

A VOYAGE
TO
THE POLAR SEA

VOL. II.



Permanent Woodbury Point

NARRATIVE
OF
A VOYAGE TO THE POLAR SEA

DURING 1875-6
IN
H.M. SHIPS 'ALERT' AND 'DISCOVERY'

BY
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COMMANDER OF THE EXPEDITION

WITH NOTES on the NATURAL HISTORY

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NATURALIST TO THE EXPEDITION

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DISCOVERY BAY, STEAMER.

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CRUSTACEA,

By EDWARD J. MIERS, F.L.S., F.Z.S.

With NOTES ON THE COPEPODA, by the Rev. A. M. Norman, M.A.; and
ON THE OSTRACODA, by George Brady, M.D., F.L.S.

THE following account of the Crustacea is confined to the species collected between lat. 78° and 84° N.

The most northerly species collected is *Anonyx nugax*, one of the commonest and most abundantly distributed of the Arctic Amphipoda. Of this species several examples were collected by Commander Markham and Lieutenant Parr, at $83^{\circ} 19'$ N. lat., in May 1876, at a depth of 72 fathoms. The next most northerly species, the well-known *Hippolyte aculeata*, was found on the shore of Dumbell Harbour, in lat. $82^{\circ} 30'$ N.

The following are the principal stations at which Crustacea were collected by the naturalists on board the 'Alert' and 'Discovery.'

Floeberg Beach, the winter quarters of H.M.S. 'Alert,' in $82^{\circ} 27'$ N. lat.

Discovery Bay, winter quarters of the 'Discovery,' in $81^{\circ} 41'$ N. lat.

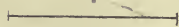
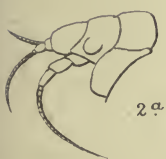
Cape Frazer, Grinnell Land, in $79^{\circ} 44'$ N. lat.

Dobbin Bay, Grinnell Land, in $79^{\circ} 40'$ N. lat.

Cape Louis Napoleon, in lat. $79^{\circ} 38'$ N.

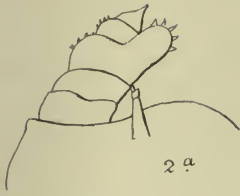
Franklin Pierce Bay, in $79^{\circ} 29'$ N. lat

A small collection of Crustacea made by Dr. A. C. Horner, while on board the yacht 'Pandora,' which has been placed in my hands for examination, contains only two species collected north of lat. 78° , i.e. three specimens of *Atylus carin-*

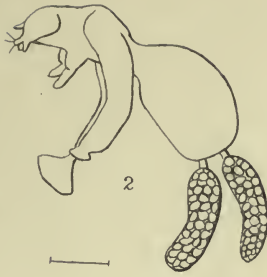


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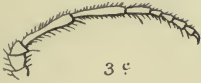
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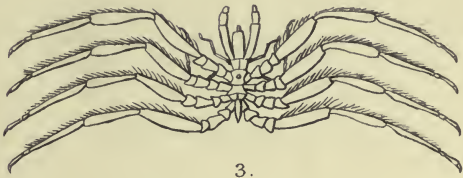
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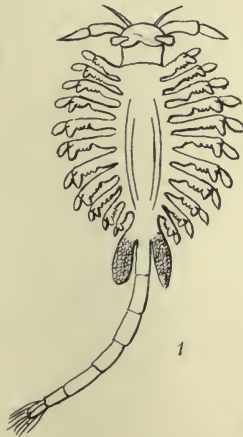
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natus, and four very small specimens of an Amphipoda perhaps belonging to the genus *Pherusa*. Both these species were collected at a depth of 7 fathoms, on a clay bottom, in Pandora Harbour, Smith Sound, in lat. $78^{\circ} 17' N$.

Since my Report was published,¹ to which I must refer for synonymical references, descriptive remarks, and notes on the geographical distribution of the species, a small collection has been sent me by Dr. Edward L. Moss, R. N., late surgeon of H.M.S. 'Alert,' containing a few *Amphipoda*, *Arcturus*, and *Nymphon*, and free-swimming *Copepoda*. The *Copepoda* were entrusted to the Rev. A. M. Norman for determination; the other species had all been obtained by Captain Feilden and Mr. Hart, the naturalists of the Expedition. To render the list of species complete, as regards the Crustacea inhabiting Smith Sound and the adjacent coasts, a few species, obtained by Dr. Hayes north of lat. 78° , and recorded by Stimpson ('P. Ac. N. Sci. Phil.' 1863), have been intercalated in the text and are placed within brackets.

DECAPODA.

CRANGONIDÆ.

Cheraphilus boreas, Phipps.

Discovery Bay, lat. $81^{\circ} 44'$ (both males and females), at depth of 25 fathoms; Cape Napoleon, one male example, at 25 fathoms; Franklin Pierce Bay, one female, at 15 fathoms: temperature of water $29^{\circ} 50$.

Stimpson records specimens collected by Dr. Hayes at Port Foulke and Littleton Island.

Sabinea septemcarinata, Sabine.

Discovery Bay, 25 fathoms, abundantly, both males and females; Cape Napoleon, 25 fathoms, three specimens, males.

Dobbin Bay, at a depth of 30 fathoms, one specimen, a female with ova.

¹ 'Ann. Mag. Nat. Hist.' xx. pp. 52-66, 96-110 (1877).

ALPHEIDÆ.

Hippolyte Gaimardii, Milne Edwards.

Franklin Pierce Bay, 13–15 fathoms, one female specimen.

Specimens were collected by Dr. Hayes at Port Foulke.

Hippolyte spinus, Sowerby.

Discovery Bay, 5 specimens, at 25 fathoms.

Hippolyte turgida, Kröyer.

Discovery Bay, 25 fathoms, one specimen.

Franklin Pierce Bay, one specimen, female with ova.

Cape Frazer, 20 fathoms, one female example.

Port Foulke (Dr. Hayes).

Hippolyte Phippsii? Kröyer.

Cape Frazer, 20 fathoms, one specimen.

Port Foulke (Dr. Hayes).

Hippolyte polaris, Sabine.

Discovery Bay, 25 fathoms, abundant; Cape Napoleon, five specimens; Franklin Pierce Bay, 15 fathoms, several specimens.

Dobbin Bay, 30 fathoms, one specimen.

Port Foulke and Littleton Island (Dr. Hayes).

Hippolyte borealis, Owen.

Discovery Bay, at 25 fathoms, several specimens; Cape Napoleon, at 25 fathoms, two specimens.

Franklin Pierce Bay, 13–15 fathoms, several specimens; Dobbin Bay, 30 fathoms, one specimen.

Littleton Island (Dr. Hayes).

Hippolyte grænlandica, J. C. Fabricius.

Dumbell Harbour, lat. 82° 30', one female specimen.

Franklin Pierce Bay, 13-15 fathoms, one male specimen.

STOMATOPODA.

MYSIDÆ.

Mysis oculata, O. Fabricius.

Cape Napoleon, 25 fathoms (temperature of water 29° 2').

The single specimen collected is in a very much mutilated condition.

Brought by Dr. Hayes from Port Foulke.

ISOPODA.

Arcturus baffini, Sabine.

Cape Napoleon, at 25 fathoms, two specimens, male and female.

Dobbin Bay, 30 fathoms, one male and one female; Franklin Pierce Bay, 13-15 fathoms, four males and three females, and many young.

A single specimen was collected, with many of the variety I have designated *Feildeni*, by Dr. Moss, on the ice foot a mile north of H.M.S. 'Alert's' winter-quarters.

Var. *Feildeni* (Miers), Pl. II. fig. 1.

This variety is distinguished by the absence of spines on the head and segments of the body.

Floeberg beach, 82° 27' N. lat., very abundant, males, females, and young.

Gyge hippolytes, Kröyer.

Discovery Bay (on *Hippolyte polaris*), one male and one female specimen.

Dr. Hayes collected this species at Port Foulke.

Phryxus abdominalis, Kröyer.

Discovery Bay, male and female, on *Hippolyte polaris*; Cape Napoleon, male and female, on *H. polaris*.

Franklin Pierce Bay, 13–15 fathoms, five males and five females.

Munnopsis typica, Sars.

Cape Napoleon, two male specimens at a depth of 25 fathoms, temperature of the water 29°·2; at 50 fathoms one male specimen.

Cape Frazer, 20 fathoms, one female specimen.

AMPHIPODA.

Anonyx nugax, Phipps.

Floeberg Beach, at 10 fathoms, male and females; fire-hole at lat. 82° 24'; and at lat. 83° 19' at 72 fathoms.

Winter-quarters of H.M.S. 'Discovery,' at 11 fathoms.

Brought from Gale Point by Dr. Hayes.

Anonyx gulosus, Kröyer. Pl. II. fig. 2.

Discovery Bay, 11 fathoms, three specimens.

I have referred these specimens with some doubt to the *Anonyx gulosus* of Kröyer, as the antero-lateral margin of the head is less broadly rounded, and the accessory flagellum is longer than that of *A. gulosus* according to Boeck's diagnosis. In the form of the first and second pairs of legs and of the terminal segment they agree well with the descriptions of *A. gulosus*, and particularly in the presence of a tooth on the inner margin of the dactyl, which is mentioned

by Lilljeborg as characteristic of that species. From *A. pumilus* they differ in the shorter antennæ, and in the absence of a tooth on the posterior margin of the fifth post-abdominal segment.

Onesimus Edwardsii, Kröyer. Pl. II. fig. 3.

Discovery Bay at $5\frac{1}{2}$ fathoms, lat. $81^{\circ} 44'$, one specimen; Floeberg Beach, at 10 fathoms, males and females, abundantly.

Atylus carinatus, J. C. Fabricius.

Discovery Bay, at depths of $5\frac{1}{2}$ and 25 fathoms, several specimens of both sexes were collected.

Acanthozone hystrix, Owen.

Discovery Bay, one specimen; Franklin Pierce Bay, five specimens.

Halirages fulvocinctus, Sars.

Discovery Bay, at 25 fathoms, one specimen; Floeberg Beach, one specimen.

Both of the specimens collected are in an imperfect condition: one is, I believe, an adult female; the other is a younger animal.

Specimens collected at Littleton Island by Dr. Hayes were described by the late Dr. Stimpson as new, under the name of *Pherusa tricuspis*.

Gammarus locusta, Linn.

Floeberg Beach, at depth of 10 fathoms, twenty-five specimens; crack between the floes in lat. $82^{\circ} 24'$, three specimens.

Port Foulke (Dr. Hayes).

Gammaracanthus loricatus, Sabine.

Floeberg Beach, at 10 fathoms, two males and two females.

Amathilla pinguis, Kröyer.

Crack between floes at lat. 82° 24' ; one specimen, in imperfect condition.

Eusirus cuspidatus, Kröyer.

Franklin Pierce Bay, 13–15 fathoms, one female specimen.

Tritropis aculeata, Lepechin.

Discovery Bay, at 25 fathoms, one male, four females ; Cape Napoleon, at 25 fathoms, three males, seven females ; Floeberg Beach, at 10 fathoms, two males, five females ; Franklin Pierce Bay, at 15 fathoms, many specimens.

Cape Frazer, 20 fathoms, three young females (?) ; Dobbin Bay, at 30 fathoms, one female.

[*Themisto libellula*, Mandt.

Cape Faraday, in the stomach of a seal (Dr. Hayes).]

Ægina spinosissima, Stimpson.

Cape Napoleon, 25 fathoms, temperature of water 29°·2, one small male specimen.

Dobbin Bay, 30 fathoms, one large male specimen.

ENTOMOSTRACA v. GNATHOPODA.

PHYLLOPODA.

BRANCHIPODIDÆ.

Branchipus (Branchinecta) arcticus, Verrill. Pl. III.
fig. 1.

Discovery Bay, in a small freshwater lake and in a stream under ice.

Several specimens were collected, including males and females, of a species of Phyllopora, which I refer to the *B. arcticus* of Verrill.

These specimens differ slightly from the descriptions of *B. arcticus* and *grænlandicus*, as will appear from my description.¹ If distinct (which may be possible, although I think it more probable that the three forms are varieties of one and the same species), the species may be designated *B. Verrilli*.

COPEPODA PARASITICA.

LERNÆOPODIDÆ.

Lernæopoda arcturi, Miers, sp. n. Pl. III. fig. 2.

This species, as will appear from the description, differs from its nearest ally, the *L. Edwardsii*, Olsson, in the somewhat shorter ovaries and abdomen, and the form of the claw of the first maxilliped. The *L. Edwardsii* is known to me only from the description.

Floeberg Beach, parasitic on the gills of *Salmo arcturus* Gthr.

Lernæopoda elongata, Grant.

Port Foulke (Dr. Hayes).]

[*Hæmobaphes cyclopterina*, Fabricius.

Littleton Island; attached to the gills of *Gymnetes viridis* (Dr Hayes).]

CIRRIPIEDIA.

BALANIDÆ.

Balanus porcatus, Da Costa.

Cape Napoleon, from a depth of 50 fathoms, five speci-

¹ Op. cit.

mens; 25 fathoms, two specimens; Richardson Bay, 80° 2' N. lat., 70 fathoms, one specimen.

Franklin Pierce Bay, 13-15 fathoms.

[*Balanus balanoides*, Linn.

Port Foulke (Dr Hayes).]

PYCNOGONIDA.

NYPHONIDÆ.

? *Nymphon hirtum*, J. C. Fabricius.

Franklin Pierce Bay, eight specimens; Discovery Bay, one specimen; Floeberg Beach, at depth of 10 fathoms, two specimens.

Nymphon hirtum, var. *obtusidigitum* (Miers), Pl. III. fig. 3.

Among the specimens from Franklin Pierce Bay is a single example, which differs from the males of the foregoing variety only in the legs being cylindrical, not dilated and compressed, and in the form of the chelæ of the mandibles. These have the fingers arcuate, meeting only at the tips, which terminate in small knobs. The chelæ are slender, not globose, as in the form figured by Bell, in Belcher, 'Last of the Arctic Voyages,' p. 409, pl. xxxv. fig. 4, under the name of *N. robustum*, and that recently described by Heller as *N. hians* ('Sitz. der k.-k. Akad.;' Wien., 'Naturw.' lxxi. p. 610, 1875), in which species the fingers although arcuate are represented as acute.

Nymphon Strömi (Kröyer).

Floeberg Beach, lat. 82° 27', at depth of 10 fathoms, three specimens, and at lat. 81° 56', one specimen; Cape Frazer, at a depth of 80 fathoms, bottom hard, one adult and three young specimens.

NOTES ON THE OCEANIC COPEPODA.

BY THE REV. A. M. NORMAN, M.A.

THE Copepodous Crustacea, though for the most part of very small size, and apparently insignificant, are nevertheless indirectly of no small consequence to mankind, inasmuch as they make up for their minuteness by their extraordinary productiveness and numbers, and constitute, in combination with the Mysidea and larval forms of higher Crustacea, a principal element in the food of the whale.

The oceanic species have not hitherto had that amount of attention paid to them which they undoubtedly deserve, yet Kröyer, Lubbock, Baird, and Buchholz have examined and described many forms which inhabit the Arctic seas.

Unfortunately the number of specimens brought home by the Arctic Expedition is very small, and, with the exception of a bottle of surface-gathering from Baffin's Bay, which contains an interesting series of some well-known forms, the species are represented only by one, or at the most two specimens, and these already mounted. In this condition it is almost impossible to determine accurately those minute details of structure in the mouth and other organs, which are absolutely essential to the correct definition of generic and specific characters. At the same time, the conditions under which the Copepoda were found, the extreme high latitude, and the extraordinary amount of cold which prevailed at the surface while these animals still remained living in the dead of winter beneath the mass of superincumbent ice, render them so interesting that I am unwilling to leave them wholly unnoticed, though the description which I shall be able to give must of necessity be extremely imperfect.

That the Copepodous Crustacea are able to exist under circumstances, with respect to cold, which are most extra-

ordinary has long been known. Otho F. Müller froze individuals of *Cyclops quadricornis* in a glass vessel, and when fully frozen continued the cold for four and twenty hours. He then placed the vessel in a warm bath, and watched the effect. For four and twenty hours the Crustacea which had been frozen showed no signs of life; the next morning, however, to his surprise he found the greater part of them restored to life and swimming about as before congelation. It is a well-known fact also that the life of the eggs of Ostracoda and Cladocera can be maintained for many months, when ponds have been completely dried up in the summer months, or frozen to their very bottom in mid-winter.

In the extremely cold winter of 1859 and 1860 I instituted some experiments for the purpose of finding how far life could be maintained, under extraordinarily trying conditions, among the lower orders of the Crustacea. The water of the lake in Hardwicke Park, in the parish of Sedgfield, had in the month of October been let off so as to drain large mud-flats on the shelving sides, in order that the weeds, exposed by this means to the influence of the frost during the winter months, might be destroyed. The severest cold of which we have record ensued for five weeks. From the seventeenth day of December the mud-flats were continuously frozen into a solid block, and the frost on Christmas Eve reached five degrees below zero, Fahr. On the conclusion of the frost a portion of this mud was procured, and, yet further to test the vitality of the eggs embedded in it, the mud was thoroughly dried. On March 11 a small portion of the mud was placed in a glass jar of water and exposed to a genial temperature. A few days afterwards *Daphnia rotunda*, *Sida crystallina*, *Diaptomus castor*, and *Cyclops quadricornis*, together with some *Rotifera*, were swimming about merrily in the vessel.

It is no surprise therefore to us to meet with these minute Crustacea in mid-winter in the Arctic Sea, though the fact is of importance as bearing upon the supply of food existing during the winter months for the Greenland whales.

A towing-net gathering from Baffin's Bay, lat. 73° 33' N., long. 76° 59' W., made September 16, 1876, the water at the temperature of 34°·4, contains numerous specimens of *Metridina* (*Metridia*) *armata*, Boeck.¹ This species has been described by Professor Brady from the Irish coast under the name of *Paracalanus hibernicus*,² and I am indebted to him for the opportunity of comparing these Irish specimens (since synonymised by him with Boeck's genus) with those of the Arctic Sea. They agree in every respect except perhaps that the terminal spines of the swimming feet are longer in proportion to the joint from which they spring in the Arctic than they are in specimens from the warmer seas. With respect to size we find here, as in so many other instances among the Invertebrata, an extraordinary development of the Arctic specimens, which are at least *six times* the size of those from the Irish coast, and measure five millimètres in length, exclusive of the antennæ. It is quite possible that this genus may prove to be synonymous with *Pleuromma* of Claus; but if that be so, the mature male of *Metridina armata* has not yet been observed, and the males which Professor Brady and myself have examined must be considered as immature, and not yet to have attained the full development of those limbs which specially characterise the male sex. Claus has named his genus '*Pleuromma*' to indicate the presence of an eye, which he describes and figures as situated 'penes maxillipedum posticorum basin.' It is not a little remarkable that, attached to the maxilliped of one of the specimens of *Metridina armata* procured by Dr. Moss, is a group of parasitic organisms, each of which is in the form of a little globular body supported on a pedicel of greater or less length. Sufficient cannot be made out of the organic structure of these parasites to determine the class of animals to which they should be referred. They are

¹ Boeck's genus is *Metridia*. I have slightly changed the termination to *Metridina* in order to avoid confusion with *Metridium* of Oken, of which our well-known sea-anemone (*Actinoloba dianthus*) is the type.

² 'Ann. Nat. Hist.,' S. IV. Vol. xii. p. 126, Pl. viii. fig. 1-3.

extremely small ; but we find semiglobular bodies of larger size figured in one of Kröyer's plates (' Voyages en Scandinavie,' &c., Pl. xli. fig. 2, e, f), as attached in one case to the ventral, and in the other to the dorsal, surface of *Calanus hyperboreus*. It may be that these are the more mature forms of the parasites now observed on *Metridina armata*. Now, if the young of such a parasite were attached to the base instead of to the extremity of the maxilliped, it might very possibly be mistaken for an organ of vision. I feel great hesitation in even hinting at this possibility, knowing the extreme accuracy of Claus' observations ; but the mistake—if a mistake has been made—is one which any observer might easily fall into, more especially since organs, presumed to be supplemental organs of sight, are not unknown among other orders of the Crustacea (*Thysanopoda*), attached to the segments of the body.

In this same gathering were large numbers of *Calani*, the examination of which has cost me no small amount of labour. I must take another opportunity of giving the grounds on which the conclusions I have arrived at are based. It will suffice now to state that I believe that the whole of these specimens are referable to *Calanus Finmarchicus*, Gunner, better known to British naturalists under the name of *Cetochilus septentrionalis*, Goodsir, and that *Calanus magnus*, *elegans* and *borealis* of Lubbock, and numerous other so-called species, are merely states and conditions resulting from differences of the sex and age of our old friend. The very great development in size of the Arctic examples as compared with the British, which results in the young immature forms of the former surpassing in size the fully developed individuals of the latter, has tended much to render the confusion greater.

A mounted specimen collected by Captain Feilden near the same spot is referable to the same species which was also procured by Dr. Moss in the summer months at the winter quarters of the 'Alert,' lat. 82° 27' N.

Two very interesting gatherings were made by Dr. Moss

from water drawn, in mid-winter, from under the ice-floes at the winter quarters of the 'Alert,' lat. $82^{\circ} 27'$. There are three species, unfortunately two of them represented only by a single specimen, which being mounted prevents the possibility of full examination; the first of these is a form closely resembling apparently our *Idya furcata* (Baird), but differs manifestly in the form of the last legs, which are ovate instead of produced and linear, as in the just-mentioned species; this new form may be named *Idya palæocrystica*.

The next species is remarkable on account of the numerous long setæ of the anterior antennæ, which are not longer than the cephalo-thorax, and also the very long setæ of the swimming feet; it is possibly a *Dias*, and may be called *Dias* (?) *Mossi*.

The last I doubtfully refer to the genus *Pseudocalanus* of Boeck, and it may be named *P. Feildeni*.

NOTES ON THE OSTRACODA.

BY GEORGE STEWARDSON BRADY, M.D., F.L.S.

1. Mud from ravine, Repulse Bay, Hall's Land; 150 feet elevation, lat. $82^{\circ} 10' N$.

Cytheropteron montrosiense, Brady, Crosskey and
Robertson.

2. Mud from Fiord Valley, lat. $82^{\circ} 8' N$.; 200 feet elevation, from valves of shells.

Cypris curvata, nov. sp.

3. Mud-beds, Cave Ravine; 100 feet elevation. Lat. $82^{\circ} 32' N$.