LII.—*Natural History Notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander R. F. Hoskyn, R.N., commanding.*—Series II., No. 1. *On the Results of Deep-sea Dredging during the Season* 1890–91. By J. Wood-Mason, Superintendent of the Indian Museum, and Professor of Comparative Anatomy in the Medical College of Bengal, and A. Alcock, M.B., Surgeon I.M.S., Surgeon-Naturalist to the Survey.

[Continued from p. 275.]

Family **Acanthephyridæ**.

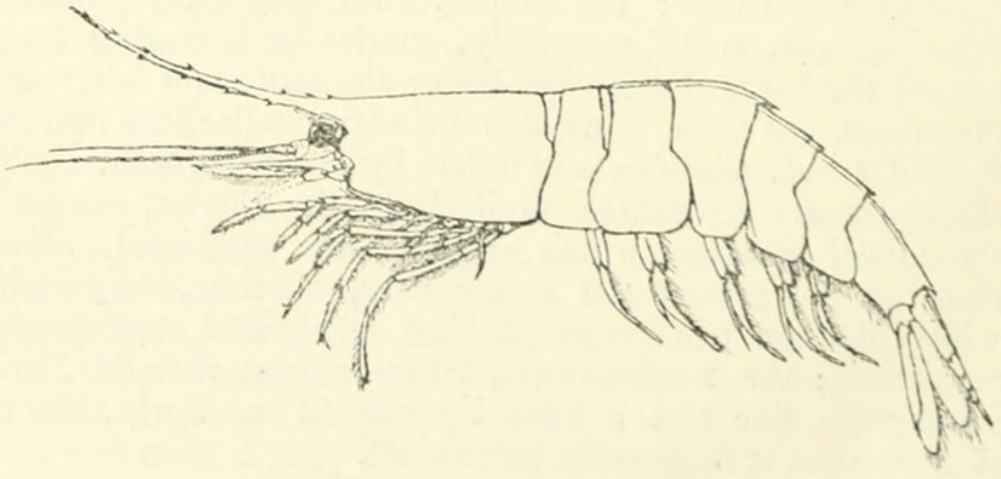
Acanthephyra, A. Milne-Edwards.

37. *Acanthephyra sanguinea*, sp. n.

♀. Closely allied to *A. Agassizii*, S. I. Smith, ♂ (*A. purpurea*, A. M.-Edw., ♀), from which it differs in the minute size of the spines of the anterior margin of the carapace, which are so small as to be scarcely discernible by the unaided eye; (?) in the armature of the telson, which bears only five pairs of dorsal spinules besides three longer and subequal terminal ones; in its longer and slenderer rostrum, which is fully twice the length of the antennal scale; and in its less elongated abdomen.

Colour in life deep crimson.

Fig. 1.



Acanthephyra sanguinea, ♀, nat. size.

Length, from tip of rostrum to tip of telson, 92 millim.; of carapace, from supraorbital to posterior margin, 18 millim.; of rostrum, from same point to tip, 26·5 millim.; of antennal scale 13 millim.; of abdomen 50 millim.; of telson 14·5 millim.

One female from Station 106, 1091 fathoms, one immature in fragments from Station 107, 738 fathoms, and a third from Station 117, 1748 fathoms.

♂. A male of about the same size as that of *A. Agassizii* figured by Prof. S. I. Smith was obtained in a previous season 7½ miles east of North Cinque Island, in the Andaman Sea, in 490 fathoms. It has a decidedly less elongated abdomen than *A. Agassizii*; its carapace has much the same shape, but the rostrum shows no signs of becoming porrect and reduced in length as in that species, for although it is broken off just in front of the third tooth of the lower series, it still extends fully to the end of the antennal scale.

Length, from supraorbital margin to tip of telson, 83 millim.; length of carapace, from supraorbital to posterior margin, 23·25 millim.; of antennal scale 15·25 millim.; of abdomen to tip of telson 59 millim.; of telson 17·25 millim.

38. *Acanthephyra armata*, A. M.-Edw.

Acanthephyra armata, A. M.-Edw. Ann. d. Sc. Nat. Zool. (6) xi. 1881, 4, p. 12, et Rec. Fig. Crust. 1883; Spence Bate, 'Challenger' Macrura, 1888, p. 744, pl. cxxv. fig. 2, ♂ var.

One fine male from Station 116, 405 fathoms.

Colour in life crimson.

Length, from tip of rostrum to tip of telson, 144 millim.; of carapace, from supraorbital to posterior margin, 35 millim.; of rostrum, from same point, 34 millim., from front of inferior spine to tip 17 millim.; of antennal scale 26 millim.; of abdomen to tip of telson 75 millim.; of telson 18 millim.

It differs from Milne-Edwards's figure in the following points:—The rostrum is of the same length as the carapace; its basal spines are only four in number; the spine of its inferior margin arises midway between its base and its apex, and is much more nearly opposite to the middle than to the apex of the antennal scale. The branchiostegal spine is continued backwards along the side of the carapace as a very strong ridge half as long as the antennal scale. The fringes of the legs are greatly developed, reminding one of those of the last two pairs of legs in *Sergestes*. The spines of the third to the sixth abdominal terga are equal.

It differs from the specimen figured and described by

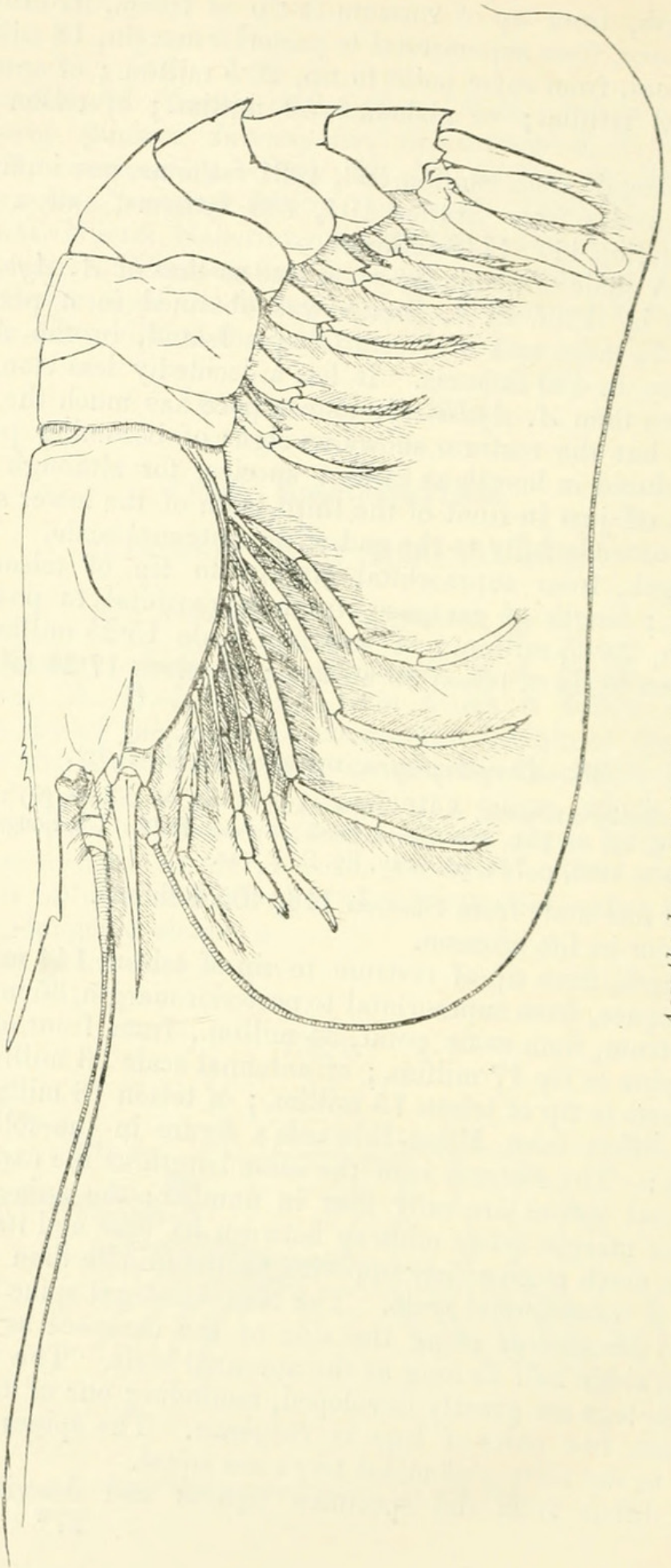


Fig. 2.

Acanthephyra armata, ♂, var., nat. size.

Spence Bate in the form and the armature of the rostrum, in the smaller spinous processes of the abdominal terga, and in the more highly developed fringes of the legs. The dactylopodite of the last pair of legs is incorrectly represented by Spence Bate as equal to those of the two preceding pairs.

39. *Acanthephyra microphthalma*, S. I. Smith.

Acanthephyra microphthalma, S. I. Smith, Proc. U. S. Nat. Mus. 1885, p. 502; Ann. Rep. Comm. Fish. 1886, p. 65, ♂ ♀, pl. xiii. fig. 3, ♂.
Acanthephyra longidens, Spence Bate, 'Challenger' Macrura, 1888, p. 735, pl. cxxiv. fig. 4, ♂.

Two males from Station 117, 1748 fathoms.

Colour in life deep crimson.

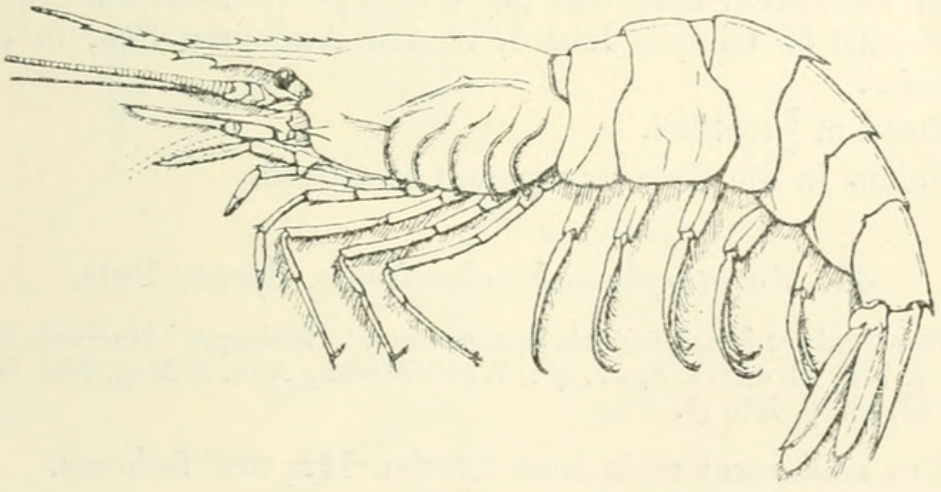
In one specimen the rostrum is armed with five teeth, and probably also in the other, in which it is broken off just beyond the fourth tooth.

40. *Acanthephyra eximia*, S. I. Smith.

Acanthephyra eximea, S. I. Smith, Rep. U. S. Comm. Fish. 1884, p. 32, 1886, pl. xiv. fig. 1, ♂.
Acanthephyra Edwardsii, Spence Bate, 'Challenger' Macrura, 1888, p. 747, pl. cxxvi. fig. 1, ♂.

♀. Differs from the male in its longer and more styliform

Fig. 3.



Acanthephyra eximia, ♀, nat. size.

rostrum, which extends by about one third of its length beyond the antennal scale.

Colour in life crimson.

Length, from tip of rostrum to tip of telson, 100 millim.; of carapace, from supraorbital to posterior margin, 22·5 millim.; of rostrum, from same point to apex, 26 millim.; of antennal scale 15 millim.; of abdomen, from base to tip of telson, 53·5 millim.; of telson 14·5 millim.

One specimen from Station 116, 405 fathoms.

♀ juv. Differs from the above in the rostrum only extending by a portion of its unarmed tip beyond the extremity of the antennal scale.

Length, from tip of rostrum to tip of telson, 58 millim.; of carapace, from supraorbital to posterior margin, 13·75 millim.; of rostrum, from same point to apex, 11 millim.; of antennal scale 9·75 millim.; of abdomen, from base to apex of telson, 35 millim.; of telson 10 millim.

Colour in life bright red.

One specimen from Station 112, 561 fathoms.

♀ jun. Much smaller than the above, the rostrum slightly ascendant, straight or only very faintly curved, short, extending about to the end of the second third of the antennal scale.

Length of carapace 10 millim.; of rostrum 5·25 millim.

Rostrum $\frac{7}{4}$-toothed.

Colour in life deep crimson.

One much younger specimen, with another of the same age as that from Station 112, from Station 109, 738 fathoms.

The above series of specimens proves that the rostrum increases in length from extreme youth to adolescence.

An adolescent male was taken in a previous season 8 miles south-east of Cinque Island, in the Andaman Sea, in 500 fathoms.

Rostrum $\frac{7}{4}$-toothed.

Colour in life deep transparent blood-red.

41. *Acanthephyra brachytelsonis*, Spence Bate.

Acanthephyra brachytelsonis, Spence Bate, 'Challenger' Macrura, 1888, p. 753, pl. cxxvi. fig. 7, ♀; Wood-Mason, Ann. & Mag. Nat. Hist. (6) vii. p. 195, ♂.

One adolescent male from Station 113, 683 fathoms.

Colour in life bright red.

Two adolescent males and one young female were taken in a previous season 7½ miles east of North Cinque Island, in the Andaman Sea, in 490 fathoms.

Our series of specimens proves that the rostrum undergoes great changes in form and in length from youth to maturity.

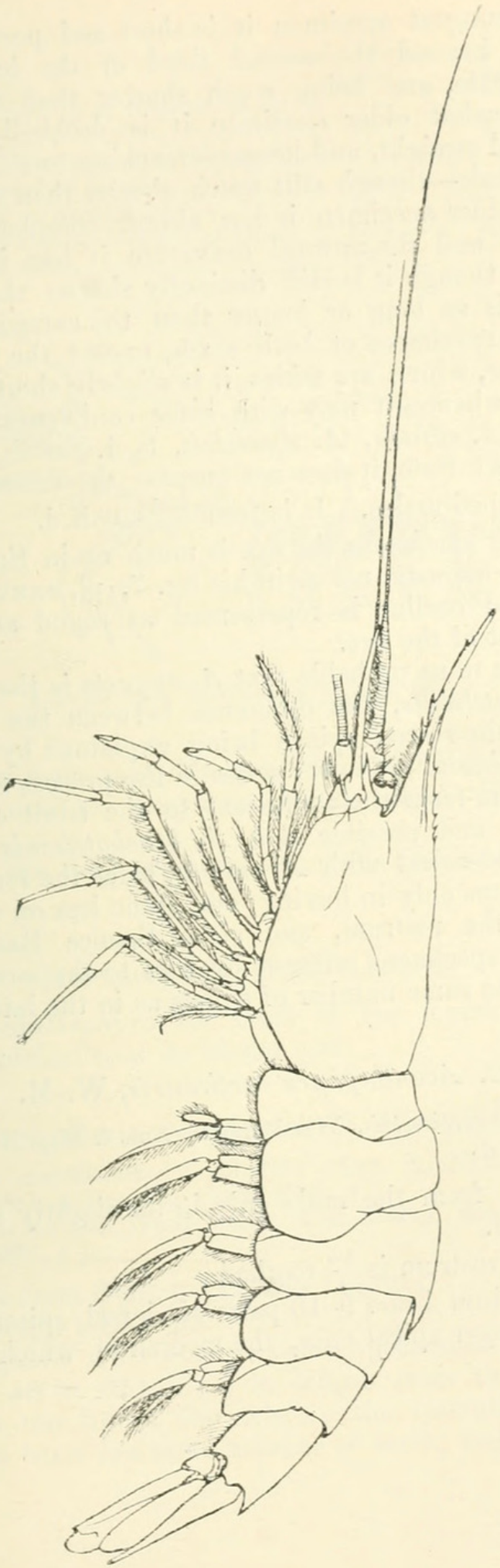


Fig. 4.

Acanthephyra brachytelsonis, ♂, nat. size.

In our youngest specimen it is short and porrect, scarcely extending beyond the second third of the length of the antennal scale, and being much shorter than the carapace. In a somewhat older specimen it is decidedly ascendant, though still straight, and longer—reaching to the apex of the antennal scale—though still much shorter than the carapace. In a still older specimen it has almost completely attained the length and the upward curvature it has in adolescent specimens, though it is still distinctly shorter than the carapace. It is as long or longer than the carapace in all our adolescent specimens of both sexes, except the two largest, and in these, which are males, it is slightly shorter than the carapace; whence it may with some confidence be inferred that, as in *A. eximia*, *A. Agassizii*, S. I. Smith, and *A. angusta*, Spence Bate, it does not surpass the antennal scale in fully developed males. It is from $\frac{5-11}{3}$-toothed.

In all our specimens the eye is much as in Spence Bate's figure of *A. angusta*, not as in his fig. 7, pl. cxxvi., in which the so-called ocellus is represented as round and separate from the rest of the eye.

It appears to us probable that *A. angusta* is the adult male of *A. brachytelsonis*, the difference between the two in the number of the rostral spines being explained by the loss of the apical spine of the lower series in the process of reduction of the rostrum from the adolescent to the adult condition in the former; and possible that *A. brachytelsonis* itself will prove to be identical with *A. eximia*, since the former differs from the latter only in having one spine less on the inferior margin of the rostrum, and since Spence Bate includes amongst the specimens referred by him to the former individuals with the same number of spines as in the latter.

42. *Acanthephyra curtirostris*, W.-M.

Acanthephyra curtirostris, Wood-Mason, Ann. & Mag. Nat. Hist. (6) vii. p. 195, ♂.

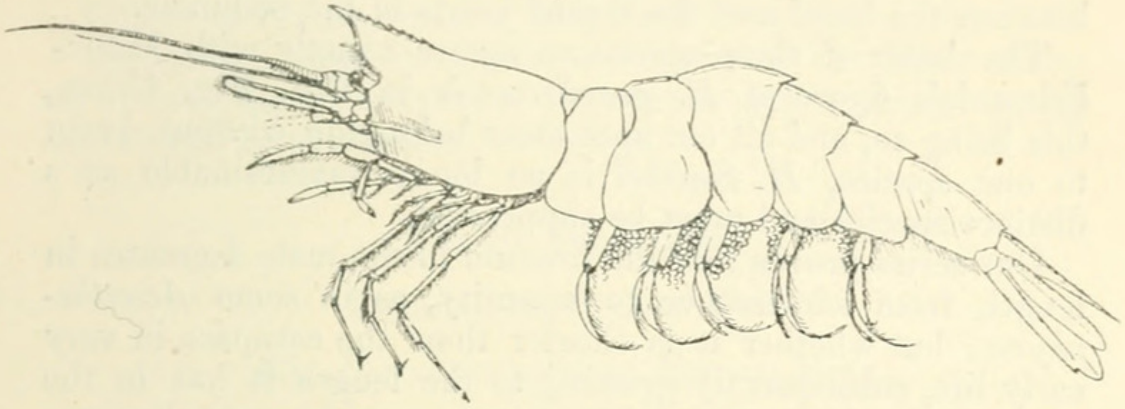
♀. Differs from the male only in its slightly more produced rostrum.

♂ ♀. The rostrum is $\frac{8-9}{1}$-toothed.

♂. The telson bears 9–10 pairs of dorsal spinules and 5 somewhat longer apical ones, the median of which is apparently fixed.

	♂ (type). millim.	♀ (type). millim.
Length from tip of rostrum to tip of telson	83	c. 77
Length of carapace from supraorbital to posterior margin	19	17·75
Length of antennal scale	14	13·5
Length of abdomen to end of telson	56·5	c. 53
Length of telson	18	——

Fig. 5.



Acanthephyra curtirostris, ♀, nat. size.

One young male from Station 108, 1043 fathoms, and an adult male and an ovigerous female from Station 114, 922 fathoms.

Colour in life deep crimson, as in all previously obtained specimens.

Hoplophorus, Milne-Edwards.

As in *Acanthephyra* the crest of the fourth abdominal tergum is notched near its hinder end.

43. *Hoplophorus gracilirostris*, A. Milne-Edwards.

Aplophorus gracilirostris, A. M.-Edw. Ann. Sc. Nat. Zool. (6) xi. 4, p. 6, 1881, et Rec. Fig. Crust. 1883, ♂.

Hoplophorus Smithii, Wood-Mason, Ann. & Mag. Nat. Hist. (6) vii. p. 194, 1891, ♂ juv.

One male from Station 112, 561 fathoms.

Colour in life bright red.

As compared with our previous specimens it is larger, measuring about 62 millim. in length from the tip of the rostrum to the tip of the telson; the rostrum is a trifle shorter, but bears the same number of teeth, and the antero-

inferior angle of the first abdominal pleuron is decidedly produced.

The right eye-peduncle has been neatly and cleanly excised without injury to any of the surrounding parts.

Another male from Station 115, 188–220 fathoms, is larger still, measuring about 77 millim. in length. The rostrum is still shorter and bears only $\frac{11}{7}$ teeth. The antero-inferior angle of the first abdominal pleuron is much as in the preceding specimen.

The left antennule has been cut clean off at the articulation between the basal and the second joints of the peduncle.

The latter of these specimens agrees exactly with Milne-Edwards's figure of *H. gracilirostris* in Rec. Fig. Crust., this being so, and all our specimens belonging without doubt to one species, *H. Smithii* is no longer maintainable as a distinct species and must be suppressed.

Our series proves that the rostrum in the male decreases in length from adolescence to maturity, as in some *Acanthephyræ*; but whether it is shorter than the carapace in very early life, subsequently growing to the length it has in the adolescent animal, there is at present no evidence to show.

An ovigerous female was taken in a former season in the Bay of Bengal, in lat. 19° 35′ N., long. 92° 24′ E., in 272 fathoms. It measures about 59 millim. in length. The rostrum, which is weak and somewhat deformed, and moreover has lost its tip, is only $\frac{10}{4}$-toothed. The pleura of the first and the second abdominal terga are soft and membranous and larger than in the male, more especially the latter of the two; and they form the lateral walls of a capacious incubatory pouch for the eggs. The appendages are smaller and are attached much further below the level of their sterna than in the male, being carried downwards towards the edges of the pleura by pillar-like prolongations of their bases, especially the anterior pair, which are attached quite close to the edges of the pleura. The two anterior abdominal sterna too appear to be more strongly arched upwards, whereby the height and hence the capacity of the pouch is still further increased.

The eggs are few in number, only eighteen having been found beneath the abdomen of our specimen, and large, measuring 2·4 and 1·6 millim. in major and minor diameters respectively.

Family **Alpheidæ**.

Genus Alpheus, Fabricius.

44. *Alpheus*, sp.

A male and an ovigerous female from Station 115, 188–220 fathoms

A larger male was taken in a previous season in the Bay of Bengal, in lat. 20° 17′ 30″ N., long. 88° 59′ E., in 193 fathoms.

Colour in life transparent blood-red.

As each of these specimens wants one of the great chelæ, we reserve the description of the species until complete specimens shall be available.

Family **Pandalidæ**.

Dorodotes, Spence Bate.

45. *Dorodotes reflexus*, Spence Bate.

Dorodotes reflexus, Spence Bate, 'Challenger' Macrura, p. 678, pl. cxvi. fig. 3; Wood-Mason, Ann. & Mag. Nat. Hist. (6) vii. 1891, p. 195, ♂ ♀.

Three females (two of them ovigerous) and three immature specimens from Station 111, 1644 fathoms.

Colour in life bright pink; legs crimson; carapace transparent, greasy.

Heterocarpus, A. Milne-Edwards.

46. *Heterocarpus Alphonsi*, Spence Bate.

Heterocarpus Alphonsi, Spence Bate, 'Challenger' Macrura, 1888, p. 632, pl. cxii. fig. 1; Wood-Mason, Ann. & Mag. Nat. Hist. (6) vii. 1891, p. 196, ♂ ♀.

Four males and four females (one ovigerous) of different ages from Station 112, 561 fathoms.

Colour in life bright pink.

The specimens were highly luminous when brought on board (see Introduction, vol. viii. p. 16).

This species had previously been taken in lat. 6° 32′ N., long. 79° 37′ E., off Colombo, in 675 fathoms (one male); in lat. 6° 29′ N., long. 79° 34′ E., in 597 fathoms (one very large ovigerous female); and twice in the Andaman Sea, in 500 fathoms (one male and two females).

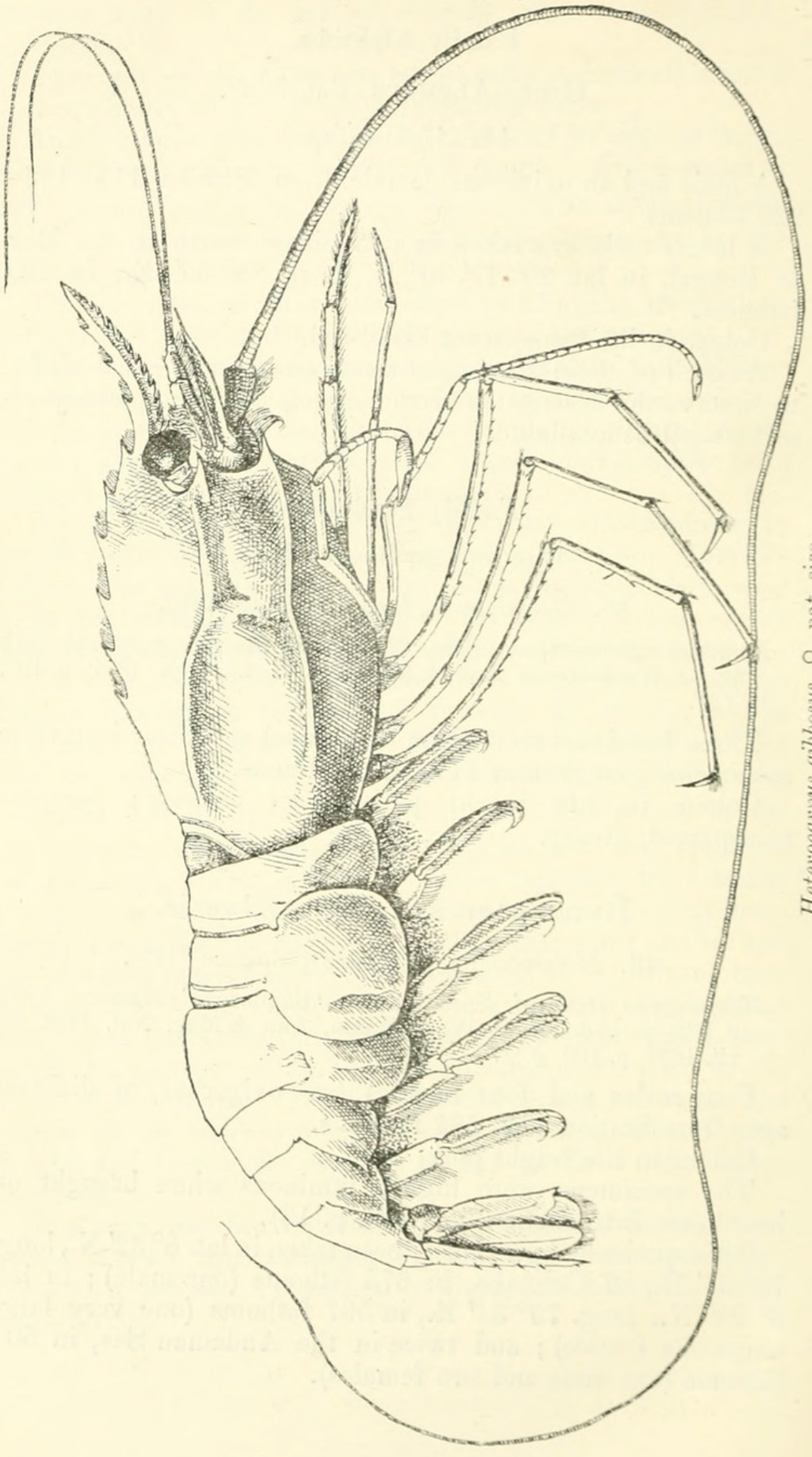


Fig. 6.

Heterocarpus gibbosus, ♀, nat. size.

47. *Heterocarpus carinatus*, S. I. Smith.

Pandalus carinatus, S. I. Smith, Bull. Mus. Comp. Zool. x. 1882–83, p. 63, pl. x. figs. 2–2*f*, et pl. xi. figs. 1–3, ♀.
Heterocarpus ensifer (A. M.-Edw.),=*Pandalus carinatus* (S. I. Smith), A. Milne-Edwards, Rec. Fig. Crust. 1883, ♀.

One small specimen from Station 155, 188–220 fathoms.

48. *Heterocarpus? gibbosus*, Spence Bate.

Heterocarpus gibbosus, Spence Bate, 'Challenger' Macrura, 1888, p. 634, pl. cxii. fig. 2, juv.

Eight males and four ovigerous females from Station 115, 188–220 fathoms.

Colour in life pink, with the legs pink and white.

One pair (the male with deformed rostrum) from Station 120, 240–276 fathoms.

This species had previously been obtained off Port Blair in 271 fathoms (two males), and in lat. 20° 17′ 30″ N., long. 88° 50′ E., in 193 fathoms (one young specimen with a still longer rostrum than in Spence Bate's figure).

Spence Bate described the species very imperfectly from an immature specimen.

We give a figure of an adult female measuring 138 millim. in length from tip of rostrum to tip of telson in a straight line.

PANDALUS, Leach.

49. *Pandalus* prox. *quadridentatus*, A. M.-Edw.

Pandalus quadridentatus, A. M.-Edw. Rec. Fig. Crust. 1883.

One fine male from Station 112, 561 fathoms.

Colour in life bright pink.

The rostrum is armed with $\frac{5}{16}$ teeth.

One immature specimen with imperfect rostrum from Station 116, 405 fathoms.

Colour in life red.

It has the same number of teeth on the base of the rostrum as the male from Station 112.

50. *Pandalus* prox. *martius*, A. M.-Edw.

Pandalus martius, A. M.-Edw. Rec. Fig. Crust. 1883.

Many specimens of both sexes, immature as well as adult, from Station 115, 188–220 fathoms.

Colour in life pink; eggs light blue.

There are only 7–8 teeth on the base of the rostrum.

51. *Pandalus*, sp.

One pair (the female ovigerous) from Station 112, 561 fathoms.

Colour in life light pink.

One ovigerous female from Station 115, 188–220 fathoms.

One ovigerous female from Station 116, 405 fathoms.

Colour in life pink.

A small species, allied to some European forms, of which we have no specimens for comparison.

[To be continued.]

LIII.—*Remarks on Australian Slugs.*

By T. D. A. Cockerell, F.Z.S., Institute of Jamaica.

As my own idea of "courteous criticism" is very different from Mr. Hedley's, I shall not attempt to reply to the opinions regarding my conduct expressed in this Magazine, pp. 169–171 (Feb. 1892).

With regard to matters of fact it is not quite the same, as, if Mr. Hedley's statements were not contradicted, they might pass as valid among those not specially acquainted with slug-literature. I will therefore discuss them one by one.

(1). *Limax megalodontes.*—Any one may see by reference to my paper that I expressed much doubt as to its being an *Aneitea*. It seemed to me very unlikely that *L. flavus* could have been in Australia at such an early date; but later, having read some observations by Mr. Musson, I expressed the opinion that it might be *L. flavus* after all (Brit. Nat. 1891, p. 120).

(2). "The conclusion has forced itself upon me," says Mr. Hedley, that all the Australian *Limaces* have been introduced from Europe. I have said nothing to the contrary, except that I provisionally regard the *Amalia* as endemic. It *may* be *gagates*, but writers have usually considered it distinct, and nobody has satisfactorily proved the supposed identity. It was Mr. Hedley himself who named an Australian species *Limax queenslandicus*, and regarded it as distinct until Dr. Simroth said it was *lævis*.

(3). I think anybody reading my paper will see that when