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VI.—*Crustacea Cumacea* of the 'Lightning,' 'Porcupine,' and 'Valorous' Expeditions. By the Rev. A. M. NORMAN, M.A.

Order CUMACEA.

Genus DIASTYLIS, Say, 1817.

(= *Alauna*, Goodsir, 1843.)

1. *Diastylis Rathkii* (Kröyer).

1841. *Cuma Rathkii*, Kröyer, Naturhist. Tidsskrift, vol. iii. p. 513, pl. v. figs. 17–30; id. *op. cit.* anden række ii. 1846, p. 144, pl. i. figs. 4, 5; id. *Voyages en Scandinavie &c.* pl. v. fig. 1, *a-u*.
 1852. *Cuma Rathkii*, Lilljeborg, *Öfversigt af Vet.-Akad. Förhandl.* p. 6.
 1856. *Diastylis Rathkii*, Bate, *Ann. & Mag. Nat. Hist.* 2nd ser. xvii. p. 451, pl. xiii.
 1859. *Diastylis Rathkii*, Danielssen, *Beretning om en Zoologisk Reise foretag.* Som. 1857, p. 7.
 1864. *Diastylis Rathkii*, G. O. Sars, *Om Cumacea*, Chr. Vid.-Selskab. *Förhandl.* 1864, p. 35, and 1873, *Om Cumaceen fra de store dybder i Nordishafvet*, Kongl. Vet.-Akad. *Handl. Bd.* ii. no. 6, p. 7, pl. iii. figs. 8, 9.

'Lightning' Expedition, Station 3, lat. 60° 31' N., long. 9° 18' W., 229 fathoms. 'Valorous' Expedition, Station 4, Davis Strait, lat. 66° 59' N., long. 55° 27' W., 60 fathoms.

This polar species is widely distributed in the Arctic and Boreal North Atlantic. I have seen it from Greenland, river St. Lawrence, N.E. America (New-England coast), Norway, Sweden, and Great Britain.

Professor G. O. Sars has, I think, fallen into error* in supposing that *Cuma angulata* of Kröyer is the male of his *C. Rathkii*. Both sexes of *D. Rathkii* are alike in the spiny armament of the carapace, consisting of two longitudinal lines of spines, one on each side of the dorsal line; these spines are largest and widest apart just behind the rostrum, where the spines are also usually in pairs on each line; the two lines gradually converge backwards, the spines rapidly decreasing in size, so as entirely to disappear at some distance from the hinder margin of the carapace. Among a collection of N.E. American Cumacea, for which I am indebted to Mr. L. I. Smith, is a *Diastylis* which I take to be the true *Cuma angulata* of Kröyer.

* Beskrivelse af de paa Fregatten Josephines expedition fundne Cumaceer, 1871, pp. 5 and 21.

2. *Diastylis cornuta* (Boeck).

1853. *Cuma bispinosa*, Stimpson, Marine Invertebrata of Grand Manan, p. 39.
 1860. *Cuma cornuta*, A. Boeck, Vidensk. Selsk. Förhandl. p. 190.
 1864. *Diastylis bispinosa*, G. O. Sars, Om Cumacea, p. 89.
 1865. *Diastylis bicornis*, Bate, Ann. & Mag. Nat. Hist. ser. 3, vol. xv. p. 84, pl. i. fig. 2.
 1868. *Diastylis bispinosa*, Norman, Brit. Assoc. Report, 1868 (1869), p. 270.

I am not satisfied that this is the *Cuma bispinosa* of Stimpson, though it is the species which has been known by that name among European carcinologists. I am not aware that the form for which I here adopt Boeck's name has been recorded from the American coast; and specimens of a New-England *Diastylis* are before me which seem to agree more nearly with Stimpson's brief description.

Sars says that the male of this *Diastylis* has a spineless carapace; but I have males which closely agree in the spiny armature of the carapace with the females; these are not, however, fully developed, inasmuch as the lower antennæ and uropods have not attained their plumose characters. It is hardly likely, however, that the subsequent exuviation, in which a change in *degree* of development would take place in these organs, would result also in so great a change in *kind* as from a strongly spinous to a smooth carapace. *Fully developed* males of *Diastylis* are scarce—that is, males in which the antennæ have attained their excessive length and the verticillately ciliated peduncle, and the abdominal feet have their swimming setæ on the peduncles. *Such* males I have seen of only a few species that I could assign to their females; they are more commonly taken in the tow-net than at the bottom, where, from their great activity, they probably generally succeed in escaping the dredge.

Diastylis cornuta was taken in the 'Porcupine' Expedition, 1869, in Lough Foyle, in 15 fathoms, and at Station 21, lat. 55° 40' N., long. 12° 46' W., in 1476 fathoms.

3. *Diastylis insignis*, G. O. Sars.

1871. *Diastylis insignis*, G. O. Sars, (Eftvers. af Kongl. Vet.-Akad. Förhandl. p. 76; id. Beskrivelse af de paa Fregatten Josephines expedition fundne Cumaceer, Kongl. Svenska Vetensk.-Akad. Handl. ix. p. 34, pl. xiv. figs. 68-71.

A strongly marked and beautiful species, described by Sars from the 'Josephine' Expedition, having been taken on a muddy bottom in 550 fathoms off the coast of Portugal. A single specimen was dredged in the 1869 'Porcupine' Expe-

dition, in 250 fathoms, to the west of Shetland, lat. 60° 45' N., long. 3° 6' W.

4. *Diastylis echinata*, Bate.

1865. *Diastylis echinata*, Bate, Ann. & Mag. Nat. Hist. ser. 3, vol. xv. p. 81, pl. i. fig. 1.

The type specimen was dredged off Shetland; and Sars has taken it in 100–300 fathoms on the coast of Norway (Hardanger and Christiania Fiords and Lofoten Islands).

In 1868 it was dredged by the 'Lightning' Expedition, Station 8, lat. 60° 10' N., long. 5° 59' W., in 550 fathoms.

5. *Diastylis Josephineæ*, G. O. Sars.

1871. *Diastylis Josephineæ*, Øfvers. af Kongl. Vet.-Akad. Förhandl. p. 77; id. 'Josephines' Cumaceer, Kongl. Svenska Vetensk.-Akad. Handl. ix. p. 36, pl. xv. figs. 72–74.

The types of this *Diastylis* were dredged in 750 fathoms off the Portuguese coast (lat. 38° 10' N., long. 9° 25' W.), in the 'Josephine' Expedition. It seems to be the commonest Cumacean inhabiting the deep waters between Farøe and Shetland.

	Station.	Lat.	Long.	fms.
'Lightning,'	1868 . . 6	67° 7' N.	5° 21' W.	500
'Porcupine,'	1869 . . 36	48 50	11 9	725
"	" . . 47a	59 34	7 18	542
"	" . . 75	60 45	3 6	344
"	" . . 90	59 41	7 34	458

6. *Diastylis polaris*, G. O. Sars.

1873. *Diastylis polaris*, G. O. Sars, Om Cumaceer fra de store dybder i Nordishafvet, Kongl. Svenska Vetensk.-Akad. Handlingar, xi. no. 6, p. 4, pl. i. figs. 1–3.

Cephalothorax, viewed laterally, elongated ovate, greatest depth subcentral. *Carapace* longer than free cephalothoracic segments, having two indistinct obliquely transverse rugæ on the hinder portion, rough all over with microscopic spines of subequal size, and pitted all over, the pittings being more conspicuous on the portion posterior to the rugæ, where also the microscopic spines are fewer in number; lateral margin denticulately serrated on the anterior half; posterior margin elevated into a well-pronounced fillet. Second, third, and last cephalothoracic segments denticulate on their anterior margin; last segment with the epimera not produced. *Telson* not quite equal in length to two preceding segments, subequal to peduncle of uropod, with 9–11 small spines on each side. *Uropods* slender; peduncle subequal to telson, with 12–

14 spines on inner margin; inner ramus with first joint furnished with five, second with two, third with three lateral and a terminal spine; outer ramus longer than inner, with 4-5 setæ on external margin. Length 8-10 millims.

At first sight near to *D. lævis*; but the carapace, instead of being conspicuously setose as in that species, is rough with microscopic spines, the small and uniform size of which suffices to distinguish it from the spine-ornamented species with which we are acquainted, except *D. stygia*, G. O. Sars, which has not the rugæ of *D. polaris*. Sars speaks of the rugæ as one or three in number; in the above description, which was drawn up before the species was described in Norway, it will be seen I mention two.

Habitat. 'Lightning,' 1868, Station 3, lat. 60° 31' N., long. 9° 18' W., 229 fathoms. The type specimens were dredged by the Swedish Expedition in the Arctic Seas, lat. 80°, long. 4° 33' E., in 950 fathoms.

7. *Diastylis biplicata*, G. O. Sars.

1864. *Diastylis biplicata*, G. O. Sars, Om Cumacea, p. 46.

This species has a great range in depth. The types were taken by Sars in 20-30 fathoms, off the Lofoten Islands; and I have specimens dredged off the Durham coast in a few fathoms; but in the 'Porcupine' Expedition of 1869 it occurred down to 1630 fathoms. The localities in that expedition are:—

	Lat.	Long.	fms.
Station 2 . . .	51° 22' N.	12° 25' W.	808
„ 11 . . .	53 24	15 24	1630
„ 17 . . .	54 28	11 44	1230
„ 18 . . .	54 15	11 9	183

8. *Diastylis spinosa*, Norman.

1868. *Diastylis spinosa*, Norman, Brit. Assoc. Report, p. 271.

1878. *D. bimarginatus*, Bate, Ann. & Mag. Nat. Hist. ser. 5, vol. i. p. 409.

1878. *D. bimarginatus*, Sim, Ann. & Mag. Nat. Hist. ser. 5, vol. ii. p. 453, pl. xviii. figs. 3-5.

A single specimen was taken, 'Porcupine' 1869, in each of the following localities:—

	Lat.	Long.	fms.
Station 6 . . .	52° 25' N.	11° 40' W.	90
„ 18 . . .	54 15	11 9	183

The type was from Shetland; and I have also procured the

species in deep water off Valentia, Ireland, while Mr. Bate has recorded it from Aberdeen.

Only the male is known to me. It would be more satisfactory if we could pair it; but the two sexes of such species as might be supposed to be most nearly allied to *D. spinosa* are known; and we conclude, therefore, that the female, up to the present time, has hidden herself.

9. *Diastylis longipes*, G. O. Sars.

1871. *Diastylis longipes*, G. O. Sars, Beskr. af de paa Fregatte Josephines Exped. fundne Cumaceer, p. 32, pl. xiii. figs. 65-67.

At once known by three very remarkable characters:—

1. The extraordinary length of the first pair of feet, which had led me to apply the very same name in my MS. to the species as that which Sars has given it.

2. The crest of spines on the underside of the first abdominal segment.

3. The peculiar and unique appearance of the large telson, which is devoid of the usual lateral spines throughout almost its entire length, and has only a few minute spines close to the origin of the terminal fork.

Sars records it from lat. $38^{\circ} 7' N.$, long. $9^{\circ} 18' W.$, 'Josephine' Expedition, 550 fathoms; and it occurred in almost the same depth in the British dredgings, viz.:—

	Station.	Lat.	Long.	fms.
'Lightning,' 1868	. 6	$60^{\circ} 45' N.$	$4^{\circ} 49' W.$	510
'Porcupine,' 1869	. 90	59 41	7 34	458

10. *Diastylis stygia*, G. O. Sars.

1871. *Diastylis stygia*, G. O. Sars, Œfvers. af Kongl. Vet.-Akad. Förhandl. p. 798.

1873. *Diastylis stygia*, G. O. Sars, Om Cumaceer fra de store dybder i Nordishavvet, Kongl. Vetensk.-Akad. Handl. xi. p. 6, pl. ii. figs. 4-7.

A female measuring 6 millims. comes so near to *D. stygia* that I here assign it to that species; the carapace is longer in proportion to the free cephalothoracic segments, being nearly twice their length; the anterior dorsal margin of the free segments is not crenulated; the pleon is quite smooth; the telson and uropods very like those of *D. stygia*; the peduncle of the latter has ten slender marginal spines, and the inner ramus has seven spines on 1st, three on 2nd, and two on 3rd joint; there is a spine on the abdomen, between the last pereopods.

An immature male has the carapace as in female, except that the denticulations of the infero-anteal margin are larger and stronger, the first five abdominal segments are smooth

(the last two segments being mutilated in the specimen), and the first two are furnished with swimming-feet.

The slight differences in the above characters from those of the type might, for the most part, be easily accounted for by difference in age and size, as Sars's specimen measured 10 millims.; the only points of distinction of any consequence are:—1st, that although the 'Porcupine' specimen is smaller, it has more spines on the uropods than Sars's; and 2nd, the presence of a spine between the *last* legs*. It must be left to the future to determine whether there is any value in these distinctions.

'Porcupine' Expedition, 1869, Station 36, lat. 48° 50' N., long. 11° 9' W., 725 fathoms.

Sars says of his type of *D. stygia*, "Habitat in mari arctico, latit. 78°, longit. occident. 2° 28', in profunditate portentosa 2600 orgyarum."

11. *Diastylis Bradyi*, n. sp.

Female. *Cephalothorax* having the dorsal margin unusually straight, the depth not being very unequal throughout; subequal in length to the pleon, exclusive of the telson. *Carapace* as long as the free segments; lateral margin very minutely serrated throughout almost its entire length; surface with scattered spines of small and subequal size, and ornamented with lines of small spines, the points of which are directed forwards. These lines of spines map the carapace out into areas as follows:—The central lacinia is surrounded by what is a plica in front, but a row of spines at its hinder portion, and it is crossed by two transverse spine-rows; the anterior of these passing into the lateral lacinia terminates at its junction with an arched spine-row, which, taking its origin from the lateral margin, sweeps upwards and forwards to the rostrum; the second transverse spine-row passes right down to the lateral margin; further back is a third transverse spine-row, which, crossing the dorsum, curves at the sides forwards and either dies out or joins the second transverse spine-row. The anterior *free segments* have their front dorsal margin very minutely crenulated; the last is widely separated from the preceding segment, and remarkable in its form and character; behind, the epimera (in both sexes) are greatly produced into large spine-like processes, while the anterior dorsal margin is cut into large teeth, alternating with conspicuous plumose setæ,

* I cannot say whether my specimen has the spines between the first three pairs of legs, which characterize *D. stygia*, as I was unwilling to mutilate the only specimen, which would have been necessary to get a good view of this part.

which have a backward direction. The *pleon* has small spines (in both sexes) on the ventral surface of the fourth, fifth, and sixth segments, but chiefly on the fifth. *Upper antennæ* reaching beyond the rostrum by the last very long joint of the peduncle; flagellum 3-jointed, as long as the last joint of the peduncle; shorter flagellum small, not longer than the first joint of the longer flagellum. The *first feet* have the three terminal joints subequal; first joint of all the legs, and even the basal joint of their palps, spinose; last three legs very robust. *Telson* with about fourteen spines on each side. *Uropods* with twenty-five lateral spines on the peduncle; inner branch with 1st joint bearing eleven spines on the inner margin, 2nd three, 3rd three and terminal spine; outer branch having about fifteen cilia on the exterior margin. Length 11 millims.

Immature male. Length 9 millims. Like ♀ in character of carapace, pereion, pleon, legs, &c.; *telson* with ten lateral spines; *uropods* having their peduncle equal in length to the telson and bearing eighteen spines on the inner margin; inner branch having 1st joint furnished with eight spines, 2nd with four, 3rd with three and terminal spine.

Dredged during the 'Porcupine' Expedition of 1869, in Lough Swilly, co. Donegal, in 15 fathoms.

I have named this species after my friend Professor G. S. Brady, who has added so much to our knowledge of the Entomostraca of our seas.

12. *Diastylis lævis*, Norman.

1869. *Diastylis lævis*, Norman, Last Report Shetland Dredging, Brit. Assoc. Report, 1868 (1869), p. 270.

Professor Sars has given the above as a synonym of *D. tumida*, Lilljeborg. It certainly comes very near it, but is, I think, distinct. At the time I drew up the description of *D. lævis* I had by my side (*a*) specimens of *D. tumida* received from Professor Lovén, (*b*) Sars's description of that species. In describing my species, in order to draw attention to the strong points of resemblance, I adopted almost the very words of Sars's description wherever they were applicable. I have now also by me specimens received from the Professor as *Diastylis tumida*. The points of distinction seem to be as follows:—1st, the carapace of *lævis* is much more elongated and much less deep; 2nd, the telson is of a different form; in *D. lævis* the part posterior to the anal aperture is always markedly longer than the basal portion, whereas in *D. tumida* it is usually much shorter, never apparently longer; 3rd, in the much more numerous spines of telson and uropods in *D. lævis*.

A *female* taken in the 'Porcupine' has seventeen spines on each side of the telson, and the uropods have twenty-four spines on the peduncle; inner ramus, 1st joint seven, 2nd four, 3rd three spines; the outer ramus is longer than the inner, its inner margin is smooth, but the outer margin and face carry fifteen setæ besides three terminal smooth setæ. An *immature male*, measuring 10 millims., has eleven pairs of spines on the telson; uropods with twenty-three spines on the peduncle; inner ramus, 1st joint eight, 2nd four, 3rd three spines; outer ramus has only seven very small setæ on the external margin. The last segment of the pereion has strongly produced epimera, and the anterior dorsal margin is both strongly serrated and adorned with plumose setæ. When the pleon is viewed from above, rows of spines are seen on each side of the segments; the hinder spine of each segment is larger than those before it; and, as seems to be general with the males in this genus, the spines of the fifth segment are the most developed*.

'Porcupine' Expedition, 1869.

Station		Lat.	Long.	fms.
6	. . .	52° 25' N.	11° 40' W.	90
"	11	. . . 53 24	15 24	1630
"	18	. . . 54 15	11 9	183

13. *Diastylis Edwardsii* (Krøyer).

1841. *Cuma Edwardsii*, Krøyer, Naturhist. Tidssk. iii. pp. 504, 531, pl. v. figs. 1-16; id. op. cit. anden rækkes ii. (1846), pp. 128, 207, pl. i. figs. 1, 3, 5, 9-14; id. Voyages en Scandinavie &c. pl. iv.

1846. *Cuma brevirostris*, Krøyer, Naturhist. Tidssk. anden rækkes ii. pp. 174, 208; id. Voyages en Scandinavie &c. pl. v. A. fig. 1 a-t (mas adultus).

'Carapace' tumid, not remarkably deep or broad, occupying about three fifths of the length of entire cephalothorax, with five denticulately edged plicæ on each side, the first curving directly forwards and running right out to the end of the rostrum; the second branching laterally from the first and proceeding towards the lateral margin, which, however, it does not reach; the third running right down from above to the lateral margin; the fourth and fifth curving forwards and looping with the third plica, which they join; rostrum short, hispid. *Free segments* of cephalothorax having their anterior margin elegantly denticulated. *First pereopods*, when extended forwards, reaching beyond the rostrum by the last two

* My description of the first feet in the Brit. Assoc. Report is incorrect. These organs do not differ materially in the proportional length of the joints from *D. tumida*.

joints and half of the antepenultimate; first joint strongly spined on the outer margin. *Pleon* having the fifth segment spinose on the posterior margin. *Telson* with nine pairs of lateral spines. *Uropods* having peduncle edged with fourteen spines; inner branch, 1st joint with six, 2nd with two, 3rd with two marginal spines. Length 11 millims.

Young male (sexual characters not fully developed) has the telson with seven pairs of lateral spines, and uropods with eleven spines on peduncle, four on 1st, two on 2nd, and two on 3rd joint of inner branch, and four small spine-like setæ on outer margin of external branch.

'Valorous' Expedition, off Holsteinborg, Station 5, lat. 66° 59' N., long. 55° 27' W., 57 fathoms.

This species approaches, but is quite distinct from, the N.E.-American *Diastylis sculpta* of Sars.

14. *Diastylis strigata*, n. sp.

Male. Carapace with antero-lateral corner produced forwards in the form of a well-rounded and strongly serrated lobe; rostrum short, spinose on the sides; surface of carapace not spined, having two transverse and vertical plicæ on the anterior portion, and a third longitudinal plica running nearly parallel with, and a little within, the lateral margin, and joining the posterior of the vertical plicæ at nearly a right angle; these plicæ are all quite smooth (neither serrated nor spine-crowned). *Inferior antennæ* reaching beyond the extremity of the uropods. *Cephalothorax* having the anterior dorsal margin of the last segment serrated, and the epimera produced backwards into well-developed pointed lobes. *Last pereopods* have the basal joint excessively flattened throughout the greater part of its length, but rounded at the distal extremity. *Pleon* with a crest of three spines on the underside of the first segment (similar in position and character to those of *D. longipes*, but fewer in number and of smaller size); viewed from above, the 1st and 2nd segments are seen each to have a pair of minute spines transversely placed; 3rd, 4th, and 5th segments have a central dorsal line of minute spines; these lines of spines are confined to the posterior portion of each segment, and the hindermost spine in each row is the largest; these three segments have also a crest of spines on the external angles of the ventral surface; the spines composing these ventral crests are of much larger size than those of the dorsal surface; and the crests of the 5th segment are more developed than those of the preceding segments (as is usual in males of the genus). *First joint of posterior maxillipeds and of first pereopods* unarmed, except that there is a single

distal spine; penultimate joint of first legs longer than, and commonly folded back upon, the antepenultimate; last joint about half the length of preceding. *Upper antennæ* with filaments longer than usual, the longer equalling the last two joints of peduncle, the shorter as long as the last joint. *Pleopods* well developed on first and second segments of pleon.

Telson with six to seven pairs of lateral spines. *Uropods* very slender; peduncle furnished with about twenty-five complex spines on the inner margin; inner ramus with the three joints subequal in length, 1st with sixteen to eighteen, 2nd with seven to eight, 3rd with four to six spines; outer ramus longer than the inner, with two to three short setæ on internal, and five to six on external margin. Length 7 millims.

One specimen dredged in Lough Swilly, co. Donegal, in 15 fathoms, 'Porcupine,' 1869. In the following year I took the species in the tow-net off Valentia.

15. *Diastylis Calveri*, n. sp.

Male. Cephalothorax much wider than deep. *Carapace* not deep, dorsal line only slightly arched; surface not spined, with two curved plicæ on the central portion, and extending from the dorsal line to the margin; numerous little pits stud the surface; and the stomachal region is furnished with numerous lucid spots (as in *D. sculpta* and other species); lateral margin unusually straight, strongly serrated in front; rostrum very short, blunt, and broad, hollowed above at the base. *Third free segment* with a pair of dorsal spines; first, second, and last denticulately serrated on the front dorsal margin; epimera of last segment only slightly produced backwards, and bearing two or three plumose setæ. *Pleon* with a pair of thorn-like spines on the under surface of first segment, a spine at the dorsal posterior angle of each segment, and a spine at the posterior ventral angle of the first two segments. *First pereopods* extending beyond the rostrum by their last two joints, the first of which is longer than the antepenultimate and three times as long as the last joint. *Telson* and uropods very slender; the telson has the anal aperture very far back, almost at its commencement, and at some distance from the end of the thicker anterior portion; this anterior portion is channelled above, the edges of the channel being serrulated; distal and more slender portion of telson with five pairs of very slender lateral spines; terminal spines largely developed and long. *Uropods* with eight to eleven spines on inner margin of peduncle; inner ramus having 1st joint with nineteen to twenty-two, 2nd with four, 3rd with three and terminal spines, the whole of the inner margin is also minutely pectinate, with ex-

cessively minute spinules between the spines just enumerated; outer ramus reaching only to the end of the second joint of inner, very narrow and slender in structure, with about eight small slender setæ on each margin. Length 8–9 millims.

Two specimens, 'Porcupine' Expedition, 1869. Station 11, lat. 53° 24' N., long. 15° 24' W., 1630 fathoms.

I have named this species in honour of Captain Calver, the able commander of H.M.S. 'Porcupine,' to whose nautical skill, untiring zeal, and keen appreciation of the value of scientific research, exhibited in his able and successful conduct of the 'Porcupine' Expeditions, natural history owes so much.

16. *Diastylis armata*, n. sp.

1876. *Diastylis armata*, Norman, MS., 'Valorous' Report, Proc. Royal Soc. xxv. p. 212.

Female. *Cephalothorax* short; free segments remarkably short, scarcely half as long as the carapace, the three posterior segments developed as usual, but the two before these only indicated by a narrow fillet. *Carapace* broad, deep, and tumid; length only half as much again as depth; dorsal margin boldly arched in the centre, declining posteriorly, and still more anteriorly in the sweep to the rostrum; posterior margin abruptly truncate; lateral margin strongly arched in the centre, where the carapace attains its greatest depth; anteriorly the margin is serrulate; serrulations about twenty, increasing in size in front; no infero-anteal angle, the lateral margin gradually sloping upwards to the rostrum; rostrum short, reaching the middle of the second joint of the peduncle of the upper antennæ, its sides rapidly converging to the acute point in which it terminates; surface of carapace for the most part glabrous and devoid of spines, sculptured with scattered little shallow pittings; the rostrum bears a pair of conspicuous, acute, erect spines; behind these each lateral lacinia bears a longitudinal curved row of four spines, the anterior of which is similar to those on the rostrum, but the hinder ones very small; beneath this row, between it and the lateral margin, is an isolated triangular spine of small size. The *free cephalothoracic segments* and those of pleon are all quite smooth, save that the epimera of the last cephalothoracic segment are armed with a spine (but not produced backwards). *Upper antennæ* have the three joints of peduncle subequal, the first armed with a spine at the extremity on the lower side. *First legs* with the basal joint strongly armed with spines all along the margin. *Pleon* exceeding the length of the cephalothorax by its last two segments. *Telson* longer than the peduncle of the uropods,

having the basal portion longer than usual (exceeding the length of the sixth segment); only three pairs of small lateral spines, but the terminal fork long and slender. *Uropods* weakly formed; peduncle narrow, but slightly widening distally, with only three small spines on the inner margin; inner branch rather shorter than the outer; external margin quite smooth, inner with two spines on 1st, two on 2nd, one and a terminal spine on 3rd joint; outer branch narrow and delicately formed, quite smooth on both sides, devoid both of spines and setæ, terminating in a long and very slender spine. Length 10 millims.

One specimen taken by the 'Valorous' at the entrance of Davis Strait, Station 9, lat. 59° 10' N., long. 50° 25' W., 1750 fathoms.

Genus LEPTOSTYLIS, G. O. Sars (1869).

Leptostylis producta, n. sp.

Cephalothorax remarkably short and tumid, not half as long as the abdomen (exclusive of the uropods). *Carapace* very short, broad, and gibbous, abruptly truncate behind, length not greater than breadth; rostrum short, rounded, slightly bent upwards; surface smooth, or nearly so; lateral margins strongly denticulately serrated, infero-anteal corner not produced. *Telson* short, scarcely more than one third as long as basal joint of uropods; not longer than sixth, and not more than half the length of the fifth segment; no lateral spines; terminal spines two, large in proportion to size of telson. *Uropods* having the base nearly three times as long as the telson, slender, with four long, widely distant spines on the inner margin; inner ramus long, styliform, nearly as long as the basal joint, 1st joint with two, 2nd with one long spine on inner margin, 3rd joint much produced, gradually attenuated to a fine point, no spines on the inner margin; outer ramus only equalling in length the first joint of the inner ramus, slender, and scarcely exceeding in size the terminal joint of the inner ramus.

A single specimen procured in the 'Porcupine' Expedition, 1869, off the Butt of Lewis, Station 90, lat. 59° 41' N., long. 7° 34' W., 458 fathoms.

Genus CHALAROSTYLIS, n. g.

(χαλαρός, laxus; στῦλος, stilus.)

Male. General characters the same as in *Diastylis*, but furnished with three pairs of feet on the pleon, each consisting of a

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long peduncle and two branches furnished with plumose setæ. Telson short, terminating in three spines (instead of the usual fork). Uropods remarkably long and slender. *Female* unknown.

Chalarostylis elegans, n. sp.

Male (adult). *Cephalothorax* equal in length to five abdominal segments. *Carapace* shallow, but wide, length three-fifths of entire cephalothorax; dorsal margin well-arched on hinder portion, but depressed on the anterior two thirds of its length; surface microscopically spinulose; lateral margin not serrated, gradually sloping upwards, without any sinus, to the extremity of the rostrum; anterior margin (*i. e.* slope from lateral margin) edged with about fifteen spines; anterior portion of dorsal margin with a crest of about ten small spines. *Anterior margin* of free cephalothoracic segments smooth; epimera of last segment not posteriorly produced. *Pleon* quite smooth and glabrous. *Upper antennæ* with the basal joint covered with numerous spines, especially on the underside. *Lower antennæ* as long as cephalothorax, with last joint of peduncle and also the flagellum furnished with very numerous semiverticils of crowded cilia. *First feet* having first joint more slender than usual, not spined, with three to four verticillately plumose short setæ on the hinder margin; 2nd joint very short, armed with one long spine; 3rd joint longer, having one long spine; 4th very long, almost as long as three upper joints, and much longer than two following combined, armed with ten spines, of which two are much longer than the rest, and of the same size as the large single spine on the preceding joints; penultimate joint very short, about one fifth the length of 4th; last joint three times as long as penultimate, terminating in spine-like setæ. *Three pairs* of abdominal feet, each consisting of a long peduncle (as long as the depth of the pleon), minutely spinous on the hinder margin, and two branches furnished with plumose setæ. *Telson* short, equalling length of sixth segment, but not much more than half the length of fifth, with two pairs of lateral spines, and terminating in three spines (instead of the usual fork). *Uropods* remarkable for their great length and slenderness; peduncle three times the length of telson, with twenty-four spines on the inner margin; inner branch with first joint as long as telson, with eight marginal spines, 2nd with two, 3rd without any marginal spines; outer branch reaching to the middle of the last joint of the inner branch, 1st joint with three spine-like setæ on inner margin,

and 2nd with four such setæ on inner margin and three terminal setæ; outer margin without setæ. Length rather more than 8 millims.

One taken, 'Porcupine,' 1869, off Rockall, in 109 fathoms.

Genus SPENCEBATEA, n. g.

(Named after Mr. C. Spence Bate.)

Characters of Male.—General aspect that of *Diastylis*. Five segments of cephalothorax exposed behind the carapace. All feet, except the last, palpigerous. No feet on pleon. Telson rudimentary (as in *Eudorella*). Uropods with both branches two-jointed. *Female* unknown.

Spencebatea abyssicola, n. sp.

Male. Cephalothorax, viewed laterally, long ovate, the upper margin a bold gradual curve from the rostrum to the last segment. *Carapace* three fifths of the length of entire cephalothorax, shallow and of nearly equal depth throughout; dorsal margin evenly arched; lateral margin inarched and exposing all the feet to their very bases, entire throughout (*i. e.* not denticulated); rostrum very short, suddenly and broadly truncated, its inner sheath projecting considerably beyond the outer; entire surface of carapace showing a structure composed of hexagonal cells, not at all spinous; but a few hairs are scattered on carapace, free segments, and pleon. *Last cephalothoracic segment* having a pair of spines on the ventral surface between the slender legs; a pair of minute spine-like points are also present on the back of this segment. *Telson* rudimentary. *Uropods* greatly developed, equal in length to the last four abdominal segments; peduncle much longer than the rami, with eight cilium-tipped spines on the inner margin; inner branch consisting of a long first joint having eight long spines on the inner margin, and a terminal greatly developed spine, which might be considered a second joint, and has been so called in the generic description; outer branch much smaller, shorter and more slender, 1st joint short, 2nd with one minute spine on inner and one small seta on outer margin, terminating in two slender spines, one of which is of great length and very slender.

A very small species, only measuring 4 millims.

A single specimen, 'Porcupine,' 1869, Station 19, west of Donegal Bay, lat. 54° 53' N., long. 10° 56' W., 1360 fathoms.

Genus LAMPROPS, G. O. Sars (1864).

1. *Lamprops rosea* (Norman).

1863. *Vaunthompsonia rosea*, Norman, Trans. Tyneside Nat. Field Club, v. p. 271, pl. xiii. figs. 1-3 (femina adulta).

1863. *Cyranassa elegans*, Norman, Trans. Tyneside Nat. Field Club, v. p. 275, pl. xiv. figs. 1-6 (mas adultus).

1864. *Lamprops rosea*, G. O. Sars, Om Cumacea, Vid. Selsk. Forhandl. p. 64.

'Porcupine' Expedition, 1869, Lough Foyle, 15 fathoms.

2. *Lamprops cristata*, G. O. Sars.

1869. *Lamprops cristata*, G. O. Sars, Nye Dybvandskrustaceer fra Lofoten, Vidensk. Selsk. Forhandl. p. 157.

'Porcupine,' 1869, south of Rockall, Station 23, lat. 56° 7' N., long. 14° 19' W., in 630 fathoms.

Genus IPHINOË, Bate (1856).

(=*Halia*, Bate, 1856, in use for genera of Mollusca and Lepidoptera.)

Animal greatly elongated. *Cephalothorax* low, narrow, compressed, greatly produced, generally having the dorsal line of carapace spined in female; rostrum produced; five free segments of pereon, the last two subequal, scarcely wider or higher than the pleon. *Second maxilliped* having the basal joint longer than the remainder taken together, first and second joints distally furnished with a long plumose seta, last joint in the form of a strong nail. *Third maxilliped* having the first and third joints produced into very large setiferous lobes on the inner distal extremity; the lobe of the first joint reaches at least to the middle or end of the third joint, that of the third joint extends to the middle of the fourth joint. *Pereiopods*, only the first, even in the male, furnished with palpi; second pair much smaller than usual and more like the following pairs. *Telson* rudimentary, but bilobed. *Uropods* strongly developed, both branches two-jointed; outer joint flattened, truncate at the apex. The male has the first five segments of pleon furnished with swimming-feet, and the spines on the dorsal line of the carapace usually (?always in adult) absent.

This genus was established by Bate (Ann. & Mag. Nat. Hist. 1856, 2nd ser. vol. xvii. p. 458) under the name *Halia*, with the *Cuma trispinosa*, Goodsir, as the type. Subsequently finding that *Halia* was already in use for a genus of Lepidoptera, he changed the name to *Iphinoë* (Ann. & Mag. Nat. Hist. 1856, 2nd ser. vol. xviii. p. 187).

The members of this genus bear a striking general resem-

blance to *Leucon*; but in that genus three pairs of pereopods are furnished with a palp, and the male has only two pairs of swimming-feet on the pleon.

Iphinoë serrata, Norman.

1866. *Iphithoë serrata*, Norman, Report of Committee for exploring Coasts of the Hebrides, Brit. Assoc. Report, 1866 (1867), p. 201.
 1868. *Iphinoë serrata*, Norman, Brit. Assoc. Report, 1868 (1869), p. 272.

'Porcupine,' 1869, Station 20, lat. 55° 11' N., long. 12° 46' W., 1443 fathoms.

Genus LEUCON, Kröyer (1846).

1. *Leucon longirostris*, G. O. Sars.

1871. *Leucon longirostris*, G. O. Sars, Beskr. af Fregatten Josephines Exped. Cumaceer, Kongl. Vet.-Akad. Handl. vol. ix. p. 42, pl. xv. fig. 75.

The type of this species was procured in 550 fathoms off the coast of Portugal during the 'Josephine' expedition. It was only a fragment, part of the pleon being broken off.

A single specimen dredged in the 'Valorous' expedition, at the entrance of Davis Strait, lat. 59° 10' N., long. 50° 25' W., in 1750 fathoms, agrees very closely with Sars's beautiful figure.

I add a few notes, chiefly on that portion of the animal which was absent in the type specimen. The specimen examined by me is a female; that observed by Sars was a male.

Number of dorsal spines of carapace seven, of the under-side of the rostrum four, of the antero-lateral margin nine; and there are two small spines close together on the front margin between the antero-lateral corner and the base of the rostrum.

The first legs are very long and remarkably free from setæ; the thigh is armed with two spines.

On the belly between the last pair of legs is a thorn-formed spine with the point curving forward.

Pleon having the first five segments gradually increasing in length, but the fifth twice as long as the sixth; telson very short.

Uropods broad and flattened; peduncle with two spines on the inner margin; inner branch with eleven spines on the inner margin (nine on 1st joint, two on 2nd), and terminating in a long spine; the second joint not one third the length of the first; outer branch as long as the first joint of the inner

branch, its first joint very short and unarmed, second having one simple and two plumose spines on the inner margin and terminating in two very long spines. The spines of the inner margin of the inner branch are all tipped with a little cilium; and the two long spines of the outer branch, which I have called "plumose," are of very peculiar structure: their basal portion under the microscope appears as if furnished with stiff hairs; but the apical portion would perhaps be more correctly described as pectinate.

The peculiar production of the rostrum in this species is a very remarkable feature.

From the wide distance apart at which the only two known examples were found, it is probable that *Leucon longirostris* will prove to be widely diffused over the bed of the Atlantic Ocean.

2. *Leucon nasicus*, Kröyer.

1841. *Cuma nasica*, Kröyer, Naturhist. Tidsskrift, vol. iii. p. 524, pl. vi. figs. 31-33.

1846. *Leucon nasica*, Kröyer, Naturhist. Tidsskrift, and. rækkes vol. ii. pp. 189, 209, pl. ii. fig. 5, a, b; id. Voyages en Scandinavie &c. pl. iii. fig. 2, a-o.

1855. *Leucon nasica*, Lilljeborg, Öfvers. af Vetensk.-Akad. Förh. p. 121.

1864. *Leucon nasicus*, G. O. Sars, Om Cumacea, Vid. Selskab. Forhandl. p. 53.

A single specimen taken by the 'Porcupine' expedition in 1869 in the Minch. Not before known as belonging to the British fauna.

3. *Leucon serratus*, n. sp.

1876. *Leucon serratus*, Norman, MS., 'Valorous' Report, Proc. Royal Soc. vol. xxv. p. 212.

Female. *Carapace* much longer than the free segments of cephalothorax and very deep, the depth being subequal to the length, exclusive of the rostrum; dorsal margin boldly arched, having a continuous unbroken serrated line throughout its length; serrations triangular, small posteriorly, and gradually increasing in size forwards; rostrum, viewed laterally, short, deep, triangular, directed horizontally in front of the point where the dorsal line sweeps down to meet it, its edge with a few elongate serrations; antero-lateral corner produced forwards and outwards in wing-like form; lateral margin with about ten elongated triangular serrations, of which the three or four front (on the wing-like expansion) are much larger than the rest. Total length of *pleon* (without uropods) not exceeding that of the cephalothorax. *Upper antennæ* very small, just reaching to the end of the rostrum. *First feet* having

seven spines on the hinder margin of the first joint; the last three joints gradually decrease in length; and the limb does not reach beyond the extremity of the rostrum. *Telson* rudimentary. *Uropod* with a peduncle not exceeding in length the 5th segment of the pleon, bearing three spinules on the inner margin; inner branch much shorter than the outer, 1st joint with five spines, of which the distal is much the largest, on the inner margin; second joint with five spines, which gradually increase in length distally, on the inner margin, one distal spine on the outer margin, and a terminal spine, which is two thirds as long as the joint from which it springs; outer branch having the first joint short and unarmed, the second very long, with two or three minute setæ on the outer margin, and long setæ on the distal portion of the inner margin and at the apex. Length 6 millims.

One specimen taken in the 'Valorous' expedition at the entrance of Davis Strait, Station 9, lat. 59° 10' N., long. 50° 25' W., in 1750 fathoms.

4. *Leucon brevirostris*, n. sp.

Female. *Cephalothorax* equal in length to five segments of pleon. *Carapace* longer than the free segments, ovate, deep, gently arched above, compressed; infero-anteal angle greatly produced and terminating in a sharp point, with five serrations; rostrum unusually short, broad, rounded, minutely serrated on the edge; dorsal line toothed more or less throughout, but the teeth separated by intervals posteriorly, where they are small, increasing in size and closeness to each other in front, about twenty in all; the teeth are not regularly arranged, as usual, in single file, but in an irregular double alternating line; surface everywhere ornamented with very pretty and regular hexagonal celled structure; carapace, seen from above, widest behind the middle, gradually and evenly narrowed thence to the extremity of the rostrum. *Third maxilliped* with the first joint strongly spined, the four or five more distal spines of great size and thorn-like form, the lobe of this joint greatly developed, reaching forward to the end of the third joint, and its long setæ extending to the end of the penultimate joint; second joint armed with one spine, similar in character to those of first joint. *Telson* very short, semiovate, smooth. *Uropods* with peduncle slightly longer than the fifth segment of the pleon, having five long spines on the inner margin; inner branch with first joint longer than the second, having ten spines of unequal length on the inner margin; second joint with five spines on the inner margin and two longer at the extremity; outer branch

longer than the inner, and longer than the peduncle; first joint short; second with four hair-like spines on the inner margin and two long setæ at the extremity. Length 10 millims.

'Porcupine,' 1869, dredged in 109 fathoms, to the south of Rockall, lat. $56^{\circ} 26' N.$, long. $14^{\circ} 28' W.$

The short rostrum distinguishes this at once from *L. nasicus* and *pallidus*; the absence of the three spines on each side of the central line of the middle lacinia from *L. nasicoïdes*; and the more numerous teeth of the crest from *L. fulvus* and *L. acutirostris*.

Genus EUDORELLA, Norman (1867).

(= *Eudora*, Bate, 1856; name preoccupied.)

1. *Eudorella truncatula*, Bate.

1856. *Eudora truncatula*, Bate, Ann. & Mag. Nat. Hist. ser. 2, xvii. p. 457, pl. xiv. fig. 3.

1864. *Eudora truncatula*, G. O. Sars, Om Cumacea, Vid. Selskab. Forhandl. p. 61.

1867. *Eudorella truncatula*, Norman, Brit. Assoc. Report, 1866 (1867), p. 197, note.

1871. *Eudorella truncatula*, G. O. Sars, Kongl. Vetensk.-Akad. Handl. ix. p. 44, pl. xviii. fig. 99.

'Porcupine,' 1869, Station 20, lat. $55^{\circ} 11' N.$, long. $11^{\circ} 31' W.$, 1443 fathoms.

2. *Eudorella hirsuta*, G. O. Sars.

1869. *Eudora hirsuta*, G. O. Sars, Undersøgelser over Christianiafjordens Dybvandsfauna, p. 43.

1871. *Eudorella hirsuta*, G. O. Sars, Beskrivelse af de paa Fregatten Josephines Expedition fundne Cumaceen, Kongl. Vetensk.-Akad. Handl. ix. p. 44, pl. xviii. fig. 100.

A 'Porcupine' *Eudorella* is so near *E. hirsuta* that I prefer provisionally considering it a variety of that species to giving it a distinctive name. I give, however, the characters.

Cephalothorax deepest at the anterior part of the carapace, and thence gradually becoming shallower to the last segment, which is not deeper than the abdomen. *Carapace* subequal in length to the free segments; front margin truncate, but not retrace, the lower two thirds of this margin and also the lateral margin denticulate throughout; denticulations of nearly equal size; infero-anteal angle well rounded off; a narrow sulcus at about one-fourth-way up the anterior margin, but the denticulations are not interrupted even by this sulcus, but pass down into it; there are about six denticulations from the bottom of the sulcus to the infero-anteal corner, and about ten

above, counting from the bottom of the sulcus; surface not strongly hispid (as in *hirsuta*), only a few scattered hairs, sculptured with roundish or hexagonal cells. *Uropods*: peduncle not broad, the length much less than that of fifth segment of pleon, and about four times its own breadth; the anterior half of the inner margin bearing four little hairs, while the more distant portion has two spines; inner ramus longer than the peduncle or the outer branch, the first joint has eight spines on inner and three little spine-like setæ on outer margins, the 2nd joint has three spines on the inner and two distal spines on outer margin besides the terminal spine; outer branch has the first joint glabrous, the second with thirteen spine-like setæ. Length 5 millims.

'Porcupine,' 1869, midway between Ireland and Rockall, in 1380 fathoms (Station 30, lat. 56° 24' N., long. 11° 49' W.).

Genus *CAMPYLASPIS*, G. O. Sars (1864).

Campylaspis rubicunda (Lilljeborg).

1855. *Cuma rubicunda*, Lilljeborg, *Œfvers. af Vet.-Akad. Förhandl.* p. 121.

1864. *Campylaspis rubicunda*, G. O. Sars, *Om Cumacea*, p. 77.

1873. *Campylaspis rubicunda*, G. O. Sars, *Om Cumaceer fra de store dybder i Nordshafvet*, Kongl. Svenska Vetensk.-Akad. *Handl.* xi. p. 10, pl. iv. figs. 14-16.

Off Holsteinborg, Greenland, 'Valorous,' Station 5, lat. 66° 59' N., long. 55° 27' W., 57 fathoms; one specimen.

Genus *CYCLAPIS*, G. O. Sars (1864).

Cyclapis longicaudata, G. O. Sars.

1864. *Cyclapis longicaudata*, G. O. Sars, *Om Cumacea*, p. 82.

Off the Spanish coast, 'Porcupine,' 1870, Station 9, lat. 48° 6' N., long. 9° 18' W., 539 fathoms; and North Atlantic, 'Valorous,' 1875, Station 12, lat. 56° 11' N., long. 37° 41' W., 1450 fathoms.

VII.—*Descriptions of new Genera and Species of Galleruciinæ.* By JOSEPH S. BALY, F.L.S.

[Continued from vol. ii. p. 422.]

Genus *DIABROTICA*, Chevr.

Diabrotica ecimia.

D. subelongata, postice paullo ampliata, nigra, nitida, pedibus