

- 7.—*The Sympoda* (Part VI. of S.A. Crustacea, for the Marine Investigations in South Africa)*.—By the Rev. THOMAS R. R. STEBBING, M.A., F.R.S., F.L.S., F.Z.S., Fellow of King's College, London, Hon. Member of New Zealand Inst., Hon. Fellow of Worcester College, Oxford.

THE Sympoda are a group in many ways remarkable. Its boundaries are at present as sharply defined as any systematist could possibly wish. All known Crustaceans are either clearly Sympoda or clearly not Sympoda. None hover doubtfully on the outskirts of this society. On the other hand, within its limits the relations are highly perplexing. There is so much interlacing of characters, together with so many fine gradations, that any settled standard of classification is difficult to adopt, or if adopted to uphold against reasonable objections. For distinguishing families practical convenience solicits a choice of external and easily observable features. The widely separated eyes of *Nannastacus* offered such a character, till the kindred *Cumella* was found with a single eye. The presence or absence of a distinct telson sets one group of families in a marked manner apart from another group. Yet between the greatly elongated segment in *Makrokyllindrus* and the disappearance of the segment in *Bodotria* there are not a few intermediaries, so that a comparatively short and narrow telson in *Leptostylis* leads on through a short and blunt one in *Petalosarsia* to forms in which the telsonic segment is produced between the uropods, though the produced part is not articulated, and in *Eudorellopsis biplicatus*, Calman, this unarticulated portion is marked off "by a very distinct transverse groove." In some of the appendages the third or "ischial" joint is apt to disappear. Accordingly its presence or absence seemed likely to be available for classificatory purposes. But this proved disappointing, because, though the joint is often quite definitely present, and some-

* Parts I.—III. have been published in the "Marine Investigations in South Africa"; Parts IV. and V. in Vol. VI. of the "Annals of the South African Museum." In Part V., pp. 409–418 treat of the Sympoda (olim *Cumacea*).

times quite definitely missing, there are other cases when the ring is incomplete or when coalescence with the preceding joint can only be inferred from a line of suture. The endopod or inner ramus of the uropods may be a single piece or it may be divided into two or three joints of varying relative lengths. The resulting differences are rather easy to observe, and have been, in fact, of much service in classification. But even here perplexities occasionally arise. Among the species of *Sympoda* earliest described are *Bodotria scorpoides* (Montagu) and *Bodotria arenosus*, Goodsir. These are so much alike that their generic separation is hardly to be thought of. Nevertheless the uropod of the former has a two-jointed endopod, while that of the latter is provokingly undivided.

When the question arises of arranging the families in a natural order, one would probably think precedence appropriate to those which retain the most primitive characters. Among these would be the most complete segmentation of the body and the fullest equipment of the segments with their several pairs of appendages. On the first account the families with a distinct telson should stand before those without one. But when the second point is also considered, we find the full complement of five pairs of pleopods combined with entire want of a distinct telson, or in one case with a telson of the smallest type. All other families with the telson distinct have a diminished number of pleopods, varying from three pairs to none. These differences refer only to the male sex, because, so far as at present known, all the females with singular unanimity dispense with pleopods altogether. In some families, however, the males are in this respect like the females.

The provision of exopods or swimming branches on the peræopods in the two sexes has its uses for systematic arrangement. But while in the majority of families the adult males have these branches well developed on the first four pair of peræopods, the females are never so well provided, having at most exopods well developed on the first three pairs and a rudiment on the fourth. In both sexes the exopods may be limited to the first pair of peræopods. For full advantage to be taken of these much-varying characteristics it is obviously important that both sexes should be observed. But, owing probably to the respective habits of these, it not unfrequently happens that new species have to be, or at any rate are, founded on specimens of a single sex, so that the characters of the other sex have to be guessed at or left out of count.

These are a few of the difficulties which confront the systematist in points the most readily available for his purpose. There are

plenty more in those other details of the organism which cannot well be studied without dissection and microscopic examination. The mandibles may have the trunk pointed at the base or very blunt, the molar stout or slender, spines of the spine-row numerous or very few; the palp of the first maxillæ may end in two filaments or only one, or the palp may be missing altogether; important variations in the terminal joints of the first maxillipeds are indeed more or less easily discernible, but this is not the case with the branchial apparatus which is out of view in complete specimens, but which has important differences to offer in the number and disposition of the branchial leaflets. Even the comparative uniformity of the intestine cannot be depended on, since *Cyclaspoides sarsi*, Bonnier, and *Platycuma holti*, Calman (Fisheries, Ireland, 1904, I. [1905], p. 30, pl. 3, figs. 39-56), agree with many of the Cladocera in having a coiled instead of a straight alimentary canal.

It is reasonable to suppose that the Malacostracan type of body was gradually produced in far-distant ages, but the pattern is now so wonderfully persistent and traceable under all sorts of disguises, that missing parts are almost certainly due to losses, not to inheritance of ancestral defect. Hence, as above suggested, we may be allowed to assume that the organism with the largest number of distinct parts comes nearest to the original pattern. On this principle the family Vaunthompsoniidae will stand first, having in the male five pairs of pleopods together with exopods on the first four pairs of peræopods, and in the female exopods on the first three of those pairs. The Sympodommatidae agree as to pleopods, but have exopods only on the first three pairs of peræopods in the male as well as in the female. The Bodotriidae with the same number of pleopods have well-developed exopods only on the first peræopods in each sex. The only other family with five pairs of pleopods is the Ceratocumatidae, which might claim precedence over the families already named in respect of its distinct telson, which they are without, but it is inferior to the Vaunthompsoniidae by having exopods in the male on the first two only instead of the first four pairs of peræopods, and in its only known species it has lost the fifth peræopods altogether.

The present essay proposes the adoption of fourteen new species, nine new genera, and a new name for a genus already known, but a more important innovation affects the framework of the group at large. In view of a forthcoming monograph, which avowedly aims, not at introducing novelties, but simply at recording the actual state of science, it has seemed desirable here to name a great number of

Pleopods, Pairs in Male.	Peraopods, Pairs with Exopods in		Telson.	Apical Spines of Telson.	Antennal, Accessory Flagellum.	Antenna 2 of Female, Joints.
	♂	♀				
5	4	3	0	..	very small	2
5	3	3	0	..	very small	2
5	1 or 1 + 2r	1 or 1 + 2r	0	..	very small	1 or 2
5	2	?	small	0	very small	?
3	4	3 + r	0	..	very small	3
3	4	2 + 2r	large	3 or more	well developed	4
3	4	2 + 2r	large	3	well developed	5
3	4	1	large	3	well developed	4
2	4	2 or 2 + 2r	large	2	well developed	4
2	4	2 + 2r	small	0	very small	3 or 4
2	4	2 + 2r	large	0	small	4
?	?	2 + 2r	large	3	very small	? 4
2	4	2	large	2	small	? 4
2	4	2	large	2	small	5
2	4	2	large	2	rather small	?
2 or 1 + r	4	2 + 2r	small	0	very small	1 or 2
2	4	3	0	..	very small	1, 2, or 3
1	4	3	0	..	small	3
0	4	3	0	..	small	?
0	4	2 + 2r	large	3 or more	well developed	4 or 5
0	4	?	large	0	very small	?
0	4 or 2	2	large	0 or 2r	very small	3 or 4
0	4	2 or 0	0	..	very small	1, 2, or ? 3
0	4	2	0	..	very small	?
0	4	2	0	..	very small	1
0	2	2	0	..	small	3

In the table above *r* stands for *rudimentary*. In most families the mandibles are tapering at the base and have a blunt molar, the second maxillæ are apically divided, the first maxillipeds are more than 4-jointed, and in the second maxillipeds the inner margin of the apical joint is not strongly dentate.

Mandibles.	Maxilla 1, Apical Filaments of Palp.	Maxilla 2.	Maxilliped 1.	Maxilliped 2, Apical Joint.	Uropod. Joints of Inner Ramus.	
..	2	..	..	..	2	Vaunthompsoniidae
..	2	..	..	..	2	Sympodommatidae
..	1 or 2	..	..	..	1 or 2	Bodotriidae
..	2	..	..	..	1	Ceratocumatidae
..	2	..	..	..	2	Leptocumatidae *
..	2	..	..	..	3	Hemilampropidae
..	no palp	..	..	..	3	Paralampropidae
..	no palp	..	..	..	3	Platysympodidae
..	2	..	..	..	3	Diastylidae
..	2	..	..	..	2 or 3	Colurostylidae
..	2	..	..	..	3	Oxyurostylidae
..	?	..	..	..	?	Pseudodiastylidae
broad at base	2	..	..	..	3	Diastylolidae
..	2	..	..	..	2	Ekdiastylidae
..	2	..	..	..	1	Holostylidae
..	2	..	..	..	1	Pseudocumatidae †
broad at base	1	..	..	..	2	Leuconidae
broad at base	1	..	..	..	2	Paraleuconidae
broad at base	?	..	..	..	2	Hemileuconidae
..	1 or 2	..	..	..	3	Lampropidae
..	2	..	..	..	3	Dicidae
..	2	..	..	..	2 or 1	Gynodiastylidae
..	1 or 2	..	..	..	1	Nannastacidae
molar narrow	2	..	..	{strongly dentate }	1	Procampylaspidae
molar stilliform	1 or 2	undivided	4-jointed	..	1	Campylaspidae
broad at base	1	..	..	..	1	Heteroleuconidae

* A new family for the genus *Leptocuma*, Sars, 1873, with the species *L. kinbergii*, Sars, 1873, and *L. minor*, Calmar, 1912.

† Name modified from Pseudocumidae, instituted by Sars to receive his genus *Pseudocuma*, 1865, and allied genera.

families among which all the genera of the group will in that monograph be distributed. The accompanying tabulation of several characters will give the student an opportunity of understanding at a glance and criticising at his leisure the proposed arrangement. There are several obvious weaknesses. Besides those which depend on unavoidable want of information, there are those due to alternative characters, to reliance on features of little significance, and to the use of indefinite terms such as large and small. In defence it may be pleaded that the case is essentially one in which convenience should be studied and compromise accepted, since Nature makes a mock of our pragmatistical divisions and is continually supplying the links which the evolutionist desires and the systematist abhors.

The naturalist who happens to be a grammarian, or the grammarian who happens to be a naturalist, will find among the names of Sympoda, as among the names in almost any other branch of zoology, a plentiful supply of false concords. This arises from the tiresome and ridiculous idea that the termination of a generic name can make a species masculine, feminine, or neuter. How Nature must laugh! As though because of the Latin words *Aquila* and *Vultur* an eagle must be a hen and a vulture a cock! Since some one must make a beginning, if so inconvenient and unnatural a rule is to be discountenanced and discarded, I here brave reproof and reproach by making all the species of Sympoda of one and the same gender, and that the masculine. In due time, if editors are graciously pleased to allow it, the virtue of simplicity will be recognised and common sense will win a victory over a vexatious custom.*

FAMILY VAUNTHOMPSONIIDÆ.

1879. *Vaunthompsoniida*, G. O. Sars, Arch. Naturv. Kristian., vol. iv., p. 63.

In this family, though there is no distinct telson, the telsonic segment is notably produced between the peduncles of the uropods, this being especially the case in the genus *Gaussicuma*, Zimmer, 1907. In that genus the pseudorostral lobes do not meet in front of the eyelobe, thus distinguishing it from *Bathycuma*, Hansen, 1895, in which they do meet. Both these genera agree in having the second joint of the third maxilliped strongly produced at the outer distal

* See "Knowledge," vol. xxxiii., pp. 259 and 470, 1910, for a fuller discussion of this subject.

angle—a feature not possessed by the typical genus *Vaunthompsonia*, Bate, 1858.

GEN. BATHYCUMA, Hansen.

1895. *Bathycuma*, H. J. Hansen, *Ergebn. Plankton-Exp.*, vol. ii., G.c., p. 55.
 1905. *B.*, Calman, *Fisheries, Ireland, for 1904, I.*, p. 17.
 1905. *B.*, Calman, *Siboga-Exp.*, vol. xxxvi., p. 9.
 1908. *B.*, Zimmer, *Deutsch. Tiefsee-Exp.*, vol. viii., p. 164–166.
 1912. *B.*, Calman, *Proc. U.S. Mus.*, vol. xli., p. 614.

General form elongate. Pseudorostral lobes meeting in the front. First pedigerous segment short, but well exposed. Telsonic segment produced between the bases of the uropods. Eye wanting. Mandible with long spine-row and strong molar. First maxillæ with bisetose palp. First maxillipeds comparatively broad, the epipod furnished with several branchial leaflets. Third maxillipeds with second joint distally produced, the fourth little expanded. First four peræopods in male, only the first three in female, carrying exopods. All five pairs of pleopods in male well developed.

To this genus Dr. Calman in 1905 transferred *Leucon brevisrostris*, Norman, 1879, and also in 1905 described a new species, *Bathycuma longirostris*, to which he added *Bathycuma longicaudatus* in 1912, calling it "*Bathycuma (?) longicaudata*."

BATHYCUMA NATALENSIS, n. sp.

Plate XLIX.

All the five species assigned to this genus show signs of very near relationship. It is an inconvenient circumstance that in two cases only the male is known, and in two others only the female. Only in the case of *B. brevisrostris* (Norman) is the situation saved by Dr. Calman's decision that *Vaunthompsonia cæca*, Bonnier, 1896, is a synonym of Norman's species. From Norman's account of the female the form about to be described differs in respect to the third maxillipeds, the telsonic segment, and the uropods. From Bonnier's description and figures of the young male it differs further in regard to the first and second maxillipeds. From *B. longirostris*, Calman, founded on a young male, it differs strikingly in characters of the pseudorostral lobes, and from *B. longicaudatus*, Calman, founded on an immature female, it differs conspicuously by inferior size and in the proportions of the first antennæ. From the typical species, *B. elongatus*, Hansen, also described from an immature

female, it differs in the proportions of the mandibles and the uropods.

The pseudorostral lobes meet for a short distance in front of the little triangular eyelobe; seen from the side they project a little upwards in an acute point, and laterally are truncate, meeting the serrate lower margin without forming any produced tooth; seen from above they show a slightly serrate sinuous front. The carapace is about one-fourth of the total length from pseudorostral point to end of telsonic segment; the medio-dorsal line is carinate, the first third showing the alternating spinules in double line commencing on the eyelobe and seemingly fading away into a single line obscurely continued to the hind margin. High magnification shows an extensive distribution of minute denticles, each projected from one of the irregular hexagonal cells of the surface, most of these cells having an internal marking suggestive of their capacity to produce a denticle.

The first pedigerous segment appears to be firmly united to the carapace. The four following segments are bordered below with firm edges. The lower borders of the first five pleon segments are flattened out. The produced part of the telsonic segment is almost semicircular, with a little serration on each side of the middle of the apical border. Norman assigns to *B. brevirostris* "telson very short, semiovate, smooth." Bonnier figures the part in question as semi-ovate, but rather long in relation to the antecedent part of the segment.

As in all species of the genus, the eye is wanting. The first antennæ have a geniculate first joint, the second shorter than the third, the two-jointed flagellum shorter than the third joint of the peduncle, its first joint being dilated near the base and fringed with long filaments, the shorter second joint carrying the usual annulated setæ and others; the minute two-jointed accessory is provided with a close-set fascicle of very long setæ. That this rather striking apparatus is not mentioned in the other species is no doubt due to the sex of the female specimens and probably to the immaturity of the males. The second antennæ have characters commonly found in male Symptoda, unless the interlocking of the third and fourth joints of the peduncle may prove to be exceptional (but Sars has figured something similar in *Bodotria* and *Leucon*); the short penultimate joint pushes up a small lobe between the two widely separated lobes of the antepenultimate; the flagellum was not complete in any specimen, but the proximal portion showed a very great number of short joints furnished with setules.

The upper lip is emarginate. The mandibles have the basal section longer than the part on the other side of the strong molar; a spine-row of twenty-one spines leads on to a very narrow cutting plate, which in one mandible is accompanied by a narrow accessory. In Hansen's *B. elongatus* the basal section of the mandible is, contrary to custom, shorter than the spiniferous portion. The first and second maxillæ are normal.

The first maxillipeds have a long second joint, the third missing, the fourth and fifth broad, closely united, the fifth fringed with a row of eight bifid teeth, the two following joints small; the branchial apparatus with eight leaflets agrees better with Hansen's account for *B. elongatus* than with Bonnier's figure and description of this part in his *Vaunthompsonia cæca*. The second maxillipeds have a slender, sinuous, strongly ridged second joint twice the length of the rest of the limb, with the third joint scarcely forming a complete ring, instead of a joint twice as long as broad as represented in Bonnier's figure. The third maxillipeds have the second joint well produced and serrate on inner side of the apical process, but without the strong armature of spines described by Norman for his species. After the small third joint the rest of the limb is missing.

The first peræopods were available only to the end of the second joint; the exopod has a remarkably broad basal joint, the flagellar part having a first joint not very long, but succeeded by no less than seven short joints. The second peræopods have the second joint serrate, the third short, the much-spined seventh about as long as the fifth with the little sixth.

The pleopods have the peduncle little longer than the subequal rami, the one-jointed endopod with its lateral process little produced across the two-jointed exopod, of which the second joint, like the endopod and peduncle, is amply provided with setæ.

The exopod of the uropods is about three-fourths as long as the peduncle, and has eight slender spines on its inner margin. The scarcely shorter endopod is fringed with about seventeen little spines and four larger on the inner margin of its large first joint: the much thinner second joint, more than half as long, has a dozen little spines on the inner margin, on which the peduncle has a varied assortment of a score.

Length of male 11 mm. Female unknown.

Locality. Cape Natal N. by E. 24 miles; depth 805 m.; No. 12605, sent by Dr. Péringuey.

FAMILY SYMPODOMMATIDÆ, n.

Without distinct telson; with exopods only on the first three pairs of peræopods in both sexes; with five pairs of pleopods in the male.

SYMPODOMMA, n. g.

General form slender, elongate, width diminishing gradually from carapace to pleon. Eyelobe narrowly linguiform, separating the pseudorostral lobes, in which the sinus is well defined by the produced antero-lateral angle. All five pedigerous segments dorsally exposed, the first short. Pleon elongate; telsonic segment produced between the bases of the uropods. First antenna with both flagella slight. Third maxilliped with second joint distally much produced, fifth not much distally widened. First three pairs of peræopods in both sexes with exopods, fourth and fifth pairs without any. Five pairs of pleopods in the male. Uropods with both rami two-jointed.

The name of the genus is compounded of the tribal name and *ὄμμα*, an eye.

Under this genus I group the new species *Sympodomma africanus*, and three previously known under other names: 1. *S. anomalus*, assigned by G. O. Sars in 1871 and 1873 with much hesitation to the genus *Leucon*, but in 1879 and 1887, again with some doubt, transferred to *Vaunthompsonia*; 2. *S. weberi*, described by Calman in 1905 as *Heterocuma? weberi*, and 3. *S. diomedææ*, the species described by Calman in 1912 as a companion of the preceding species in the genus *Heterocuma*.

SYMPODOMMA AFRICANUS, n. sp.

Plate L.

The present species bears a close resemblance to that recently described by Dr. Calman from Japan under the name *Heterocuma diomedææ* (Proc. U.S. Mus., vol. xli., p. 612, text figs. 6-9, 1912), but is distinguished by the different armature of the carapace and by the proportions of the uropods.

The pseudorostral lobes are kept quite apart by the advanced eye-lobe, the slightly expanded pellucid apex of which appears to be occupied by numerous small lenses; an angular antennal sinus is formed by the well-advanced antero-lateral angle, from which commences a serration carried some way along the lower margin. A

median carina, beginning on the eyelobe, is carried right through to the hind margin, on the frontal lobe carrying three conspicuous forward-pointing teeth just as in the Japanese species, but not as there behind these teeth dividing into two tuberculated ridges, nor are the sides of the carapace here tuberculate except for a single pair of tubercles anteriorly outside the frontal lobe. Microscopic denticles can be made out along the centre of the carina and scattered over the minutely squamose surface of the carapace.

The pedigerous segments after the first are laterally keeled, and after the second have a median pair of carinæ. There is a slight interlocking laterally between the third and fourth segments. No ventral spine was found on these segments. The first five pleon segments have each a dorsal and lateral pair of carinæ, but the telsonic segment though elevated in the middle is scarcely to be called carinate; its rounded end is well produced between the bases of the uropods.

In the first antennæ the geniculate first joint is as long as the subequal second and third joints combined; the small flagellum is three-jointed, with the third joint minute, the sensory filaments long; the accessory flagellum with its two joints is not nearly as long as the first joint of the principal. The second antennæ of the specimen had the usual character for a male not fully adult, giving promise, however, of very numerous joints.

The mandibles have a strong molar, finely toothed on the apical margin; the spine-row contains at least a score of spines. The first maxillæ show an elongate palp, with two unequal terminal filaments. The second maxillæ with the usual armature appear to be longer than usual. The first maxillipeds have the marginal teeth of the ante-penultimate joint apparently simple, although a spine projecting from below under a low magnification makes the upper tooth seem bifid; the second joint at the apex of its inner margin shows a tooth of unusual size. In the second maxillipeds the slender second joint is much longer than the five following joints combined. The second joint of the third maxilliped is more than twice as long as the five following joints combined, wider at both ends than in the middle, much produced apically; the fourth joint is also produced, but is little longer than broad; the three following joints are narrow. The long first pereopods have the sixth joint less than twice the fifth and not a fourth longer than the seventh. In the short second pair the sixth joint is not longer than the third, the seventh as long as fifth and sixth combined. Exopods to the third pair were not satisfactorily made out, but may be presumed, as they occur in both sexes of the allied Japanese species.

The five pairs of pleopods were without swimming setæ, the one-jointed inner branch having a narrow process across the line of junction between the two joints of the outer branch. In the uropods the endopod is about two-thirds as long as the carinate peduncle, a little longer instead of shorter than the exopod, its first joint about twice as long as the second, instead of subequal to it.

Length of specimen, subadult male, 18 mm. Female unknown.

Locality. Cape Point N. 81 E. 32 miles; No. 17643, sent by Dr. Péringuey.

FAMILY BODOTRIIDÆ.

1901. *Bodotriidæ*, T. Scott, Rep. Fish. Board Scotl., vol. xix., p. 273.

Telson wanting, telsonic segment little produced between the uropods; exopods only on the first pair of peræopods or also with rudiments on the second and third pairs in both sexes; five pairs of pleopods in the male; inner branch of uropods two-jointed or simple.

To this family are referred *Bodotria*, Goodsir, 1843; *Iphinoë*, Bate, 1856; *Cyclaspis*, Sars, 1865; *Stephanomma*, Sars, 1871; *Heterocuma*, Miers, 1879; *Cumopsis*, Sars, 1879; *Eocuma*, Marcusen, 1894; *Cyclaspoides*, Bonnier, 1896; *Zygosiphon*, Calman, 1907.

From these genera the species *Iphinoë brevipes*, Hansen, and *Iphinoë crassipes*, Hansen, have been already considered, and the species *Iphinoë zimmeri*, Stebbing, described, in the Catalogue of S. African Crustacea, 1910; a specimen of *Cyclaspis spectabilis*, Zimmer, mentioned in the same work, has since been obtained by Dr. Péringuey from Cape Point, E. by N. 29 miles; Museum No. 17585, and another, No. 12605, from a depth of 805 m., Cape Natal, N. by E. 24 miles; the Catalogue further notices *Eocuma sarsii* (Kossmann).

GEN. BODOTRIA, Goodsir.

1843. *Bodotria*, Goodsir, Edinburgh New Philosophical Journal, vol. xxxiv., pp. 120, 128.

Carapace without lateral cornua; first pedigerous segment inconspicuous, the second large. Only the first pair of peræopods carrying exopods in either sex; second peræopods with the third joint indistinct; inner branch of uropods either two-jointed or simple.

The two species here added to the genus are distinguished from *B. arenosus*, Goodsir, 1843; *B. pulex*, Zimmer, 1903; and *B. similis*, *B. siamensis*, *B. parvus*, all three established by Calman in 1907, because those five species have the inner branch of the uropods simple, whereas the new species have it two-jointed, in agreement with *B. scorpioides* (Montagu), 1804; *B. gibbus* (Sars), 1879; *B. pulchellus* (Sars), 1879; and *B. sublevis*, Calman, 1907. But while each of the four last-mentioned species is provided with an eye, that organ is apparently wanting in the two new species.

BODOTRIA MONTAGUI, n. sp.

Plate LI.A.

This species is closely related to *Bodotria scorpioides* (Montagu), but exhibits the following points of difference in the female sex, to which the single specimen belongs. The integument is not hard and strong. The eyelobe shows no trace of an eye. The carapace exhibits a pair of oblique grooves, diverging near the middle backwards from the central carina. In the first antennæ the third joint is not longer than the second. The second maxillipeds are without the six strong spines on the distal part of the second joint's outer margin, that part being furnished with four very slight setules. The third maxillipeds have the second joint narrowed in the middle. In the first peræopods the fifth joint, though decidedly longer than the sixth, is considerably shorter than the sixth and seventh combined. In the second peræopods there is a faint indication of the third joint, but with incomplete articulation. In dorsal outline the fourth pedigerous segment is not separated from the third and fifth by any deep incisions, and the telsonic segment is little produced between the peduncles of the uropods.

The comparison has been instituted between the South African specimen and the excellent figures and description given in 1879 and 1899 by Professor Sars of "*Cuma Edwardsi*, Goodsir," which is now recognised as a synonym of *Bodotria scorpioides* (Montagu). Though the differences above mentioned are rather numerous, the points of resemblance are also so many and so close that it seems unnecessary to repeat descriptions practically available in the writings of Professor Sars. Among the minute details which he gives is a character of the first maxillæ, the elongate palp of which has its unequal apical filaments furnished with little lateral hairs pointing in different directions. It is difficult to see the hairs at all, but in the southern specimen some point upwards and some downwards as described by Sars for the northern species.

Length of specimen 4.5 mm.

Locality. Lat. 32° 53' 30" S., long. 28° 11' 00" E.; depth 75 m.
No. 83, sent by Dr. Gilchrist.

BODOTRIA AUSTRALIS, n. sp.

Plate LI.B.

This species, like the preceding, showed no visual elements and had a yielding integument which permitted the flattening out of the carapace, thus making visible a pair of lateral ridges on the under side with a scalloped edge. The outer edge of the extended carapace is fringed beneath with a series of little raised processes. The antero-lateral angle is well marked. The last three pedigerous segments and first two of the pleon are separated from one another and their neighbours by deep depressions. The first antennæ have the third joint shorter than the second. The second maxillipeds have the second joint widest distally instead of in the proximal half. The first peræopods have the sixth joint not longer than the seventh, and the two combined not so long as the fifth joint. In the second peræopods the third joint makes no appearance. The rami of the uropods are two-thirds the length of the peduncle, the exopod being inconsiderably longer than the endopod, of which the second joint is a little over a third of the first.

Length of female specimen 3.25 mm. Male unknown.

Locality. Lat. 32° 53' 30" S., long. 28° 11' 00" E.; depth 75 m.;
No. 83, sent by Dr. Gilchrist.

FAMILY CERATOCUMATIDÆ.

1905. *Ceratocumilæ*, Calman, Fisheries, Ireland, 1904, I., p. 37.

The telson is distinct, but small and unfurnished with spines; only the first two pairs of the peræopods are furnished with exopods; the seventh joint in the two following pairs ends in a curved spine; the pleon carries five pairs of pleopods; the inner ramus of the uropods is 1-jointed.

The characters are all taken from the male, the other sex being as yet unknown.

GEN. CERATOCUMA, Calman.

1905. *Ceratocuma*, Calman, Fisheries, Ireland, 1904, I., p. 37.

As the family depends at present on one sex of a single species, it is, perhaps, inexpedient to attempt a selection of generic characters.

CERATOCUMA HORRIDUS, Calman.

1905. *Ceratocuma horrida*, Calman, Fisheries, Ireland, 1904, I., p. 39, pl. 4, fig. 57-75.

This remarkable species has been fully described and figured by Dr. Calman. Briefly may be mentioned the numerous procurved processes on the flattened oblong carapace, the expanded lateral processes of the second and third pedigerous segments, the absence of limbs from the fifth pedigerous segment (while both pairs of antennæ give evidence of maturity), the peculiar processes with their dense tufts of radiating setæ on the short sixth joint of the first peræopod, and the great length of the slender uropods, in which the equal rami are very much longer than the peduncle. The only point in which the South African specimen differs from Dr. Calman's description and figures is in a small bulbous expansion of the base of this peduncle. The capacity of the telson for closing down over the anal opening, when exercised, has the effect of obscuring its existence. The South African specimen measures 4 mm.

Locality. Cape Natal N. by E. about 24 miles; depth 805 m.; No. 12605, sent by Dr. Péringuey.

FAMILY HEMILAMPROPIDÆ, n.

Telson large, with more than two apical spines; first antennæ with both flagella well developed; exopods on the first four pairs of peræopods, but those on the third and fourth pairs only rudimentary in the female; first peræopods with second joint much shorter than the rest of the limb; three pairs of pleopods in the male; uropods with 3-jointed inner ramus.

The system here followed makes it imperative to separate from the Lampropidæ those genera in which the male has three pairs of pleopods. It seems also desirable to institute a family Paralampropidæ for the genus *Paralamprops*, Sars, 1887, containing the species *P. serratocostatus* (Sars), 1885, and *P. asper*, Zimmer, 1907, this family being distinguished from the Hemilampropidæ by the first maxillæ, which here have no palp. That feature the family shares, so far as is known, only with the Platysymphodidæ, but the latter family has in the female exopods only on the first pair of peræopods, whereas in the Paralampropidæ there are in that sex exopods on the first four pairs, although, as often elsewhere, those on the third and fourth peræopods are rudimentary. The genus *Platysympus* has a

new name in place of the preoccupied *Platyaspis*, Sars, 1870. It contains the species *P. typicus* (Sars), 1870, and *P. brachyurus* (Zimmer), 1907. The species *orbicularis*, which Dr. Calman referred to *Platyaspis* in 1905 and to *Paralamprops* in 1912, may, perhaps, be transferred to a new genus *Platytyphlops* to be subsequently introduced. The suggestion made by Professor Sars in 1900 that *Chalarostylis*, Norman, 1879, might be referred to the Platyspidæ (now Platysymphodidæ) will not suit the character of the first maxillæ in Norman's *Chalarostylis elegans*, since Dr. Calman has observed that those appendages have a normal bisetose palp.

GEN. HEMILAMPROPS, Sars.

1882. *Hemilamprops*, Sars, Forh. Selsk. Christian., 1882, pp. 11, 55.

1899. *H.*, Sars, Crustacea of Norway, vol. iii., p. 21.

As this is at present the only genus assigned to the family, the family characteristics may suffice to define it. The species included are *H. roseus* (Norman), 1863; *H. cristatus* (Sars), 1870; *H. uniplicatus* (Sars), 1872; *H. assimilis*, Sars, 1882; *H. normani*, Bonnier, 1896; *H. pellucidus*, Zimmer, 1908.

HEMILAMPROPS PELLUCIDUS, Zimmer.

Plate LII.

1908. *Hemilamprops pellucida*, Zimmer, Deutsch. Tiefsee-Exp., vol. viii., pt. 3, pp. 171, 172, pl. 39, figs. 53, 54, pl. 40, figs. 55-59.

1910. *H. p.*, Stebbing, S.A. Crustacea, pt. 5, p. 415.

The specimens here described and figured, if not in absolute agreement with the young female and still younger male, examined by Dr. Zimmer, do not admit of any real doubt that they belong to the same species.

The integument is pellucid, delicate, microscopically scabrous. Pseudorostral lobes short, subacute, with serrate edges. Carapace in both sexes rather deep, the small triangular eyelobe without lenses, the medio-dorsal line carrying four or five forward-pointing denticles, immediately followed by a nearly level line of twenty denticles reaching back beyond the middle of the carapace and succeeded by a groove between the inflated branchial regions. Pedigerous segments combined shorter than the carapace. Pleon longer than those segments and carapace together. Telson with three long apical spines, its denticulate margins carrying six to eight pairs of

spines on the nearly parallel-sided hinder half; in the nearly adult male the telson is longer than in the female, with a narrower base.

First antenna with serrate edge to the large first joint, third joint small, and in the male not longer than broad, flagellum in the female of five or six joints, with accessory of three joints, the third microscopic; in the male the flagellum is four-jointed, with accessory of three well-developed joints. Second antenna of the female small, four-jointed, with a seta on the rather large first joint and another on the small second joint; second antenna in the male showing a flat process on the side of the penultimate joint of the peduncle, the last joint long, probably composite, the flagellum long, annulated, the very numerous short rings not having attained their full development.

The first peraeopod has the second joint much curved, with its convex border distally serrate. The second peraeopod has the second joint shorter than the succeeding joints combined, of which the strongly spined fifth is longer than the short sixth and long narrow seventh together. The third and fourth peraeopods have the second joint more dilated in the male than in the female, in correspondence with the exopods well developed in the former sex but reduced to two-jointed rudiments in the latter; the third joint of the third peraeopod in the male shows no sign of the peculiar flattened spines found in adult males of northern species belonging to this genus.

The three pairs of pleopods in the male with short apical setae may be taken to represent a subadult character.

Peduncle of the uropods in the female longer than the telson with its apical spines and longer than either ramus; in the male it is subequal to the telson with its spines and shorter than the rami; of these the exopod is a little the shorter, with the first the longer of its two long joints; the endopod has its first joint much longer than the two following joints combined, these two being subequal in the female, but the second shorter than the third in the male.

Length 8.5 mm.

Locality. Cape Point N. 81° E. 32 miles; No. 17386, sent by Dr. Péringuey.

FAMILY DIASTYLLIDÆ.

1856. *Diastyllidæ* (part), Bate, Ann. Nat. Hist., Ser. 2, vol. xvii. p. 449.

1900. *D.* (part), G. O. Sars, Crustacea of Norway, vol. iii., p. 41.

All the pedigerous segments distinct; telson large, with only two apical spines; accessory flagellum of first antennæ distinct; mandibles normal, not broad at the base; first maxillæ with bisetose palp; branchial leaflets numerous, often spirally arranged; exopods on the first four pairs of pereopods in the male, on the first two pairs in the female and sometimes rudiments on the third and fourth pairs; two pairs of biramous pleopods in the male; inner branch of uropods three-jointed.

With this definition the family will be restricted to the genera *Diastyllis*, Say, 1818; *Leptostyllis*, Sars, 1869; *Diastylopsis*, S. I. Smith, 1880; *Paradiastyllis*, Calman, 1904; and the new genera *Adiastyllis*, *Malrokylindrus*, and *Ekleptostyllis*. But this compactness has to be purchased at the cost of establishing several new families closely allied in most of their features. Thus a two-jointed inner ramus of the uropods introduces a new genus, *Ekdiaastyllis*, in the Ekdiaastyllidæ, with *E. sculptus* (Sars), 1871, and eight companion species transferred from *Diastyllis*. *Holostyllis* in the Holostyllidæ is instituted to receive *Diastyllis helleri*, Zimmer, 1907, and with it *Cuma gayi*, Nicolet, 1849, both of which are set forth as having a simple inner ramus to the uropods. In *Diastylloides*, Sars, 1900, the Diastylloididæ have a genus in which the mandibles are broad at the base instead of normally tapering, and the second pleopod has only a single ramus. The Pseudodiastyllidæ, dependent on *Pseudodiastyllis ferox*, Calman, 1905, known only in the female sex, have an elongate telson with more than two apical spines. In the Oxyurostylidæ, *Oxyurostylis smithi*, a new genus and species, established by Dr. Calman in 1912, exhibits a sharply pointed telson with no apical spine or spines. The Colurostylidæ, in the original representative *Colurostylis pseudocuma*, Calman, 1911, have a short telson without apical spines and a two-jointed inner ramus to the uropods, but "*Colurostylis* (?) *occidentalis*," Calman, 1912, has that ramus three-jointed. The Gynodiastyllidæ are separated from all the families just mentioned by having no pleopods in the male. The species originally assigned to the genus *Gynodiastyllis*, Calman, 1911, agree in having a rather small, unarmed telson not produced beyond the anus, and as in *Paradiastyllis* with no exopod to the third maxillipeds

in the female. But the relations of the species among themselves are rather complicated, since the type species, *G. carinatus*, agrees only with *G. lævis* in having no exopods on the third and fourth peræopods of the male, while *G. lævis* is separated from the type and Dr. Calman's other two species, *G. costatus* and *G. bicristatus*, by having the inner ramus of the uropods simple. A family Dicideæ, with the new genus and species *Dic calmani*, was instituted in the General Catalogue of South African Crustacea, published in 1910, and *Dic tubulicauda* (Calman), is accepted by Dr. Thomas Scott.

GEN. DIASTYLIS, Say.

1818. *Diastylis*, Say, J. Ac. Sci. Philad., vol. i., p. 313.

1900. *D.*, G. O. Sars, Crustacea of Norway, vol. iii., p. 42.

Pseudorostral lobes with antero-lateral corners usually little produced; telson long, post-anal portion narrowly produced, elongate, with several pairs of lateral spines; second antennæ of adult male very long; third maxilliped with exopod in both sexes; third peræopods not widely separated from the second in the adult female; both pairs of pleopods in the male well developed, the outer ramus two-jointed.

The genus *Paradiastylis*, Calman, 1904, has no exopod on the third maxilliped of the female, and the adult female of *Diastylopsis* has the second and third peræopods widely separated. Distinguishing points of other genera in the family are noticed under other headings. *Diastylis* itself, after all the deductions here made, still contains thirty-three species. In six of these the third and fourth peræopods of the female have rudimentary exopods. In the remainder these rudiments are regarded as wanting, but it is an open question in regard to *D. tricinctus*, Zimmer, 1903, only known in the male, and *D. armatus*, Norman, for which these peræopods have not been described.

DIASTYLIS ALGOÆ, Zimmer.

1908. *Diastylis algoe*, Zimmer, Deutsch. Tiefsee-Exp., vol. viii., p. 188, pls. 44, 45, figs. 96-108.

1910. *D. a.*, Stebbing, S.A. Crustacea, pt. 5, Annals S.A. Mus., vol. vi., p. 418.

Three numbers should be added to the stations from which this species was obtained by Dr. Gilchrist, namely, 78, 83, 131, the localities being respectively lat. 33° 54' 15" S., long. 25° 53' 30" E.,

depth 57 m.; lat. $32^{\circ} 53' 30''$ S., long. $28^{\circ} 11' 00''$ E., depth 75 m.; Sebastian Bluff, W.N.W. 2 miles, depth 44 m.

ADIASTYLIS, n. g.

This genus is separated from *Diastylis* as having the proximal division of the telson long and cylindrical, while it is distinguished from *Makrokyllindrus* by having the short post-anal part furnished with lateral spines. It contains the new species *A. acanthodes*, together with *A. longipes* (Sars), 1871, *A. costatus* (Bonnier), 1896, both transferred from *Diastylis*, and *A. longicaudatus* (Bonnier), 1896, originally referred to *Leptostylis*, from which it differs strikingly by the length of the telson.

It is not improbable that the species agree in having the first peræopods elongate, but those limbs were mutilated in the specimens from which *A. costatus* and *A. acanthodes* were described—a calamity to which the front legs are especially liable when they are of great length.

ADIASTYLIS ACANTHODES, n. sp.

Plate LIII.

The present species is unfortunately known only in the male sex. The carapace of the single specimen was damaged, the first legs were defective from the end of the second joint and the endopod of the uropods from what appears to be the end of the second joint.

The pseudorostral lobes meet for some distance in advance of the apparently sightless eyelobe, being produced acutely as far as the end of the first joint of the first antennæ; their upper surface is diversified, in common with the rest of the carapace, with numerous denticles of various sizes. The carapace seems to be devoid of ridges. The five pedigerous segments are free, much denticulate, each with a pair of conspicuous dorsal teeth, unless the first segment be an exception; that and the following segment have each the front margin serrate; the side-plates were not clearly made out but appear to have some denticles larger than those on the general surface. The pleon is longer than the anterior division of the body, all of it denticulate except the telson, with several conspicuous dorsal denticles and a few such subventral; the fifth segment the longest and the sixth the widest of the first six, the telson much longer than the fifth segment, about two-thirds as long as the peduncle of

the uropods, its last third very narrow, tapering, somewhat curved, with an apical pair of spines, larger than the unsymmetrically placed lateral spines, four on the left, three on the right.

First antennæ with stout peduncle carrying a few denticles, the first joint the longest, the third ending in a subcircular process from which amidst a bush of filaments issue the two very slender flagella, the principal five jointed, its first joint the longest, the accessory four-jointed, its first joint the shortest. Second antennæ with second joint of peduncle four times as long as the third, twice the fourth, and two-thirds the length of the fifth joint; the flagellum short, not twice the peduncle, of about twenty joints.

The mouth organs show substantial agreement with those in *Diastylis*, the upper lip slightly emarginate, the first maxillæ with bisetose palp, the mandibles with tapering base, not broad as in *Diastylolites*, the molar well developed but not very stout, the first maxillipeds with no great number of branchial leaflets, the third with long plumose setæ on the somewhat dilated end of the long curved second joint.

First peræopods with second joint much like that of the third maxillipeds, but much more denticulate and forming a narrower neck; the distal joints missing. Second pair with a much shorter second joint, stout, not longer than the long fifth and short sixth joints combined, fourth joint not half the length of the slender fifth, nor the sixth half the seventh. The following limbs successively shorter, the third and fourth distinguished by their denticulate second joint, strikingly narrowed distally. The fifth pair being as usual devoid of exopods, such as are borne by the five preceding pairs of appendages, has a smooth uniformly narrow second joint.

The first pleopods are considerably larger than the second, with more numerous setæ on the peduncle; the little two-jointed outer ramus slightly shorter than the one-jointed inner, while in the second pair there is equality or the outer ramus is a little the longer, in each case carrying four plumose setæ while the inner ramus has eight. The peduncle of the uropods about equals in length the fourth, fifth, and sixth pleon segments combined, the exopod equalling the fifth and sixth combined, and barely exceeding the two remaining joints of the endopod, in which the second joint is two-thirds the length of the first.

Length of the specimen about 9 mm., of which the pleon occupies 5 mm.

Locality. Cape Natal N. by E. about 24 miles; depth 805 m.; No. 12605, sent by Dr. Péringuey.

MAKROKYLINDRUS, n. g.

Carapace denticulate; no distinct eye; telson elongate, basal portion cylindrical, much longer than the short post-anal portion, which carries only the two apical spines. Peræopods of the female, so far as known, without rudimentary exopods on the third and fourth pairs.

Name compounded of *μακρός*, long, and *κύλινδρος*, a cylinder.

It seems convenient to assign to this genus, besides the new species *M. fragilis*, four species previously placed under *Diastylis* and one doubtfully assigned by Bonnier to *Diastylopsis*, so that *Makrokylindrus* will contain *M. josephinae*, described by Sars in 1871; *M. erinaceus* (Sars), 1887; *M. dubius* (Bonnier), 1896; *M. cingulatus* (Calman), 1905; *M. serricauda* (Scott), 1912; and *M. fragilis*, n. sp.

MAKROKYLINDRUS FRAGILIS, n. sp.

Plates LIV., LV.

The integument displays conspicuously a network of hexagonal cells, regular or irregular, with a few smooth spots on the sides of the pedigerous segments. The pseudorostral lobes are subacutely produced in front of the prominent rounded but seemingly sightless eyelobe. Along the line of junction there is on each side a dorsal series of spines successively smaller to the rear, more numerous in the male than in the female. The processes overhang the peduncle of the first antennæ to the end of its second joint; a receding convexity joins the lower margin without any projecting corner. Behind the eyelobe a central ridge, elevated at the middle, ascends to a bilobed girdle which crosses the carapace a little behind the middle. Each lobe of the girdle descends forward to a point at which it meets a dentate carina diverging upwards from the base of each pseudorostral process; from the same point a ridge descends almost perpendicularly towards the lower margin, but before reaching it divides, sending a short branch forward to the base of the pseudorostrum and a somewhat longer one backward to the lower margin. Behind the slightly advanced median point of the girdle the dorsal line of the carapace undulates in gentle descent to the hind margin in the female, with smooth curve in the male. First and second pedigerous segments short, the first partially covered, third and fourth dorsally coalesced but laterally distinct, with considerable rounded dilatation of the side-plates of the third segment, fifth comparatively long, the hinder angles rounded. First three segments of pleon in the male each with a pair of small dorsal

teeth, the rest and all in the female smooth; sixth segment not much shorter than the fifth, and near the uropods much wider; the telson rather longer than both combined, evenly cylindrical for about seven-ninths of its length, then narrowing over the anal valves to the truncate apex which is occupied by a pair of rather large spines; the sides of the telson are serrate in the upper half, but smooth near the base and in the lower half.

First antennæ with long peduncle, stout in the male, first joint dentate at the apex, second equally long, third much shorter, slender in the female, stout in the male, flagellum slender, joints seemingly four, with the usual long setæ at apex, accessory with 2 joints and a very long apical seta at least in the male, in which sex there is a fascicle of sensory filaments attached to a broad process at the base of the flagella, possibly representing the first joint of the principal flagellum. Second antennæ four-jointed in the female, carrying seven plumose setæ, terminal joint very small, sometimes in geniculate attachment. In the male the penultimate joint of the peduncle has a proximal tooth on the outer margin; the outer margin of the long last joint is fringed with very small tufts of setules.

Upper lip emarginate. Lower lip with the lobes apparently deeply indented on the inner margin.

Mandibles with strong molar, spine-row with spines as many as twenty, or sometimes rather fewer, one mandible with an accessory plate and the principal plate minutely quadridentate, the other mandible without accessory plate and narrower principal.

First maxillæ with inner plate broad, five spines on its narrow apex; the palp not very long, with two apical setæ. Second maxillæ seemingly with undivided distal plate, carrying numerous spines on the distal margin and one on the lateral surface, the slightly projecting basal lobe fringed with very numerous short setæ.

First maxillipeds like the maxillæ of very delicate texture, the epipod voluminous, in the male carrying numerous branchial leaves, general structure as in *Diastylis*. Second maxillipeds with second joint rather broad, nearly as long as the rest combined, carrying two plumose setæ at the apex of each margin, third joint distinct, very small. In the females with well-packed ovaries no fan of vibratory setæ was discovered, but in place of the fans a pair of long simple processes with some apical setules. Third maxillipeds with second joint much longer than the rest combined, much curved, strongly produced at the outer apex, which is rounded and furnished with five long plumose setæ, the fourth to the seventh joints differing little in length but the last two much the narrower.

First peræopod with second joint stout and long, much curved; the rest of the limb probably long and slender, as in all the specimens it is missing. Second peræopod with second joint shorter than the rest of the limb, in which the third joint is short but distinct, the denticulate fifth joint longer than the fourth or seventh, the sixth as usual very small. The three following pairs are successively shorter, with no trace of exopods in the female, and in correspondence with this the second joint very slender, whereas in the third and fourth pairs of the male which have exopods this joint is stout. The fifth peræopod is small in both sexes, but with the full number of joints.

The pleopods of the male are similar on the first and second segments of the pleon, having a rather long peduncle with two short rami, the inner one-jointed, furnished with five plumose setæ, of which three are apical, the outer two-jointed, with four setæ, its second joint the shorter. The third and fourth pleon segments show some ventral setæ, presumably vestiges of pleopods now absent.

The uropods have a narrow peduncle, not quite so long as the fifth and sixth pleon segments combined, but much longer than the rami, of which the three-jointed endopod is two-thirds the length of the peduncle, and the exopod little more than two-thirds that of the endopod. In the female specimen figured there are ten spinules along the inner margin of the peduncle, and seven, five, and four respectively on that of the first, second, and third joints of the endopod.

Average length of adult specimens, 10 mm.

Locality. Cape Natal N. by E. about 24 miles; depth 805 m.; No. 12605, sent by Dr. Péringuey.

GEN. LEPTOSTYLIS, Sars.

1869. *Leptostylis*, G. O. Sars, *Nyt. Mag. Naturv.*, vol. xvi., p. 343 (39).

1900. *L.*, Sars, *Crustacea of Norway*, vol. iii., p. 67.

1911. *L.*, Stappers, *Duc d'Orléans Campagne Arctique*, *Crust. Malacostracés*, p. 116.

In general agreement with *Diastylis*, but having a shorter telson, with lateral spines few or none; second antennæ in male with flagellum not very long; all the species with rudimentary exopods on third and fourth peræopods of the female; pleopods of the male less fully developed than in *Diastylis*.

This genus appears to suit eleven species, beginning with *L. ampul-*

laceus (Liljeborg), 1856. to which Sars added *L. longimanus*, *L. macrurus*, and *L. villosus* in 1869, the first of these having been described in 1865 under *Diastylis*. In 1873 he described *L. mancus*, re-described by Zimmer in 1902, and by him transferred to *Diastylis* in 1908. *L. productus*, Norman, dates from 1879, and has been followed by *L. antipus*, Zimmer, *L. crassicauda*, Zimmer, both in 1907, with *L. gracilis* and *L. borealis*, Stappers, in 1908, and here a new species. Dr. Stappers suggests the possibility that his two species may prove to be only the two sexes of a single species, but deems it very improbable.

Leptostylis walkeri, Calman, 1907, is transferred to a new genus *Ekleptostylis*, in which the short telson is furnished with many lateral spines, and in the male has a lobe uniquely produced over the narrow distal portion.

LEPTOSTYLIS MACRUROIDES, n. sp.

Plate LVI.

This species combines some of the characters for which *Leptostylis macrurus* and *L. villosus* are notable. The latter is described by Sars as having the lower edges of the pseudorostral lobes "throughout divided into peculiar lamellar serrations." These resemble a machicolated parapet, and this curious feature occurs in the new species, which, however, is easily distinguished from *L. villosus* both by the carapace and the uropods. On the other hand, to *L. macrurus* of Sars it makes a near approach in these and some other respects. The proportions and general appearance are certainly very similar. But the carinæ in *L. macrurus* are serrate in the ordinary way, not machicolated; the telson is "but slightly narrowed distally," instead of much narrowed; the rami of the first pleopods are more strongly developed; and other differences combine with these to separate it from the southern form.

The dorsal line of the carapace is convex between a slightly upturned pseudorostral projection and a slight upturning of the hind margin. From the base of the pseudorostral projection issue two long curved lateral carinæ which reunite before reaching the hind margin; each of them is machicolated in the anterior half, the upper one then becoming serrate, the lower one almost smooth; the eyelobe is small, seemingly eyeless; the whole surface is pitted with minute glassy circles, each with a microscopic hair. Some at least of the pedigerous segments and the first two of the pleon segments have long slender latero-ventral spines, of which no mention is

made in the northern species. The fifth pleon segment is very long and narrow, the telson as long as the sixth segment, the terminal part much narrowed, carrying an apical pair of spines attended by a very small subapical pair.

The first antennæ have a stout peduncle, the third joint short, with circular process bearing the usual brush of filaments, from among which springs the slender flagellum, of five joints, the second the longest, the fifth minute; in the four-jointed accessory the first joint is shorter than the second or third, the last minute. The second antennæ have a long slender peduncle, the second joint much longer than its neighbours, the fifth nearly thrice as long as the second. The flagellum missing.

The mouth organs are of delicate structure. Upper lip emarginate. Mandibles with strong molar and ten spines in the spine-row. First maxillæ with narrowly ended plates and bisetose palp, the third maxilliped with second joint much longer than the next five joints combined.

First peræopods with long and remarkably bent second joint; rest of the limb missing. Second peræopod with second joint bent, stout, not distally narrowed, much shorter than the five following joints combined, sixth joint as long as the fourth, seventh considerably shorter than fifth. Third peræopods with second joint distally narrowed, much longer than following joints together, one margin strongly serrate. Fourth peræopod like the third, but with second joint considerably shorter. Fifth peræopod slender throughout, second joint longer than the other five combined.

Pleopods with the peduncles not tapering as in *L. macrurus* but parallel-sided, the exopod minute, especially in the first pair, and the endopod of that pair much shorter in proportion to the breadth than represented by Sars for his species. Peduncle of uropods about twice and a half as long as the telson, but considerably less than twice the endopod, of which the first joint is longer than the second but shorter than the third, with 4, 3, 3 spines on the inner margin and a much larger apical spine; exopod broken.

Length of specimen, adult male, about 5 mm.

Locality. Cape Natal N. by E. 24 miles; depth 805 m.; No. 12605, sent by Dr. Péringuey.

FAMILY EKDIASTYLIDÆ, n.

This family is distinguished from the restricted Diastylidæ by having the inner ramus of the uropods two-jointed.

EKDIASTYLIS, n. g.

With the character of the family.

The species allotted to this genus are *E. sculptus*, *E. insignis*, *E. abbreviatus*, all assigned to *Diastylis* by Sars in 1871; *E. fimbriatus* (Sars), 1873; *E. politus* (S. I. Smith), 1882; *E. horridus* (Sars), 1887; *E. mystacinus* (Sars), 1887; *E. hexaceros* (Zimmer) 1908; and *E. argentatus* (Calman), 1912.

EKDIASTYLIS HEXACEROS (Zimmer).

1908. *Diastylis hexaceros*, Zimmer, Deutsch. Tiefsee-Exp., vol. viii. p. 187, pl. 44, figs. 93-95.
 1910. *D. h.*, Stebbing, S.A. Crustacea, pt. 5, Annals S.A. Mus. vol. vi., p. 418.

I have not myself met with this species, which was taken by the German Expedition outside the Agulhas Bank in a depth of 565 m.

FAMILY LEUCONIDÆ.

1879. *Leuconidæ*, G. O. Sars, Arch. Naturv. Kristian., vol. iii., p. 6, vol. iv., p. 74.
 1900. *L.*, Sars, Crustacea of Norway, vol. iii., p. 28.

All the pedigerous segments distinct; telson wanting; eye wanting; first antennæ with accessory flagellum small; mandibles broad at the base, spines few; first maxillæ with unisetose palp; branchial leaflets few; exopods on first four pairs of pereopods in the male and the first three in the female; two pairs of pleopods in the male; inner branch of uropods two-jointed.

To this family are assigned the genera *Leucon*, Krøyer, 1846; *Eudorella*, Norman, 1867; *Eudorellopsis*, Sars, 1882; and *Pseudo-leucon*, Zimmer, 1903. From it are detached the three genera *Paraleucon*, *Hemileucon*, and *Heteroleucon*, all instituted by Dr. Calman in 1907. The first of these I take as representative of a

new family Paraleuconidæ, in which the male has only one pair of pleopods. In the second, for which the family Hemileuconidæ is proposed, the male has no pleopods, and this is the case also with the Heteroleuconidæ, represented by *Heteroleucon*, which has the further character to separate it from the other three families that only the first two pairs of peræopods carry exopods in either sex.

GEN. LEUCON, Krøyer.

1846. *Leucon* (part), Krøyer, Naturhist. Tidsskrift, Ser. 2, vol. ii., p. 208.

1900. *L.*, Sars, Crustacea of Norway, vol. iii., p. 29.

Carapace with longitudinal, medio-dorsal, serrate crest in female, but often not in male; pseudorostral projection prominent; peduncle of first antennæ not conspicuously geniculate, accessory flagellum minute; terminal joint of second antennæ in female well defined.

The new species here introduced brings the number of species at present included in this genus up to twenty.

LEUCON KALLUROPUS, n. sp.

Plate LVII.

This species belongs to the small group in which the one-jointed accessory flagellum of the first antenna is not shorter than the first joint of the principal flagellum, and to the still smaller group in which the outer ramus of the uropod is much shorter than the inner. It makes undoubtedly a close approach to *Leucon longirostris*, Sars, taking into account the successive descriptions of that species by Sars in 1871, by Norman in 1879, and by Calman in 1906. Sars had at command a young male ending with the second segment of the pleon, the fragment being scarcely 4 mm. long. He describes the accessory flagellum of the first antenna as rudimentary and like a tubercle. It was taken off the coast of Portugal at a depth of 1,036 m. Norman's specimen, a female, was taken at the entrance of Davis Strait in lat. 59° 10' N., at a depth of 3,109 m. Calman examined specimens male, female, and young from the Mediterranean, taken at depths between 950 and 1,200 m. He did not find among them the rudimentary accessory flagellum of the first antenna, but only such as matched in length the first joint of the principal. He gives the total length of the adult male as 6 mm., from which it may be inferred that the specimen described by Sars was at least as long when perfect, or probably longer. There is a

tendency throughout the genus *Leucon* for the pseudorostrum in the male to be shorter than that in the female, but the difference is nowhere so extreme as in the sexes of *L. longirostris*, where the produced part is more than a third of the length of the carapace in the adult female, but only a fifth of that length in the adult male.

The present species is unfortunately known only from a single adult male specimen, which differs, so far as can be determined, from the adult male of *L. longirostris* chiefly in the less-produced telsonic segment and the proportions and armature of the uropods.

The outline of the pseudorostrum was not made out with precision. Integument squamose. Fifth pedigerous segment with procurved ventral spines. Telsonic segment with produced portion much instead of little shorter than the base.

In the first antennæ the third joint is shorter and much narrower than the second, and carries two slightly feathered setæ; the four-jointed principal flagellum has the first joint nearly as long as the three following combined, and carries on the outer margin approaching the middle a fascicle of setæ: the one-jointed accessory flagellum is narrower than the first joint of the principal, but about equal to it in length. The second antennæ have the large last two joints of the peduncle fringed with tufts of short setæ, which till resolved by high magnification look like fringed single setæ.

The upper lip is only slightly emarginate. The mandibles are powerful. The palp of the first maxillæ ends in a single filament; the second are without setæ on much of the inner margin. The first maxillipeds have a long seta on the second joint, third joint absent, the fifth joint as long as the second and very setose, the sixth with a strong plumose seta overhanging the small seventh joint, which is tipped with a serrate spine. Second maxillipeds full-jointed; the third the same, its second joint broad, rather longer than the narrow following joints combined, with strong spines or setæ on the fore-part of the apical border.

First pereopods broken, the second joint much narrowed distally, part of the margin fringed with setæ. Second pair not elongate, its second joint rather longer than the remaining joints combined, the terminal joint not longer than the antepenultimate, fringed with a longitudinal series of five spines, and having its blunt apex armed with three long feathered seta-like spines. In these and the much shorter following pereopods the true third joint does not seem to be distinct from the long second joint. In the last three pairs the last four joints are all short, the last much the narrowest and tipped

with two smooth spines narrowed at about the middle of their length; long serrate spines are distributed on the other joints.

The first pleopods have a peduncle considerably longer than that of the second pair, which has three slender spines on its inner margin; in both pairs the one-jointed inner ramus is a little shorter than the two-jointed outer; both rami are very small, and each carries six plumose setæ. The peduncle of the uropods is a little longer than the first joint of the endopod, the inner margin fringed with numerous unequal slender spines, of which there are a few on the outer margin. The first joint of the endopod is more than three times as long as the second; its inner margin is fringed with over a score of serrate spines besides two or three of seta-like character at the top; beginning above the middle of the outer margin is a series of eight slightly plumose spines; of these there are four on the outer margin of the second joint, which has its inner margin prettily fringed with eight little serrate spines, the apex carrying two stout spines, one short and one long, both microscopically serrate; the exopod is a little shorter than the first joint of the endopod, and has five spines on each margin of its second joint, those on the inner slender and finely serrate; there are four elongate spines on its apex.

Length of the specimen about 5 mm. Female unknown.

Locality. Cape Natal N. by E. 24 miles; depth 805 m.; No. 12605, sent by Dr. Péringuey.

FAMILY LAMPROPIDÆ.

1882. *Lampropidæ* (part), G. O. Sars, Vid. Selsk. Forh. Christiania, No. 18, p. 11.

1899. *L.* (part), G. O. Sars, Crustacea of Norway, vol. iii., p. 17.

Pseudorostral lobes not strongly produced; all pedigerous segments distinct; telson well developed, with more than two apical spines; both flagella of first antenna well developed; second antenna of female more conspicuous than usual; palp of first maxilla bisetose or with only one apical seta; first four pairs of peræopods with exopods, those of the female rudimentary on the third and fourth pairs; no pleopods in either sex; inner ramus of uropods three-jointed.

This definition excludes the genera *Hemilamprops* and *Paralamprops*, in which the male has three pairs of pleopods, but it admits a new genus *Platytyphlops* here described, and provisionally

allows the inclusion of another, *Stenotyphlops*, in which, however, only the female is at present known. The last is distinguished from its companions by having only one seta or apical filament on the palp of the first maxilla, and both the new genera are distinguished from *Lamprops*, Sars, 1862, by their blindness.

PLATYTYPHLOPS, n. g.

Carapace broad, depressed, eyelobe devoid of visual elements, pleon slender, telson carrying three apical spines. First antenna with the flagella long and nearly equal. Second antenna of female four-jointed. First maxilla with bisetose palp. In the male the first four pairs of peraeopods have exopods; in the female the first two pairs are similarly furnished, but the third and fourth pairs have only microscopic rudiments of them. Fifth pair of peraeopods rudimentary. Pleon in both sexes without pleopods.

The generic name is derived from *πλατύς*, broad, in allusion to the character of the carapace, resembling that in the *Platysympodidae*, and *τυφλώψ*, blind-faced, to emphasise the fact that this is a blind genus in the family *Lampropidae*, of which the typical genus was named from the brightness of the eyes.

The comparatively large size of the specimens for which the genus is instituted makes it very improbable that the want of pleopods in the male and the dwarfed, apparently functionless, fifth peraeopods in both sexes, could be juvenile characteristics. Nevertheless, it had to be borne in mind that the specimen, 7·5 mm. long and apparently adult, for which Sars instituted *Leptostylis manca*, was entirely devoid of fifth peraeopods, and yet a specimen, 10·5 mm. long, was subsequently found by Dr. Zimmer to be provided with the limbs in question well developed (see Hamburger Magahaensische Sammelreise, Cumaceen, p. 9, 1902). Fortunately, however, in the present case doubt is to a great extent dispelled by the presence in the collection of a fragmentary specimen containing eggs in the marsupium, yet with the diminutive appendages on the fifth pedigerous segment.

PLATYTYPHLOPS PERINGUEYI, n. sp.

Plates LVIII., LIX.

Pseudorostral lobes short, upturned. Carapace rounded oval, a little longer than broad, the margin forming a sharp carina all round, fringed with microscopic pellucid overlapping scales. The sightless ocular lobe small, triangular; the frontal lobe broad; the medio-

dorsal line from the front to a little beyond the middle convex and finely serrate; near the end this carina is flanked by the commencement of a submedian pair of short carinae which rise each into a conspicuous rounded process and then gradually fade away towards the hind margin. The pedigerous segments combined are about half as long as the carapace, the first shorter and narrower than the second, the second and third raised in the middle but flattened and rounded at the sides, apparently overlapping subacute angles; the fifth cylindrical, not wider than the long, narrow pleon, which greatly exceeds in length the preceding portion of the body. The telson, about as long as the fourth segment of the pleon, has the anal opening near the base, thence narrowing to the apex which is occupied by three spines, forming a kind of fan, with a lateral pair a little higher up; between these and the middle of the telson two other lateral pairs are placed, successively smaller.

First antenna with long first joint, more than twice as long as the second, which is rather longer than the third, all three carrying plumose setae, flagella rather shorter than the peduncle, the principal flagellum five-jointed, the accessory four-jointed. In the female specimen the minute fifth joint of the principal flagellum appears to be succeeded by a still smaller sixth joint. In both sexes a couple of setae attached to the fourth and fifth joints have the usual annulated appearance.

The second antenna of the female carries three plumose setae on the rather large first joint, one such seta on the small second joint; the third joint is narrow, nearly as long as the first, with a small tooth near the base and a seta midway between that and the apex; the fourth joint is very slender, but fully twice as long as the third, with some apical setules. In the male specimen the flagellum has the annulated appearance indicative of incomplete maturity.

The upper lip has the free border a little emarginate. The spinerow of the mandibles consists of about thirteen spines. On the palp of the first maxilla the subapical seta is much shorter than the apical. The first maxillipeds have seven unequal loosely disposed branchial sacs on the epipod, and two very small coupling spines on the basal joint. In the second maxillipeds the third joint is distinct. The third maxillipeds have the second joint not apically produced or widened, shorter than the remaining joints combined, the third joint short, distinct, the fifth longer than the sixth, apparently less so in the female than in the male, the seventh fringed with somewhat adpressed spines, and, as it were, prolonged by an apical spine exceeding the length of the joint itself.

The first and second peræopods are slender and elongate, with the full number of joints, the second joint in each shorter than the rest combined; among these in the first pair the sixth joint is the longest, while in the second pair it is shorter than any except the third. In the remaining pairs the second joint is longer than the rest of the joints combined. The third and fourth pairs are alike in the two sexes, except for the minuteness of the difficultly discernible two-jointed exopods in the female; they have the sixth joint set forward on the truncate apex of the fifth, leaving room behind for insertion on that apex of the long spines by which the sixth joint is overlapped. The minute fifth pair are probably vestigial; they are pellucid, and the last three joints are microscopic.

The peduncle of the uropods is a little longer than the endopod, its inner margin carrying numerous spines (9-13), the endopod on inner margin of its three joints having respectively 8-9, 3-4, and 2 spines, besides an apical spine. The exopod, which is a little longer than the telson, reaches just beyond the base of the endopod's third joint.

Length of the specimens about 10 mm.

Localities. No. 17585, Cape Point E. by N. 29 miles; 17643, Cape Point N. 81° E. 32 miles. The specimens were sent by Dr. Péringuey, out of respect for whom the species is named.

When describing this species and defining the genus, I felt convinced that Dr. Calman's *Platyaspis orbicularis* (Fisheries, Ireland, Sci. Invest., 1904, I. [1905], p. 42, pl. 5, figs. 77-81) must be congeneric. That species, however, was founded on a specimen which did not extend beyond the first pedigerous segment. But quite recently (Proc. U.S. Nat. Mus., vol. 41, p. 631, figs. 29-39, 1912), with far more advantageous material, Dr. Calman has given a fresh description with numerous instructive figures, and provisionally transferred his species to the genus *Paralamprops*. He recognises that it is distinguished from that genus by the possession of a normal palp on the first maxillæ, but having only female specimens at his disposal, he could not make use of the further distinguishing character that the male has no pleopods. At least this is the case if the nearly adult South African specimen of the new species may be trusted as establishing that character. The two species of the new genus are well distinguished by differences in the carapace, but in many respects they show very close agreement, and it was not till I had studied Dr. Calman's account of *P. orbicularis* that I was able, by renewed investigation, to make out the rudimentary exopods on the third and fourth peræopods of *P. peringueyi* in the female.

STENOTYPHLOPS, n. g.

Carapace narrow, eyelobe without visual elements, all five pedigerous segments conspicuous, pleon slender, telson carrying three apical spines. First antenna with both flagella elongate. Second antenna of female four-jointed. First maxilla with unisetose palp. First maxillipeds with terminal joint peculiarly widened at the base. In the female first and second peræopods with exopods, third and fourth having only microscopic rudiments of them. Fifth peræopods apparently wanting.

Male unknown.

The generic name, from στενός, narrow, and τυφλός, blind-faced, is intended to indicate the many points of resemblance between this genus and *Platytyphlops*, although the typical species in one of the genera has a broad carapace, and in the other a narrow one. The present genus is further distinguished from its ally by having the palp of the first maxillæ furnished with a single apical seta or filament, and by what appears to be the unique conformation of the terminal joint in the first maxillipeds. The absence of the fifth peræopods, as a negative character based on a single specimen, will naturally be accepted with reserve, but the degraded condition of those limbs in *P. peringueyi* is suggestive of a decline through inactivity to extinction.

STENOTYPHLOPS SPINULOSUS, n. sp.

Plate LX.

The whole surface seems to be more or less densely sprinkled with minute spinules, among which are some that are rather larger, but the close reticulation renders it difficult to make out the arrangement.

The pseudorostral lobes are slightly upturned, meeting in a point well in advance of the little triangular eyeless eyelobe, from which a keel traverses the middle line far backwards, flanked somewhat behind the centre of the carapace by a pair of raised ridges. The general shape of the carapace is narrowly oval, with sides sharply inflexed. The five pedigerous segments, all dorsally conspicuous, diminish gradually in width to the fifth, which is no wider than the slender pleon. The telson is about four-sevenths of the length of the peduncle of the uropods, inflated rather more than a third of its length for the anal opening, then converging to its three-spined apex, the margins serrate, and below the middle having three pairs of spines, successively larger but none equalling the apical

trio; on the left side a small spine above the middle appears to have no counterpart on the right.

The upper lip is emarginate. The lower lip has the lobes tipped with inward projecting points. The mandibles have a powerful molar and quadridentate cutting edge, accompanied on one of the pair by an accessory plate slightly smaller than the principal, and fourteen spines in the spine-row, of which the foremost six are feathered. On the other mandible there is no accessory plate, but one additional spine, the row not showing any feathering of the spines.

The first maxillæ have the usual five spines on the inner plate, apparently eleven on the outer, the palp elongate, conspicuously with a single but very long apical seta.

The first maxillipeds have the broad antepenultimate joint fringed with seven much-divided spines, the next joint broader than long, exceeded in length by the following joint, which is greatly expanded in its basal half but quite narrow in the terminal, the re-entering angle of the hind margin being beset with blunt teeth. The second maxillipeds are slender throughout, the second joint elongate, the third short, scarcely forming a complete ring. The third maxillipeds have the second joint curved, not apically widened or produced, longer than the five remaining joints combined, of which the fifth is the longest, the seventh short and narrow; the exopod is slender. The mutilated first peræopod was probably of considerable length, the second is slender, with second joint not quite so long as the five following joints combined, among which the well-spined fifth is longer than the short sixth together with the needle-like seventh; the exopod is smaller than that of the larger first peræopod. The third and fourth peræopods are much shorter than the second, the second joint longer than the rest combined, and carrying near its origin a microscopic two-jointed exopod; the fourth joint about equals the fifth and sixth together, both of which carry long apical setæ with annulated terminals; the seventh joint is almost spine-like but not very sharply pointed. Of fifth peræopods no trace could be discerned.

The uropods have serrulate margins; the endopod, four-fifths the length of the peduncle, has a first joint about twice as long as the two following joints combined, the second being a little longer than the third, the spines on the inner margin being respectively ten, three, and one; the exopod, which reaches nearly to the middle of the third joint of the endopod, has seta-like spines on both margins.

Length of the specimen, 12 mm.

Locality. Cape Point E. by N. 29 miles; No. 17585, sent by Dr. Péringuey.

FAMILY NANNASTACIDÆ.

1866. *Nannastacidae*, Bate, Zoological Record (for 1865), vol. ii., p. 329.

1900. N., G. O. Sars, Crustacea of Norway, vol. iii., p. 79.

1900. N., Stebbing, Willey's Zoological Results, pt. 5, p. 611.

Pseudorostral lobes with the anterolateral corners well defined; all the pedigerous segments distinct; telson wanting; one eye or two eyes usually present; first antenna with accessory flagellum very small; second antenna of female small, indistinctly jointed; mandibles normal; terminal joint of first maxilliped usually dilated; exopods on first four pairs of peræopods in the male, on none but the first two in the female; no pleopods in either sex; inner branch of uropods simple.

The family includes *Nannastacus*, Bate, 1865; *Cunella*, Sars, 1865; *Cunellopsis*, Calman, 1905; *Platycuma*, Calman, 1905; *Schizotrema*, Calman, 1911; *Diops*, Paulson, 1875, being usually regarded as a synonym of *Nannastacus*, although this can hardly be justified except on the view that Paulson's description and figures are misleading. With respect to the three-jointed second antennæ of the female he is very explicit, as also in ascribing a single filament to the palp of the first maxillæ. In 1911 Dr. Calman allotted six new species to *Nannastacus* all agreeing with *N. suhwi*, Sars, 1887, in having no exopod on the third maxilliped of the female. He was deterred from giving to this group a new generic designation by the further discovery that two of the species, *N. reptans* and *N. tardus*, had no exopods even on the first and second peræopods of the female. The case was complicated by the close resemblance of these species respectively to *N. minor* and *N. agnatus*, in which the first and second peræopods of the female have well-developed exopods, the relationship being so near that Dr. Calman says "it must be admitted as quite possible that *N. reptans* may be merely an individual variation or a phase in the life-history of *N. minor*, and that *N. tardus* may stand in the same relation to *N. agnatus*." Under these circumstances it seems clear that *N. reptans* and *N. tardus* can be safely assigned to a new genus, *Paranannastacus*, in which the leading character is the absence of an exopod from the third maxilliped. This character they share with five other members of the group, from which they would eventually be separated in a family Paranannastacidae, if or when it might be established that the unique feature of all the peræopods being devoid of exopods in the female was not accidental or temporary.

GEN. SCHIZOTREMA, Calman.

1911. *Schizotrema*, Calman, Trans. Zool. Soc. London, vol. xviii., pt. 4, pp. 341, 360.

The leading character of the genus, to which it owes its name, is the circumstance that the exhalent respiratory orifices are paired and widely separated from each other. As, however, this feature is not confined to the present family, it is convenient to amplify the generic definition by some additional characters. As only females were known when the genus was first established, the absence of pleopods in the male had to be presumed, as well as the presence of exopods on the first four pairs of peraeopods in that sex. The new species, as represented by a male specimen, confirms both of those anticipations. In the female the exopods are confined to the first two pairs of peraeopods, but both sexes have exopods on the third maxillipeds. There is no distinct telson, and the inner ramus of the uropods is one-jointed.

In all the three forms already described the peduncle of the uropods is shorter than the inner ramus, so that the new species will be found to be conspicuously distinguished from them by having the rami of the uropods very much shorter than the peduncle.

SCHIZOTREMA CALMANI, n. sp.

Plate LXI.

In lateral view the pseudorostral lobes are seen to be upturned, in dorsal aspect they are wide apart and slightly divergent. Following what appears to be a small upturned eyeless eyelobe the median line of the carapace is finely denticulate and setulose throughout almost its whole length; the lateral margins are fringed with denticles for some distance, the teeth at first rather conspicuous but presently dwindling to disappearance. Owing to the smallness of the specimen and the texture of the integument, details of the carapace were not satisfactorily made out before dissection, and owing to its brittleness the result of dissection was in this respect equally disappointing. Of the pedigerous segments the last four have laterally flattened edges cut into teeth, all but the last being rather widely expanded. The pleon segments show lines of denticulation which are conspicuous both dorsally and ventrally on all but the telsonic segment, and also lateral ridges; the fifth segment is long and distally narrowed, the telsonic segment short.

In the first antenna the first joint is much the largest, somewhat geniculate, and having a small distal tooth; the second joint is similarly furnished, and is longer than the third; the slender

flagellum is indistinctly four- to five-jointed, and accompanied by three long filaments; the accessory is minute, perhaps two-jointed. The second antennæ have the penultimate joint of the peduncle more than half as long as the following joint; both have ample brushes of setæ; the flagellum, if complete, is not extremely long.

The mandibles have a narrow cutting edge, supplemented in one member by a narrow accessory plate, four to five spines in the spine-row, and a moderately strong molar.

The maxillæ were not clearly deciphered, but appear to be normal.

The first maxillipeds show some seven branchial leaflets on the epipod; they have a broad antepenultimate joint fringed with pectinate spines, and the last joint very slender, not stumpy or elliptical as in certain species of *Cumella* and *Nannastacus*. The second maxillipeds have the third joint distinct, the three following joints broad, not elongate, the seventh very small. In the third maxillipeds the second joint is broad, rather longer than the following joints combined, carrying long plumose setæ on the free outer (not produced) part of its apical border, the third joint is missing, the fourth has long plumose setæ on the distal part of its outer margin, the fifth is wider but a little shorter than the curved apical sixth, the seventh is slender, subequal in length to the fourth; the exopod is of moderate size.

In the first pereopods the second joint is shorter than the following joints combined, distally narrowed, the third joint is longer than broad, the fourth distally widened, half as long as the fifth, which is about three-fourths of the sixth; the slender seventh in length equals the fourth; the exopod is larger than that of the third maxillipeds; the following exopods successively diminish in size. The second pereopods have a second joint rather shorter than the following joints combined, little more than twice as long as its greatest breadth, its edges somewhat denticulate; the third joint is nearly if not quite obsolete, the fourth little longer than broad, the fifth twice and a half as long as the sixth but scarcely longer than the seventh. The third and fourth pereopods have the second joint narrowly piriform, the narrow end distal, the third joint well developed, the fourth short, the fifth longer than the sixth, the seventh very small, with a long unguis or curved spine. In the third pereopod the second joint is longer but the fifth shorter than in the fourth pair. The fifth pereopods are very slight in structure, the second joint longer than the rest combined, the seventh joint shorter than the third, the fifth a little longer than either the fourth or sixth.

The uropods have about thirty spinules or denticles on each of three edges of the peduncle, which is twice as long as the endopod. The latter has six good-sized spines along its serrate inner margin, some submarginal spinules, and a very long apical spine. The exopod, about four-fifths as long as the endopod, has a fairly long apical spine, but is otherwise slightly armed.

The length of the single specimen, a male, is about 2.5 mm., thus being, although so small, considerably larger than any of the three species of the genus previously described. The specific name is given out of respect to Dr. Calman, who instituted the genus.

Locality. Cape Natal distant N. by E. 24 miles; depth 805 m.; No. 12605, sent by Dr. Péringuey.

FAMILY PROCAMPYLASPIDÆ, n.

Telson wanting; no distinct eye; first antenna with accessory flagellum very small; mandible with narrow molar; second maxilla normal; first maxilliped with seventh joint small, unexpanded; second maxilliped with strong teeth projecting from inner margin of the terminal joint; exopods on first four pairs of peræopods of male, only on first two of female; no pleopods in either sex; inner branch of uropods simple.

GEN. PROCAMPYLASPIS, Bonnier.

1896. *Procampylaspis*, Bonnier, Ann. Univ. Lyon, vol. xxvi., p. 541.

1900. *P.*, Stebbing, Willey's Zool. Results, pt. 5, p. 611.

This being at present the only genus, will have the characters of the family. In addition to the new species *P. tridentatus*, it contains *P. armatus*, Bonnier, 1896, with *P. echinatus*, Bonnier, of the same date, by Calman held to be a synonym of the preceding species; *P. bonnierei*, Calman, 1906, and *P. compressus*, Zimmer, 1907, briefly described without illustrative figures.

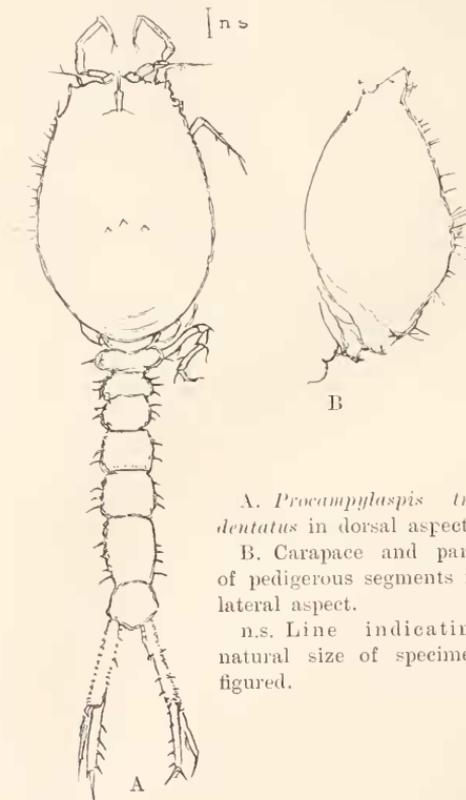
PROCAMPYLASPIS TRIDENTATUS, n. sp.

Plate LXII.

This genus is specially remarkable for the form of the last joint in the second maxillipeds. In the forms described by Bonnier as *P. armatus* and *P. echinatus*, which are considered by Calman to be one and the same species, this joint has in addition to its terminal

unguis four stout teeth. The figures which Bonnier gives of these teeth under the two names are not precisely alike, but in his text he makes no allusion to the difference. The species now added to the genus has, however, only three teeth to this joint instead of four, and to that mark of distinction the specific name calls attention.

The integument is conspicuously squamose. The pseudorostral



A. *Procampylaspis tridentatus* in dorsal aspect.

B. Carapace and parts of pedigerous segments in lateral aspect.

n.s. Line indicating natural size of specimen figured.

lobes a little upturned meet for a short space in front of the narrow bidenticulate eyelobe; their margins in dorsal aspect are obliquely truncate and finely denticulate; they form a sinus, and after a bulge descend to a small antero-lateral tooth, which is followed at some distance by a similar tooth on the lower margin. The carapace is longitudinally well arched, not actually carinate, with scattered hairs and a little denticle behind the centre of the median

line, the denticle perhaps not constantly present. The pedigerous segments narrow successively towards the pleon. The pleon segments are laterally, as so commonly in male *Sympoda*, bicarinate for the protection of the slender flagellum of the second antenna; the fifth segment is distally narrowed, not very elongate, though much longer than any of the other segments, telsonic segment not longer than broad.

First antenna with first joint geniculate, larger than second, second than third, flagellum slight, three-jointed, accessory minute, one-jointed. Second antenna with penultimate joint of peduncle more than half as long as the last joint, furnished with strong brush of setae; first joint of the long slender flagellum knobbed at the base.

Upper lip not quite symmetrically bilobed. Lower lip with inward pointing apical tooth to each lobe. Mandibles with cutting plate and accessory finely dentate, spine-row of six spines, molar slender, with its narrow apex divided into about six close-set teeth, of which the hindmost is the strongest. First maxilla with only seven spines on apical margin of outer plate, palp with two very unequal apical filaments. Second maxilla with eleven seta-like spines distributed on its divisions.

First maxillipeds having the large laminar antepenultimate joint bordered by six spatulate spines with an ordinary spine at the apex and followed by two short joints, of which the second is much the narrower and tipped with a slender spine. The proximal joints are not easy to distinguish, but between that which carries the two little coupling spines (the true second joint) and the laminar fourth joint there is an indication of an intervening third joint. The branchial elements of the epipod are numerous. The second maxillipeds have the second joint not twice as long as broad, with a plumose seta at the apex of its inner margin, a short third joint, the fourth as long as the fifth, with a plumose seta springing from a little prominence on the side where a square marking gives a deceptive appearance of an articulation, the sixth joint is subequal to the fifth, the much-curved seventh has three strong teeth, the middle tooth the longest. The third maxillipeds have a powerful second joint, bent, much longer than the remaining joints combined, with three long plumose setae on the slightly produced outer apex, the third joint very small, the fourth much widened distally, the fifth much shorter than either the fourth or sixth, but longer than the narrow seventh.

The first pereopods are remarkable because the third joint, which so often in appendages of the *Sympoda* gives trouble by its elusive smallness, here has a length equal to that of the inner margin of the

fourth or the outer margin of the fifth joint; the slender sixth is about twice as long as the still more slender seventh. The exopods of the first four peræopods, like those of the third maxillipeds, have the peduncular joint narrow compared with the stout second joint of the limb, while the first joint of the flagellum is unusually long, and at least in that of the first peræopods with a denticulate margin. In the second peræopods the third joint is short but outdrawn to a conspicuous apical spine; the fourth joint is much stouter but not longer than the fifth, which together with the small sixth cannot make up the length of the slender straight seventh joint. The third peræopods have the stout second joint much narrowed distally, longer than the slender rest of the limb, in which the fifth joint is considerably the longest, the seventh almost spine-like. The fourth peræopods are very like the third, but with the second joint a little shorter and less narrowed distally, while the fifth joint is a little longer than in the preceding pair. The fifth peræopods are very like the two preceding pairs, except for the absence of an exopod and the strikingly different second joint, which is very slender and not much longer than the fifth joint.

The endopod of the uropods is rather less than two-thirds of the length of the serrately margined peduncle, and carries nine spines on its inner edge, the apex having a large spine flanked by two smaller ones; the much narrower and shorter exopod has a slender apical spine with a small one adjoining and a small spine or two on its inner edge.

Length of the specimen 4.5 mm.

Locality. Cape Natal distant N. by E. 24 miles; depth 805 m.; No. 12605, sent by Dr. Péringuey.

FAMILY CAMPYLASPIDÆ.

1879. *Campylaspida*, G. O. Sars, Arch. Naturv. Kristian., vol. iv., pp. 6, 126.

1900. *C.*, Sars, Crustacea of Norway, vol. iii., p. 82.

Telson wanting; first antenna with accessory flagellum very small; second antenna of female imperfectly developed; mandible with molar slender, acute; second maxilla an undivided plate; first maxilliped of four joints, the last minute; second maxilliped without strong teeth on inner margin of the terminal joint; exopods on first four pairs of peræopods of male, only on first two of female; no pleopods in either sex; inner branch of uropods simple.

GEN. CAMPYLASPIS, Sars.

1865. *Campylaspis*, G. O. Sars, Forh. Selsk. Christian. for 1864, p. 200 (75).

1900. *C.*, Sars, Crustacea of Norway, vol. iii., p. 83.

This being at present the only genus, the characters of the family suffice for its definition. It contains twenty-three species, including the two here described as new.

CAMPYLASPIS OVALIS, n. sp.

Plate LXIII.

This species, which agrees with *C. vitreus*, Calman, in the transparency of the integument and shares with that and *C. macrophthalmus*, Sars, the possession of two long lateral keels on the carapace, is at once distinguished from the former by not having a transverse keel to divide the carapace dorsally into two compartments, and from the latter by having the eyelobe obsolete instead of peculiarly elongate. At first sight the species was suggestive of the genus *Platycuma*, Calman, but it proved to be generically distinct.

The pseudorostral lobes are very briefly and obtusely produced in advance of a minute eyeless eyelobe. In dorsal view the carapace presents a flattened oval appearance, wider in front than behind. The oval is formed by the somewhat raised edges of a surrounding keel, the central part broadly convex, with a depression on either side and towards the rear. Another keel runs nearly parallel to the sinuous lower margin and not very distant from it. The sides of the carapace below the upper keel are strongly inflexed, so as to leave only a long narrow opening occupied by the maxillipeds. The stomach appeared to be dilated with food, including foraminifera and what looked like the dentate fingers of some crustacean, the horny nature of which had defied digestion. The second to the fifth pedigerous segments successively narrowed and depressed have the lateral angles more or less rounded. The pleon segments show faint serration of the front angles, the fifth segment the longest, the telsonic pentagonal, the two combined not quite as long as the peduncle of the uropods.

First antenna very small, flagellum three-jointed, its terminal joint and the one-jointed accessory flagellum minute. Second antennæ those of a male not fully adult.

Upper lip with obtuse-angled margin. Mandibles with the generic character.

First maxilla with bisetose palp; on the inner plate one of the

spines showed a tridentate apex. First maxilliped having very numerous branchial leaflets on the epipod, exopod very elongate; terminal joint extremely small, attached at inner front angle of the preceding laminar joint. Second maxilliped with short but very broad second joint, rather longer than the remaining joints, distally narrowed, carrying a long feathered seta; from the very short third joint projects nearly at right angles a spine with a distally widened spear-like end, microscopically ciliated, similar to that described by Sars for *C. macrophthalmus*; sixth joint not specially dilated, tipped with two spines and carrying a short curved seventh joint, which but for the attached muscles might pass for a spine. The third maxillipeds have the much-curved second joint about as long as the remaining serrate joints combined, the seventh joint very small.

The first peraeopods are very like the third maxillipeds, but with all the joints rather longer, and the fifth rather longer than the sixth instead of the reverse. Second peraeopods with second joint stout, not so long as the rest combined, the seventh rather longer than the fifth and thrice the sixth. Third peraeopods with second joint much narrowed distally, much longer than the rest combined, while in the fourth pair this joint about equals the others together. Fifth pair narrow throughout.

Peduncle of uropods serrate on both margins, more strongly on the inner, about twice and two-thirds as long as the endopod, which has five spines on the inner margin and a terminal spine; the slightly shorter exopod is almost unarmed.

The carapace, of immature male, measured 3.3 mm. long, by 2.5 mm. broad.

Locality. Cape Natal distant N. by E. 24 miles; depth 805m. No. 12605, sent by Dr. Péringuey.

CAMPYLASPIS PÆNEGLABER, n. sp.

Plate LXIV.

The specific name is applicable not only to the character of the carapace but also to the close affinity between this species and the *Campylaspis glaber*, described by Professor Sars, from Norway and the Mediterranean. The size, the shape, the mouth organs, and even so particular a feature as the arrangement of pellucid spots on the carapace seem to be in close agreement. On the other hand, against identification of the two species may be set the following differences. The South African species is rather larger, its carapace is not quite smooth, its eyelobe is differently shaped and without

any sign of lenses, its first antennæ have a geniculate bulb at the base, in the second peræopods the seventh joint is longer than the fifth and sixth joints combined, and the fifth peræopod, so far as can be judged from figures of the other species, is more slenderly built, with the second and fifth joints more elongate.

The female of the present species is at present unknown. The carapace of the male is somewhat compressed, narrowly oval, in dorsal view having what may be called a high-shouldered appearance. The pseudorostral lobes are somewhat upturned, meeting for a short distance in advance of the narrowly oval, slightly prominent eyeless eyelobe, and in lateral view showing a very shallow sinus. On the front part of the carapace are various pimples, one pair of marked importance, but all difficult to observe except by turning the opaque white carapace at different angles to the light. When the carapace is divested of its contents the pattern on it of pellucid spots comes clearly into view. The first pedigerous segment is almost concealed by the carapace, but the other four are distinct, with lateral ridges which are continued along the pleon. This is much shorter than the preceding part of the body, its last three segments together not much longer than the peduncle of the uropods.

Both mandibles have the principal cutting-plate divided into six teeth. The first maxilla shows ten spines on the outer plate and four on the inner, the palp is long, ending in a single seta. The second maxilla has four slender spines on its single plate. The first maxillipeds have the little terminal joint almost obsolete; the branchial epipod with a great number of leaflets. The terminal joint of the second maxillipeds appears to be bifid, as in the Norwegian *C. glaber*, not trifid as in the Mediterranean form. The figures will show the likeness of the third maxilliped and the first peræopod to those of *C. glaber*. The second peræopod has the seventh joint longer than the fifth and sixth joints combined and has four short setæ on each margin; the third and the shorter fourth peræopods have the second joint narrowed at the apex.

The peduncle of the uropod is about once and three-quarters the length of the endopod and twice as long as the exopod, with eight setæ on its inner margin; the endopod has nine spines on the inner margin and a long apical spine; the exopod has a still longer apical spine, but for most of its length is unarmed.

Length of specimen about 4.3 mm.

Locality. Cape Natal N. by E. 24 miles; depth 805 m.; No. 12605, sent by Dr. Péringuey.

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* Names printed in italics are such as are not accepted in the classification of the present treatise. A note of interrogation signifies that the name originally was, or still is, of doubtful validity.

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The systematic position of *Pachystylis rotundatus*, Hansen, 1895, and of some other important species remains for the present indeterminate. For *Colurostylis* (?) *occidentalis*, Calman, the new generic name *Anchicolurus* is proposed, and Kröyer's *Cuma resima* is transferred from *Diastylopsis* to a new genus *Brachydiastylis* in the family Diastylidæ.