, obtusely spherical. Palps:  $2 - 3$ ;  
45. Length 6 mm, width 64 mm.....N. longitarse  
Kröyer (plate XCIII, 2b, c, e) Arctic, circumpolar form. Listed  
for Kola Gulf and White Sea.

- 2 (1) Seventh segment slightly longer than eighth one, ocular tubercle obtusely conical. Flat spines of ovigers with small number (6-7) of medium-sized teeth. Palps:  $2 \leq 3$ ;  $4 \leq 5$ . Length 5 mm, width 45 mm.....N. microrhynchum  
G. O. Sars Arctic form. Listed for Kara and White seas.

Species of 3rd group

- 1 (2) Main claw on legs less than  $\frac{1}{2}$  and more than  $\frac{1}{3}$  length of eighth segment. Legs  $3\frac{1}{2}$  times longer than body; seventh segment shorter than 8th one. Flat spines of ovigers with two pairs of basal spines and small number of large teeth. Ocular tubercle low with rounded apex. Palps:  $2 = 3$ ;  $4 \leq 5$ . Length 3 mm, width 22 m....N. micronix  
G. O. Sars (plate XCIII, 3d). Arctic form. Listed for White Sea.
- 2 (1) Main claw on legs approximately  $\frac{1}{2}$  length of 8th segment and even considerably longer. Legs 5 times longer than body;  $7 > 8$ .
- 3 (4) Flat spines on ovigers vary in form on one segment: either without basal teeth with 8-9 fairly large denticles, or with two pairs of basal teeth and broad, barely marked denticles. Ocular tubercle fairly high, commonly with two lateral extensions. Main claw of legs more than  $\frac{1}{2}$  length of eighth segment, accessory claws small. Palps:  $2 = 3$ ;  $4 \leq 5$ . Length 6.5 mm, width 62 mm....N. leptocheles  
G. O. Sars (plate XCIII, 4b, c, d, e). Arctic-boreal form, encountered at depths of 9-1264 m. Barents Sea.
- 4 (3) Flat spines on ovigers of same form..... 5
- 5 (6) Flat spines on ovigers without basal teeth, with very small denticles. Ocular tubercle low, with flatly truncated or rounded apex. Main claw barely reaches or does not reach halfway point of segment; accessory claws small. Palps:  $2 \geq 3$ ;  $4 \geq 5$ . Length 15 mm, width (348)

150 mm.....N. stroemii Krøyer (plate XCIII, 5b, c, d, e, f)

Arctic-boreal form. Encountered at depths of 20-534 m. Quite common in Kola Gulf. Encountered on various bottoms, but prefers muddy ones.

- 6 (5) Flat spines on ovigers large and serrated, with numerous large denticles lacking basal teeth. Ocular tubercle high, with flatly truncated apex. Accessory claws of legs equal to  $\frac{2}{3}$  of ocular claw. Chelicerae slender, long. Chelae very long; both fingers end in curved tip. Length 8 mm, width 85 mm.....N. macrum Wilson (plate XCIII, 6b, c, d, e, f). Arctic-boreal form. Encountered at depths of 9-1264 m. Barents Sea.

Species of 4th group

Main claw of legs equal to  $\frac{1}{2}$  length of eighth segment, accessory claws to  $\frac{1}{2}$  of main claw;  $7 \approx 8$ ; legs 5 times longer than body. Flat spines of ovigers with tiny denticles. Three sharply conical tubercles at midline of dorsum. Ocular tubercle with obtusely rounded apex. Palps:  $2 > 3$ ,  $4 > 5$ . Length 12 mm, width 117 m.....N. serratum G.O. Sars (plate XCIV, 1b, c, e, f). Arctic form. Encountered at depths of 49-490 m. Listed for Kola Gulf.

Genus Chaetonymphon G.O. Sars

Key to Chaetonymphon species encountered in northern seas of the USSR

- 1 (2) Body oval, ocular tubercle without lateral tubercles; main claws of legs  $1\frac{1}{2}$  times shorter than eighth segment or less than  $\frac{1}{2}$  its length. Basal part of chelicerae elongate-oval; 8th segment of legs expanded in basal part. Length 6 mm, width 33 mm....Ch. hirtum Krøyer Arctic-boreal form. Encountered at depths of 22-1844 m. Listed for White Sea.

- 2 (1) Body form, ocular tubercle and main claw of legs as in preceding species. Basal part of 2nd segment of chelicerae expanded distally. Eighth segment of legs uniformly narrowed distally. Length 8-11 mm, width 50-70 mm.....Ch. spinosum Goodsir. Arctic, almost circumpolar form. Depths up to 1500 m. Very common in Kola Gulf where it is encountered in vast numbers.

Family P a l l e n i d a e Wilson

Key to genera of the family Pallenidae

encountered in northern seas of the USSR

- 1 (2) Proboscis conical with mamillary appendage at apex and corolla of setae around mouth. Chelae 2-segmented, chelicerae short, thick, lacking teeth along inner edges. Palps lacking. In males 5th segment on ovigers with paddle-shaped process on distal end; 4 terminal segments also bear serrated smooth-edged spines arranged in one row. Claws serrated. Fourth segment of legs in females highly inflated, same segment in males with numerous openings of adhesive glands. 8th segment with individual basal spines, accessory claws lacking.....Pseudopallene
- 2 (1) Proboscis cylindrical with mamillary appendage, without corolla of setae around mouth. Chelae of 2-segmented chelicerae very short and thick; lamellar extension, serrated or smooth, on inner margin of immovable finger of chelae. Palps lacking. Ovigerous leg 10-segmented; its 5th segment with paddle-shaped process on distal end. Four terminal segments each carry one row of lamellar cuspidate spines; terminal serrated claws present. 4th segment of legs in females only slightly inflated or slightly wider than in males..... Cordilochelle



Genus P s e u d o p a l l e n e WilsonPseudopallene circularis Goodsir

Body almost clypeate, distinctly segmented, 2nd and 3rd segments carry spinelike processes in middle of dorsal surface. Proboscis shorter than ocular segment, cylindrically conical. Mouth surrounded by corolla of setae. Ocular tubercle low, obtusely spherical. Chela short, Inner margin of movable finger smooth. Ovigerous legs not longer than body. Legs slightly more than twice longer than body, yellowish brown. Length 3.5 mm, width 19 mm.

Arctic form; depths of 10-400 m. Listed for Kola Gulf and White Sea.

Pseudopallene spinipes Fabr.

Distinguished from P. circularis by less expanded body, with smooth dorsal surface, without spinelike processes, by longer legs (4 times longer than body), and by a number of other less significant characteristics. Length 4.5 mm, width 39 mm.

Arctic form; depths of 6-380 m. Listed for White Sea and Kola Gulf.

Genus C o r d i l o c h e l l e G.O. SarsCordilochelle brevicollis G.O. Sars

Body oval, ocular segment shorter than remaining part of trunk. Proboscis cylindrical, rounded on end, almost as long as ocular segment. Ocular tubercle very low, rounded, eyes developed. Immobile finger of chelae with lamellar unserrated expansion, inner margin of movable finger smooth. Palps lacking. Lanceolate, broad, cuspidate, flat spines of oviger lacking teeth, only with undulate edges. Legs almost four times longer than body. Length 10 mm, width 80 mm..

Arctic form. Encountered at depths of 12-650 m. Listed for Kola Gulf.

Family Phoxichilidiidae SarsKey to genera of the family Phoxichilidiidaeencountered in northern seas of the USSR

- 1 (2) Ocular tubercle located slightly anterior to middle. Chelicerae strong and contracted.....Phoxichilidium
- 2 (1) Ocular tubercle located on anterior end of cephalic segment. Chelicerae weak and slender.....Anoplodactylus

Genus Phoxichilidium RathkePhoxichilidium femoratum (Rathke) (plate XCIV, 2a, g)

Body smooth, fairly strong and thick. Ocular segment shorter than following two segments. Proboscis does not exceed  $\frac{1}{2}$  length of remaining part of trunk, cylindrical. Ocular tubercle low, obtusely conical. Chelicerae longer than proboscis, smooth, first segment cylindrical, overlaps end of proboscis and slightly curved inward. Ovipiger in male not longer than body (without proboscis); all its segments curved; three uncinatae spines on fifth segment. Legs  $2\frac{1}{2}$  times longer than body, slightly pubescent; main claw more than  $\frac{1}{2}$  length of 8th segment; accessory claws small. Length up to 4 mm, width 26 mm. From reddish to brown in colour.

Arctic-boreal form, encountered at depths up to 200 m. Listed for Kola Gulf and White Sea.

Genus Anoplodactylus Wilson

(350)

Anoplodactylus petiolatus (Kröyer)

Ocular segment equal to following three segments in length. Ocular tubercle very high, cylindrical, with conical apex and slightly protruding corners. Chelicerae longer than proboscis. Ovipigerous legs equal to length of body without proboscis. Legs slightly more than twice longer than body; main claw slightly shorter than 8th segment, accessory claws rudimentary, barely visible. Length 2 mm, width 10 mm. Males smaller than females.

Boreal species, listed for Kola Gulf.

Family A m m o t h e i d a e Dohrn

Key to genera of the family Ammotheidae

encountered in northern seas of the USSR

- 1 (2) Proboscis consists of two distinctly separate parts: cylindrical main part and spindle-shaped or ovate terminal part bent under abdomen with mouth directly posteriorly.....Eurycyde
- 2 (1) Proboscis not divided into two parts, narrowed at base, obliquely directed downward.....Ammothea

Genus E u r y c y d e Schiödte

Eurycyde hispida Kröyer (plate XCIV, 3)

Only species belonging to this genus. First pair of appendages 3-segmented. Chelae of mature forms resemble rudimentary appendage with process on it. Main claw of legs lacking accessory claws. Ocular tubercle high and located in middle of dorsal side of ocular segment. Length without proboscis 2.5 mm, width 10 mm.

Arctic form. Encountered at depths of 100-400 m. Listed for Kola Gulf.

Genus A m m o t h e a Hodge

Ammothea borealis Schomk (plate XCIV, 4)

Eighth segment of legs without individual basal spines on sole. Ovipigerous legs without serrated spines. Proboscis oval, almost equal in length to trunk, flatly truncated in front. Chelicerae 2-segmented with two small tubercles on top of 2nd segment; chelae sometimes also preserved in mature males. Main claw of legs not longer than 1/3 of 8th segment, accessory claws equal to 2/3 of main claw. Length 5 mm, width 25 mm.

Arctic form. Encountered at depths of 16-40 m. Listed for White Sea.

Ammothea echinulata Hodge (plate XCIV, 5)

Eighth segment of legs with individual basal spines on sole. Ovigerous legs carry serrated spines. Legs densely covered with hairs and spines. 2nd segment of legs in males has two pairs of conical tubercles with one spine each. Palps: 2 > 4. Yellowish in colour. Length 2 mm, width 7 mm.

Boreal form. Listed for White Sea.

Ammothea laevis Hodge (plate XCIV, 6)

Eighth segment as in A. echinulata. Oviger also with serrated spines. 2nd segment of legs without tubercles. Palps: 2 > 4. Length 1.5 mm, width 6 mm.

Boreal form. Encountered at depths of 35-55 m. Listed for White Sea.

Family P y c n o g o n i d a e Wilson (351)

Genus P y c n o g o n u m Brünnich

Pycnogonum littorale Ström

Five conical tubercles on dorsal side of body. Proboscis almost equal to  $\frac{1}{2}$  length of body and directed more or less horizontally; beginning cylindrical, end conical. Chelicerae and palps absent. Ovigerous legs present only in males, short, barely reach last segment of body. Legs shorter than body, thick and strong; main claw equal to  $\frac{1}{2}$  length of 8th segment, no trace of accessory claws. Females: length 15 mm, width 26 mm. Males smaller.

Most likely of boreal origin, but thrives quite well in colder waters. Quite common in Kola Gulf at depths up to 380 m. Encountered in warmer seas and in littoral, as name indicates.

Family C o l o s s e n d e i d a e Hoek

Genus C o l o s s e n d e i s Jarzynsky

Colossendeis proboscidea Sabine (fig. 35, 1)

Body quite large compared with other pantopods: up to 50 mm long (without proboscis) and 225 mm wide. Proboscis of enormous size, more than

twice longer than trunk (without abdomen); anterior part highly expanded (twice thicker than trunk) and slightly curved and directed obliquely downward. Proboscis conical at base. Ocular tubercle sharply conical, lacking distinct eyes. Chelicerae absent altogether. Palps 10-segmented, longer than proboscis. Ovigerous legs twice longer than proboscis. Length of legs in females more than twice longer than body. Main claw equal to  $\frac{2}{3}$  of eighth segment. Bright red or reddish yellow in colour.

Arctic form. Encountered at depths of 35-2206 m. Listed for Kola Gulf.