

rich and melodious, and apparently lends itself well to oratory and song. It belongs to the Negro group of languages, for the Madis are pure negroes.

NOTE.—I had at first intended to illustrate this paper with drawings from objects in my collection, which are interesting as being the only ones that have yet found their way into Europe. Finding, however, that somewhat similar articles may be found depicted in *Geschichte der Waffen*, Band iii., Berlin und Leipzig, 1877, and in Schweinfurth's *Artes Africanæ*, Sampson Low, 1875, this has been deemed unnecessary.

4. On the *Crinoidea* of the North Atlantic between Gibraltar and the Faeroe Islands. By P. Herbert Carpenter, D.Sc. (Camb.), Assistant Master at Eton College. With some Notes on the *Myzostomida*, by Prof. L. von Graff, Ph.D. Communicated by Mr John Murray.

INTRODUCTION.

This communication falls conveniently into two sections—I. dealing with the specimens obtained by H.M.S.S. "Lightning" and "Porcupine," during what may be called the pre-Challenger period of deep-sea exploration; II. concerning those dredged by the "Knight Errant" and "Triton" during the surveys of the Wyville Thomson ridge, which were conducted in the years 1880-82.

All the species will be properly described and illustrated in the "Challenger" Reports; but many reasons seem to render it desirable that some of them, and more especially the *Comatulæ*, should be briefly noticed before the larger report can be published.

My friend Professor L. von Graff has kindly sent me a short account of the *Myzostomida*, from which it will appear that four species of these parasites have been added to the two already known in the British seas.

I. *The Crinoids obtained by H.M.S.S. "Lightning" and "Porcupine," 1868-70.*

The detailed zoological results of the preliminary dredging expeditions of the "Lightning" and the "Porcupine," in the years 1868-70, have been so completely cast into the shade by the mag-

nificent collections of the "Challenger," that little is known about many of the deep-sea animals obtained by these expeditions beyond the first references to them in the reports of Sir Wyville Thomson, Dr Carpenter, and Dr Gwyn Jeffreys, in the *Proceedings of the Royal Society*.

The Annelids, Corals, Echinids, and Mollusca soon found their way into able hands, and have been fully described in the publications of various learned societies. But as regards most of the other groups no detailed results have ever been published. This want of systematic information about our earlier expeditions is not to be wondered at, when it is remembered that the "Challenger" sailed but little more than two years after the return of the "Porcupine" from the Mediterranean, and that Sir Wyville Thomson, in whose hands the collections mostly remained, was in bad health, with his time much occupied by his professional duties and by the preparations for his four years' absence. When he returned the "Porcupine" collections were entirely dwarfed by those of the "Challenger;" and it is only now that they have been examined by Mr Murray that specimens dredged nearly fifteen years ago are coming into the hands of specialists, who are working them up together with the "Challenger" material, and with that of the "Knight Errant" (1880) and "Triton" (1882).

Nearly the same thing has taken place on the other side of the Atlantic, little being yet known about many of the types obtained by the U.S. ships "Corwin," "Bibb," and "Hassler" (1868, 1869, 1872); and they are now being described by those specialists, in whose hands have been placed the larger collections of the "Blake" (1877-80), second only in importance to those of the "Challenger."

Before sailing in the "Challenger," Sir Wyville Thomson read before the Society a paper* entitled "On the Crinoids of the 'Porcupine' Deep-Sea Dredging Expedition." It was, however, by no means complete, as regards either the list of species obtained or their geographical distribution; and in the following pages I propose to partially make good this deficiency. When our knowledge of the Crinoids fifteen years ago is taken into consideration, the material obtained by the "Porcupine" must be regarded as com-

* *Proc. Roy. Soc. Edin.*, vol. vii, pp. 764-773. A large portion of this paper was also printed in *The Depths of the Sea*, pp. 434-454.

paratively rich. For it includes four stalked Crinoids, three of which were new to European seas and also new to science, while one represents a new generic type altogether; and among the seven *Comatula* species were three or possibly four new forms, one representing a genus which, up till very lately, has scarcely been known to occur outside the limits of the tropics. Sir Wyville Thomson's list embraces only seven species of Crinoids altogether; whereas eleven different types were really obtained, seven being *Comatule*, and four stalked Crinoids, the latter including three additions to the four species then known.

These facts seem to me of sufficient interest to merit being treated separately, so that they may not be lost sight of in the general account of the Crinoids which will appear in the "Challenger" Report.

Family PENTACRINIDÆ.

Genus *Pentacrinus*, Miller.

Cainocrinus, Forbes.

Picteticrinus, de Loriol.

1. *Pentacrinus wyville-thomsoni*, Jeffreys.

H.M.S. "Porcupine," 1870. Station 17. Lat. 39° 42' N., long. 9° 43' W. 1095 fathoms. Temp. 39°·7 F. Ooze. "About twenty specimens."

Remarks.—This fine species was worthily dedicated to Sir Wyville Thomson, in the Report of Drs Carpenter and Gwyn Jeffreys; but no further description of it was published until the appearance in 1872 of *The Depths of the Sea*. This contains a good figure, with a description by Sir Wyville, which is identical with that given in his paper on the "Porcupine" Crinoids. A series of five beautifully executed plates, illustrating the anatomical characters of the skeleton, which were drawn by Mr Hollick for Dr Carpenter, will appear in the "Challenger" Report.

P. wyville-thomsoni has a closed ring of basals, and would therefore belong to Forbes' genus *Cainocrinus*, which has recently been revived by de Loriol.* I have elsewhere given my reasons for regarding *Cainocrinus* as indistinguishable from *Pentacrinus*.†

* *Monographie des Crinoïdes fossiles de la Suisse*, p. 111.

† *Journ. Linn. Soc. Zool.*, vol. xv. p. 210; and *Bull. Mus. Comp. Zool.*, vol. x. No. 4, p. 168.

Family BOURGUETICRINIDÆ; de Loriol.

Genus *Rhizocrinus*, M. Sars, 1868.

Bourgueticrinus, Pourt., 1868.

Democrinus, Perrier, 1883.

2. *Rhizocrinus lofotensis*, M. Sars, 1868.

Bourgueticrinus hotessieri, Pourt. 1868.

Rhizocrinus lofotensis, Wyv. Thomson, 1872 (pars).

H.M.S. "Lightning," 1868. Station 12. Lat. 59° 36' N., long. 7° 20' W. 530 fathoms. Temp. 47°·3 F. Globigerina ooze. Three small specimens without arms.

Station 16. Lat. 61° 2' N ; long. 12° 4' W. 650 fathoms Globigerina ooze. Two small specimens without arms.

"Once or twice we found a fragment of the stem of *Rhizocrinus* in the cold area." *

Remarks.—So far as my information goes, this widely distributed species was never dredged by the "Porcupine," not even on the the "*Holtenia*-ground" in 1869. But according to Sir Wyville,† "several occurred attached to the beards of the *Holtenia* off the Butt of the Lews." This would be at Stations 47 and 90, both of them close to No. xii. of the "Lightning" cruise, which was the original *Holtenia*-ground, and was described by Sir Wyville as being in the Faeroe channel. There is, however, no mention of *Rhizocrinus* in the accounts of the dredgings at these stations, either in *The Depths of the Sea*, or in the Royal Society Report; and I suspect therefore that Sir Wyville was speaking from memory only, and confounded the dredgings of the two years. At any rate, if the "Porcupine" did obtain specimens on the *Holtenia*-ground in 1869, they have since disappeared.

Sir Wyville mentioned individuals of considerable size as having been dredged by the "Porcupine" in 862 fathoms off Cape Clear. They really belong, however, to the species which three years later was met with off Barbadoes by the "Hassler," and was subsequently described by Mr Pourtalès under the following name:—

* *The Depths of the Sea*, p. 124.

† *Ibid.*, p. 450.

3. *Rhizocrinus rawsoni*, Pourt., 1872.*Rhizocrinus lofotensis*, Wyv. Thomson, 1872 (pars).*Rhizocrinus rawsoni*, P. H. Carpenter, 1882.*Democrinus Parfaiti*, Perrier, 1883.

H.M.S. "Porcupine," 1869. Station 42. Lat. 49° 12' N., long. 12° 52' W. 862 fathoms. Temp. 39°·7 F. Ooze with sand and shells. Two armless specimens.

Station 43. Lat. 50° 1' N., long. 12° 26' W. 1207 fathoms. Temp. 37°·7 F. Globigerina ooze. Two young specimens, one without arms.

Remarks.—These four specimens, as already indicated, were really the first discovered examples of *R. rawsoni*; but they differ from *R. lofotensis* far less than the Caribbean individuals do.* Those from Station 42 were noticed by Sir Wyville at the time they were obtained, and described as unusually large examples of *R. lofotensis*. But I am not aware that he ever made a closer examination of them. After reading Pourtales' description of the Caribbean *R. rawsoni*, I came to the conclusion that the "Porcupine" specimens should really be referred to this type; and this view was confirmed when the originals of Pourtales' description were sent to me last year (1882), as I have pointed out in my "Blake" report.

The two young individuals from Station 43 seem to have been altogether overlooked; for they are not mentioned either in the Royal Society's Report, *The Depths of the Sea*, or the paper on "Porcupine" Crinoids. They did not come into my hands until August last, having been discovered by Mr Murray among Sir Wyville's collections at the University. They are the youngest specimens of this type which I have seen. Each has 28 joints in the stem, from the calyx to the root; but its length, which is only 20 mm. in the smaller, is 24·5 mm. in the larger individual. The majority of the joints are cylindrical and elongated, only a very few at the base of the stem showing the characteristic dice-box shape with expanded ends. The length of the calyx is almost the same in both specimens, 1·8 mm.; though its diameter across the

* "The Stalked Crinoids of the Caribbean Sea," *Bull. Mus. Comp. Zool.*, vol. x. No. 4, pp. 174, 175.

radials is greater in that which has the longer stem. It is mainly composed of the basals, which are 1.2 mm. in height, and form a nearly cylindrical tube, at the top of which are the short radials, having a more decided upward and outward slope. This causes the calyx to appear slightly constricted at the level of the basiradial suture, a feature which is very marked in some varieties of the adult form.

As compared with equal sized specimens of *R. lofotensis*, these young individuals of *R. rawsoni* are distinguished by the relatively great height of the calyx in proportion to its width, the length of the basals, and the expansion of the calyx at the basiradial suture. The basals of *R. lofotensis* (uppermost stem-joint, Sars.) have a smaller share in the formation of the cup, and it expands uniformly upwards from the stem to the upper margin of the radials.

It is noteworthy that even these two young individuals from the same locality present differences in the shape of the calyx such as are more distinct in adult specimens from different localities in the East and West Atlantic. Perrier's genus *Democrinus** is founded upon a variety of unusual size, with a great disproportion in the heights of basals and radials, and a somewhat strongly marked circular furrow at the level of the highest points of the basals, so that it crosses the middle of the radials.

Genus *Bathyerinus*, Wy. Th., 1872.

Ilycrinus, Danielssen & Koren, 1877.

4. *Bathyerinus gracilis*, Wy. Th., 1872.

H.M.S. "Porcupine," 1869. Station 37. Lat. 47° 38' N., long. 12° 8' W. 2435 fathoms. Temp. 36°·5 F. Globigerina ooze.

One nearly complete specimen, and one stem with the basal ring attached, but wanting the rest of the calyx.

Remarks.—A figure of this species was given by Sir Wyville Thomson on page 453 of *The Depths of the Sea*, together with the same description which he published in his paper on the

* Sur un nouveau Crinoïde fixé, le *Democrinus Parfaite*, provenant des dragages du "Travailleur," *Comptes Rendus*, Tome xcvi. No. 7, pp. 450, 451. See also "Note on *Democrinus Parfaite*," *Ann. & Mag. Nat. Hist.*, May 1883, p. 335. I am indebted to Professor Perrier's kindness for a drawing of this interesting type.

“Porcupine” Crinoids. This, however, is not quite accurate, for there is no mention of any calyx-plates below the radials, the lower portion of the head being said to consist “of a gradually expanding funnel-shaped piece, which seems to be composed of coalesced upper stem-joints.” Subsequently, however, Sir Wyville found that in *B. aldrichianus*, from the Southern Sea, there is “a series of basals which are soldered together into a small ring, scarcely to be distinguished from the upper stem-joint.”* The existence of basals in *Ilycrinus* (*Bathycrinus*) *carpenteri* was also recognised by Daniels- sen & Koren,† who were fortunately able to see the interbasal sutures in young individuals, though they entirely disappear in the adult; and there is a similar basal ring in *B. gracilis*, intervening between the radials and the numerous thin joints at the top of the stem.

The two outer radials and the two lowest brachials of *B. gracilis*, and also of *B. aldrichianus*, were described by Sir Wyville as respectively united by syzygy, while Danielssen and Koren made the same statement respecting *B. carpenteri*. In all these cases, however, the supposed syzygy is really a modification of the ordinary bifascial articulation permitting lateral movement only, which is so common in the *Comatulæ*, and is also characteristic of four species of *Pentacrinus*; for a third and smaller bundle of fibres is inserted into a deep pit at the lower or dorsal end of the vertical articular ridge on each joint-face. Externally, this form of articulation looks very much like a syzygy, as the joints are brought into closer connection than when they are united by a pair of muscular bundles. But a glance at their terminal faces is sufficient to show that the plainness of *Pentacrinus* or *Rhizocrinus*, or the striation of the *Comatula*-syzygies is altogether absent, and that they are marked by distinct ridges and fossæ.

According to Sir Wyville’s description, there are none of these so-called “syzygies” in the arms of *B. gracilis* beyond that between the first two joints; while in *B. aldrichianus* there is a syzygy between the fourth and fifth brachials, and at irregular intervals beyond them; but the “alternate syzygies in the arms, which form

* “Notice of new living Crinoids belonging to the Apiocrinidæ,” *Journ. Linn. Soc. Zool.*, vol. xiii. p. 50.

† *Nyt. Mag. for Naturvidskaberne*, Bind. 23, p. 4.

so remarkable a character in *Rhizoerinus*, are absent." I find, however, that in both species the grouping of the arm-joints is exactly the same as was observed in *B. carpenteri* by Danielssen and Koren, if the term "trifascial articulation" be substituted for "syzygy" in their descriptions. In the nine lowest brachials there are alternations of a pair of joints united trifascially, and a single joint with muscular attachments at each end; while beyond the ninth brachial the two forms of articulation alternate with great regularity. The presence of this trifascial articulation, and its peculiar distribution may therefore be considered as characteristic of *Bathycrinus*; and the "alternate syzygies" in the arms, which are supposed to be absent in this genus, are really present in a modified form. Neither do the arms "resemble in character the pinnules of *Rhizoerinus*," or "show no trace of pinnules" in *B. gracilis*. For one or two of them have little stumps on their terminal joints, which give them the appearance of bifurcation, just as at the growing points of the arms of young *Comatulidæ* and *Pentacrinidæ*; and I see no reason to doubt that these stumps are the commencing pinnules.

Family COMATULIDÆ.

Genus *Antedon*, Frém.

5. *Antedon rosacea*, Linck. sp.

"Frequent in water of moderate depth."* One individual which seems to belong to this species, though certainly representing a rather strongly marked variety, was obtained somewhere in the North Atlantic, but the exact record of its locality has unfortunately been lost.

Among the numbers of *Ant. phalangium* of various ages which were dredged in 1870, at 30 to 120 fathoms, on the Skerki Bank, and at 50 to 120 fathoms, in the Bay of Benzert, on the Tunis coast, were five young specimens certainly not belonging to this type, and probably, therefore, to be referred to the Mediterranean variety of *Ant. rosacea*. It is impossible to state now the exact depth from which they were collected, but it was probably not below 50 fathoms, as *Ant. rosacea* has not yet been found in the

* *Proc. Roy. Soc. Edin.*, vol. vii, p. 765.

Mediterranean at a greater depth than 37 fathoms. I am still in doubt whether some of the very varied forms usually referred to this type should not be distinguished by the name *Ant. milleri*, as was done by Müller, and more especially by Sir Wyville Thomson. But I would postpone giving a decided opinion until I have been able to add considerably to my already large series of specimens from widely-separated localities.

6. *Antedon phalangium*, Müll. sp.

Comatula woodwardii, Barrett.

Comatula celtica, Barrett.

Antedon celticus, Wyv. Th. &c.

Non *Antedon celtica* of von Marenzeller, and Sladen.

H.M.S. "Lightning," 1868. Station 13. Lat. 59° 5' N., long. 7° 29' W. 189 fathoms. Warm area.

H.M.S. "Porcupine," 1869. The Minch, 60 to 80 fathoms. Several specimens. Off Loch Scavaig, Skye.

1870. Station 13. Lat. 40° 16' N., long. 9° 37' W. 220 fathoms. Temp. 52° F. Several specimens.

Off Cape Sagres, 45 fathoms. Several specimens.

Off Carthage, 80 fathoms. Several specimens.

Bay of Benzert, 50 to 100 fathoms. Abundant.

Skerki Bank, 30 to 120 fathoms. Abundant.

Remarks.—It has been noted elsewhere* that Barrett's *Ant. celtica* from Skye is really identical with the *Ant. phalangium* of Müller, which was considered until lately as one of the rarities of the Mediterranean, for it inhabits somewhat deeper water than *Ant. rosacea*. Sir Wyville Thomson noted it as occurring "in local patches to 150 fathoms off the north coast of Scotland;" but I have no record of it besides Stat. xiii. of the "Lightning" expedition, and neither the "Knight Errant" nor the "Triton" ever met with it.

The occurrence of this species off the Spanish and Portuguese coasts is of some interest; for it had not previously been recorded between the Mediterranean and the Minch. Curiously enough, it seems (until this year) never to have been obtained in any of the

* "Note on the European *Comatule*," *Zool. Anzeiger*, Jahrg. iv. p. 520.

numerous dredgings, both public and private, off the French and British coasts between the parallels of 40° and 57°. One would certainly have expected its appearance during the first cruise of the "Porcupine" in the neighbourhood of the 100-fathom line on the west of Ireland; but no traces of it were met with. It was very abundant off the Tunis coast, both on the Skerki Bank and in the Bay of Benzert, specimens of all ages coming up on the tangles in great numbers, though unfortunately in a very much mutilated condition. These were noticed by Sir Wyville Thomson in the following passage: *—"Many examples of the form known to Continental naturalists under the name of *A. mediterraneus*, Lam. sp., were dredged in the Mediterranean off the coast of Africa. I do not feel satisfied that this is identical with *Antedon rosacea* of the coast of Britain, though the two specific names are usually regarded as synonyms. There is a great difference between them in habit, a difference which it is difficult to define." It is curious that the extreme length of the dorsal cirri of these individuals did not lead Sir Wyville to identify them with *Ant. phalangium (celtica*, Barrett), of which this is one of the special marks, as he himself points out. But I am strongly inclined to believe that he is right in differentiating the common Mediterranean type from the British *Ant. rosacea*. As pointed out above, however, the "Porcupine" only got a very few young specimens of it on the African coast.

It is singular that while no parasitic *Myzostoma* occurred among the numbers of *Ant. phalangium* dredged on the Tunis coast, some of the individuals obtained in the Minch in 1869, and at Station 13 in 1870 (off Mondego) proved to be the hosts of a new species, *M. alatum*, which is briefly described by Professor von Graff further on. A single example of another new species, *M. pulvinar*, was also found attached to the peristome of one of the Minch specimens of *Ant. phalangium*, which does not appear to serve as host to the same species of *Myzostoma* as occur on *Ant. rosacea*.

7. *Antedon dentata*, Say, sp.

Antedon Sarsii, auct.

H.M.S. "Porcupine," 1869. Station 51. Lat. 60° 6' N. long., 8° 14' W. 440 fathoms. Temp. 42° F. One specimen.

* *Proc. Roy. Soc. Edin.*, vol. vii. p. 765.

Station 54. Lat. 59° 56' N., long. 6° 27' W. 363 fathoms.
Temp. 31°·4 F. One specimen.

Station 55. Lat. 60° 4' N., long. 6° 19' W. 605 fathoms.
Temp. 29°·8 F. Two specimens.

Station 74. Lat. 60° 39' N., long. 3° 9' W. 203 fathoms.
Temp. 47°·6 F. Three specimens.

1870. Station 17*a*. Lat. 39° 39' N., long. 9° 39' W. 740 fathoms. Temp. 49°·3 F. One specimen.

Remarks.—This species occurs in profusion at moderate depths off the New England coast, over 10,000 individuals having been obtained by the "Fish Hawk" at a single haul. It is also abundant at moderate depths off New Jersey, near the locality (Great Egg Harbour, N.J.) whence Say's original specimens were obtained; and it agrees so well with his description of *Ant. dentata*, that the identity of the two can hardly be doubted.* The adoption of his specific name thus becomes inevitable, however undesirable this may seem to European naturalists, who have been so long accustomed to associate the type with the name of a deservedly honoured Norwegian zoologist.

Sir Wyville Thomson gave no definite list of stations for this species, though he mentioned the occurrence of more or less complete specimens or fragments in nearly every one of the deep hauls of the dredge from the Faeroe Islands to Gibraltar. So far as I am aware, its southernmost limit in the East Atlantic, and also its lowest bathymetrical range are at present united in Station 17*a* of the "Porcupine," 1870; 740 fathoms. It was obtained at 605 fathoms in the "cold area" in the previous year; but the U.S. Fish Commission have not dredged it below 238 fathoms off the New England coast.

Sir Wyville Thomson stated that one or two small examples of the pentacrinoid were procured in the Faeroe channel. Only one, however, has come into my hands. It is a trifle more advanced than that represented by Sars in figs. 9 and 11 on Tab. V. of his classical *Mémoires*. The arms are longer, with the first pinnule on about the twelfth joint. There is, however, but one cirrus, which seems to be the only one as yet developed, though it is of considerable size, reaching up to the level of the radial axillaries.

* See Verrill, *Am. Journ. Sci.*, vol. xxiii. p. 222.

The stem is attached by a slight calcareous expansion at about its 35th joint to one of the rays of a *Rhabdammina abyssorum*; and it then passes on to form two other spreading attachments, with radicular branches sprouting from them on what appears to be a portion of a tubular hydroid.

8. *Antedon eschrichti*, Müll. sp.

H.M.S. "Porcupine," 1869. Station 57. Lat. 60° 14' N., long. 6° 17' W. 632 fathoms. Temp. 30°·5 F.

Sir Wyville Thomson stated that considerable numbers of this species were obtained in many of the cold area hauls; and he noted their small size as compared with more northern specimens. No. 57, however, is the only station of which any record has been preserved; and it is interesting as being by far the greatest depth at which this species has yet been met with. Its usual parasite *Myzostoma gigas*, Lütken, MS., was also obtained at this station.

Two pentacrinoids besides that of *Ant. dentata* were dredged in the cold area; but I do not think that either of them can be the one referred to by Sir Wyville Thomson in the following passage:—"A single example of a pentacrinoid in an early stage was found associated with *Ant. eschrichtii*. It resembled closely the larva of *Ant. sarsii* but the specimen was not sufficiently perfect for a critical examination." Neither of the larvæ which I am about to describe is at all like that of *Ant. dentata*, and I fear, therefore, that the one mentioned by Sir Wyville Thomson has somehow been mislaid.

No. 1. In this larva there is no trace of cirri, the anal plate separates two of the radials, and the arms are just beginning to sprout from the radial axillaries. There are five discoidal joints at the top of the broken stem, which is much more robust than that of the corresponding stage of *Ant. rosacea*; while the head, which exceeds 1 mm. in length, is nearly twice as big as that of the *rosacea* larva. The orals which rest directly on the radials recall those of *Hyocrinus*, having a deep median groove, only more marked than in that type, with the lateral edges folded over somewhat strongly. This interesting larva, may perhaps belong to *Ant. phalangium*, but I rather doubt such being the case. For that species is almost the nearest ally of *Ant. rosacea*; and from what I

have seen of the condition of the youngest unattached individuals, I should judge that the larva was not very different from that of *Ant. rosacea*.

I think it much more probable, judging from the robust nature of this larva, that it belongs either to one of the Arctic species, *Ant. eschrichti*, or *Ant. quadrata*, sp. n., or to *Ant. hystrix*, sp. n., which is as yet only known from the cold area. It is very likely only a younger stage of the larva next to be described.

No. 2. The stem, which is broken some 20 mm. from the calyx, forms an attachment to a hydroid tube at about its 30th joint, and is continued downwards half a dozen joints further. There are five discoidal joints below the rudimentary centrodorsal, which bears the sockets of five short cirri. Only one of them remains, however, reaching up to the top of the basals, which make up about half the height of the cup. The second radials and axillaries are well developed, as are also the arms, which are unfortunately broken at about the tenth joint. But even under these circumstances the head has a length of 4 mm. A slightly bifid plate, having a somewhat worn appearance, stands up in one of the interradii of the disc. It may be one of the orals, or as I am more inclined to think, the anal plate; for I cannot make out anything corresponding to it in the other interradii, which are, however, but imperfectly visible. A striking feature of this very robust larva, and one in which it resembles *Ant. dentata* rather than *Ant. rosacea*, is the large development of the arms before the appearance of the cirri. The radials and brachials are much larger than those of a recently detached individual of *Ant. rosacea*. This is also the case in a "Challenger" pentacrinoid from Ascension, which has a robust appearance like the one under consideration. The latter must certainly belong to one of the three *Antedon* species already mentioned as occurring in the cold area, though further identification is impossible.

9. *Antedon hystrix*, P. H. Carpenter, 1883.

$$\text{Formula, } * A. 10. \frac{c}{bc}.$$

Centrodorsal hemispherical, and thickly covered with numerous

* For an explanation of the signs used in these formulæ, see F. J. Bell, *Proc. Zool. Soc.*, 1882, pp. 530-535; and P. H. Carpenter, *ibid.*, pp. 731-747.

long-jointed cirri, which vary considerably in appearance. One of the largest reaches 36 mm., and consists of forty smooth joints, of which all but the basal and terminal ones are longer than broad, the fifth to the tenth being especially so. The cirri attached round the upper edge of the centrodorsal are all of this smooth type, and may be observed in every stage of growth. But those attached nearer the dorsal pole are somewhat different in appearance. They are more slender, and their component joints are relatively shorter than in the other type; while the joints have slightly expanded distal ends, so as to overlap their successors. This is especially marked on the dorsal side, which is produced into a sharp forward projecting spine. I have reason to believe that these characters gradually disappear as the joints increase in age, and that the mature cirri of the two types are not very different in appearance, especially about what might be called the equator of the centrodorsal. But the smooth young cirri all round its edge are totally different from the spiny ones nearer the dorsal pole.

Traces of the first radials may be seen at the angles of the calyx; but there is no constancy about their appearance even in individual specimens. The second radials are short, even at the sides, and are often not visible at all in the middle line of the ray, owing to their being very deeply incised to receive the strong backward projections of the axillaries. These are quadrate in form, with their sides curved, especially the anterior pair; and they are distinctly longer than wide, sometimes almost seeming to overlap the centrodorsal; but much less than half the length is in front of the line joining their lateral angles. The first brachials have long outer sides and very short inner ones, but (like the second radials) are almost invisible in the middle line of the arm, owing to the very strong backward projections of the irregularly triangular second brachials, which nearly reach the axillaries. Both on these joints and on the rudely oblong third brachials, which are much wider than long, the pinnule-socket is placed much nearer the dorsal surface than usual. The next following joints are short and quadrate, with curved proximal and distal edges; and the pinnule is on the shorter side, the longer being marked by a backward projection.

There are syzygies in the 3rd and 8th brachials, and then at intervals of three or four joints throughout the rest of the arm. The

lower brachials are triangular and slightly wider than long; but they slowly become quadrate and finally slightly elongated towards the arm-ends.

The first pair of pinnules (on 2 and 3 br.) are much longer and stouter than the next pair. They reach nearly 15 mm., and consist of some thirty smooth joints, the first six of which are short and nearly square. The second pair have but eighteen or twenty slender joints, and are only about 6 mm. long. The following pinnules increase gradually, both in length and stoutness, reaching 15 mm. in the outer parts of the arms. The two basal joints become slightly flattened and the succeeding ones elongated. They have a somewhat glassy aspect, especially in the later pinnules, while their ends present the usual dead white appearance. The same difference presents itself in the joints of the younger and more spiny cirri round the dorsal pole, and also in the pinnules and cirri of *Ant. dentata*. It recalls the contrast between the hyaline and porcellanous types of Foraminifera, though due to entirely different causes. The ovaries are long and fusiform, extending over the greater part of the length of the lower pinnules; and the disc is naked, or rather closely covered with irregular polygonal plates.

Diameter of centrodorsal 5 mm.; spread about 170 mm.

H.M.S. "Porcupine," 1869. Cold area? Two specimens, bearing seven individuals of *Myzostoma cirriferum*, F. S. Leuckart.

Remarks.—The foregoing description is based upon the characters presented by three examples of the type, two obtained by the "Porcupine" and one by the "Triton." They all agree very closely in their general features, and especially in the curious dimorphism of the cirri, which recalls that already noticed in *Eudiocrinus varians*.* The shape of the axillaries and of the second brachials is very striking, the great length of the former being much more marked than in *Ant. eschrichti*. It is the characters of the radials and three lowest brachials which principally distinguish *Ant. hystrix* from *Ant. prolifica*, Sladen.† Both species are remarkable for the small size of the second, as compared with the

* *Journ. Linn. Soc. Zool.*, vol. xvi. pp. 496, 497.

† Duncan and Sladen, *A Memoir on the Echinodermata of the Arctic Sea to the West of Greenland*, p. 77, pl. vi. figs. 7-10.

first pair of pinnules; and this peculiarity distinguishes them from *Ant. phalangium*.

None of the cirri of *Ant. hystrix* reach the size of those borne by the smaller examples of *Ant. proluxa*. Many of these have a short dorsal spine on the distal edge which projects forwards over the base of the next joint, just as in the more centrally placed cirri of *Ant. hystrix*.

Ant. eschrichti is described in the "Porcupine" reports as abundant in the cold area. The only record which I have of its occurrence, however, is Station 57 (1869), 632 fathoms. But whether *Ant. hystrix* occurred here or not, we may assume with tolerable certainty that it is a "cold area" species; for the "Triton" specimen was obtained at a station where the temperature was below 0° C.

10. *Antedon lusitanica*, P. H. Carpenter, 1883.

Formula, A. 10. (2). $\frac{a}{c}$.

Centrodorsal hemispherical, roughened at the dorsal pole, and bearing about a dozen slender cirri which reach nearly 30 mm. in length. They have about fifty joints, of which the first three or four are quite short, the next three much longer, and the following ones longer than wide, but gradually diminishing up to the fifteenth or twentieth joint. From this point (or earlier) to the end of the cirrus the joints have a well-marked dorsal spine, which is slightly less distinct in those just preceding the terminal claw. Ten arms, or (rarely) two distichals not united by syzygy. First radials scarcely visible except sometimes at the angles of the calyx. The second short and trapezoidal, with a strong median ridge, which is continued on to the axillaries. These are just pentagonal with slight backward projections into the second radials, and their sides are much flattened. This is still more marked on the outer sides of the first brachials, which are longer than their inner sides. The second brachials project more or less backwards into the first, and the third is a syzygial joint, the next three squarish, and the following ones more elongated with very oblique ends. The second brachials bear moderately long pinnules of about fifteen broad joints. The lowest have very prominent dorsal keels which are

continued, though less marked, on to the later joints. The next following pinnules are altogether smaller, consisting of but a few slender joints.

Disc 5 mm. in diameter, thickly covered with numerous small plates, those at the sides of the ambulacra being rather more regularly arranged than the rest.

Colour, in spirit, brownish-white or greenish-white.

H.M.S. "Porcupine," 1870. Station 17a. Lat. 39° 39' N., long. 9° 39' W. 740 fathoms. Temp. 49°·3 F.

Ten mutilated specimens.

Remarks.—Nearly all the individuals obtained had the arms broken at the syzygy in the third joint beyond the radial axillaries; and it is therefore quite possible that the epizygal of this joint might sometimes have been a distichal axillary. In one example, at any rate, there are two distichal series, each consisting of two joints, the second of which is axillary. This species, therefore, seems to be dimorphic like *Actinometra pulchella*, and to constitute another exception to the general rule that ten-armed types are sharply distinguished from those in which the primary arms divide. The length and spiny character of its cirri, and the peculiarities of its pinnules, readily distinguish it from all the species of *Antedon* hitherto described. But it has many points of resemblance to some of those dredged by the "Blake" in the Caribbean Sea. It is a type of some interest for two reasons: it is the only European *Comatula* which is in the condition of the so called recent Cystid, *Hyponome sarsii*, i.e., with a plated disc and the ambulacra converted into tunnels by the folding down of the plates at their sides; and it is the only European *Antedon* with more than ten arms.

11. *Actinometra pulchella*, Pourtalès, sp.

Antedon pulchella, Pourtalès, 1878.

Actinometra pulchella, P. H. Carpenter, 1881.

H.M.S. "Porcupine," 1870. Station 31. Lat. 35° 56' N., long. 7° 6' W. 477 fathoms. Temp. 50°·5 F. Clay.

One mutilated specimen.

Remarks.—I cannot distinguish this form from the smoother variety of that singularly protean species, *Act. pulchella*, of the

Caribbean Sea. It was dredged by the "Blake" at a very large number of stations; but the depth was nowhere over 300 fathoms, and rarely exceeded 200 fathoms; so that its discovery in the "Porcupine" collection increases both its bathymetrical and its geographical range. Except the two species of *Rhizocrinus*, it is the only Crinoid common to the European and Caribbean seas; while it is the only European species of *Actinometra*. This is an essentially tropical genus, a few species only ranging to the parallels of 35°, such as those at the Cape of Good Hope, Yeddo, and this Gibraltar specimen. The depth too, 477 fathoms, is much greater than that at which the genus usually occurs; so that this "Porcupine" specimen which, like *Rhizocrinus rawsoni*, was obtained in European seas long before its discovery on the other side of the Atlantic, is of interest in every way.

The "Porcupine's" discovery of *Actinometra pulchella* in the East Atlantic has been recently confirmed and extended by the dredgings of the telegraph-ship "Dacia," a few dismembered individuals having been obtained in lat. 34° 57' N., long. 11° 57' W., at a depth of 533 fathoms.

All the primary arms divide except one; but the number 20 is kept up by the fact that a palmar axillary is present on one of the secondary arms, a point which I do not remember to have met with in any of the "Blake" specimens. This involves a slight addition to the second of the two formulæ which I have given for this dimorphic type,* so that they become

$$a. 10. \frac{a}{b}; \text{ and } a. 2. (2). \frac{b}{2}, \frac{a}{b}.$$

In the following list of stations at which Crinoids were dredged by the "Lightning" and "Porcupine," the forms which are now noticed for the first time are distinguished by an *.

Station List of Crinoids and Myzostomida, 1868-70.

H.M.S. "Lightning." 1868.

Station 12. Lat. 59° 36' N., long. 7° 20' W. 530 fathoms.
Temp. 47° 3 F. Globigerina coze.

Rhizocrinus lofotensis.

* *Proc. Zool. Soc.*, 1882, p. 745.

Station 13. Lat. 59° 5' N., long. 7° 27' W. 189 fathoms.
Temp. 49°·3 F.

Antedon phalangiun.

Station 16. Lat. 61° 2' N., long. 12° 4' W. 650 fathoms.
Globigerina ooze.

Rhizocrinus lofotensis.

H.M.S. "Porcupine." 1869.

Station 37. Lat. 47° 38' N., long. 12° 8' W. 2435 fathoms.
Temp. 36°·5 F. Globigerina ooze.

Bathycrinus gracilis.

Station 42. Lat. 49° 12' N., long. 12° 52' W. 862 fathoms.
Temp. 39°·7' F. Ooze, with sand and shells.

* *Rhizocrinus rawsoni.*

Station 43. Lat. 50° 1' N., long. 12° 26' W. 1207 fathoms.
Temp. 37°·7 F. Globigerina ooze.

* *Rhizocrinus rawsoni.*

The Minch, 60 to 80 fathoms; and off Loch Scavaig, Skye.

{ *Antedon phalangiun.*
Myzostoma alatum.
M. pulvinar.

Station 51. Lat. 60° 6' N., long. 8° 14' W. 440 fathoms.
Temp. 42° F.

Antedon dentata.

Station 54. Lat. 59° 56' N., long. 6° 27' W. 363 fathoms.
Temp. 31°·4 F.

Antedon dentata.

Station 55. Lat. 60° 4' N., long. 6° 19' W. 605 fathoms.
Temp. 29°·8 F.

Antedon dentata.

Station 57. Lat. 60° 14' N., long. 6° 17' W. 632 fathoms.
30°·5 F.

{ *Antedon eschrichti.*
Myzostoma gigas.

Station 74. Lat. 60° 39' N., long. 3° 9' W. 203 fathoms.
Temp. 47°·6 F.

Antedon dentata.

Stations unknown.

Antedon rosacea, var.
 { *Antedon hystrix*.
 { *Myzostoma cirriferum*.

H.M.S. "Porcupine." 1870.

Station 13. Lat. 40° 16' N., long. 9° 37' W. 220 fathoms.
 Temp. 52° F.

* { *Antedon phalangium*.
 { *Myzostoma alatum*.

Station 17. Lat. 39° 42' N., long. 9° 43' W. 1095 fathoms.
 Temp. 39°·7 F. Ooze.

Pentacrinus wyville-thomsoni.

Station 17a. Lat. 39° 39' N., long. 9° 39' W. 740 fathoms.
 Temp. 49°·3 F.

Antedon dentata.
 **Antedon lusitanica*.

Station 31. Lat. 35° 56' N., long. 7° 6' W. 477 fathoms.
 Temp. 50°·5 F. Clay.

**Actinometra pulchella*.

Off Cape Sagres. 45 fathoms.

**Antedon phalangium*.

Off Cartagena. 80 fathoms.

**Antedon phalangium*.

Bay of Benzert. 50 to 100 fathoms.

Antedon phalangium.

**Antedon rosacea* (young).

Skerki Bank. 30 to 120 fathoms.

Antedon phalangium.

**Antedon rosacea* (young).

II. *The Crinoids obtained by H.M.S.S. "Knight Errant" and
 "Triton," 1880-82.*

1. *Rhizocrinus lofotensis*, M. Sars.

H.M.S. "Knight Errant," 1880. Station 5. Lat. 59° 26' N.,

long. $7^{\circ} 19' W.$ 515 fathoms. Temp. $45.4^{\circ} F.$ Mud. Two young specimens without arms.

Station 6. Lat. $59^{\circ} 37' N.$, long. $7^{\circ} 19' W.$ 530 fathoms. Temp. $46.5^{\circ} F.$ Grey mud. A fragment only.

2. *Antedon rosacea*, Linck, sp.

H.M.S. "Knight Errant," 1880. In 53 fathoms on the plateau N.N.W. of North Rona. Lat. $59^{\circ} 12' N.$, long. $5^{\circ} 57' W.$ Rough ground.

One mutilated individual was obtained here. It closely resembles the "Porcupine" variety from an unknown locality, both of them having the first brachials shorter than usual and a better developed backward projection of the second brachials. The "Porcupine" specimen, which is the better preserved, has a somewhat more robust appearance than is generally presented by this species, and looks altogether as if its habitat were in the cold area.

3. *Antedon petasus*, Dub. and Kor., sp.

A single but tolerably perfect example of this well-known Scandinavian type was obtained by the "Triton" at a depth of 87 fathoms on the Faeroe Banks (Dredging Station No. 3. Lat. $60^{\circ} 39' 30'' W.$, long. $9^{\circ} 6' W.$ Sand and shells. Temp. $49^{\circ} F.$). It was officiating as host to no less than eighteen individuals of *Myzostoma cirri-ferum*, F. S. Leuckart.

4. *Antedon dentata*, Say, sp.

H.M.S. "Triton," 1882. Station 2. Lat. $59^{\circ} 37' 30'' N.$, long. $6^{\circ} 49' W.$ 530 fathoms. Temp. $46.2^{\circ} F.$ Mud. Five mutilated specimens, the disc varying in diameter from 2.5 to 4 mm.

Station 5. Lat. $60^{\circ} 11' 45'' N.$, and $60^{\circ} 20' 15'' N.$, long. $8^{\circ} 15' W.$ and $8^{\circ} 8' W.$ 433-285 fathoms. Hard ground; stones. Temp. 43.5 to $40.8^{\circ} F.$

The calices and arm-bases of two individuals were obtained here. The larger one, with a disc 6.5 mm. in diameter, does not reach the size of some of the specimens dredged by the "Blake" off the coast of New England.

Attached to the disc of each was an example of von Graff's new

species *Myzostoma carpenteri*. That on the smaller individual was the larger of the two (2.3 mm.), almost rivalling its host in diameter.

Even the smallest of these seven individuals has fully developed ovaries; but it is only in the largest that the cirri exceed 10 mm. in length, and are composed of more than twenty joints.

This species was taken by the "Porcupine" both in the warm and in the cold areas.

5. *Antedon eschrichti*, Müll. sp.

H.M.S. "Triton," 1882. Station 4. Lat. 60° 22' 40" N. and 60° 31' 15" N., long. 8° 21' W. and 8° 14' W. 327 to 430 fathoms. Temp. 31°·5 to 30° F. Stones; mud.

A small but singularly interesting example of this well-known Arctic type. The cirri are small and comparatively delicate, not exceeding 20 mm. in length; and the arm-bases are but slightly tubercular. All the arms have been broken either at the second (8th) or third syzygy (12th or 13th brachial).

One can therefore study the appearance presented by the new arm-joints in various stages of growth. The lowest and therefore oldest of these new joints are most like those of the corresponding part of the arm in the adult, *i.e.*, triangular or very slightly quadrate, but relatively long in proportion to their width. These characters, however, do not disappear as they do in the adult, where the joints gradually become shorter and shorter, with a markedly triangular outline. But throughout the remainder of the restored arms the joints are quadrate and relatively long; while the two lowest pinnule-joints show but few traces of the flattening and peculiarities of outline which are so characteristic of the adult. It is just in these characters (besides the smaller size of the third pair of pinnules) that *Antedon quadrata* (No. 7) differs from *Ant. eschrichti*; and it is therefore to be regarded as a permanently immature form of the latter species.

6. *Antedon hystrix*, sp. n.

H.M.S. "Triton," 1882. Station 4. Lat. 60° 22' 40" N. and 60° 31' 15" N., long. 8° 21' W. and 8° 14' W. 327 to 430 fathoms. Temp. 31°·5 to 30° F. Stones; mud.

The single individual obtained here has been already described together with those previously dredged by the "Porcupine" (*ante*, p. 365).

7. *Antedon quadrata*, P. H. Carpenter, 1883.

$$\text{Formula, } A. 10. \frac{c}{b}.$$

1877. *Antedon celticus*, von Marenzeller, *Wiener Denkschr.*, Bd. xxxv. p. 24 (separate copy).

1881. *Antedon celtica*, Sladen, *Mem. Arct. Echinod.*, p. 75.

1881. *Antedon celtica*, P. H. Carpenter, *Zool. Anzeig.*, Jahrg. iv. p. 520.

Non *Antedon celticus* of Barrett, Norman, Wyv. Thomson, &c.

Special Marks.—The lower arm-joints (after the twelfth) as long or slightly longer than wide and slightly quadrate in outline, though sometimes triangular. Those in the middle of the arm are distinctly quadrate, the length bearing a large proportion to the breadth; and the later ones are somewhat elongated. But none of the joints are shaped like an isosceles triangle, and much shorter than wide.

The third pair of pinnules (on 6 and 7 br.) are little more than half as long as the second pair; and the basal joints of the lower pinnules have their dorsal edges more or less produced into sharp flattened processes.

H.M.S. "Triton," 1882. Station 4. Lat. 60° 22' 40" N. and 60° 31' 15" N., long. 8° 21' W. and 8° 14' W. 327 to 430 fathoms. Stones; mud. Temp. 31°·5 to 30°. One good specimen.

Station 6. Lat. 60° 9' N., long. 7° 16' 30" W. 466 fathoms. Stones. Temp. 29°·5 F. Two mutilated individuals and one fragment.

Remarks.—This species has caused me no little trouble. The first example of it known to science was dredged in 1872 by the ill-fated "Tegetthof" 5° west of Nova Zembla. It was minutely described by von Marenzeller* five years afterwards and referred to

* "Die Coelenteraten, Echinodermen, und Würmer der k. k. österreichisch-ungarischen Nordpol-expedition," *Denksch. d. Wien. Akad.*, Bd. xxxv. p. 25 (of separate copy).

Antedon celticus, Barrett sp., of which only a very poor description had ever been published. In the meantime I had met with a specimen off Disco, when in the "Valorous" with Dr Gwyn Jeffreys (1875), and I recognised it at once as distinct from an *Ant. eschrichti* obtained during the same cruise. Three other examples were dredged by Fielden in the "Alert" a few months later, two at Discovery Bay (lat. 81° 41' N.), and one at Franklin Pierce Bay (lat. 79° 25' N.); and when the "Challenger" *Comatulæ* came into my hands I found the same type among a quantity of individuals of *Ant. eschrichti*, from a dredging in 51 fathoms a little to the south of Halifax. I have little doubt that it was also obtained by the "Vega." The "Willem Barents" met with it in 1880 near the locality of the Tegetthof dredging. Fielden's specimens were well and carefully described by Sladen,* who identified them with that dredged by the "Tegetthof," so far as he could judge from von Marenzeller's description of the latter. Thanks to the kindness of Dr von Marenzeller, I have been enabled to examine his type for myself, and I am satisfied that Sladen was right in identifying it with those dredged by the "Alert." After writing his description of them Sladen saw for the first time some examples of *Ant. celtica*, Barrett sp., and recognising that these were totally different from the Arctic specimens, he inserted a note to that effect, but did not rename the latter.

Barrett's type now turns out to be the long but little known *Antedon phalangium* of the Mediterranean; and the specific designation *celtica* being therefore unoccupied, I thought at first that it might conveniently be retained for the type described under this name by von Marenzeller and Sladen respectively.† This, however, has seemed undesirable for many reasons; and in compliance with the wishes of both the above named naturalists, I propose to give it a new name altogether. I have, therefore, chosen one indicative of the character by which the species is most easily distinguished from *Ant. eschrichti*, viz., the markedly quadrate shape of the middle and outer arm-joints, as has been noted above among the "special marks" of *Ant. quadrata*.

* *A Memoir on the Echinodermata of the Arctic Sea to the West of Greenland*, London, 1881, p. 75, pl. vi. figs. 5, 6.

† "Note on the European *Comatulæ*," *Zool. Anzeiger*, Jahrg. iv. p. 520.

This type was doubtless met with by the "Porcupine" in 1869, somewhere or other in the cold area. But there were no examples of it in the remains of the collection of *Comatulæ* which have come into my hands. The "Triton" dredgings increase its bathymetrical range down to 466 fathoms, the "Valorous" Station in Davis Strait (410 fathoms), having been the deepest hitherto known. The three "Triton" specimens are all of them small, like those of the "Tegethof" and "Valorous"; while they have a stiffer and less feathery appearance than the larger ones obtained farther north by the "Alert" and "Willem Barents." In fact, they more nearly resemble the small individual figured by Sladen* in their general characters. The dorsal processes on the lower joints of the basal pinnules are less prominent than usual; while the peculiar characters of the first two pinnule-joints in the outer parts of the arms are by no means so marked as in larger individuals. This feature is one which is more or less visible in all the Arctic species, reaching its best development in *Ant. eschrichti*.

Station List of Crinoids and Myzostomida, 1880-82.

H.M.S. "Knight Errant." 1880.

Station 5. Lat. 59° 26' N., long. 7° 19' W. 515 fathoms.
Mud. Temp. 45°·4 F.

Rhizocrinus lofotensis.

Station 6. Lat. 59° 37' N., long. 7° 19' W. 530 fathoms.
Grey mud. Temp. 46°·5 F. (Fragment only.)

Rhizocrinus lofotensis.

Aug. 4. On the plateau N.N.W. of North Rona. Lat. 59° 12' N., long. 5° 57' W. Rough ground.

Antedon rosacea, var.

H.M.S. "Triton." 1882.

Station 2. Lat. 59° 37' 30" N., long. 6° 19' W. 530 fathoms.
Mud. Temp. 46°·2 F.

Antedon dentata.

Station 3. August 8, on the Faeroe Banks. Lat. 60° 39' 30" N.,
long. 9° 6' W. 87 fathoms. Sand and shells. Temp. 49° F.

{ *Antedon petasus.*

{ *Myzostoma cirriferum.*

Station 4. Lat. $60^{\circ} 22' 40''$ N. and $60^{\circ} 31' 15''$ N., long. $8^{\circ} 21'$ W. and $8^{\circ} 14'$ W. 327 to 430 fathoms. Stones; mud. Temp. $31^{\circ} 5'$ to 30° F.

Antedon quadrata.

Antedon eschrichti.

Antedon hystrix.

Station 5. Lat. $60^{\circ} 11' 25''$ N. and $60^{\circ} 20' 15''$ N., long. $8^{\circ} 15'$ W. and $8^{\circ} 8'$ W. 433 to 285 fathoms. Hard ground; stones. Temp. $43^{\circ} \cdot 5$ to $40^{\circ} \cdot 8$ F.

{ *Antedon dentata*.

{ *Myzostoma carpenteri*.

Station 6. Lat. $60^{\circ} 9'$ N., long. $7^{\circ} 26' 30''$ W. 466 fathoms. Stones. Temp. $29^{\circ} \cdot 5$ F.

Antedon quadrata.

III. On the *Myzostomida* of the "Porcupine" and "Triton"
Dredgings. By Prof. L. von Graff, Ph.D.

A. "Porcupine" Specimens.

1. *Myzostoma cirriferum*, F. S. Leuck.

Seven individuals were found on two examples of *Antedon hystrix*, P. H. Carpenter, probably from the cold area. This is a new host, the species having been hitherto met with only on *Ant. rosacca*. It has since been found on *Ant. petasus* as well.

2. *Myzostoma gigas*, Lütken, MS.

Hab. *Antedon eschrichti*. Station 57. Lat. $60^{\circ} 14'$ N., long. $6^{\circ} 17'$ W. 632 fathoms. Temp. $30^{\circ} \cdot 5$ F.

Two individuals were obtained, but in such a distorted condition that they cannot be accurately determined. As, however, the numerous *Myzostomida* infesting *Ant. eschrichti* at the most widely separated localities invariably belong to this species, those obtained by the "Porcupine" are probably of the same type. It will be fully described in the "Challenger" Report.

3. *Myzostoma alatum*, sp. n.

Hab. *Antedon phalangium*. The Minch. August 14, 1869.
60 to 80 fathoms.

Station 13, 1870. Lat. 40° 16' N., long. 9° 37' W. 220
fathoms. Temp. 52° F.

A species belonging to the type of *Myzostoma glabrum*. Dorsal surface arched and the ventral one hollowed, with a small muscular prominence in the centre. It is unprovided with cirri, and not transparent at the margin. Mouth ventral and cloacal papilla dorsal as in *M. glabrum*. Colour dirty yellow. Parapodia extremely short and reduced to annular folds, from the middle of which there project the brownish-black points of well-developed hooklets. These are closely grouped around the central muscular prominence; while the round suckers lie near the edge of the ventral surface.

A fully grown individual, 4 mm. in diameter, was so firmly attached to the disc of its host near the mouth that the hooklets remained in the perisome when it was removed. On its back was a young one measuring 1 mm. in its longer diameter. This differs from the adult in the presence of distinct papillæ on the dorsal surface, separated from one another by considerable intervals.

4. *Myzostoma pulvinar*, sp. n.

Hab. *Antedon phalangium*. The Minch. August 14, 1869.
60 to 80 fathoms.

This species has a very singular form. It is transversely oval, 3.2 mm. wide and 2.7 mm. long; and it is thicker than any other free-living species. The dorsal surface is flat, while the ventral one is raised like a cushion, with the parapodia projecting round its edge at equal distances apart, as wide and blunt processes, at the points of which powerful hooklets are protruded for some distance. There are no suckers; while the mouth and cloacal openings, usually situated on the same side as the parapodia, are placed on the dorsal surface. Both this and the ventral surface are of a strong yellow brown colour. The only specimen obtained was closely attached to the perisome of its host. No other *Myzostomida* but *M. pulvinar* and *M. alatum* are known to infest *Antedon phalangium*.

B. "Triton" specimens.

1. *Myzostoma cirriferum*, F. S. Leuckart.

Hab. *Antedon petasus*. Station 3. Lat. 60° 39' 30" N., long. 9° 6' W. 87 fathoms. Sand and shells. Temp. 49° F.

The single individual of *Ant. petasus* obtained at this station was harbouring no less than eighteen examples of this species, some adult and some young. It may have therefore yet another host besides *Ant. rosacea* and the new *Ant. hystrix* of the "Porcupine" dredgings. It has also been found on a specimen of *Ant. petasus* from Norway, in P. H. Carpenter's own collection; and likewise on another Norwegian example (from Arendal) in the University Museum at Kiel. No other species of *Myzostoma* is as yet known to infest *Ant. petasus*.

2. *Myzostoma carpenteri*, sp. n.

Hab. *Antedon dentata*. Station 5. Lat. 60° 11' 45" N. and 60° 20' 15" N., long. 8° 15' W. and 8° 8' W. 433 to 285 fathoms. Hard ground; stones. Temp. 43°·5 to 40°·8 F.

I have dedicated this species to my friend Dr P. H. Carpenter. It is of a dirty yellow colour, 2·3 mm. long, and of slightly greater width. Twenty short cirri appear at its margin, which is without a transparent rim. In fact, the whole disc is firm and opaque. The form of the ventral surface is most unusual, and there is no trace of the muscular prominence which is so generally present in its centre. This would indicate that the parapodial musculature is very weak. The parapodia themselves are extremely slender and short, being lodged in shallow pits close to the edge of the ventral side, and almost on the same level with the equally feeble suckers. Both mouth and cloacal opening are terminal. Attached to the dorsal surface of one of the two adults was an immature individual 46 mm. long. The very characteristic differences between the two will be given in the "Challenger" Report, together with the specific diagnoses. This is the only species of *Myzostoma* which has yet been found infesting *Antedon dentata*, better known as *Antedon sarsii*; and it is as yet only known from the "Triton" dredgings.