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# DECAPODA

COLLECTED DURING

## THE FISHING INVESTIGATIONS

DIRECTED BY

DR. HJORT IN 1897 & 98

BY

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WITH 2 AUTOGRAPHIC PLATES, (AND LETTERPRESS FIGURES)



KRISTIANIA

OSCAR ANDERSENS BOGTRYKKERI

1900



During the fishing investigations in 1897—98, a number of decapods were obtained, consisting of 33 different species. Of these 9 were *Brachyura*, 5 *Anomura*, 2 *Macrura*, 17 *Carida*.

The majority of these were collected in the Christiania Fjord, though a great number were obtained on a cruise round the south coast of Norway including the Hafsr Fjord, in the summer of 1898, and during a week's exploration of the Trondhjem Fjord in 1899.

As will be seen from the following account, the decapods obtained, belong chiefly to the larger species, while several of the smaller species [as for instance the *Carides*] are absent, owing to the comparatively wide-meshed fishing implements that were chiefly employed during the fishing investigations. Only during the latest researches in the Trondhjem Fjord, was a suitable bow-net obtained for the catching of smaller species.

This net, attached to the end of a shrimp-trawl, brought up in a few hauls, from 100—200 fathoms, a considerable quantity of Crustacea and other small forms.

Most of the investigations were carried on in deep water [generally from 50—100 fathoms], which accounts for the predominance of deep-water forms amongst the Decapoda obtained. The information given in the following pages regarding their geographical distribution, is chiefly obtained from G. O. Sars's «Crustacea» in the Report of the Norwegian North-Atlantic Expedition», and from Fr. Meinert's «Scientific Results of the Cruise of the gunboat «Hauch, 1883—86», Crustacea malacostraca, etc. Other works referred to are Bell's «British Stalk-Eyed Crustacea», G. O. Sars's «Oversigt af Norges Crustaceer», Storm's «Bidrag til Kundsk. om Trondhjemsfjordens Fauna», and other shorter articles by the above mentioned and other authors.

As there is no list for the determination of our Caridea species, my studies have been chiefly directed towards the elaboration of one, in order thereby to facilitate the work of eventual determinations.

## Account of the Decapoda obtained during the fishery investigations in 1897—98.

### Brachyura.

*Cancer pagurus*, Lin.  
*Geryon tridens*, Kröy.  
*Carcinus maenas*, Lin.  
*Portunus arcuatus*, Leach.  
 —»— *depurator*, Lin.  
*Hyas araneus*, Lin.  
 —»— *coarctatus*, Leach.  
*Inachus dorsettensis*, Pen.  
*Stenorhynchus rostratus*, Lin.

### Anonura.

*Lithodes maja*, Lin.  
*Eupagurus pubescens*, Kröy.  
*Eupagurus bernhardus*, Lin.  
*Galathea dispersa*, Sp. B.  
*Munida rugosa*, Fabr.

### Macrura.

*Calocaris Macandreae*, Bell.  
*Nephrops norvegicus*, Lin.

### Carida.

*Crangon vulgaris*, Lin.  
 —»— *Allmanni*, Kin.  
*Cheraphilus echinulatus*, M. Sars.  
*Pontophilus spinosus*, Leach,  
 —»— *norvegicus*, M. Sars.  
*Sabinea Sarsii*, Smith.  
*Hippolyte Gaimardii*, Eden.  
 —»— *polaris*, Sab.  
 —»— *securifrons*, Norm.  
*Virbius varians*, Leach.  
*Pandalus brevivirostris*, Rtk.  
 —»— *annulicornis*, Leach.  
 —»— *leptorhynchus*, Kin.  
 —»— *borealis*, Kröyer.  
*Palæmon squilla*, Lin.  
 —»— *Fabricii*, Rtk.  
*Pasiphaë tarda*, Kr.

Of the remaining 17, or, including *Synhimantites typicus*, 18 Carida species which belong to our fauna, only one of the larger species, of common occurrence elsewhere was not identified during the investigations, namely *Pandalus propinquus*. *Cheraphilus neglectus*, *Sergestes Meyeri*, *Nika edulis* and *Hippolyte spinus*, which is no doubt frequently mistaken for *H. securifrons*, are only known in this country from some few specimens. *Sclerocrangon boreas* and *Sabinea septemcarinata* are arctic forms, which in this country are only to be found on our Northern coast. *Cheraphilus nanus*, *Athanas nitescens*, *Hippolyte turgida*, *H. Cranchii*, *H.*

*pusiola*, *Virbius fasciger*, which is considered by many to be identical with *V. varians*,\*) *Bythocaris simplicirostris*, *Cryptocheles pygmæa*, *Caridion Gordoni* and *Pasiphaë sivado* are all small — mostly rare species — which were only accidentally taken with the wide-meshed fishing implements.

### **Cancer pagurus**, Lin.

The black-clawed crab was caught during the fishing investigations of the Vest Fjord, near Tønsberg, from a depth of 25 fathoms, and is moreover common along the entire coast of Norway. According to Mr. Storm, it is not so frequently met with in the upper part of the Trondhjem Fjord, whereas it is often found farther out on the sea shore. Here, specimens of considerable size are constantly taken in the nets, but seldom utilised. This species is wide distributed all over Europe, and, besides in the Mediterranean and off Denmark [Anhalt and Læsø 10<sup>1</sup>/<sub>2</sub> fathoms] is also found on the coasts of Great Britain, in the English Channel, the Adriatic, the North Sea, off the coasts of Holland, Belgium and Sweden. During the Zoëa-stage the larva of this species is distinguished by two fairly powerful lateral spines upon the carapace.

### **Geryon tridens**, Krøyer.

Previously never found except in the Christiania Fjord, at the head of which it is sometimes caught during the spring in the fishing nets, and at Haakonsund, at the entrance to the Kors Fjord [Bergen], where a single specimen was caught and preserved in the Museum at Bergen.

Again in January, 1899, it was captured in the Trondhjem Fjord [Beistad Fjord off Stornæsøren, from 60 fathoms, soft, smooth bottom deposits with an English trawl], this being the most northern locality in this country, from which it has hitherto been obtained.

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\*) The great difference between the *V. varians* and *V. fasciger*, which has caused their determination as two different species, is that in *V. fasciger*, the segments of abdomen, tail-joints and buckler, are furnished with tufts of hair. Many authors maintain, however, that specimens indicated as *V. varians*, are identical with the *V. fasciger* and are only deprived of these hair, which is very probable.

In the Christiania Fjord [at Drøbak and in the Bunde Fjord, from 60 — 90 fathoms, St. No. 30,] 3 specimens were found in 1897 & 98\*).

From Denmark some few specimens are stated to have been caught in the eastern part of the Cattegat in 1834, since which time it has never been subjected to observation. Otherwise, it is only known on the south-west coast of Ireland, and is thus a species that is very poorly represented.

#### ***Carcinus mænas*, Lin.**

Is a very Common crab, along the entire coast of Norway.

It is widely distributed all over Europe as well as the North American east coast. Also on the British coast it is very common.

On the banks off the Danish coast and Bohuslæn, it is very frequently found, as well as in the Baltic, the North Sea, the German, Dutch, and Belgian coasts, the English Channel and the coast of France, the Mediterranean, the Adriatic and the Black Sea, and finally on the Canary Islands [Meinert].

#### ***Portunus arcuatus*, Leach.**

Of this species some small specimens were found in the Naver Fjord at Fredriksværn, in shallow water; also at Drøbak and on the west coast (Christiansund). They live by preference on a sandy sea-bottom in shallow water, but are sometimes found even at a depth of 20 fathoms.

Danish observations state their existence in the Cattegat, Øresund and at other stations; moreover on the British coast, the Channel and west coast of France, Belgium, Holland and Sweden.

#### ***Portunus depurator*, Lin.**

Is found in deep as well as shallow water; thus, during the fishing investigations, from 0—60 fathoms. It is common in the Christiania Fjord, and especially in the Brevik Fjord [from 50--60 fathoms] where it is very plentiful, again at Aasgaardstrand [from 20 fathoms] and in the Drøbaksund. In the Risevigen [Jæderen] specimens have also been procured [from 0—4 fathoms].

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\*) The sea-bottom in the last-named locality, chiefly consisted of a brown clay, mixed with great quantities of decaying plankton deposits [viz, shatters, zostera].

This species likewise occurs in Danish waters, along the coast of Sweden [Bohuslæn to the Väder isles] off the British, Dutch and French coasts, in the English Channel, the Mediterranean and the Adriatic.

**Hyas araneus, Lin.**

This species is very common along our coast, and specimens have been procured from Drøbak and the Brevik-Fjord [from depths of 50—60 fathoms]. In the Trondhjem Fjord also it is stated by Mr. Storm to be exceedingly numerous in some localities in shallow water.

It is generally asserted to be an arctic form, very frequently found on the coast of Greenland, Beeren Eiland, Iceland, Spitsbergen and in the Kara and Murman Seas, along the east coast of North America, and in the Behring Strait.

In Europe its distribution in a southerly direction extends towards the north coast of France.

Its occurrence in Danish waters is rather rare. It is further known off the Bohuslæn (Kullen), British, Dutch and Belgian coasts as well as in the Baltic.

**Hyas coarctatus, Leach.**

Is likewise a common species off the Norwegian coast, being even more frequently obtained during the fishing investigations than the preceding species. It is generally found in deep water; for instance, from Drøbak and the Brevik-Fjord at a depth of 50—60 fathoms, in Lysaker Bay from 30 fathoms, and in the Trondhjem Fjord by Mr. Storm even down to a depth of 150 fathoms. At the same time, however, in shallow water such as the Risevigen, Jæderen [from 0—4 fathoms].

Distribution the same as that of the foregoing species.

**Stenorhynchus rostratus, Lin.**

Half a dozen individuals of this species were found (on the 26th of September, 1898) in the Naver Fjord, near Fredriksværn.

In the Trondhjem Fjord it is common from the Coast, while scarce in the upper part of the fjord.

Again it exists on the west coast from Hardanger to Bohuslæn and Kullen. Both in Denmark and Great Britain it is recorded as a common species, and also throughout the various parts of Europe, for

instance, in the English Channel, on the west coast of France, in several parts of the Mediterranean, the Adriatic, on the Belgian and Dutch coasts and in the German Gulf.

The majority live in shallow water (circ. 6 fathoms) though some are found at a depth of 20 fathoms.

#### ***Inachus dorsettensis*, Penn.**

Is found in deep as well as shallow water (Naver Fjord, Fredriksværn, 5—6 fathoms, Ferkingstad Isles South of Haugesund, ca 30 fathoms) Also in the Trondhjem Fjord.

Its occurrence in Danish waters chiefly comprises the Cattedgat, generally from 10—20 fathoms, though also from a depth of nearly 50 fathoms.

Otherwise it exists in most of the places already mentioned for the above-stated species.

#### ***Lithodes maja*, Lin.**

«Troldkrabben» was frequently found during the fishing investigations in the Christiania Fjord, in deep water (from 20—70 fathoms). Moreover in the Trondhjem Fjord it is very common from 20—300 fathoms, and lastly, it was found during the Norwegian North Atlantic Expedition at Husø, in the Alten and Tana Fjords.

In Denmark it is only found in the Øresund; otherwise it is known at Bohuslæn and the Väder Isles, as well as on the Dutch, Belgian and British coasts.

Its distribution in a northerly direction comprises the North American east coast, Greenland and the Murman Coast.

#### ***Eupagurus bernhardus*, Lin.**

Of this, very common species, several specimens were procured in 1897—98. It appeared to be particularly plentiful in the Brevik Fjord, from 50—60 fathoms; soft clay bottom.

In Denmark it is not only considered the most ordinary hermit-crab, but also the most common deep-water crab. On the coasts of Great Britain and France it is very numerous, and is found on the coasts of Belgium and Holland, in the Mediterranean, the Adriatic (?) as well as the on east coast of the United States.



**Eupagurus pubescens**, Kröy.

Is an arctic and circumpolar species, likewise common along the coast of Norway; several specimens were found during the fishing investigations of the Christiania Fjord, in 50—100 fathoms; from the Trondhjem Fjord a specimen was caught from 60 fathoms.

Apart from the Norwegian coast, it was found during the Norwegian North Atlantic Expedition off Iceland, Beeren Eiland and Spitsbergen, and is furthermore known in Greenland, Novaia Semlia, Kamtschatka and the east coast of North America. In Europe it has never been observed farther south than the British Isles. It is rather scarce in the Danish waters.

**Galathea dispersa**, Sp. Bate.

This species is common on our south and west coasts, and is found in various parts of the Christiania Fjord. For instance, at Aasgaardstrand a dozen specimens were caught in a depth of 20 fathoms, and in the Drøbak sound and Brevik Fjord, where it is very numerous, in depths of 50—60 fathoms, in the Herlø-Fjord at Bergen, in 60—100 fathoms, and in Vest Fjord, at Tønsberg, in 25 fathoms.

This species greatly resembles *G. squamifera*, Fabr., from which it is generally distinguished by the middle spine on the rostrum, which, in *G. dispersa*, projects a good deal more than the two adjacent spines which is not the case with the *G. squamifera*,

On the whole, species of this genus greatly resemble each other, and are therefore not easily distinguished without a close examination.

**Munida rugosa**, Fabr.

From several parts of the Christiania Fjord this species is recorded as very plentiful, in as much as several specimens have been found above and about Drøbak, in the Brevik and Langesund Fjord, and at Fredriksværn, the depth being from 25—70 fathoms, and the bottom generally of a soft lime.

In this country it is found as far north as Vadsø, but is not therefore recorded as an arctic form, as it is never seen in the so-called polar sea, nor on the east coast of North America.

This species is also known from the Shetland Isles and, is found southwards down to the Mediterranean.

**Munida Rondeletii**, Bell.

3 specimens of this rare species — constantly mistaken for *M. rugosa* — were found during the fishing investigations in 1897—98, 1 specimen off Fredriksværn and 2 in the Brevik Fjord, in depths of from 50—60 fathoms. It has previously been found in this country near Flekkefjord (2 specimens) and Grimstad (1 specimen).

From *M. rugosa* it may easily be distinguished by the absence of bristles of hair across their small eyes, as well as the absence of the two dorsal spines on the 3rd segment of the abdomen.

**Calocaris Macandreae**, Bell.

Of this pretty and apparently common species, a dozen specimens were obtained in the Laurvik Fjord (Christiania Fjord, September, 98), 18 from 60—70 fathoms; it appeared to be particularly common in the Trondhjem Fjord in 225 fathoms (in the Kors Fjord), where up to a dozen individuals were caught in a haul; also in 100 fathoms (in the Gulosen and Stjørdal Fjord), they appeared to be very plentiful. The bottom was everywhere of a soft lime\*). Mr. Storm has likewise found this species to be common in various parts of the Trondhjem Fjord, on a sandy mixed clay bottom.

This is a West European species, and occurs, apart from Scandinavia, on the west coast of Great Britain and the eastern part of the Cattegat (during the cruises of the gunboat «Hauch» in 1883—86, from 49—25 fathoms, the bottom-deposits generally consisted, of a pure silt.

The peculiar Polyzoë *Triticella Koreni*, G. O. Sars, is generally a parasite upon *Calocaris*.

**Nephrops norvegicus**, Lin.

Very common throughout the Christiania Fjord, and obtained in deep as well as shallow water, on rocky as well as smooth bottom. In the Laurvik Fjord, in 60 or 70 fathoms 1/2 dozen young specimens of this species were caught, of which the smallest measured 6 cm.

During the cruise in the Trondhjem Fiord it was never observed, nor by Mr. Storm in those regions, though it is found in this country right up to the North Cape.

\*) A young specimen of this *Calocaris*, measuring scarcely 7 mm. was found in the Kors Fjord (Trondhjem Fjord) at a depth of 225 fathoms.

In addition to the Norwegian coast, it is known along the British, French and Belgian coasts, in the Cattegat, Skagerak, Øresound, the Mediterranean and the Adriatic.

### **Crangon vulgaris, Lin.**

This species is generally considered one of the most common littoral Carides existing on our coasts. Nevertheless in the Brevik Fjord it appeared to be quite common in 50—60 fathoms, in as much as no less than 20 specimens were obtained in 3 days [the 28th, 29th November, and 8th of December, 1898].

One of these is particularly remarkable for its carrying ova.

G. O. Sars, some years ago, found some specimens in the Christiania Fjord at a depth of 30 fathoms, which is the greatest depth hitherto recorded in which this species has been found.

The sea-bottom of the Brevik Fiord, from which these samples were taken consisted of a soft clay.

It may be seen from the account of the cruises of the gunboat «Hauch», that it most was frequently caught on a sandy bottom, though never on lime, from a depth of 4 or 5 fathoms in the Cattegat, not more than 16 fathoms in the Baltic. The specimens obtained in 50 or 60 fathoms were rather darker coloured than those in shallow water, but did not otherwise differ from them.

In Norway it is found right up to the Lofoten. In Great Britain, it appears in great quantities («Shrimps», «Sand Shrimps», «Gray Shrimps»). It is also known from the Mediterranean, the Adriatic, Belgium, Holland, the German Gulf, Bohuslæn, the Swedish coast with the isle of Gotland, Jutland, the east and west coasts of North America. etc.

### **Crangon Allmanni, Kinahan.**

Is commonly known from various parts of the south coast. It was particularly numerous in the Brevik Fjord in 50 or 60 fathoms, where, next to the *Pandalus borealis* and *Hippolyte securifrons*, it is the most frequently caught of all Carides. In the Trondhjem Fjord in 60—80 fathoms, it occurred as frequently as in the Brevik Fjord (about 20 individuals in one haul) and formed the majority of the

Carides procured along with the *Pandalus borealis*, *Pasiphaë tarda* and *Pontophilus norvegicus*.

Several of the collected samples of *Crangon Allmanni*, chiefly from the Brevik Fjord, were of a considerable size, measuring up to 10 cm.

According to G. O. Sars, it exists along the entire Norwegian coast, at least to the Lofoten Isles. Furthermore it is known in Great Britain, Iceland (Reykjavik, 20—30 fathoms), Holland, the German Gulf, Bohuslæn, Skagerak, Cattegat, the North Sea and in Danish waters.

It is generally found singly, scattered throughout the North Sea; it is also observed in the eastern depths of the Cattegat, where it is caught in depths of 23—50 fathoms [Meinert].

### **Pontophilus norvegicus**, M. Sars.

Was found in the Brevik Fjord [October, November, December, 1898] in depths of 50—70 fathoms]; likewise obtained at Drøbak [50—100 fathoms], Aasgaardstrand [80—100 fathoms], and north of Bolæerne [100 fathoms].

In the Trondhjem Fjord in 60—80 fathoms, it was almost as common as the *Crangon Allmanni*; but as the trawl was gradually lowered to a greater depth, the numbers increased, simultaneously with a diminution in the number of *Crangon Allmanni*. Even at a depth of 100 fathoms, *P. norvegicus* appeared to predominate. The greatest depth in which trawling was done was 225 fathoms [in the Kors Fjord]. Here up to 40 *P. norvegicus* were constantly caught in one haul, while no *Crangon Allmanni* were taken. The largest individuals measured about 10 cm.

In the fine-meshed net, attached to the end of the trawl, specimens were found, with a length of 10 mm. and upwards.

The 4 or 5 samples of 10 mm. in length, were probably newly developed individuals, being quite soft, thin and rolled up. During the Norwegian North Atlantic Expedition, they were found at great depths in the Sogne Fjord, Vest Fjord, Porsanger Fjord and Tana Fjord, as well as in the open sea. It is also known on the coasts of Greenland and North America.

Only one specimen has been known from Danish waters, recorded [by Metzger] from the Skagerak.

**Pontophilus spinosus**, Leach.

Among the Carida collected, and preserved in 1897—98 there is only one specimen of *Pontophilus spinosus* from the Brevik and Lange-sund Fjord [from 50—70 fathoms]. Here, however, it was found in great quantities [in October, November and December]. At Farsund it has been found by G. O. Sars on a clay bottom at a depth of 30 fathoms. Off the Danish coasts it is very rarely met with. According to Meinert, it is found in 6 localities of the eastern Cattegat, the depth being from 22—53 fathoms. It is more seldom in the west and south of Europe, and apart from Scandinavia is only known in Great Britain, the Shetland Isles, on the Irish coast, in the German Gulf and the Adriatic.

**Ceraphilus echinulatus**, M. Sars.

23 admirable samples of this deep-water Caride were caught in the Brevik Fjord, in 50—60 fathoms, on the 28th and 29th of November, and the 8th of December.

This species, which, according to G. O. Sars, is not infrequently met with on our south and west coasts is likewise obtained in the Drøbak sound from a depth of 50 fathoms.

It was also found during the Norwegian North Atlantic Expedition at Husø and in the Sogne Fjord. Otherwise, it has only been observed in the Shetland Isles.

**Sabinea Sarsii**, Smith.

A dark-coloured individual with hard roe, measuring nearly 8 cm. was captured on the 29th of November, 1898, in the Brevik Fjord in 50—60 fathoms. Some smaller specimens were also taken off the Ferkingstad Isles [South of Haugesund], Station No. 64, on the 16th of August, in 30 fathoms on sand. It is fairly common on our west coast [for instance at Christiansund] and southward towards Stavanger [G. O. Sars]. It also exists on the east coast of North America.

**Hippolyte Gaimardi**, Edw.

Although this species is exceedingly common on our western and northern coasts, very few specimens have been collected amongst the Carides taken during the fishing investigations. These were taken

during the cruise in the summer of 1898, from Tananger [Jæderen, 0—4 fathoms 3rd August].

Krøyer states, that *H. Gaimardi* is the most prolific or at least the most widely distributed of northern Hippolytes.

Off the coast of Norway it is found to be more numerous than any other Hippolyte. According to Mr. Storm it is one of the most common species in the shallow parts of the Trondhjem Fjord. During the Norwegian North Atlantic Expedition, it was caught at Røst and in the Alten Fjord.

It is recorded by Meinert as being the most common Danish Hippolyte existing in the entire western part of the Cattegat, the depth being generally from 5 to not more than 12 fathoms, and never less than 11 feet.

The species is also known in the Baltic, at Spitsbergen, Greenland, where it is very common, Iceland, Labrador and Vancouveris Island.

### **Hippolyte polaris, Sab.**

Was found during the fishing investigations at various depths, from 1 to 100 fathoms, for instance, at Aasgaardstrand in 80—100 fathoms Risevigen, Jæderen, 1—4 fathoms, and in the Brevik Fjord from 50 to 60 fathoms, several fine looking specimens having been obtained here. In the Drøbak sound it is also rather common. Moreover it is well known from various other places along our coast, having been observed in the Vest Fjord and at Røst, during the Norwegian North Atlantic Expedition, and at Christiansund and in the Trondhjem Fjord by Mr. Storm in greater depths, among Oculinæ where it was one of the most frequently occurring Crustacea.

Apart from the Norwegian coast, it is caught at Beeren Eiland, in several parts of Spitsbergen, and at six stations of the Norwegian North Atlantic Expedition, at a great distance from shore, as well as off Greenland and the east coast of North America and Franz Josef Land.

The living specimens subjected to my observation [from the Brevik Fjord] were beautifully marked with transverse purple coloured wavy lines and red and blue spots of various sizes, the body being fairly transparent. The brilliant colours, however, soon fade after death, and

alcoholic specimens of the *H. polaris* therefore greatly resemble *H. Gaimardi*, from which, however it may be easily distinguished by its clumsier shape and a constantly upward-turned rostrum.

### **Hippolyte securifrons**, Norman.

Is a species frequently occurring on our south and west coasts, and in certain localities of Lofoten. It was obtained from various parts of the Christiania Fjord (above and at Drøbak, in the Bunde Fjord, Laurvik Fjord, Langesund Fjord, Brevik Fjord, in 30—150 fathoms. In the Brevik Fjord it was caught during the *Pandalus borealis* fisheries, apart from which it is the most common of all Carides.

Some specimens were found in the Stjördals Fjord [60—80 fathoms] during a week's cruise in the Trondhjem Fjord in the middle of January, 1899, and one specimen was found in the stomach of a cod-fish (Beistad Fjord, 60—80 fathoms). It has also been found in the Trondhjem Fjord by Mr. Storm, though very rarely.

During the Norwegian North Atlantic Expedition it was observed, besides in the Vest Fjord, in 2 places in the ocean to the N. W. of Finmark. (G. O. Sars).

It is also recorded from the Shetland Isles and the east coast of North America. On several of the preserved specimens of *H. securifrons* obtained in the Christiania Fjord (and chiefly the Brevik Fjord) may be found as well as the *Bopyrus abdominalis*, more especially the *Bopyrus Hippolyte*.

### **Virbius varians**, Leach.

Several specimens of this beautiful little species were caught in the Tananger Bay (Jæderen) in depths up to 4 fathoms.

The specimens, when caught, were of the same green colour as that of the weeds among which they lived; but after death they soon lose their colour.

In the Christiania Fjord, the occurrence is less frequent, while the *V. fasciger*, which is probably identical with *V. varians*, appears very frequently both in the Christiania Fjord and along the entire south coast, amongst the deep-growing algæ.

Along our Northern coast, *V. varians* is said to be very common. Krøyer has found it at Christiansund and in the Cattegat, where it is rather common.

In England it is regarded as one of the most common Hippolytes, though perhaps not the most widely distributed. It is chiefly on the south-west coast of Devonshire and Cornwall that it appears in great quantities, and on the Irish coast. Furthermore it exists along the entire coast of France, in the Mediterranean, the Adriatic, and on the coasts of Holland and East Friesland\*).

#### ***Pandalus brevirostris*, Rathke.**

During the cruise in the Trondhjem Fjord, 4 specimens of this species were caught in the fine-meshed seine, (3 in the Stjørdal Fjord in 100 fathoms, and 1 in the Kors Fjord in 225 fathoms).

Some specimens were also captured at Drøbak. It is supposed to be very common along the entire coast from the Hardanger Fjord to the Christiania Fjord.

Lofoten is the most northerly part of this country from which this really southern or west European form has been obtained. It was taken there by G. O. Sars. It has never been recorded by Mr Storm from the Trondhjem Fjord, though, as has been already mentioned, it was caught in that fjord in 225 fathoms.

The depth at which this species is found in Danish waters, varies from 15 to 26 fathoms, and is only occasionally 10<sup>1</sup>/<sub>2</sub> fathoms. Apart from Scandinavia, it is found on the west coast of France, in several parts of the Danish waters [the northern Cattegat and Samsø belt], as well as in the Adriatic.

#### ***Pandalus annulicornis*, Leach.**

This species is very common along our coast, and was found in several southern localities during the fishing investigations in 1897—98, both in deep and shallow water, from 1 to 100 fathoms.

In the Christiania Fjord, however, it is found exclusively in deep water, from 20 to 100 fathoms. It was found in the neighbourhood

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\*) Likewise observed in various parts of the Danish coast. The account of the cruises of the gunboat «Hauch» indicate a variation of depth from 5—7 fathoms, and it is very rarely found in less than 3<sup>1</sup>/<sub>2</sub> fathoms or more than 12—17 fathoms.



of Fredriksværn and on the west coast during the cruise in the summer of 1898, in deep and shallow water, from 1 to 50 fathoms in depth, both on sand deposit, stones and mud. (see table of localities). Meinert states that in Denmark it is also found in very different depths, such as from 5 to 8 and from 17 to 54 fathoms. In the first instance the bottom deposit consisted of a substratum of sand, and in the second of mud, either pure mud, or a mixture of mud, sand and gravel, which is very similar to what is found in Norway.

During the cruise in the Trondhjem Fjord, no specimens of this type were observed, in spite of which Mr. Storm states their appearance to be fairly common.

It is to be assumed that in the Trondhjem Fjord, they chiefly occur in shallow water, and were thus not met with during the cruise, the shallowest depth trawled being 12 fathoms.

In addition to the Norwegian coast, where, as already mentioned, it is common it also exists off Iceland, (in the harbour at Reikjavik), Greenland, the east coast of North-America, the Murman Coast, Great Britain, where it is very frequent chiefly on the south coast, and is caught in great numbers at Yarmouth, and in deep water on the north coast of Ireland, and near Dublin. It is also taken off the Belgian and Dutch coasts, in the North Sea, Skagerak, Cattegat, off Bohuslæn, the Väder Isles and in the Baltic.

*Pandalus annulicornis* attains the same length as the full grown spawner of the *Pandalus borealis*.

Amongst the many beautiful specimens of *borealis* obtained in the Brevik Fjord, there are some measuring 16 cm. [the rostrum included].

When alive, it exhibits some beautiful, red, wavy, transverse delineations, which also are noticeable in *Pandalus leptorhynchus*, though not so distinct.

#### ***Pandalus leptorhynchus*, Kinahan.**

On the 29th of Nov. 1898, 3 large specimens of this species were found in the Brevik Fjord, in 50—60 fathoms, soft clay bottom, and 4 specimens at Drøbak in 1897.

The species is very scarce along our coast. G. O. Sars reports a few young individuals obtained at Aalesund and in the Sogne Fjord

in depths of from 100 to 150 fathoms, and 3 samples by Sars at Drøbak in 60—100 fathoms.

**Pandalus borealis**, Krøyer.

Besides in the Brevik Fjord, where it has been the object of very well paying fisheries, it has been obtained in the fishing investigations of various other parts of the coast, at a depth of 100 fathoms.

Not until recently, when discovered by Dr. Hjort (October, 1898), was the abundant existence of this species known in the localities of the Brevik Fjord, except from occasional specimens observed in the stomach of fishes.

In the middle of November, 1898, fisheries of this kind were started in the Brevik Fjord.

As a proof of its frequent occurrence I will refer to the results of a 2 days' trawling

[from 8 a. m. to 4 p. m.].

1st haul 30'—	2.5	Kilogram.	1st haul 30'—10	Litres
2nd » 45'—	8	»	2nd » 40'—15	»
3rd » » —	9.5	»	3rd » 18'—17	»
4th » » —	12	»	4th » 45'—20	»
5 » » —	15.5	»	5 » » 30'—21	»
6 » » —	12	»	6 » » » — 8	»
7 » » —	10.5	»	7 » » » — 20	»
8 » » —	2.5	»	8 » » » — 24	»
			9 » » » — 26	»
			10 » » » — 10	»
Total 72.5 Kilogram.			Total 171 Litres.	

[1 Klg. *P. borealis* = about  $1\frac{2}{3}$  litre].

Altogether 1048 kilogrammes were caught in 36 days on an area of about 1 mile square; average nearly 30 Kilogram a day. The results on the last day were equal those of the first. Though this small area has been subjected to fisheries day after day, no appreciable decline has been observed.

Individuals of the different sizes were found. The largest spawner measured 16 cm. The only locality in this country in which *P. borealis*

has previously been fished is the Drammen Fjord; but of late years these have greatly decreased.

One man, fishing for the railway restaurant at Drammen, might spend the whole day in catching from 1 to 2 litres. In return, however, the price of prawns was very high, sometimes amounting to a half-penny for one large specimen.

According to Mr. Storm (Bidrag til Kundsk. om Trondhjemsfjordens Fauna) *P. borealis* is very abundant in the Trondhjem Fjord, in as much as he constantly found them in the ventricles of the fishes of that locality, especially of the *Raja* genus. It was but rarely obtained in the dredge, which may be readily understood, considering the inferior implements previously applied. During the cruise in the Trondhjem Fjord, in the middle of January, 1899, several localities, with depths varying from 12 to 225 fathoms, were subjected to trawling no haul, however, furnishing more than 1 litre. In a few hauls from 225 fathoms some 40 or 50 individuals 2 years old were caught, but none of a larger size.

*P. borealis*, which is recorded as an arctic form, and previously as very scarce on the Norwegian coast, was found during the Norwegian North Atlantic Expedition in the Tana Fjord, Porsanger Fjord and Vest Fjord, as well as in some localities off Spitsbergen, in the eastern part of the Arctic Ocean and in the sea between Finmark and Beeren Eiland. It is also known from Bohuslän, the Väder Isles, the North Sea and the Skagerak.

### **Palæmon squilla, Lin.**

Preserved specimens of this common species in the Christiania Fjord is only obtained from Drøbak [in shallow water].

Along the British coasts, it occurs (according to Bell) in shallow water as well as in deep. Being a west and south European species, it appears, not only in Scandinavia, where it is found from Christiansund as far as to the east coast of Sweden and the Baltic, but in Denmark, the British Isles, the coast of France, the Canary Isles, the Mediterranean, the Adriatic and the Black Sea, as well as off the Belgian and Dutch coasts, and in the German Gulf.

**Palæmon Fabricii**, Rathke.

Obtained from various parts of the Christiania Fjord, the maximum depth being 7 metres.

In Denmark, *P. Fabricii* has a wider distribution than any other Caride. Like *P. squilla*, it is a west and south European species, occurring on the coast of Great Britain, in the English Channel, on the west coast of France, in the Mediterranean, the Adriatic and the Baltic.

In Norway, this species is well known, and is the only one, besides *Pandalus borealis*, that is fished.

**Pasiphaë tarda**, Krøyer.

Several examples of this species have been procured from Drøbak, the Langesund Fjord (100 fathoms), Aasgaardstrand (80—100 fathoms) and various parts of the Trondhjem Fjord [from 60—225 fathoms]. This, being recorded as a pelagic and arctic form, is generally considered quite rare, though it occurs throughout the entire coast of Norway.

In the Trondhjem Fjord it appeared in great abundance, as already stated by Mr. Storm. Scores of individuals were caught, whose length varied from 1½ to 10 cm., taken in depths varying from 60 to 80, and from 10 to 225 fathoms.

A few hauls with a fine-meshed seine at a depth of 225 fathoms, yielded scores of the small *Pasiphaë*, all belonging to the *tarda*, and none to the *sivado*.

As regards the larger specimens, the top part of the carapace presented a colourless transparency, being elsewhere more or less translucent and milky in hue. The smaller individuals are quite transparent, with parts of the legs and lamellæ red.

In Norway, it is found at least to the Lofoten Isles, and is furthermore known on the east coast of North America, in Greenland and Denmark, from the last-named country only through *one* specimen obtained in the North Sea in surface water, (Meinert).

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## Table recording the Norwegian Carides.

- I. Anterior feet do not terminate in a true chela, but the terminal joint admits of being inflected inwards to the anterior margin of the greatly developed penultimate joint. (Fig. 1).
1. 2nd pair of legs (with graspers,) of same length as anterior pair, though much more slender.
- A. Only 1 spine in the central margin of the carapace.



Fig. 1.

### **Crangon.**

6th segment of abdomen smooth.

*Crangon vulgaris.*

6th segment of abdomen with 2 longitudinal carinas.

*Crangon Allmanni.* [Pl. I, fig. 1].

- B. Several spines along the medial line of the carapace.

### **Sclerocrangon.**

Rostrum rather longer than eyestalks; 5 first segments of abdomen with prominent median ridges, 6th segment with 2 longitudinal ridges.

*Sclerocrangon boreas.*

2. 2nd pair of feet (with graspers) shorter than the anterior.

A. 2nd pair of feet exceedingly slender and considerably shorter than anterior pair.

a. the carapace with 5 longitudinal rows of spines.

**Pontophilus.**

1st lateral row of spines on the carapace with 2 spines, 2nd with one spine; the first 5 segments of abdomen smooth on the dorsal side.

*Pontophilus norvegicus.* [Pl. I, fig. 2].

1st lateral row of spines on the carapace with 3 spines, 2nd with 2, basal segment of abdomen with 3 spines, other five segments with 4 ridges lengthwise, 2 of which extend obliquely to each side.

*Pontophilus spinosus.*

b. Carapace with 7 rows of spines.

**Sabinea.**

Rostrum projecting rather pointedly.

*Sabinea Sarsii.* [Pl. I, fig. 3].

Rostrum rounded at apex.

*Sabinea septemcarinata.*

B. 2nd pair of feet rather strong (with small graspers).  $\frac{3}{4}$  size of anterior feet.

**Cheraphilus.**

a. Only 2 spines in the median line of carapace.

5th and 6th segment of abdomen double ridged.

*Cheraphilus nanus.*

The 6th segment of abdomen unridged, the posterior spine of the carapace rudimentary.

*Cheraphilus neglectus.*

b. Carapace with 3 spines in the median line.

5th segment of abdomen plainly marked with a median ridge and 4 less prominent longitudinal ridges. 6th segment double ridged.

*Cheraphilus echinulatus.*

**II.** Anterior pair of feet terminating in a perfect grasper, or simply pointed; terminal joint does not inflect towards anterior margin of penultimate joint.

1. Anterior feet unequal, one being monodactyle the other didactyle, 2nd pair of feet much longer and more slender than anterior pair, both with graspers.

**Nica.**

Very short rostrum, without teeth; no spines on carapace.

*Nica edulis.*

2. Anterior feet equal.

A. Anterior feet monodactyle.

a. Chelae of 2nd pairs small.

**Pandalus.**

Rostrum but slightly projecting beyond the eyestalks, 7—8 teeth above and 2—3 beneath.

*Pandalus brevirostris.*

Rostrum elongated and slightly turned upwards, furnished with teeth almost as far as the apex. [Fig. 2].

*Pandalus borealis.*

Rostrum much elongated, considerably turned upwards, exter-

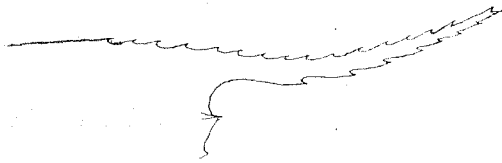


Fig. 2.

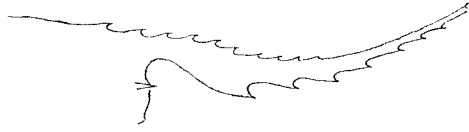


Fig. 3.

nal half of dorsal margin smooth, without spines. Greatly resembling *P. borealis*, but differs chiefly by the presence of a lateral filament on the last pair of maxillipeds which is not to be observed on *P. borealis*. [Fig. 3].

*Pandalus leptorhyncus*.

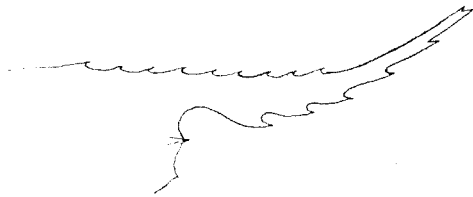


Fig. 4.

No lateral filaments on last pair of maxillipeds; rostrum long and turned upwards, without teeth on the extreme third of same. Carapace and segments of abdomen with oblique stripes of red colour. (Fig. 4).

*Pandalus annulicornis*.

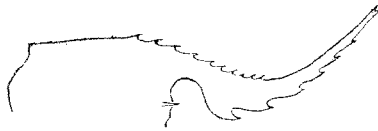


Fig. 5.

No lateral filaments on external maxillipeds; rostrum turned strongly upwards, antennal scales tapering abruptly. (Fig. 5).

*Pandalus propinquus*.

b. Chelae on 2nd pair of feet very large and powerful.

### **Caridion.**

Rostrum about half the length of carapace, with 6—7 teeth above and one beneath, ca. 23 mm.

*Caridion Gordoni*.

### **B. Anterior feet didactyle,**

a. legs without lateral filaments.

\* 2nd pair of feet the strongest (didactyle).

### **Palæmon.**



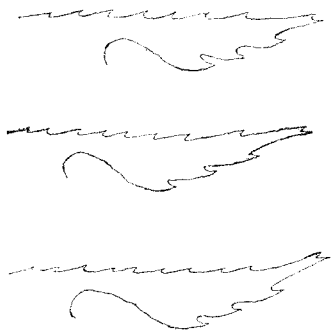


Fig. 6.

Rostrum with 7—8 teeth above, of which the two are on the carapace at the base of rostrum, and 3 teeth beneath. (Fig. 6).

*Palæmon squilla.*



Fig. 7.

Rostrum with 5—6 teeth above of which one on the carapace, and 3 beneath. (Fig. 7).

*Palæmon Fabricii.* [Pl. II. Fig. 1].

\*\* Anterior feet the most robust.

*a.* Internal antennæ with 3 filaments.

**Athanas.**

Rostrum simple without teeth.

*Athanas nitescens.*

*β.* Internal antennæ terminating in two filaments.

† Rostrum extending backwards with a ridge along the carapace. The wrist on second pair of feet many jointed. Mandibular palpe existing.

**Hippolyte.**

Peduncle of internal antennæ rather shorter than external filament, and much shorter than that of the internal. Rostrum generally horisontal, armed with 6—7 teeth above, of which 1—3 on the carapace,



Fig. 8.

and 2—4 teeth beneath. Shape elongated and slender. (Fig. 8).

*Hippolyte Gaimardi.*

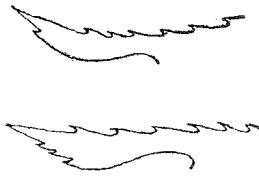


Fig. 9.

Peduncle of internal antennæ longer than the external filament, and of about the same length as the inner. Rostrum generally turned slightly upwards, armed with  $\frac{4-7}{1-3}$  spines, of which 2—3 on the carapace without teeth. (Fig. 9).

*Hippolyte polaris.*



Fig. 10.

Median ridge of carapace projecting almost at its terminal margin; the spines of carapace as well as of rostrum are finely incised in the margin — serrate; rostrum obtuse at apex, shaped in a crescent. (Fig. 10).

*Hippolyte spinus.*



Fig. 11.

Point of posterior spine on carapace situated almost above the centre of same; spines not serrated, rostrum not obtuse; terminates in a point. (Fig. 11).

*Hippolyte securifrons.*

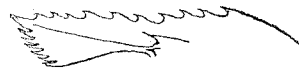


Fig. 12.

Rostrum generally straight, triangularly dilated; inferior teeth of rostrum set close together, slender and long. (Fig. 12).

*Hippolyte turgida.*

Rostrum short with 3 teeth above, unarmed beneath; apex

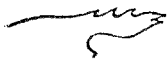


Fig. 13.

emarginate, bidentate, Only about 15 m. m. length. (Fig. 13).

*Hippolyte Cranchii.*



Fig. 14.

A slight carina on carapace; rostrum short straight and acute, about the same length as eyestalks, no expansion below, with 3—4 teeth above none beneath. (Fig. 14).

*Hippolyte pusiola.*

†† Rostrum does not extend with a carina on the carapace; wrist on second pair of feet divided into 3—4 distinct articulations. No mandibular palpe.

#### **Virbius.**

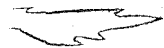


Fig. 15.

Rostrum straight, 2 teeth above, one close to the base and one near the apex. No tufts of hair on the body. (Fig. 15).

*Virbius varians*

Rostrum same number of teeth. Carapace and abdomen with tufts of hair.

#### **Virbius fasciger.**

††† Anterior feet as in the Hippolyte, 2nd pair of feet very slender and weak, with a 9-jointed wrist. The mandible without palpe. Telson much elongated, with an obtuse point.

#### **Bythocaris.**

Rostrum short, little longer than eyestalks, apex awl-shaped, without teeth. Ca. 33 mm.

*Bythocaris simplicirostris.*

†††† Chela on anterior pair of feet apparently wanting (rudimentary).

### **Cryptocheles.**

Rostrum horizontal, apex pointed with several (8—12), teeth above unarmed beneath ca. 13 mm. (Fig. 16).

*Cryptocheles pygmaea.*

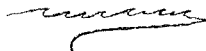


Fig. 16.

b. All feet with distinct lateral filaments, 1—2 pair with strong graspers, longer than remaining feet; the shape greatly compressed.

### **Pasiphaë.**

Telson transversely truncated at the tip. (Fig. 17).

*Pasiphaë sivado.*



Fig 17. 18.

Telson incised at the tip. (Fig. 18).

*Pasiphaë tarda.*

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## Appendix.

The remainder of the material collected during the Fishing investigations of *Crustacees* will later be subjected to a closer perusal.

Meanwhile however an account will be given of the Crustacees [not including the Decapodes previously recorded] gathered from the 3 hauls in the Trondhjem Fjord from a depth of 200 and 100 fathoms with a finemeshed bag, which indicates the abundant occurrence of these marine-animals in those localities.

The undermentioned species are all recorded by G. O. Sars, to whom I furthermore feel much indebted for the ready assistance received during the ascertainment and elaboration of notifications concerning the collected material of *Decapodes*.

### The Trondhjem Fjord, January 18th 1899.

<b>Copepoda.</b>		Kors Fjord.	Stjærdals Fjord.
<i>Eucheta norvegica</i> , Boeck,	several scores,	200 fathoms,	100 fathoms.
<i>Calanus finmarchicus</i> , Gan,	" 1 <sup>1</sup> / <sub>2</sub> "	" 5 spec.	" "
<i>Chiridius armatus</i> , Boeck.	" "	" 6 "	" "
<b>Schizopoda.</b>		Kors Fjord.	Stjærdals Fjord
<i>Tysanopoda norvegica</i> , M. Sars.	Several specimens,	200 fathoms	100 fathoms
<i>Thysanoessa longicaudata</i> , Kr.	1 "	" "	" "
<i>Boreomysis arctica</i> , Kr.	5 "	" "	1 spec. "
" <i>tridens</i> , G. O. Sars.	Some scores	" "	" "
" <i>megalops</i> , G. O. Sars.	1 spec.	" "	" "
<i>Erythropis serratus</i> , G. O. Sars.	1 "	" "	1 " "
<i>Mysidopsis didelphys</i> , Norm.			
<i>Hemimysis abyssicola</i> , G. O. Sars	12 "	" "	1 " "
<b>Isopoda.</b>			
<i>Munnopsis typica</i> , M. Sars.	8 "	" "	1 " "
<i>Erycope cornuta</i> , G. O. Sars.	9 "	" "	" "
<b>Amphipoda.</b>			
<i>Aceros phyllonyx</i> , M. Sars.			3 " "
<i>Oediceropsis brevicornis</i> , Lilljeb.	3 "	" "	" "
<i>Pardalisca tenuipes</i> , G. O. Sars	2 "	" "	" "
<i>Halice abyssii</i> , Boeck.	2 "	" "	1 " "
<i>Nicipe tumida</i> , Brüzel,	1 "	" "	" "
<i>Andania abyssii</i> , Boeck.	12 "	" "	" "
<i>Scina borealis</i> , G. O. Sars	20 "	" "	" "
<i>Phaehotropsis macropus</i> , G. O. Sars	20 "	" "	12 " "
" <i>leucoptalma</i> , G. O. Sars,	16 "	" "	" "
<i>Sorathemisto oblivia</i> , Kr.	1 "	" "	2 " "
<i>Tryphosites longipes</i> , Sp. B.			10 " "



Fig. 1.

Fig. 2.

Fig. 3.

*A. Wölbekent auctore. Fig. 1. Palaeomon Fabricii, Rothke. Fig. 2. Hippolyte secuirifrons, Penna.  
Fig. 3. Pasiphaë tarda, Kröyer.*

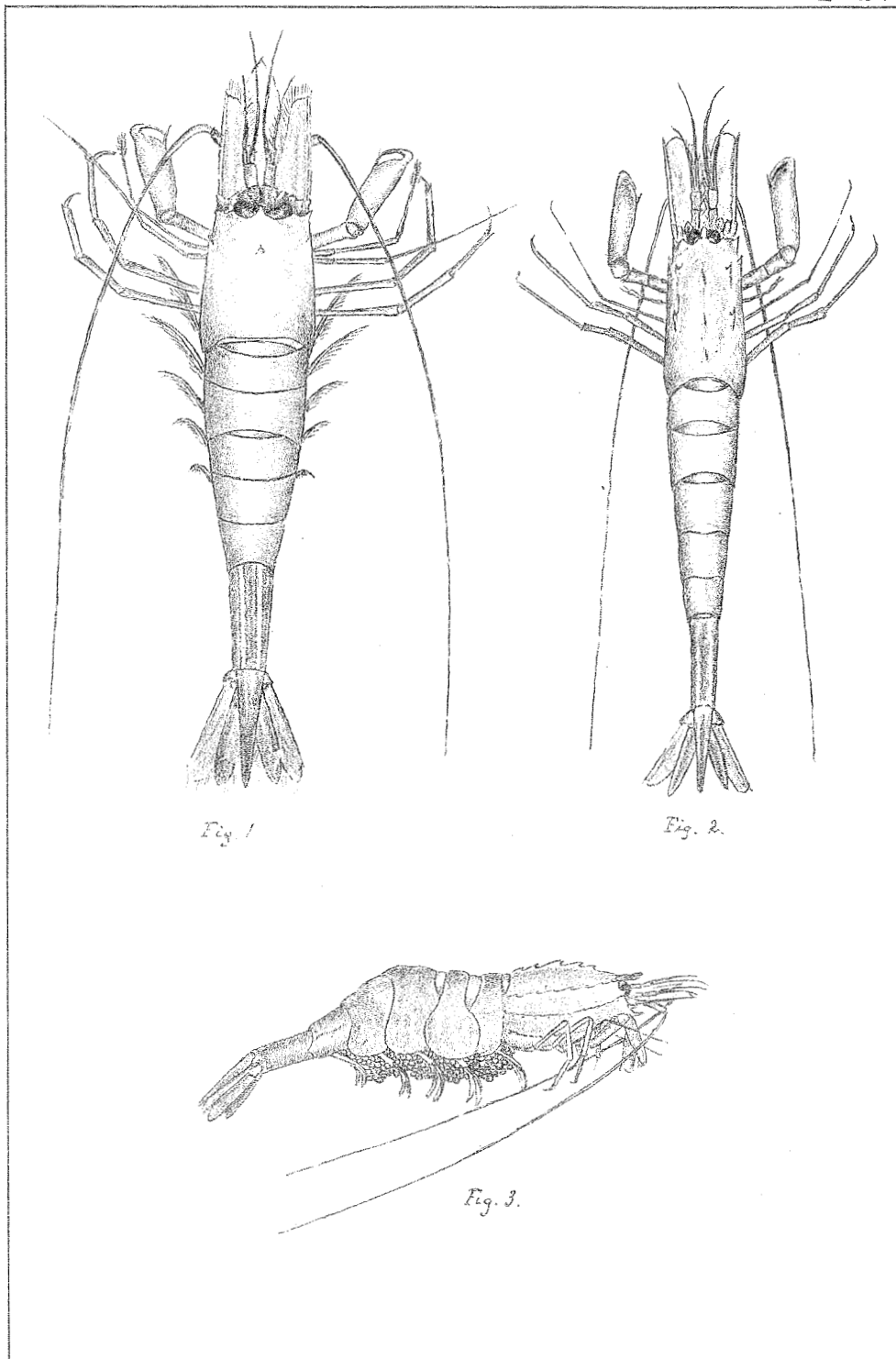


Fig. 1

Fig. 2.

Fig. 3.

A. Höllbæk auctogr.

Fig. 1. *Crangon Almanni*, Hin. Fig. 2. *Pontophilus norvegicus*, M. Sars.

Fig. 3. *Sabinus Sarsii*, Smith.