

DETO (Guerin).

The body is somewhat depressed, and the animal cannot roll itself into a perfect ball. The lateral parts of the thorax are expanded, and the third to fifth segments of the abdomen have well-developed side portions.

Rock Louse. *Deto marina* (Chilton). (marine).

The body is suboval, a little more than twice as long as wide. The front margin of the head is trilobed, the antero-lateral projections being very broad, and the median lobe triangular. There are tubercles on the upper surface of the head and thorax. In the male these elevations are numerous, acute, and in general much more pronounced than in the female, in which they are more irregularly arranged, sparser, and not very conspicuous. The second antennae are about one-third the length of the body in the female; somewhat longer in the male; they are slender in both sexes, with the fifth joint rather longer than the third and fourth joints together. The flagellum has the fourth joint much smaller than any of the other three, which are subequal in length. In the female the protopod of the uropods reaches to the level of the apex of the telson, and the outer branch is not longer than the protopod. The uropods are much more elongate in the male, their bases extending well beyond the apex of the telson. The outer branch in this sex is twice as long as the protopod. The third, fourth, and fifth segments of the abdomen have the lateral parts prominent, with acute apices. A young female is illustrated. Length: 11 mm., or $\frac{7}{16}$ in. (S.A.M.)

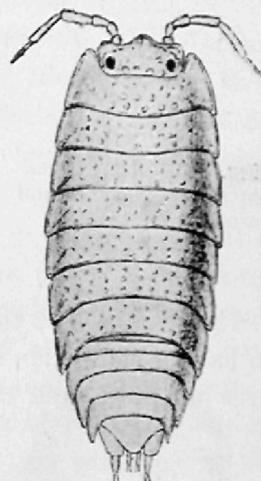


FIG. 339.—*Deto marina* (after Chilton, x 8).

This species is found on the underside of stones, etc., at about high-tide level, on rocky and exposed portions of our coasts. When disturbed, it is slow and sluggish in movement, and is thus easily captured. On the south coast of Kangaroo Island the Rock-lice is found in the same haunts as the very active *Ligia*.

ACTAECIA (Dana).

Beach Pill-bug. *Actaecia pallida* (Nicholls and Barnes). (pale).

The body is convex, suboval in shape, and twice as long as broad, and is covered with small, scattered spines. The front margin of the head is rounded, with the edge slightly elevated. The second antennae are not very long, and are well armed with small spines; the four-jointed flagellum is a little shorter than the last joint of the peduncle. The peduncle of each uropod is flattened, broad, and rectangular in shape; the small outer ramus is inserted on the upper surface of the peduncle, and projects slightly beyond its posterior margin; the short and slender inner branch is situated on the underside of the base. The colour is white, with brown markings. Length: 7 mm., or $\frac{2}{32}$ in. (S.A.M.)

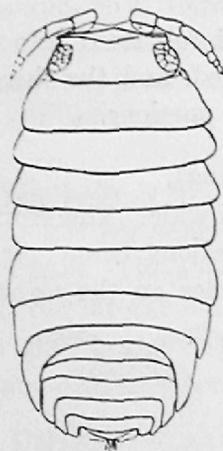


FIG. 340.—*Actaecia pallida* (after Nicholls and Barnes, x 7).

This species is not uncommon on the coasts of southern, south-western, and south-eastern Australia, where it is found on clean, sandy beaches; its colour harmonises perfectly with the white or grey surface over which it moves. On the south coast of Kangaroo Island, in places where the damp sand has compacted, I have noticed numbers of examples retreating into small burrows when alarmed, but whether the animals were responsible for the holes was not ascertained. When disturbed, the creature commonly curls itself into a ball, and often is then rolled away over the smooth beach by the wind. Owing to the small size of this Pill-bug, and its protective colouration, it is very difficult to rediscover a specimen which has thus eluded capture.

Family LIGIIDAE.

The members of this family differ from all our other terrestrial Isopods in having more than six joints in the flagellum of the second antennae. The eyes are large, and the molar process of the mandibles is well developed.

LIGIA (Fabricius).

Swift Beach Louse. *Ligia australiensis* (Dana). (Australian).

The body is suboval, more than twice as long as wide. The head is large, with the anterior margin not lobed, and the eyes are conspicuous. The second antennae are very long and slender, with the flagellum longer than the peduncle, and composed of many elongate articles. In the male, which is illustrated, each antenna is much longer than the body, exclusive of the uropods. The hinder margin of the telson is triangulate, and there are two small, acute processes on each lateral margin. The uropods are very long, each with two slender branches. The colour is slaty-grey. Length: 12.5 mm., or $\frac{1}{2}$ in. (S.A.M.)

This easily recognised species lives on the sea-shore, on mud flats, or amongst rocks by the sea. On the south coast of Kangaroo Island, and on other rocky

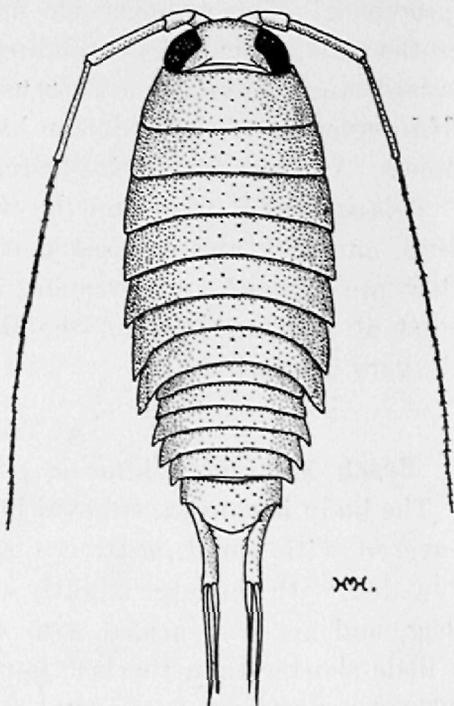


FIG. 341.—*Ligia australiensis* (x 5).

coasts, scores of individuals are disturbed when large stones are overturned. The creatures are difficult to capture, as they travel very quickly to the nearest cover when alarmed.

Chapter IX.—Order TANAIIDACEA.

The small species included in this order were at one time classed as Amphipods and, more recently, as Isopods, but are now placed in a separate order of the division Peracarida. The body is as in the majority of the Isopoda, that is to say, it is flattened from above or is somewhat cylindrical. As indicated in the key to the orders (pp. 25-26), our representatives of this order have a small carapace formed by the uniting of two of the thoracic somites with the head, leaving free only six segments of the thorax. Isopods of the family Serolidæ, and some of the family Idoteidæ, also have only six free thoracic somites, but in many other respects are quite unlike the Tanaidacea. In the last-named the eyes, if developed, are generally elevated on short immovable stalks; the first pair of thoracic appendages are modified as maxillipeds, and the remaining seven pairs as legs with a small coxal joint. The first maxillæ have a bent-down one or two jointed palp, and the second maxillæ have a small palp (Apseudidæ) or the whole appendage is rudimentary (Tanaidæ). The first legs almost always have a complete pincer, or chela, and are larger than the others. The telson is fused with the last abdominal segment. All five pairs of pleopods may be present or some or all may be absent. The uropods are attached at the end of the abdomen and have thin thread-like branches.

Respiration.—The sides of the small carapace shut in a gill-chamber on each side, in which is accommodated a more or less developed epipod of the maxilliped. This approaches the respiratory apparatus described for the next order—the Cumacea—but in the Tanaidacea the exopod, or outer branch, of the maxilliped is not developed or at most is represented by an infinitesimal projection. The sides of the carapace are supplied with blood-vessels and the epipod of the maxilliped fans water through the branchial chamber; tiny exopods which are developed on the first two pairs of legs of some species assist in maintaining this current.

Reproduction and Development.—The sexes often differ considerably. The chelæ of the first legs are commonly larger in the male than in the female, and are of different shape. Sometimes the pleopods, while well developed in the male, are reduced or absent in the female.

The eggs and young are carried in a pouch formed of one or five pairs of brood-plates; the juveniles commence independent life with the seventh pair of legs undeveloped.

The order includes two very different families, a representative of each of which is described below. One or two other unrecorded species occur in St. Vincent Gulf.

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| a. First antennæ with two flagella or lashes | APSEUDIDÆ. |
| aa. First antennæ with only one lash | TANAIDÆ. |

Family APSEUDIDAE.

The carapace usually has a distinct rostral projection and the body is depressed, with the abdomen narrower than the thorax. The first antennae have two lashes and the second pair a long flagellum and often a small scale or exopod. The first legs are large and chelate, and the second have the last three joints flattened for burrowing; exopods are commonly developed on one or both of the first two pairs of legs.

APSEUDES (Leach).

Apseudes australis (Haswell). (southern).

The depressed body has the segments wider than long. The cephalothorax is produced in front to form an acute, triangular rostrum. The side-plates of the thorax and abdomen bear long, rather sparse hairs, many of which are plumose. The basal joint of the first antennae is large, three times as long as the second, and the third joint is very small; the main lash is about as long as the peduncle and the accessory flagellum is two-thirds as long.

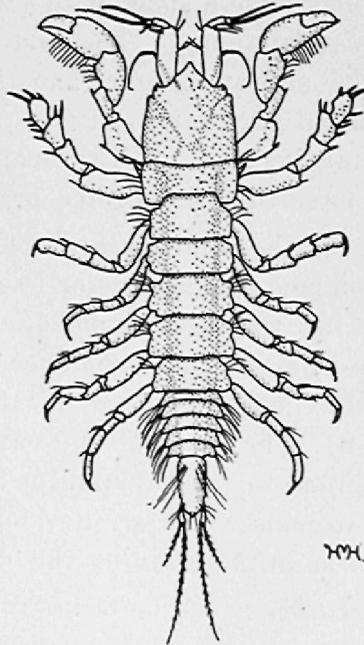


FIG. 342.—*Apseudes australis* (x 3).

The second antennae are about half as long as the first, and have an ovate exopod and a slender flagellum. The basis of the chelate limbs is wide, with a spine on the outer edge, the merus has one spine and the carpus two spines and some smaller serrations on the outer edge; the hand is somewhat swollen. The second, or digging legs, are flattened and armed with spines, and the five remaining pairs are ambulatory in character. The life colour is white. Length: 13 mm., or $\frac{1}{2}$ in. (S.A.M.)

This species is not uncommon on the white sand of our Gulfs and often appears in the dredge.

Family TANAIDAE.

The carapace is truncate in front and has only a tiny rostral projection, and the body is somewhat cylindrical, with the abdomen usually as wide as, or wider than, the thorax. The first antennae have only one lash, which is many-jointed in the male but often poorly represented or even absent in the female. The large first or chelate legs become enormously developed in the adult males of some species and all the mouth parts excepting the maxillipeds disappear. The first two pairs of legs lack exopods and the second pair are, like the following five pairs, modified for walking.

PARATANAIS (Dana).

Paratanais ignotus (Chilton). (strange).

The cephalothorax tapers towards the front, which has an inconsiderable rostral projection between the bases of the first antennae. The first segment of the last-named is stout, about three times as long as the second, which is a little longer than the third. The second antennae are about as long as the first but are more slender; the first three joints of the peduncle are subequal in length, each about half as long as the fourth, which is longer

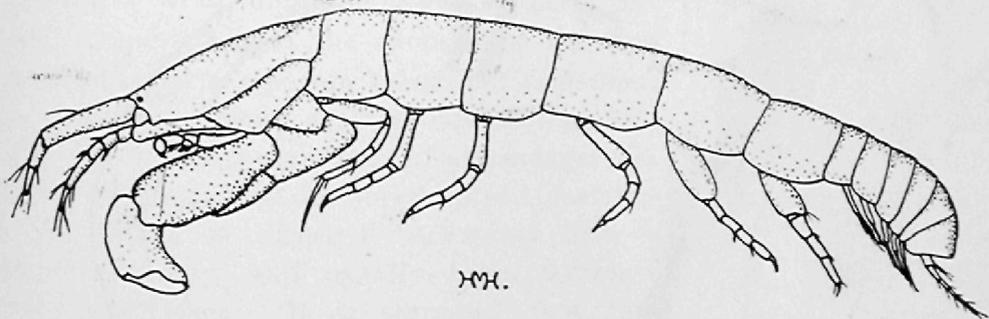


FIG. 343.—*Paratanais ignotus* (x 22).

than the fifth; the second joint has two spines at the distal end and the third has one distal spine. The first legs are moderately massive, with the hand curved; the second pair are long and slender, with a very narrow, tapering dactylus. The remaining legs are similar, but the basis becomes successively wider in the last three pairs. The end of the abdomen is truncate. The uropods are slender, with a short, single-jointed exopod and a five to seven-jointed inner branch. The life colour is white. Length: 5 mm., or $\frac{1}{4}$ in. (S.A.M.)

This little crustacean is, like the foregoing, found on the sandy bottom of our Gulfs; specimens may be secured by carefully examining weed and other debris brought up in the dredge.

Chapter X.—Order CUMACEA.

The species of this order are marine. The name of the group is derived from *cuma*, a wave, but it should be mentioned that this appellation, which was applied for more than half a century to the order, has been discarded by some systematists owing to certain rulings governing scientific nomenclature, and the alternative name *Sympoda* is sometimes used. Three of the forms described below are $\frac{3}{4}$ in. or more in length, and, comparatively speaking, are giants, for many of their relatives are very much smaller.

The Cumacea have a moderately well-developed carapace, fused with the first three or four thoracic somites, overhanging at the sides to protect the gills (which are described later), and towards the front produced into a plate on each side; these two plates often meet in front of the head to form a somewhat beak-like projection, or "pseudorostrum" (fig. 344). As a rule,

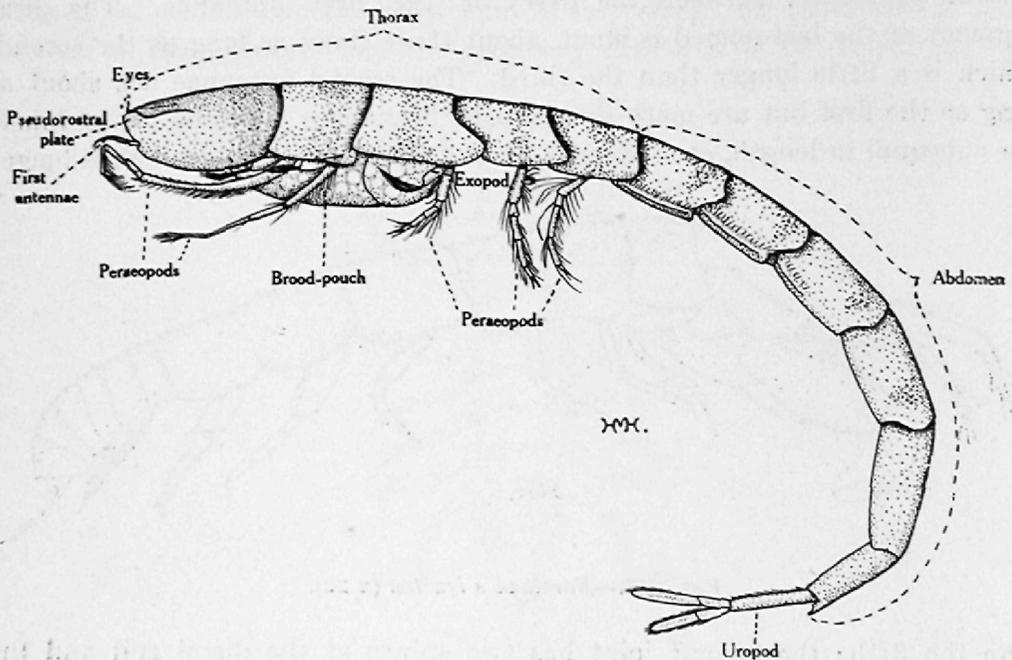


FIG. 344.—*Leptocuma pulleini* (x 6).

five distinct thoracic somites are visible behind the carapace, but further coalescence may lessen the apparent number. The cephalothorax is inflated, and the creatures have rather a headless appearance. The abdomen is long and slender, and terminates in style-like uropods, which almost always have an elongate peduncle; the telson is sometimes fused with the sixth abdominal segment, and is rarely large and conspicuous. The eyes, when present, are usually coalesced to form a single median organ. In some species each of the first antennae has two tiny lashes but in others only one flagellum is apparent. The exopod of the second antennae is not developed. The mandibles are much as in the other orders of the division Peracarida, but never have a palp. The maxillae are also similar, but the first pair have a bent-down palp, as in the preceding order (*Tanaidacea*). The first three

pairs of thoracic limbs are modified as maxillipeds. The first peraeopods, or legs, are slender and prehensile, and the second pair may have less than the normal number of joints. The third to fifth pairs are similar in structure.

According to all accounts, these animals are commonly found burrowing in mud or sand, and apparently the last three pairs of legs are used for digging. The males of some species, and more rarely the females also, are good swimmers.

Respiration.—The Cumacea are of unusual interest in that their respiratory apparatus is highly specialised and distinctive. It has already been mentioned that there is an anteriorly directed process on each side of the carapace; these lateral plates together form a channel, which extends forwards from the branchial cavities covered by the side-flaps of the carapace. Within this anterior channel lie a pair of tubes formed of the terminal parts of the exopods of the first maxillipeds. The outer branches of these appendages are expanded and membranaceous distally, and this thin portion rolls like a scroll, and thus forms a transparent tube. In some cases the exopods of the first maxillipeds form separate tubes, but sometimes they unite to produce a single siphon (fig. 345, ex.). Each of the same pair of appendages has a very large and well-developed epipod, forming a gill, which is directed backwards into a branchial cavity, and usually bears flattened respiratory lobes. It is supposed that this unusual arrangement enables the animals to breathe without discomfort while buried in sand, as the tube or tubes protruding from the front would then carry the exhalant tube well forward; the ends of the tubes close while clean water is being drawn into the gill-chamber so that vitiated water cannot re-enter. It seems possible that, as in some Decapods (for instance, *Gomezia*), the respiratory current is reversed while the animals are buried.

Reproduction and Development.—The sexes, when adult, differ most strikingly, and may be separated by some of the following characters. In general, the carapace of the male is smoother than in the female. The second antennae are very long; the lobes of the gill may be large and numerous, one to five pairs of swimmerets, or pleopods, are usually developed, and well developed exopods, modified for swimming, are generally present on the second to fourth pairs of legs, as well as on the first pair. The female commonly has spines and tubercles on the carapace; the second antennae are small and insignificant; the lobes of the gill are often smaller and less

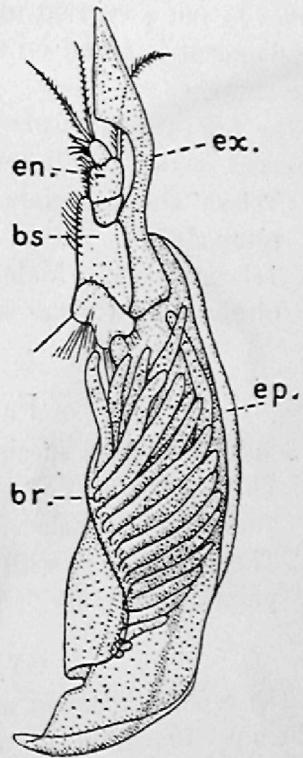


FIG. 345.—First maxilliped of *Diastylis*; en., endopod; ex., exopod; ep., epipod; br., gill lobes; bs., basis.

numerous than in the male; pleopods are never present, and swimming branches are not well developed or more than three pairs of legs, the first and one or two of the succeeding pairs.

As a rule, the males are more active swimmers than the females, and are commonly taken swimming freely near the surface. Females have a more sedentary disposition, and are usually found on the bottom.

The young are protected in a brood-pouch formed of four pairs of oostegites or brood-plates, as in most of the Isopods, and (also as in the last-named) the young leave the marsupium with the last pair of legs undeveloped. The second maxillipeds of the egg-bearing female have a small basal scale, fringed with setae, which extends back into the marsupium and serves to fan a current of water over the eggs or young therein; a similar development is found on the preceding pair of appendages of some Isopods (fig. 253).

The few species at present known from our waters may conveniently be referred to two families:—

- a. Telson absent. Male with not more than two pairs of pleopods DIASTYLIDAE.
- aa. Telson present. Male almost always with five pairs of pleopods, and never with less than three pairs BODOTRIDAE.

Family DIASTYLIDAE.

South Australian species of two genera have been described.

- a. Third maxilliped of female without exopods. No pleopods developed in male *Gynodiastylis*.
- aa. Third maxilliped with exopod in both sexes. Male with two pairs of pleopods *Anchicolurus*.

GYNODIASTYLIS (Calman).

The cephalothorax is markedly more massive than the slender abdomen. The inner branch of the uropods has one to three joints; there is no exopod on the third maxillipeds of the female, and the male lacks pleopods. The first and second legs bear exopods, and sometimes, in the male only, these branches are developed on the third and fourth legs also. The side-plates of the third and fourth leg-bearing thoracic somites are more or less expanded. In the adult female the third legs are attached to the posterior part of the backward expansion of the segment, leaving a wide gap between these limbs and the second legs. The telson is blunt and tubular. The representatives of the genus are small, our *G. truncatifrons* being the largest so far recorded.

- a. Carapace with numerous longitudinal ridges on each side. Inner branch of uropods with first joint not longer than second *turgidus*.
- aa. Carapace with only one curved ridge on each side. Inner branch of uropods with first joint longer than second . . . *truncatifrons*

Gynodiastylis turgidus (Hale). (swollen).

This form is known only from the adult female. The carapace is robust, more than one-third the total length, and about two-thirds as deep as long. There are numerous ridges on each side, the uppermost or dorso-lateral ridge being distinctly crenulate and more prominent than the others. The pseudorostral lobes are acute apically and project in front of the eye-lobe. The five free leg-bearing segments are together shorter than the carapace and the abdomen is nearly as long as the cephalothorax. The stout first legs do not extend much beyond the apices of the pseudorostral lobes, and have

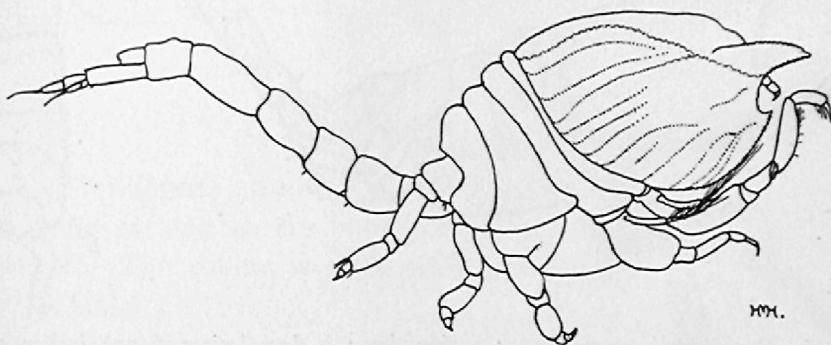


FIG. 346.—*Gynodiastylis turgidus* (x 36).

the basis as long as the three following joints together. The basis of the second legs is wide and about as long as the remaining joints together; the other legs are short and stout. The peduncle of the uropods is twice as long as the telson, and the outer branch is not much more than half as long as the inner, which is two-jointed, with the first joint slightly shorter than the second. Length: 2.7 mm., or $\frac{1}{10}$ in. (S.A.M.)

Gynodiastylis truncatifrons (Hale). (with mutilated front).

The carapace of the adult female is one-third the total length, sub-cylindrical, and about twice as long as vertical height; each side has a low ridge, curving upwards and backwards from the antennal notch, and the back has a pair of shallow grooves on the hinder half. The pseudorostral lobes are acutely pointed, and meet in front of the wide and short eye-lobe for a distance equal to about one-third the length of the rest of the carapace; they are oblique and slightly concave in front and fringed with fine hairs. The five leg-bearing segments are together three-fourths as long as the carapace, and the abdomen is only about two-thirds the length of the cephalothorax. The stout first legs extend well beyond the apex of the pseudorostrum, and the basis is shorter than the remaining joints together. The basis of the second legs is longer than the remaining joints together, and the ischium-joint of these limbs is not distinctly developed. The third and the fifth legs are stout, with the basis shorter than the remaining joints together. The uropods have a peduncle little longer than the telson and the

outer branch nearly as long as the two-jointed endopod, which has the first joint longer than the second. The colour of this and the preceding species is white. Length: 7.2 mm., or $\frac{2}{7}$ in. (S.A.M.)

The specific name alludes to the shape of the pseudorostral lobes.

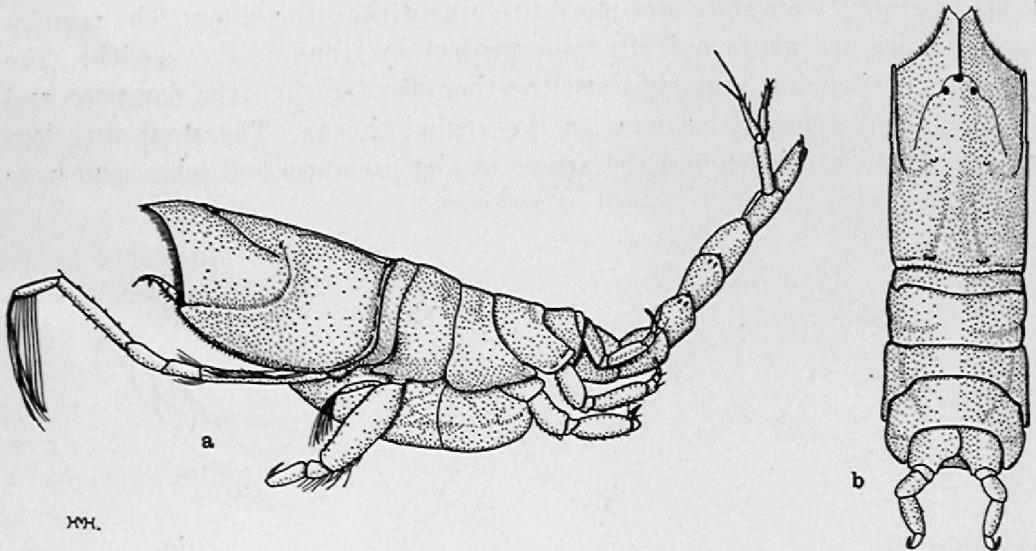


FIG. 347.—*Gynodiastylis truncatifrons*; a, side view; b, dorsal view of cephalothorax (x 12).

ANCHICOLURUS (Stebbing).

Differs from the preceding genus in that the male has two pairs of pleopods, the third maxilliped of the female bears an exopod, and the first four pairs of legs have exopods in both sexes, those of the third and fourth pairs being rudimentary in the female. The inner branch of the uropods is three-jointed.

Anchicolurus waitei (Hale). (personal name).

In the adult female the carapace is less than one-third the total length, with the surface pitted; on each side, at the antennal border, is a shallow depression, from the edge of which a low ridge curves backward and up to the back. The apically subacute pseudorostral lobes are not very long, and the eye-lobe is short and wider than long. The first and second leg-bearing segments are short, and the side-plates of the third are greatly produced behind and overlap the second somite in front. The abdomen is a little shorter than the cephalothorax. The first legs reach a little beyond the level of the apex of the pseudorostrum and the basis is about one-fifth as long again as the rest of the limb. The basis of the second leg is rather stout, a little shorter than the distal joints together. The third to fifth legs are robust, with the merus as long as, or longer than, the basis. The uropods have the peduncle less than twice as long as the telson; the inner margins of the peduncle and inner branch are armed with slender spines; the first joint of the inner branch (which is slightly longer than the outer