back, rump, and upper tail-coverts, while *the crown of the head is ashy grey like the hind neck*; sides of face also ashy grey washed with ochreous; breast and sides of the body ochreous buff, instead of vinaceous brown; centre of breast and abdomen white. Total length 6·75 inches, culmen 0·75, wing 3·9, tail 2·35, tarsus 0·8.

The male differs less from *C. coccothraustes* than the female, but it is distinguished by its paler coloration, and by the breast and sides of the body being light orange-brown instead of vinaceous. Total length 6·9 inches, culmen 0·8, wing 3·8, tail 2·1, tarsus 0·8.

I may add that the Attock bird is not *C. japonicus*, for it has a greater extent of pure white on the wing-coverts than in even true *C. coccothraustes*. *C. japonicus* is scarcely to be distinguished from the European bird; and differs only in having the median and greater wing-coverts pale drab at the ends instead of white. I propose to call the *Coccothraustes* from Attock after my friend Mr. Hume, *C. humii*. Whether it is the Hawfinch recorded by Lieut. Barnes as a permanent resident at Chaman in Southern Afghanistan (Str. F. ix. p. 456) must remain a question to be decided by an examination of specimens, which I have not yet had the opportunity of doing.

4. Preliminary Notice of the Isopoda collected during the Voyage of H.M.S. 'Challenger.'—Part III. By Frank E. Beddard, M.A., F.R.S.E., F.Z.S., Prosector to the Society [1].

[Received January 25, 1886.]

The present paper completes the preliminary description of the new species of Isopoda collected during the voyage of the 'Challenger.' This paper includes the families *Munnidæ*, *Asellidæ*, *Arcturidæ*, *Cymothoidæ*, *Sphæromidæ*, *Tanaidæ*, *Anceidæ*, and *Anthuridæ*, of all of which there are specimens in the 'Challenger' collection, representing about 45 new species, besides a number of others previously known. Among the shallow-water species the largest number of new forms are from Kerguelen, in spite of the investigations into the marine fauna of that region carried out by the British 'Transit of Venus Expedition,' and the exploring voyage of the German S.S. 'Gazelle.' I have to add quite as many new species as those previously known to the fauna of Kerguelen and the adjacent islands (Prince Edward's Island, &c.).

Among the deep-sea species the most remarkable and interesting is undoubtedly a new genus of *Cymothoadæ*, which is described below under the name of *Anuropus branchiatus*; there are also numerous representatives of other deep-sea forms, as might be expected from the nature of the explorations carrried out by the 'Challenger.'

[1] Published by permission of the Lords Commissioners of the Treasury.

Fam. Munnidæ.

Genus Munna, Kröyer.

1. Munna maculata, n. sp.

A single male example of this species was dredged in shallow water at Kerguelen. It measures about 4 millim. in length. The body is smooth, and the integument has numerous black pigment-spots. The shape of the body is characteristically that of a female, being broader anteriorly than posteriorly; the head is about as long as the first two segments of the thorax; the anterior margin is straight and fringed with a row of stiff hairs; the eye-stalks are well developed. The four anterior segments of the thorax are subequal; the three posterior are narrower; the thoracic segments have short rounded epimera. The *antennules* consist of a four-jointed peduncle, the two distal joints of which are much shorter than the proximal joint; the flagellum consists of four joints, which are elongated and narrow. The antennæ are very long, about twice the length of the body; the flagellum is shorter than the peduncle: the last two joints of the peduncle are elongated and subequal.

Kerguelen, 25 fathoms.

2. Munna pallida, n. sp.

This species, like the last, is represented by a single male specimen, measuring rather less than 3 millim. Like other species, the male is of approximately uniform diameter throughout. The species is pale and transparent, without any trace of pigment. The head terminates in a truncated anterior margin; the eyes are sessile—not stalked. The first segment of the thorax is longer than any of the three following, which are subequal; their margins are rounded and furnished with small rounded epimera; the three posterior segments are curved backwards; the first is very short, the rest increase slightly in length progressively. The abdominal shield is oval, ending in an obtusely rounded extremity. The *antennules* are like those of the last species, but the flagellum is only three-jointed.

Kerguelen, 30 fathoms.

Genus Ischnosoma, Sars.

1. Ischnosoma bacillus, n. sp.

This species is only represented by a single fragment, including the abdomen and four last thoracic segments, which is, however, sufficient to determine with at least probability its systematic position; it measures 10 millim. The fourth and fifth segments of the thorax, as in Sars's species, are closely connected and form an hourglass-shaped structure, the two pairs of appendages belonging to these segments being placed at each extreme of the conjoined segments. The fourth and fifth segments are each provided with long spine-like epimera. The presence of spines upon the fifth segment of the thorax distinguishes this species from both *I. bispinosum* and *I. quadri-*

spinosum, and from the next species *I. bacilloides*. The specimen is a female.

Station 158 ; 1800 fathoms.

2. ISCHNOSOMA BACILLOIDES, n. sp.

This species is closely allied to the preceding, but presents certain differences which appear to necessitate its separation as a distinct species. The single specimen is a fragment consisting of the same segments as *I. bacillus*, save for the fact that the fourth segment of the thorax is incomplete ; unlike the foregoing species, it is a male ; hence the supposed specific difference may be sexual. This species is to be distinguished from *I. bacillus* by the fact that the sixth segment of the thorax as well as the fifth has a pair of lateral spines. In both species the uropoda are simple, each consisting of two joints.

Station 302 ; 1450 fathoms.

3. ISCHNOSOMA SPINOSUM, n. sp.

This species is more closely allied than either of the foregoing to Sars's two species *Ischnosoma bispinosum* and *Ischnosoma quadrispinosum*, and, like them, comes from the Northern Hemisphere.

The single specimen measures 6 millim. in length. The general shape of the body is similar to *I. quadrispinosum* ; the head is narrower and shorter than the first segment of the thorax ; there is no trace of eyes. The first segment of the thorax is larger than either of the two succeeding, which are subequal ; the fourth segment is much longer and broader anteriorly than posteriorly, where it is closely applied to the fifth segment, which is the longest of all ; the sixth and seventh segments are short. The whole of the dorsal surface of the thorax is roughened and tubercular ; the lateral margins of the first three segments are furnished with two or three longish stout spines, of which one on each side is particularly long ; the dorsal region of these segments is not only tubercular but furnished with a few longish spines ; the fourth segment has no long lateral spines like those of the preceding segment ; the remaining thoracic segments have likewise no lateral spines. Between the thorax and abdominal shield is a single free abdominal segment ; the anterior half of the latter is oval ; there is a deep notch behind this, just in front of the articulation of the uropoda, which are borne upon a short truncated process ; the extremity of the abdominal shield is prolonged for some way behind the uropoda, and terminates abruptly in a straight margin. The abdomen is roughened and tubercular like the rest of the body ; there is a row of short spines on either side of the dorsal median line.

Station 78 ; 1000 fathoms.

ASTRURUS, nov. gen.

This genus comes near to *Pleurogoniun*, Sars, but may be distinguished by the spiny body, the long bifid rostrum, and the long epimeral spines, which are themselves covered with shorter spines ;

the thoracic appendages are slender and not greatly elongated; they terminate in a single claw; the first pair are subcheliform. The uropoda are rudimentary, consisting of only a single conical setose joint.

1. ASTRURUS CRUCICAUDA, n. sp.

This species is represented by a large number of individuals dredged in shallow water off Kerguelen; the largest individuals only measure 4 or 5 millim. in length.

The body is more or less pear-shaped, the anterior region of the thorax being wider than the posterior. The head is narrower than the succeeding segment of the thorax; it is prolonged anteriorly into two long slightly divergent processes, each of which is as long as the head itself; laterally is a longish process on either side, which terminates in a slightly swollen extremity; these processes resemble the eye-stalks in *Munna*, and they contained some orange-coloured pigment in the interior, but no recognizable trace of lenses; the surface, moreover, is covered with numerous short spines like the rest of the body. The four anterior thoracic segments are of nearly equal length, but they increase in width up to the third; the median region of these segments is convex and densely covered with short spines; the lateral margins are prolonged into long stout spines, which are themselves covered with short spines like the thoracic segments and the rest of the body. The three posterior segments are all much shorter than the fourth segment, and decrease gradually in length; their lateral margins are without the greatly elongated spines of the anterior segments; only on the fifth and sixth segments one of the spines which fringe the body is rather more elongated than the rest. The abdominal shield is oval, tapering posteriorly; it terminates in four somewhat flattened spines arranged in the form of a cross. The *antennules* consist of a two-jointed peduncle and a five- or six-jointed flagellum; the proximal joint of the peduncle is broader and shorter than the succeeding joint. The *antennæ* are not so long as the body but considerably longer than the antennules; the two proximal joints of the peduncle are elongated, the flagellum is shorter than either of these. The *mandibles* have a three-jointed palp. The first pair of thoracic appendages are modified into a prehensile limb; the remaining thoracic appendages are slender and elongated, particularly the three posterior pairs. The *uropoda* are rudimentary as in *Munna*.

Kerguelen, 120 fathoms.

NEASELLUS, F. E. B.

Neaselus, F. E. Beddard, Narr. Chall. Exp. vol. i. p. 882. fig. 326.

This new genus is represented by a single species from Kerguelen. It comes near to *Pleurogonium* and *Leptaspidia*, but is distinguished by the great horizontal elongation of the head, which is as wide as the following segment and bears the antennary organs at the

extreme lateral margin; eyes are absent. The thoracic segments are separated by deep incisions; the first segment is much the largest, and is fused mesially with the following segment; the margins of the segments are rounded; and the whole body is fringed with numerous leaf-like flattened spines.

1. Neasellus kerguelenensis, F. E. B., *loc. cit.*

The extreme length of the single individual of this species is 2 millim.

The body is extremely flattened and depressed, pear-shaped in general outline, being much broader anteriorly than posteriorly. The head is immensely extended laterally, being as wide as the following segment of the thorax, from which, however, it is separated by deep lateral incisions. The central region is convex; the anterior and lateral margins are fringed with peculiar flattened spines, which also border the body throughout. The two first segments of the thorax are together about equal in length to the head in its middle region; the line of suture separating these two segments is obliterated except laterally; the remaining segments are short and subequal, each is about $\frac{1}{5}$ of the length of the conjoined anterior segments; the third, fifth, and sixth segments have lateral processes, fringed with the peculiar spines referred to, which are absent from the fourth and seventh segments. The shape of the abdominal shield, which is, as in *Pleurogonium* &c., separated from the last segment of the thorax by a single free abdominal segment, is rhomboidal; it is notched posteriorly and laterally where the uropoda articulate. The *antennules* and *antennæ* arise from the extreme lateral margin of the head; in the *antennules* the basal joint is short and stout, the second rather elongated, the third and fourth narrower and shorter than the second, the flagellum has two joints. The *antennæ* are more than half the length of the body, the peduncle has six joints, the flagellum is a little longer than the distal joint. The *mandibles* are furnished with a palp. The first thoracic appendages are cheliform, the remaining thoracic appendages are not greatly elongate. The *uropoda* are as in *Pleurogonium*.

Kerguelen, Christmas Harbour, 120 fathoms.

Genus Pleurogonium, Sars.

1. Pleurogonium albidum, n. sp.

This species is represented by a single female example measuring 3 millim.

The general shape of the body is like the other species described by Sars; the epimera of the first four thoracic segments are prolonged into spines, which are of equal size upon all the segments; the three posterior segments of the thorax are separated from each other and from the fourth by deep lateral incisions; their epimera are prolonged into stout spiny processes, which are shorter than in the anterior segments; the dorsal surface of each of these three segments is traversed by a narrow ridge. Between the

seventh thoracic segment and the abdominal shield is a narrow free abdominal segment, which is ridged like the posterior segments of the thorax. The abdominal shield is almost circular in its outline anteriorly; posteriorly it terminates in a triangular-pointed extremity; the posterior region is slightly serrated.

Kerguelen, 120 fathoms.

2. Pleurogonium serratum, n. sp.

This species, like the last, is represented by a single female example measuring 3 millim. in length.

The head is small and almost enclosed by the following segment of the thorax; the frontal margin is straighter than in the last species, and the articulation of the antennæ is not so near to the posterior boundary of the head; the hinder margin of the semicircular notch which lodges the antennæ is prolonged outwards into a longish pointed process, which extends laterally nearly as far as the epimeron of the first thoracic segment. The thoracic segments are so like the last species that no special description is needed. The most characteristic and obvious difference between the two species is in the abdominal shield, which has, however, the same general shape in *P. serratum* as in *P. albidum*; in the former species the lateral margin as far back as the articulation of the uropoda is strongly serrated; there is no trace of any such serrations in *P. albidum* except along the posterior extremity of the caudal shield behind the uropoda, in which situation they are absent in *P. serratum*.

Kerguelen, 120 fathoms.

3. Pleurogonium minutum, n. sp.

The third new species of this genus is represented by a single female example, dredged off Tristan da Cunha. It measures about 1 millim. in length.

The general shape of the body is like that of the other species. The epimera of the thoracic segments are not prolonged into spines as in the last two species, but are rounded in the four most anterior segments and truncated in the posterior thoracic segments. The abdominal shield is oval, tapering posteriorly; anteriorly the margins of the abdominal shield are serrated, but the serrations are not nearly so marked, nor do they extend over so great an area as in *P. serratum*. In the two last species the antennæ are twice the length of the antennules; in the present species they are longer, but only half as long again: in this respect therefore *Pleurogonium minutum* is more typical, that is to say it agrees more closely with the northern forms described by Sars.

Off Tristan da Cunha, 100–150 fathoms.

Acanthomunna, nov. gen.

This genus is like *Munna* in outward form, and is furnished with a pair of eyes elevated on stalks as in that genus; the thoracic limbs are entirely like those of *Munna* except that they terminate in a

single elongated claw; the antennule has a four-jointed peduncle and a long multiarticulate flagellum; the uropoda are defective but evidently are of considerable size, judging from the socket of articulation. The whole body is covered with short slender spines of varying size, but nowhere very long.

1. ACANTHOMUNNA PROTEUS, n. sp.

This species, the only one referable to the genus, is represented by two individuals, both males, dredged off New Zealand in 700 and 1000 fathoms respectively. The larger specimen measures 7 millim. in length. The general shape of the body is as in *Munna*, but differs in being covered with innumerable spines, many of which are branched; the spines are nowhere of very great length. The head is furnished with a pair of eyes situated laterally; these are elevated upon short stalks; the abdominal shield is preceded by a short free abdominal segment; it is extremely convex anteriorly, and the point of articulation of the uropoda is upon the dorsal surface, though near to the lateral margin; behind the articulation of their appendages, the abdominal shield is flattened and terminates in a truncated, slightly concave extremity. The *antennules* have a four-jointed peduncle, the third joint being the longest, and a multiarticulate flagellum longer than the peduncle. The *mandibles* have a palp. The first pair of thoracic appendages are shorter than the rest and subcheliform; the remaining thoracic appendages are very long, owing to the elongation of the fourth and fifth joints; they terminate in a single claw; these appendages are covered with slender unbranched spines, which arise from tubercles. The uropoda are defective, but appear to have been larger than those of *Munna*, &c., and possibly more fully developed.

Station 168; 1100 fathoms. Station 169; 700 fathoms.

Fam. ASELLIDÆ.

Genus STENETRIUM, Haswell.

1. STENETRIUM HASWELLI, n. sp.

A single species of this genus, the only known deep-water species, was dredged off the coast of S. America in 600 fathoms. The specimen is a male, and measures 16 millim. in length.

The diameter of the body is everywhere much the same except the head and the terminal region of the abdominal shield. The head is prolonged into a short rostrum; eyes are present of narrow linear shape, and set obliquely. The thoracic segments are subequal in length as well as breadth, and the dorsal surface is quite smooth; the margins of the first thoracic segment are prolonged into a triangular spiny process; in the second segment the margin is furnished with a smaller spine-like process; in the two following segments there is in addition a smaller posterior spine; in the fifth segment the antero-lateral spine is much wider, occupying nearly the whole of the lateral margin; in the two remaining segments, the lateral

region is straight. The epimera are fused with the tergum in the first thoracic segment, elsewhere distinct but small. The abdominal shield is as long as the three last segments of the thorax; it is subquadrangular in outline. The *antennules* have four basal joints and a long flagellum, longer than the peduncle. The *antennæ* are furnished with a rudimentary exopodite. The *mandibles* have a palp. The first pair of thoracic limbs are extremely long and prehensile; the remaining thoracic limbs are slender and short, they terminate in two claws. The *uropoda* are biramose, the endopodite and exopodite being equal.

Station 320; 600 fathoms.

Iolanthe, nov. gen.

This genus appears to be closely allied to *Acanthoniscus*, Sars, with which it agrees in the absence of eyes and in the presence of long spiny epimera and long dorsal spines, and in the shape of the uropoda. It differs in that the thoracic appendages are biunguiculate and in a number of other points, which may be gathered from the following description of the single species referable to the genus.

1. Iolanthe acanthonotus, n. sp.

This species is founded on a single female dredged in deep water in the Antarctic Ocean. It measures 24 millim. in length.

The head is as wide as the succeeding segment of the thorax; its margins are prolonged on either side into two spines, of which the anterior is much the longest; the anterior margin of the head is produced into a long rostral spine, which is curved slightly upwards. There is no trace of eyes. The thoracic segments are subequal in antero-posterior diameter; in the dorsal-median line of all the segments is a stout long vertical spine; the lateral margin of the first segment is furnished with a long spiny process; on each of the three succeeding segments are two such spines, the anterior being the longer; in the remaining segments only the anterior spine is present. These spines are not outgrowths of the epimera, which are small and lie beneath them. The abdominal shield is almost circular in form; on either side are three spines arranged at equal distances, which are much shorter than the lateral spines of the thorax. The *antennules* have a four-jointed peduncle, of which the second joint is the longest. The flagellum consists of 24 joints, and is about as long as the three distal joints of the peduncle. The *antennæ* are half the length of the body; the second joint of the peduncle has a spiny process on the outer side as in *Ianthe*, which corresponds (?) to the exopodite; the flagellum is nearly as long as the peduncle. The *mandibles* have a palp. The thoracic appendages are all similar to each other and terminate in two claws. The *uropoda* have a very long proximal joint; the endopodite is extremely short, though larger than the minute exopodite.

Station 153; 1675 fathoms.

Genus Janira, Leach.

1. Janira abyssicola, n. sp.

The present species is represented by a single female example, dredged off Fiji in very deep water.

The head has a rounded anterior margin; the eyes are completely absent. The first three segments of the thorax are of about equal length; the next two segments are much shorter, being about one half the length of the anterior segments; the sixth segment has an antero-posterior diameter about equal to that of either of the anterior segments, while the seventh segment is longer than any. The *antennæ* are longer than the body of the animal; the flagellum is much longer than the peduncle. The *mandibles* have a palp. The thoracic limbs are all similar to one another. The *uropoda* are as long as the abdominal shield; they are biramose; the endopodite is stouter and longer than the exopodite.

Station, 1350 fathoms.

2. Janira tristani, n. sp.

The head is broader than long, with very large, laterally placed eyes; it is prolonged into a long stout rostrum with a rounded extremity. The first two segments are of about equal length; the three succeeding segments progressively diminish in length; the last two are again somewhat longer. The abdominal shield is sub-pentagonal and terminates in a short blunt process. The *antennules* have a long flagellum; the peduncle is composed of four joints, all of which are short. The *mandible* has a three-jointed palp. The thoracic appendages are all similar to each other.

Off Tristan da Cunha, 100–150 fathoms.

Genus Jæropsis, Köhler.

1. Jæropsis marionis, n. sp.

The only previously known species of this genus was described by M. Köhler, from the island of Sark; the present species was dredged off Marion Island in 100 fathoms. The single specimen measures 4 millim. in length.

The head is roughly quadrangular in outline; the anterior margin is prolonged between the antennæ into a rostrum, which is deeply notched at the extremity; the eyes are of fair size, and dorsal in position; the lateral margins of the head are serrated. The head is about as long as the first two segments of the thorax taken together; the latter are subequal, the third is slightly shorter, the fourth and fifth subequal and very much shorter again; the last two segments are quite as long as the two first; the segments are separated by deep lateral incisions; the lateral margins of the segments are feebly serrated. The abdominal shield is somewhat triangular in outline, and terminates posteriorly in a three-jointed process; in the two notches separating these processes lie the uropoda; the lateral margins are serrate. The *antennules* are very short; the flagellum

has two joints, the distal one being very minute. The *antennæ* have a five-jointed peduncle and four- or five-jointed flagellum ; the third joint of the peduncle is longer than the two basal joints, the fourth joint is shorter than the third, the fifth longer. The thoracic appendages are all similar and biunguiculate.

Off Marion Island, 100 fathoms.

Genus Trichopleon, nov. gen.

A single specimen of a deep-sea Isopod dredged at Station 215 does not fall very conveniently within any known genus of the *Asellidæ*.

The general shape of the body is like that of *Asellus*, with which it also agrees in the uniunguiculate thoracic appendages ; eyes are completely absent ; the first four thoracic segments are furnished on either side with a forwardly-directed lateral spine. The antennæ have a movable scale attached to the second joint, as in *Janira* and *Stenetrium*. The surface of the body is quite smooth.

1. Trichopleon ramosum, n. sp.

The specimen is an immature female, measuring 5 millim. in length.

The head is narrower, but longer than the succeeding segment of the thorax ; it is prolonged into a short wide process anteriorly. There is no trace of eyes. The three first segments of the thorax are subequal in length ; the fourth segment is shorter ; the three posterior segments gradually increase in length but diminish in breadth ; the antero-lateral margin of the first four segments is furnished with a short, acute, forwardly-directed spine. The abdominal shield is oval, but wider anteriorly than posteriorly ; it terminates behind in the middle line in a short spiny process. The *antennules* are about as long as the head and first two segments of the thorax together ; the peduncle has four joints, of which the second joint is the longest ; the flagellum consists of about fifteen joints. The *antennæ* are about equal in length to the body ; the flagellum is longer than the peduncle ; the two basal joints of the peduncle are very short, the third a trifle longer, with an articulated scale on the outer side ; the two distal joints are long and subequal. The *mandibles* have a palp. The thoracic appendages are similar to each other, terminating in a single claw. Uropoda moderately long, biramose, each ramus one-jointed.

Station 214 ; 500 fathoms.

Fam. Arcturidæ.

Genus Arcturus, Latreille.

1. Arcturus myops, n. sp.

The present species differs from any other *Arcturus* at present known by the fact that the eyes are entirely or almost entirely aborted. The only trace of eyes left are a pair of rounded tubercles, which appear to contain no pigment and are not faceted. The largest

individual measures about 9 millim. The first four thoracic segments are subequal in length; each is ridged posteriorly, the ridge widening out laterally to occupy the whole of the segment, it is covered with fine granulations; in the fourth segment the ridge is higher than in the preceding segments; anteriorly between the ridge and the anterior margin of the segment is a shorter ridge, likewise covered with numerous minute tubercles; on the first thoracic segment is a third ridge; of the three posterior segments the first is the longest; on each is a posterior ridge-like elevation beset with numerous tubercles. The abdominal shield is oval, tapering towards its extremity, which is slightly upturned; like the thorax, it is tuberculate. The proximal joints of the antennæ and of all the thoracic limbs are beset with tubercles.

Station 169; 700 fathoms.

2. ARCTURUS ANNA, n. sp.

This single specimen of this large species measures 37 millim.; the antennæ are nearly twice the length of the body. The head is excavated in front; the antero-lateral margin of the head is notched ventrally. The first four segments of the thorax are subequal; each is traversed by a ridge, which dorsally is narrow and only occupies the posterior portion of the segment, laterally it is widened out and occupies the whole of the segment; in front is another shorter ridge, which does not reach the lateral region of the segment; at the extreme lateral margin is a stout spine, inclined nearly at right angles to the longitudinal axis, which overlies the epimeron; behind are one or two shorter spines along the postero-lateral border of the tergum. The epimera, which are short, are likewise furnished with one or two short spines; these are only conspicuously developed upon the last two of the segments, especially upon the last, where one of the spines equals in length the tergal spine which it directly underlies. Of the three posterior segments the first is decidedly the largest; they are ridged like the anterior segments, the ridge widening out laterally; each segment has a short lateral spine corresponding to those on the anterior segments; the epimera are also furnished with a stout spine, that of the fifth segment with an additional spine directed forwards. There are two completely free abdominal segments, the third being to a large extent fused with the abdominal shield; on the ventral side of the first abdominal segment is a short spine on either side anteriorly and another pair of longer spines posteriorly; this segment as well as the next has a short lateral spine; the third abdominal segment has on either side a long curved spine at the postero-lateral margin. The abdominal shield has a central convexity occupying nearly the whole of its extent and bordered by a flattened rim, which is serrated, and terminates posteriorly in a pair of pointed processes projecting behind the central area, which terminates posteriorly in a short pointed spine. The thoracic limbs of the second, third, and fourth pairs have one or two longish spines on the three proximal joints.

Station 320; 600 fathoms.

3. Arcturus cornutus, n. sp.

This species, like the last, is represented by a single female example, measuring 36 millim.; the length of the antennæ is 64 millim.

The margin of the head is excavated dorsally and anteriorly; the antero-lateral margin of the head below and in front of the eyes is notched; between the eyes are a pair of long, forwardly-directed spines, and behind the eyes a pair of blunt tubercles. The first three thoracic segments are subequal, and each is a little longer than the fourth. Each of the segments is ridged as in the last species; the lateral margin of the tergum has a long spine in each of their segments, and there is another spine of equal length placed halfway between the dorsal median line and the lateral margin of the segment; on the fourth segment there is an additional lateral spine placed behind the principal spine; there are indications of a corresponding spine in the anterior segments. The epimera of segments 2–4 have a single spine near to their posterior margin, the lengths of which increase progressively from before backwards; in front of the posterior tergal ridge are a pair of blunt tubercles united by a slight elevation; the first segment has also a single tubercle placed in front of this. Each of the three posterior segments is ridged as in *A. anna*; laterally is a long spine which overlies a similar spine upon the epimeron; the first of these segments has also a somewhat longer epimeral spine directed forwards. Each of the three free abdominal segments has a long lateral spine; the first segment has ventral spines as in the last species. The abdominal shield has the same shape as in *A. anna*, but there is a distinct longitudinal keel terminating in a sharp upturned point; on either side is a single row of curved hook-like spines. The 2nd, 3rd, and 4th pairs of thoracic limbs have spines similar to those of the last species.

Station 214; 500 fathoms.

4. Arcturus brunneus, n. sp.

This species measures 19 millim. in length, the antennæ being of about the same length. The head is furnished with a pair of long spines between the eyes, and a pair of shorter spines behind these, which are, however, longer in the female. The first four thoracic segments are subequal, ridged as in the last two species; on this ridge are implanted a number of long, straight, slender spines. In the male the first segment has four equidistant spines and a minute epimeral spine at the extreme lateral margin; on the second segment the epimeral spine is longer, and there is a minute tubercle between it and the lateral tergal spine; in the third and fourth segments the lateral tubercle is developed into a spine, and there is also a short median dorsal spine; on the second, third, and fourth segments there is a transverse row of longish spines near to the anterior margin of the segment in both sexes; in the female the spines are longer. Each of the three posterior thoracic segments bears a ridge, with a single row of long spines arranged at equidistant intervals; there are three pairs of these spines, one pair epimeral; in the

female there are several shorter ones in addition. The first abdominal segment has a single row of comparatively short backwardly-directed spines; on the second and third segments these spines get to be considerably longer, especially the lateral spine on either side, which marks the commencement of the abdominal shield. The abdominal shield in both sexes is covered with longish curved spines; just above and near to the termination of its lateral margins are an extremely long pair of spines directed outwards and slightly upwards. The proximal joints of the antennæ and of the thoracic appendages are furnished with spines. The uropoda are tuberculate in the male and spiny in the female.

Station 147; 1600 fathoms.

5. ARCTURUS PURPUREUS, n. sp.

This species is represented by a single female, which is of a purplish colour. It measures 18 millim., the length of the antennæ is 31 millim.

On the head between the eyes are a pair of long forwardly curved spines; the hinder portion of the head is occupied by a rounded median convexity; on the antero-lateral margin is a very short forwardly directed spine, beneath which the margin is excavated by a semicircular notch. Of the first four thoracic segments, the fourth is rather the shortest; each of the segments bears an outwardly directed spine on each side of the body, corresponding in position to those upon the head; close to the lateral margin of each segment and projecting over the epimeron is another long spine; the first segment differs from the succeeding in having no free epimera, and the lateral margin has two spines instead of one, of which the anterior is the longer; the fourth segment has also a second spine at its postero-lateral margin. Of the three posterior thoracic segments the first is the largest; the epimera of all have a long outwardly directed spine; the first of these segments has in addition a tergal spine on either side exactly overlying the epimeral spine. The first abdominal segment has a pair of long lateral spines and a pair of short ventral spines; the third segment has a pair of lateral spines. The abdominal shield is oval, with a faintly marked central keel, terminating posteriorly in a long spine; its lateral margins are flattened and unite posteriorly; on either side are two flattened spines situated at equidistant intervals. The antennæ and anterior thoracic limbs have a few spines upon the proximal joints; the uropoda are granulated, but bear no spines.

Station 23; 450 fathoms.

6. ARCTURUS SPINIFRONS, n. sp.

This species reaches to a length of 13 millim., the antennæ measuring 20 millim. The body is extremely tuberculate, but there are no spines except a single pair upon the head; the lateral margin of the head, as in *A. anna*, is notched ventrally. The four anterior thoracic segments are subequal, each has a posterior ridge which

widens out laterally; the ridge is concave forwards, dorsally, and closely embraces a median oval convexity which lies in front of it; the fourth thoracic segment has a row of short tubercles, arranged in a semicircle with the concavity directed forward, on the ventral surface. Of the three posterior thoracic segments the first is the largest, the second and third being smaller and subequal; each of the segments is traversed dorsally by a strong ridge, which is tuberculate; the first of these segments has a number of short tubercles scattered over the ventral surface, and the two succeeding segments are ridged in the same region. The segments of the abdomen are comparatively smooth, being only slightly roughened laterally. The abdominal shield is smooth with the exception of the lateral margins, which are serrate; it terminates in a short median spine. The thoracic appendages are tuberculate on the proximal joints; the uropoda bear a single median longitudinal row of tubercles.

Station 174; 600 fathoms.

7. Arcturus spinosus, n. sp.

This is the largest of the deep-sea species, measuring up to 48 millim., the antennæ measure 60 millim. The males differ slightly from the females, the latter being wider in the thoracic region and more spiny. The anterior margin of the head is excavated; between and a little in front of the eyes are a pair of long spines, behind these are a pair of shorter spines; in the female there is an additional pair of spines situated outside these latter. Of the first four thoracic segments, the fourth is slightly the longest in the male; in the female all four are subequal. On the first three thoracic segments, the posterior ridge bears three pairs of long spines situated at equidistant intervals; the fourth thoracic segment has only two pairs, but the epimera have each a long spine, wanting in the anterior segments. In the female the first thoracic segment has four pairs of spines, the other segments being as in the male; between these principal spines there are, however (in the female), numerous smaller spines, and the margins of the epimera are furnished with short spines; each of these segments has in both sexes an anterior ridge covered in the male with blunt tubercles, in the female these tubercles are pointed. Of the three posterior thoracic segments the first is the longest; the posterior ridge is tuberculate, the tubercles being more strongly marked in the female; the epimera of these segments have a large lateral spine. The three first abdominal segments are distinct; the last free segment has a long lateral spine on either side in the female. The abdominal shield terminates in a single median spine, and in two longer upwardly curved lateral spines. The surface of the abdominal shield is tuberculate in the male and covered with short spines in the female; in this sex there are in addition a pair of moderately long lateral spines, situated just in front of the posterior lateral spine. The thoracic appendages in the female have a few short spines; in the male only the three last pairs are thus provided; the uropoda are tuberculate.

Station 146; 1375 fathoms.

8. ARCTURUS GLACIALIS, n. sp.

This new species comes near to the last, but may readily be distinguished by the fact that the spines are more numerous, shorter, and more slender. The single example, a female, measures 32 millim. The dorsal surface is densely covered with short slender spines, which extend on to the thoracic appendages and uropoda; the spines are of uniform length. The anterior margin of the head is excavated by a shallow semicircular notch; between and in front of the eyes are a pair of long spines, inclined somewhat away from each other; the spines on the thoracic segments are disposed in the following way:—each of the first four segments has a posterior and anterior ridge as in other species; both these are covered with spines, as are also the epimera; between the two ridges in all but the first segment are a pair of short spines; each of the three posterior thoracic segments is ridged, the ridge being beset with spines except in the median dorsal line. The abdominal shield is beset with spines, except in the dorsal median line, where it is grooved longitudinally.

Station 153; 1675 fathoms.

9. ARCTURUS ABYSSICOLA, n. sp.

This species was obtained from two stations in the Pacific Ocean, but near to each other.

The length is about 20 millim., the length of the antennæ 42 millim. Of the first four thoracic segments the second and third are equal in size and rather longer than the first and fourth; each of these segments is ridged posteriorly as in other species; laterally the tergum is produced into a short tubercle and there is a similar tubercle upon the epimera; on the first segment this tubercle is prolonged into a spine; on the inferior surface of the fifth segment is a short median transverse ridge; the first abdominal segment has a pair of ventral tubercles; the abdominal shield is keeled and terminates in a blunt spine, it is covered with a few low scattered tubercles. The anterior thoracic appendages are furnished with one or two spines upon the proximal joints; as in *A. anna* the posterior thoracic appendages have not these spines.

Station 184; 1400 fathoms. Station 281; 2385 fathoms.

10. ARCTURUS STUDERI, n. sp.

The extreme length of this species is 28 millim., length of antennæ 30 millim. The head has two pairs of long spines situated one behind the other, behind these again is a ridge bearing a few short spines; the antero-lateral region of the head is notched ventrally as in *A. purpureus*, &c. The four anterior thoracic segments are subequal; on the posterior ridge of the first segment are a pair of minute tubercles on either side of the median dorsal line; laterally are two long spines equidistant from each other and the dorsal tubercles; the lateral margin of the tergum is prolonged into two outwardly directed spinous processes; in front of the posterior ridge are four minute tubercles arranged transversely; the second segment

is similar; the third and fourth segments have in addition another spine upon each side, placed between and behind the two lateral spines; the margins of the epimera are prolonged into three short spines. Each of the three posterior thoracic segments has two or three long spines on either side; the epimera are large and terminate in two stout spines. The two anterior abdominal segments each consist of two portions—a narrower anterior and a smaller posterior portion; the former is smooth, the latter beset with spines and tubercles; on the first segment are two particularly long spines, one situated close to the ventral margin of the tergum, exactly above this is the other, which is of equal length; on the second segment is a lateral spine of great length, but situated more dorsally; the third segment has also a pair of lateral spines. The abdominal shield has a dorsal keel which is prolonged posteriorly into a curved spine. The whole of the dorsal surface is covered with minute pointed tubercles; the lateral region of the abdominal shield is flattened as in *A. anna*, &c., and terminates posteriorly on either side in a flattened triangular spine.

Kerguelen, Royal Sound; 28 fathoms.

11. Arcturus oculatus, n. sp.

Five specimens of this small species were dredged in shallow water off Melbourne, South Australia. The largest measures no more than 7 millim. The most remarkable point about this species, and one which serves at a glance to distinguish it from any other recorded species of the genus, is the elevation of the eyes on to stalks as in the genus *Munna*. The frontal margin of the head is broad and truncated; it is not excavated as in so many other species. The first four thoracic segments are subequal in length, they are convex posteriorly and flatter anteriorly; the surface of these segments is quite smooth and free from tubercles or spines; in the last three of these segments the epimera are furnished with a long spine. The posterior thoracic segments, like the anterior, possess an epimeral spine; each of these segments has also a lateral tergal spine. Of the three free abdominal segments the first and third are furnished with a lateral spine on either side, which is absent from the middle segment. The abdominal shield is very convex, and terminates in a median dorsal spine as in so many other species; the lateral margin of the caudal shield is beset with a series of somewhat curved spines situated at equidistant intervals, the lateral margin terminates in a longish flattened spine as in *A. anna*. On either side of the dorsal median line is another row of spines, which run from end to end of the caudal shield.

Station 161; 38 fathoms.

Family Cymothoidæ.

Anuropus, nov. gen.

Among the Isopoda dredged during the cruise of the 'Challenger,' there are not many deep-sea species which present any striking differences from the Isopoda of shallow water. One of these species

is represented by a single specimen, which was dredged in the Pacific Ocean at Station 218, in 1070 fathoms of water. It is a large Isopod, measuring upwards of two inches in length, and agrees in most particulars with such genera of the Cymothoidæ as *Ægа* ; but at the same time it presents certain remarkable peculiarities analogous to those exhibited by the aberrant genus *Bathynomus* lately described by Prof. A. Milne-Edwards from deep water in the North Atlantic. M. Milne-Edwards's preliminary account of *Bathynomus* was communicated to the French Academy[1], and a translation of his note has appeared in the Ann. & Mag. of Nat. Hist.[2] Apart from its huge size, the most remarkable feature in the organization of *Bathynomus* is the great development of branchial organs : " it appears," says M. Milne-Edwards, " that the respiratory apparatus of an ordinary Isopod is insufficient to supply the physiological needs of *Bathynomus*, and that the development of special organs of a greater functional power has been rendered necessary. The abdominal limbs, which usually in this group constitute the sole branchial apparatus, in *Bathynomus* only serve the function of a covering to the gills which lie beneath them." The gills of this Crustacean are in fact represented by a series of complicated branched outgrowths of the body-wall in the ventral region of the abdomen. The same end is attained by the Crustacean, which forms the subject of the present remarks, in a different manner. Instead of a development of accessory respiratory organs, *Anuropus* (as I may term the genus from its chief structural peculiarity) exemplifies one extreme of the Isopodan type, in that *all the abdominal appendages are converted into respiratory organs* ; the increase of respiratory surface is thus attained by an exaggeration of a structural character, which is common to all the members of the family, and which indeed is an important basis of distinction from other families of Crustacea. In all the members of this group more or fewer of the abdominal limbs are soft foliaceous appendages, which permit of an easy exchange of gases between the contained blood and the sea-water. There is no instance, however, among the Isopoda in which all the abdominal appendages are similar, functioning as respiratory organs, except in this deep-sea genus *Anuropus*. *Bathynomus*, as regards the uropoda, is quite a typical Isopod ; these appendages form a pair of swimming-feet as they do in the other Cymothoidæ[3].

The modifications of the terminal pair of abdominal appendages or uropoda serve to divide the Isopoda into natural families, which prove to be allied in other particulars ; and some stress, therefore, from a classificatory point of view, should perhaps be laid upon the fact of their modification in *Anuropus*, though it is always open to question how far a purely adaptive character is of value. Since the present genus agrees with the Cymothoidæ in the general form of the body, in the number of free abdominal segments, and in fact in all essentials, it would perhaps be hardly permissible to remove it

[1] 'Comptes Rendus,' Jan. 1879.

[2] Ann. & Mag. Nat. Hist. 1879 (vol. iii.), p. 241..

[3] There is a figure of *Bathynomus* in an interesting work recently published by M. Filhol and entitled 'La vie au fond des mers,' Paris, 1885.

from that family on account of the branchiate uropoda; but *Anuropus* should at least be regarded as the type of a special subfamily equivalent to any of the other four, viz. *Cymothoadiens errants*, *C. raviseurs*, *C. branchifères*, and *C. parasites*, into which MM. H. and A. Milne-Edwards have divided the family. *Anuropus* has a further "abyssal character" in the absence of eyes, and it is also remarkable for the abortive antennules, which are only represented by two joints—a stout basal joint, and a longer stout curved distal joint, which is possibly the equivalent of a metamorphosed flagellum. The single species I may term

1. Anuropus branchiatus, n. sp.

The extreme length of the specimen, which is a female, is 70 millim. The head is small, and entirely without eyes; the body is extremely convex; the thoracic segments are subequal, the six posterior are furnished with distinct epimera; the abdominal segments are all smaller than the thoracic segments and subequal; the fifth segment is fused with the telson and forms a caudal shield, which is rounded and flattened in shape. There is no trace of eyes; the *antennules* are short and thick, consisting of a thick basal joint and a longer, somewhat curved distal joint. The *antennæ* are longer and more slender, and quite normal in structure; the *mandibles* have a three-jointed palp. The abdominal appendages are all similar to each other, consisting of a short, stout, basal joint, and two equal rami flattened and rounded in form.

Station 218; 1070 fathoms.

Fam. Sphæromidæ.

Genus Cymodocea, Leach.

1. Cymodocea abyssorum, n. sp.

This species is the only representative of the family at present known from deep water; it is represented by two individuals, one a male, the other a female. The body in both is flattened, and is evidently incapable of being rolled into a ball. The eyes are small and whitish from the absence of pigment; the first thoracic segment is broader than the head, the following segments are subequal, and with well-developed sickle-shaped epimera, absent in the last of the segments. Abdominal shield with two blunt conical spines on the dorsal surface, one behind the other; posterior extremity obtuse and rounded. *Uropoda* with the rami subequal in the female, the outer being slightly the longer; in the male the outer ramus is very much longer than the inner and curved inwards.

Station 218; 1070 fathoms.

Fam. Apseudidæ.

Genus Apseudes, Leach.

1. Apseudes antarctica, n. sp.

The largest specimen of this small species measures 4 millim. in length. The cephalothorax is nearly as long as the first four segments

of the thorax; it terminates in the middle line anteriorly in a sharp rostral prolongation. The free thoracic segments increase in length, but decrease in width up to the fourth, but there is less difference between the first three than between the third and fourth; the fourth and fifth segments are subequal; the sixth is shorter, but not perceptibly narrower than the fifth; in the first segment the epimera are prolonged into a spine; on the fourth and fifth segments are two knob-like projections on either side, equidistant from each other, and from the epimeron; on the terminal segment there is a single process; the five anterior abdominal segments are subequal, and furnished laterally with sharp spiny epimera. The caudal shield is hourglass-shaped, being constricted in the middle, it narrows rapidly to the obtusely pointed extremity. The outer flagellum of the *antennules* has eight joints, the inner only three. The *uropoda* are extremely elongated; the endopodite has two joints, the exopodite six.

Kerguelen; 120 fathoms.

Typhlapseudes, nov. gen.

This genus is distinguished from *Apseudes* by the almost complete disappearance of the ocular lobes, which are represented by a small triangular process without any trace of ocular structures; by the absence of an exopodite to the chelipeds and fossorial limbs; and by the fact that the exopodite of the abdominal appendage is distinctly bi-articulate. In the last character this genus agrees with *Sphyrapus*.

1. Typhlapseudes nereus, n. sp.

This species attains to a length of about 10 millim. The body is somewhat flattened and depressed, very much wider anteriorly than posteriorly; the cephalothorax terminates in front in a sharp rostrum; to the outside of the antennules is the triangular pointed ocular lobe, which contains no optic structures; some way below this is a pointed lateral process. The free thoracic segments diminish in breadth, but increase in length up to the fifth; the sixth is narrower but shorter than the fifth; the epimera of the first thoracic segment project as a spiny process; the lateral margins of all but the first two segments are furnished with a short spine placed halfway between the epimera and the anterior margin of the segment; on the ventral median line of the thoracic segments is a spiny process; similar minute spines exist upon the abdominal segments. The abdominal segments with the exception of the last are furnished with small pointed epimera; the last segment is as long as four of the anterior segments, it terminates in a straight truncated extremity, in the middle of which is a short knob-like process. The *antennæ* have a rudimentary exopodite. The *chelipeds* and *fossorial limbs* are normal in structure, but possess no exopodite. The *uropoda* are extremely long, as in *Apseudes*.

Station 23; 450 fathoms.

Leiopus, nov. gen.

This genus is closely allied to the last, but differs in that the chelipeds and fossorial limbs have an exopodite. The chelipeds are extremely slender and delicate in their structure, and this, together with the characters of the abdominal appendages, serves to distinguish the genus from *Apseudes*.

1. Leiopus leptodactylus, n. sp.

This species attains to a length of 13 millim.

The cephalothorax is prolonged in front into a long rostrum; the ocular lobes are large and pointed anteriorly; there is no trace of any optic structures; behind the ocular lobes are two long spiny processes, one on either side. The first free segment of the thorax is as wide as the cephalothorax; the following segments decrease in width, the first suddenly, the rest more gradually; the length of these segments increases up to the fourth; the fifth is of equal length with the fourth, the sixth rather shorter; the first segment has well-developed spiny epimera; the last three segments of the thorax have also short spines upon the epimera, which are wanting in the intermediate segments; upon all the free thoracic segments, with the exception of the first, are a pair of long lateral spines like those of *Typhlapseudes*, but longer. On the ventral surface of both the thoracic and abdominal segments, with the exception of the last, is a median spine. The abdomen is much as in the last-described species. The outer flagellum of the *antennules* has twenty-seven joints, the inner only six. The *antennæ* have a rudimentary exopodite. The *chelipeds* are very slender and delicate. The *uropoda* are as in *Apseudes*.

Station 78; 1000 fathoms.

Fam. Tanaidæ.

Genus Tanais, Audouin & Milne-Edwards.

1. Tanais hirsutus, n. sp.

The extreme length of this species is 9 millim.

The body is elongated, the anterior region is wider than that which follows; the last thoracic segment and the first three abdominal segments are again wider, after which the body narrows towards the termination. The cephalothorax has a short obtuse rostrum; the two first segments of the thorax are short and subequal, the third segment is narrower but longer; the two following segments increase progressively in length, the first is about twice the length of the preceding segment; the last thoracic segment is wider than the preceding, but shorter. The first three segments of the abdomen are wider as well as longer than the following; the terminal segment ends in a blunt, rounded extremity. The *antennules* have a three-jointed peduncle and a two- or three-jointed palp; the extremities of the joints of the peduncle are surrounded by a circle of fine delicate plumose hairs of great length. The *antennæ* are similarly beset

with fine hairs. The *uropoda* are uniramous and consist of twelve joints.

Off Prince Edward's Island ; 50–150 fathoms.

Genus Typhlotanais, G. O. Sars.

1. Typhlotanais kerguelenensis, n. sp.

The individuals of this species measure up to 3 millim. in length. The cephalothorax is short and wide ; it is prolonged between the antennæ into a short pointed triangular process ; eyes completely aborted. The first segment of the thorax is shorter than the rest which are subequal, diminishing slightly towards the posterior extremity of the body ; the first segment has a compressed forwardly-directed spine arising from the median ventral surface ; there is a trace of a similar process on the second segment. The first pair of thoracic appendages arise close to the anterior border of their segment, the second pair further back, the third pair from about the middle of the segment ; the three posterior pairs of thoracic appendages arise close to the posterior boundary of their segments. The *antennules* are about as long as the cephalothorax. The *chelipeds* are rather slender. The *uropoda* are biramose, the outer ramus one-jointed, the inner two-jointed.

Kerguelen, Christmas Harbour ; 120 fathoms.

2. Typhlotanais brachyurus, n. sp.

The length of this species is 8 millim. The cephalothorax is hardly longer than the first free thoracic segment ; the first thoracic segment is one third less than either of the two following, which are subequal ; the fourth segment is hardly shorter than the third, the fifth and sixth decrease progressively. The first pair of appendages is attached close to the anterior border of the segment ; the two following pairs are moved a little way back, but are still quite close to the anterior extremity of their segments ; the three posterior pairs are attached close to the posterior border of their segments. There is no ventral spine on the first free segment. The abdomen is short, and not so long as the last two segments of the thorax. The *antennules* are rather shorter than the cephalothorax. The *chelipeds* are short and stout. As in the last species, the three following pairs of appendages are more slender than the three posterior pairs. The *uropoda* are as in the last species.

Station 246 ; 2050 fathoms.

Neotanais, nov. gen.

This genus comes nearest to *Heterotanais*, but differs in the great length of the endopodite of the uropoda, and in the fact that the chelæ are fully developed and of the normal structure in the male ; a well-marked character of this genus is the specialization of the thoracic appendages into an anterior and posterior series ; in the first three pairs the distal joint of the limb is a single, somewhat curved

claw; in the posterior appendages this terminal joint is furnished at its distal extremity with a circlet of slender spines and a long, mesial, slender hair.

1. NEOTANAIS AMERICANUS, n. sp.

The species is represented by two specimens, both males, measuring about 7 millim. The body is elongated and everywhere of approximately the same diameter. The cephalothorax has a convex anterior margin; on either side of the antennules are the minute, but separate, ocular lobes, which, however, show no traces of ocular structures. The thoracic segments increase in length up to the fourth, after which they diminish. The five anterior abdominal segments are subequal, the terminal segment is of course longer, it terminates in a minute, median, triangular process. The *antennules* consist of a three-jointed peduncle, and a four-jointed flagellum, the joints of which are very minute. In the *antennæ* the peduncle is five-jointed, and the flagellum consists of four joints. The *chelipeds* are short and stout. There is no difference in size between any of the succeeding thoracic appendages, only the difference in the terminal joint referred to above. All the abdominal appendages are present; the *uropoda* consist of a very stout basal joint, with which are articulated the long eight-jointed endopodite and the small two-jointed exopodite.

Station 45; 1250 fathoms. Station 323; 1900 fathoms.

Genus LEPTOGNATHIA, G. O. Sars.

1. LEPTOGNATHIA AUSTRALIS, n. sp.

A single female example of this species was dredged in shallow water at Kerguelen, it measures 4 millim. The body is extremely narrow and elongated. The cephalothorax is longer than the first segment of the thorax, but not so long as the first two segments; the eyes are completely absent; the first segment of the thorax is shorter than any of the three following, which are subequal, and each about half as long again as the first segment; the fifth segment is shorter than the fourth, but a trifle longer than the first; the last segment of the thorax equals the first in length; the first pair of thoracic appendages are articulated close to the anterior margin of their segment; the second, third, and fourth pairs at about the middle of their respective segments; the last two pairs are articulated a very little nearer to the posterior margin. The abdomen is altogether as long as the last two segments of the thorax and one half of the fourth. The *antennules* are not so long as the cephalothorax, they are four-jointed. The *chelipeds* are stout and robust, all the joints are smooth, the distal joints are not serrated as in *L. longiremis*, the three anterior pairs of thoracic appendages are more slender than the posterior pairs. The rami of the *uropoda* are both biarticulate, but the endopodite is much longer and stouter than the exopodite.

Kerguelen, Christmas Harbour, 120 fathoms.

Genus Paratanais, Dana.

1. Paratanais bathybrotis, n. sp.

The single specimen measures 4 millim. The cephalothoracic shield is about as long as the following two segments of the thorax; it is prolonged anteriorly into a wide obtusely pointed rostrum. Eyes are present and well developed. The first segment of the thorax is rather shorter than the rest, which are subequal. The length of the abdomen is about one fourth of that of the entire body. The *antennules* have a very characteristic form; they are composed of four joints; the basal joint is as long as the rest of the appendage, and is extremely wide and flattened; the following joint is short and wide; the third joint is no longer, but is narrower; the terminal joint, which represents the flagellum, is short and conical in form. The *antennæ* are shorter than the antennules, but, like them, consist of four joints; the first joint is wide and flattened, the second joint has the same shape, but is shorter, the third joint is narrow and cylindrical; the distal joint is short and narrows towards its termination.

Station 246; 2050 fathoms.

2. Paratanais dimorphus, n. sp.

A very considerable number of individuals of a small species of *Paratanais* were dredged in shallow water at Kerguelen, which are to be distinguished by a very pronounced sexual dimorphism. The female is like many other species of the genus; but the male is remarkable on account of the more slender body and the great difference in the structure of the chelipeds. Both males and females measure, in most cases, 3 mm. in length. In the male the cephalothorax is rather long and narrow, and equals in length the first three segments of the body together with half of the fourth; the first free segment of the thorax is the shortest; the second is twice the length of the first; the third segment is half as long again as the second; the fourth and fifth are subequal and about half as long again as the third; the last segment is about equal in length to the third. The abdomen equals in length the last two thoracic segments. The *antennules* consist of five joints; the *antennæ* of six. In the female the antennary organs are shorter, the antennules being three-jointed and the antennæ five. The *chelipeds* are long; both the moveable and the fixed 'finger' are of great length; the latter is, however, not as in other Tanaids a mere prolongation of the penultimate joint, but is freely moveable, being articulated with it. In the female the chelipeds are quite normal in structure. The *uropoda* are biramose, each ramus being two-jointed.

Kerguelen, Christmas Harbour, 120 fathoms.

Fam. Anceidæ.

Genus Anceus (Praniza), Risso.

1. Anceus bathybius, n. sp.

Only a single fragment of this species was obtained from deep-water; the abdomen was entirely wanting. The specimen is a male

and measures 10 millim. The head terminates anteriorly in a very long obtusely pointed rostrum. Eyes are completely absent. The first three segments of the thorax are, as usual, much shorter than the two following. The surface of the body is smooth. The first pair of thoracic appendages are operculiform and consist of five joints, the second being much the most important; the two following pairs of appendages differ from the two last in being very much more slender, otherwise their structure is much the same.

Station 76; 900 fathoms.

2. Anceus gigas, n. sp.

This large species is represented by a number of individuals both male and female; the largest specimens measure as much as 16 millim., the females being hardly smaller than the males. In the male the anterior margin of the head is almost straight, being only broken by three minute processes, one of which is median. The thoracic segments are quite like those of other species; the lateral regions of these segments are roughened, the dorsal smoother. The abdominal segments are furnished with well-developed sickle-shaped epimera, which instead of projecting outwards from the body are bent down. The first thoracic appendages agree with those of the last species in having six joints; the remaining thoracic appendages are all similar to each other.

Kerguelen, Christmas Harbour, 120 fathoms.

3. Anceus tuberculosus, n. sp.

A second species of *Anceus* was obtained at Kerguelen, which cannot be confounded with the preceding; it is represented by a considerable number of specimens, both males and females. The largest male measures only 5 millim. in length. The head is prolonged in the middle line into a short rostrum, which is squarish in outline and has a semicircular notch at its extremity. The dorsal surface of the head is very convex, and is covered with numerous tubercles, which are especially abundant posteriorly and laterally. The three anterior segments (including the rudimentary first free segment) are similarly beset with tubercles; the remaining segments are smooth. The segments of the abdomen gradually increase in length, they are furnished with well-developed sickle-shaped epimera, which project outwards. The ambulatory limbs are all similar to each other; the five anterior abdominal appendages are flattened and smooth, without any hairs.

Kerguelen, Christmas Harbour, 120 fathoms. Kerguelen, Royal Sound, 30 fathoms.

4. Anceus latidens, n. sp.

A single male specimen of this species measures 2·5 mm. The anterior margin of the head is prolonged into three short, blunt protuberances, of which the median one is the largest. The head and

the first four segments of the thorax are tuberculate, the two remaining segments and the rudimentary terminal segment being smooth. The abdominal appendages have epimera, which are directed downwards as in *A. gigas*. The operculiform first pair of thoracic appendages are like those of the majority of species in consisting of a single large basal joint, a small second joint, and a minute rudimentary third joint. The remaining thoracic appendages are similar to each other; the proximal joints are stout and bent, with short stout spines. The abdominal appendages differ from those of the last species in that both rami are setose, the outer perhaps more so than the inner.

Flinder's Passage, North Australia, 7 fathoms.

The forty-four species which have been briefly described in the foregoing pages do not include all the novelties in the 'Challenger' collection; there are a few other species which I have not yet examined with sufficient care to report upon, but which, so far as I am aware at present, are undescribed forms. These include one species of *Arcturus*, one of the allied genus *Astacilla*; two species, one from deep water, the other from Kerguelen, which are representatives of the genus *Paranthura*. The total number of new species of Isopoda obtained during the voyage of the 'Challenger' is therefore about 70, comprising 10 new genera.

Geographical and Bathymetrical Distribution.—It is interesting to note that all the existing families of Isopoda without a single exception[1] are to be found in the deeper waters of the ocean; but the number of deep-sea species differs very considerably in the different families; the most characteristic are evidently the Munnopsidæ and Arcturidæ, and, in a somewhat less degree, the Tanaids, Asellids, and Serolidæ; the occurrence of a single species each of the Anceidæ, Cymothoidæ, Anthuridæ, and Sphæromidæ may perhaps be taken as an indication that these families are not largely represented in the deep-sea fauna.

In most cases the deep-sea species are distinct from the shallow-water species; only one or two (e. g. *Arcturus furcatus*, Studer) are known, which are common to shallow water and the great depths. In many cases the deep-sea genera are distinct, and this is particularly so in the Asellids; of this group, *Acanthoniscus*, Sars, *Acanthomunna*, *Trichopleon*, *Iolanthe*, are absolutely confined to deep water, while *Ischnosoma* has four deep-sea species and only one which is an inhabitant of shallow water in the extreme north, where the conditions of temperature are much the same. Very frequently the deep-sea Isopoda are distinguished by the extremely spiny character of the body; this is largely the case with the deep-sea *Arcturi*, and there are other instances. The great development of spines upon the body is not, however, confined to the deep-sea Isopoda, but is also found in many species from the colder regions, at Kerguelen,

[1] Sars has described a species of Idotheidæ, *Glyptonotus megalurus*, which enables me therefore to enunciate the general statement.

and in the Arctic Ocean; it appears therefore to be correlated in some way which is not understood with a low temperature of the water.

The majority of the deep-sea Isopoda are entirely blind, or have, at most, rudimentary eyes devoid of pigment; of the deep-sea species obtained by the 'Challenger' only 25 p. c. have well-developed eyes, and all these species but three belong to the Arcturidæ, which form a very striking exception to the general rule. In every instance but one the genera which are confined to the deeper waters are blind; and it is just possible that the presence or absence of eyes may be an indication of the time which the species has inhabited the deep sea.

It is commonly believed that the deep-sea species are larger than their shallow-water allies; the examination of the 'Challenger' Isopoda lends some support to this view. Of the families Serolidæ, Munnopsidæ, Arcturidæ, Asellidæ, and Munnidæ the deep-sea species are certainly the larger.

With regard to the range in depth, the greatest depth at which any species has been met with is 2740 fathoms; the species obtained at this great depth is *Eurycope intermedia*. Only a few species descend below the 2000-fathom line, indeed only three to any extent. The majority of the deep-sea forms were dredged in the intermediate zone of 1000–2000 fathoms—twenty-three species out of a total of forty-four, and this does not include five species which were dredged just below the 1000-fathom limit, viz. in 1000–1070 fathoms. I hope to discuss more fully the distribution of the deep-sea Isopoda in my forthcoming Report.

5. On a Variety of *Anthocharis eupheno*, from Mogador.

By J. H. Leech, F.Z.S.

[Received January 18, 1886.]

During a recent excursion to Mogador I obtained examples of a new form of orange-tip Butterfly, which I propose to call

Anthocharis eupheno, var. androgyne.

The male of this variety differs from the typical *A. eupheno* in its larger size, and in the fainter markings of the underside of the hind wings, which are rarely strong enough to be discerned from the upper side.

The female is much larger than typical specimens of *A. eupheno*, agreeing with the male in markings and in the shape and greater depth of the fore wings. The orange blotch, instead of being confined to the tip of the fore wing in the usual manner, extends as far as the discoidal spot and is bounded (usually) on its inner margin by a black band, which sometimes suffuses the whole tip of the wing. The ground colour of the fore wing varies from pure white to pale

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