Prodromus faunae Copepodorum parasitantium Scandinaviae.

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The copepods here described were found partly in the Sea of Kattegat, near the town of Warbergam, partly on the west coast of Norway, but most of them in the western part of Skagerrack Sea and beyond the shore of Bahusia— There have been added to these the collection of the Land Museum.

Scandinavian species already reported, but not seen by me are enumerated but not described, while those found on the shores of Denmark and the Islands, but not yet in the neighborhood of Sweeden or Norway, are excluded.

Many other writers have written of these parasites, and in particular Thorell, Steenstrup and Lütken, Sars, and above all Krøyer, have described many species from Denmark and Norway. Yet they included others also and the present is the first paper to treat of Scandinavian species exclusively.

Siphonostoma (Latreille)

These animals are very closely related to the true copepods, although at first sight somewhat dissimilar, as is shown by their development, and by intermediate forms. It is not easy, therefore, to distinguish between the true copepods and the Siphonostoma.

A parasitic life seems to be common with the latter and certain of the former (Notodelphys, Corycaeidae, and Calaindae). But closer examination shows that such species as live in the cavities of Ascidians or Hydrozoa are guests rather than parasites, since they feed not on the hosts' body, but upon a part of its food. This is further shown by the fact that the really parasitic copepods are furnished with a rostrum suited for sucking, while the free-swimmers and guests are furnished with mouth-parts suited for chewing or for biting and licking.

Here it may be observed that altho a rostrum or siphon is lacking in many of the Chondrocanthidae.

Yet Krøyer saw and pictured one in Trichthaceras peristedii, and also saw one in Bllias prionotus.

Among the Ergasilidae many genera lack even the rudiments of a rostrum, yet Krøyer gives both Nicothoe and Thersites gasterostei as furnished with one. Even in Lichomolgus, which was first placed by its founder among the Ergasilidae and afterwards among the Sapphirimidae, a part of the rostrum is left.

From this it is evident, I think, that the mere presence or absence of the rostrum is not enough to determine the order. Nor is there anything better to propose— For the tail of the parasites diminishes and becomes immoveable, the body segments and swimming legs disappear, the post! antennae unable to locate them with certaintly.

The males depart less from the copepods type and retain more activity than the females— While the latter are parasites all the time the former swim around: the latter are fixed and immoveable, the former seek the female in order to affix the spermatophores to her body—

Since I have neither the space nor the ability to show the internal and external organs, development and affinity either of the whole order of Copepods or of that part of it which are commonly called Siphonostoma, I will now insert a familiar synoptic table, which refers to the Siphonostoma.

I. Anterior antennae many jointed—body segmented
  1. Body segments distinct body suborate—
    a. Head depressed: rostrum pyriform—Ascomyzontidae
    b. No rostrum— Ergasilidae
II. Anterior antennae 3 segmented—body flat or cylindrical
  1. Antennae broadly peltate, egg tubes filiform Caligidae
  2. Body segments indistinct or confluent: male a pygmy
    a. Posterior antennae free, claw-shaped — Chondracanthidae
    b. Arms joined at apex with bulla—Lernaeopodidae

c.. Nodes or horns buried in host—
Pennellidae

Argulidae omitted since they seem rather to belong to the Branchiopods..

I Family — Ascomyzontidae— Thorell.

Parasites in Ascidians and other invertebrates, unknown to me.. Ascomyzon lilljeborgii,. in Ascidia parallelogrammatus Dyspontius striatus,, host unknown— Asterocheres liljeborgii,. in Echinaster sanguinolentus.. Artobrogus orbicularis, in Doris sp..

II Family Ergasilidae,, Milue Edwds..

Body with a cyclops form - segments of abdomen and tail distinct: often furnished with lateral wings.. Cephalothorax stout, in the ♀ often subglobase, never broadened into a shield,, but sometimes depressed.. Anterior antennae slender, at least 4 joints armed with setae: posterior pair often large functioning as clasping organs, often pediform.. Rostrum none or very short. Mxpds, when present, in the form of hooks— Abdominal feet nataory,. biramose.. Tail with apical setae— Egg-sacs with eggs not uniseriate— Males cyclops-like.

Closely related to the Corycaeidae,, Bomolochus with a body form and first antennae like the Caligidae.. Selins,, a genus not yet well known,. found on the back of an Aphrodite on the Denmark Coast, is referred here but has many affinities with the Chondracanthidae..

Genus Nicothoë,. Milne-Edwds.

At least the 4th abdominal seg't of the ♀ projecting on either side in the form of a large lobe- Rostrum short.. Male minute,. cyclops shape, swimming freely.

Nicothoë astoci Edwds.. ♀ Antennae setiferons, 10-jointed.. Lateral lobes large,. bent backwards— & biramose swimming legs, the two last ones rudimentary.. Males not seen, with a much smaller num-

ber of rings, a single eye, simple antennae and feet, like those in young females. On the gills of Homarus vulgaris. Numerous specimens in the Land Museum.

Genus Thersites, Pagenstecher.
Thersites gasterostens, Pagenst, 1861.
Found on the gills of Gasterostens aculeatus.

III. Family Caligidae, Burmeister.

Body depressed: cephalothorax shield-shaped, and fused with one or more of the following segts. First seg't of post abdomen (genital seg't) greatly enlarged in the ♀, the rest (i.e. the "tail")) less developed: 2 setiferons appendages at the end of the tail. Ant I antennae with 2 free joints, on either side of the broad frontal laminae (i.e. the lamina at the anterior margin of the carapace). Post I antennae with hooks, as also the mxpds. Rostrum including two mandibles. 5 abdominal feet 4 or more of which are biramose, all natatory either branchial or with plumose setae. External egg-tubes thread-like: eggs flattened, uniseriate. Males and females parasitic on the skin of fishes, but often swimming freely. Family better defined than the preceding one and closely related to the following one- The 2-jointed antennae and frontal plates are essentials, tho Laemargus and Phyllophorus have 3-jointed antennae.

1st. Tribe Caligini: rostrum ovate and obtuse: last abdomen seg't only (in Trebius the last two) free: animal often furnished with dorsal wings (elytra). Eight swimming legs furnished with setae.

Genus Caligus (Müller) Nordmann.

Frontal plates with two lunules: two eyes: a ventrall furca between the mxpds. Three pairs of swimming feet, the 1st. with endopod only, yet with plumose setae, the 2nd. large with 3-jointed remi, the 3rd. with short 2-jointed rami, the 4th on the free abdominal seg't, with a single ramus and simple setae. A large genus.

A. Fourth legs with 4 spines
I. Tail one-jointed, short (in ♀ shorter

than gen. seg't)
2. Tail jointed, C. fallax, Krøyer, unless a freak.

B. Fourth legs with 5 spines: tail much longer
1. Tail of ♀ one-jointed.
2. Tail of ♀ jointed.

A. 1.) Caligus curtus, Müller.

Carapace of ♀ elliptical, of ♂ widely rounded. Furca with subparallel, premorse branches. Inner seta of 4th legs 1/3 longer than the next ones, serrate. Coenital seg't. of ♀ longer than wide, rectangularly concave post !, of the ♂ subquadrate. Length 10-14 mm.

Found on the outside of Gadus morrhua, G. virens: Molva vulgaris: Raja batis: Acanthias vulgaris: Raja rodiata: R. fullonica: Chimaera moustrosa: Lophius piscatorius: Trigla gurnardi: Sebastes norvegicus.

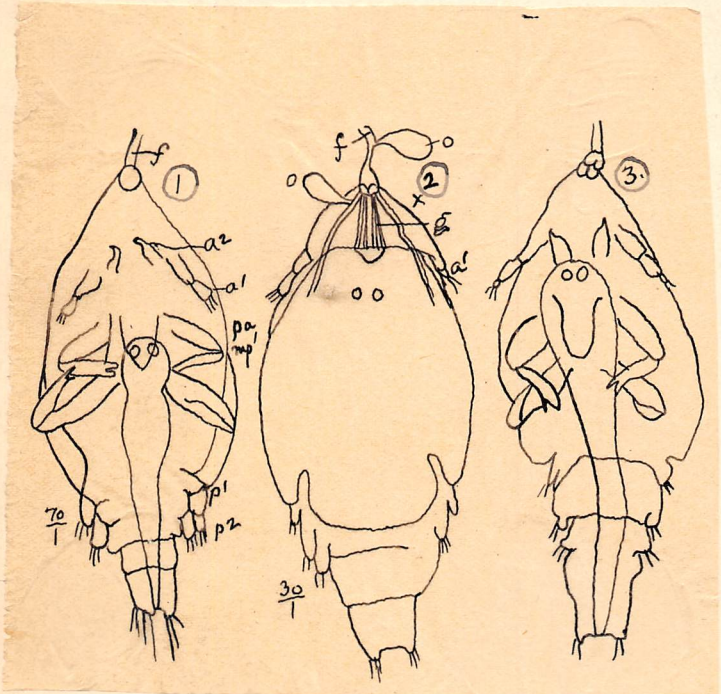
This copepod often carries a large number of the eggs of Udonella, and often the Udonellas themselves (U. caligorum) especially along the margins of the Carapace, where they look like white fibres against the dark shield. I have even found the larvae of C. curtus fastened by their frontal filament to the margins of the carapace. They were younger than those Krøyer saw. 2 mm. long, without lunules or the rudiments of the caudal feet, the eyes a little in front of the center of the carapace.

Caligus aeglefini, Krøyer, on Gadus aeglefinus and Raja radiata---abbreviatus, Krøyer on Labrus maculatus.

A. 2.) Caligus fallax, Krøyer on Gadus morrhua.
B. 1) Caligus belones, Krøyer

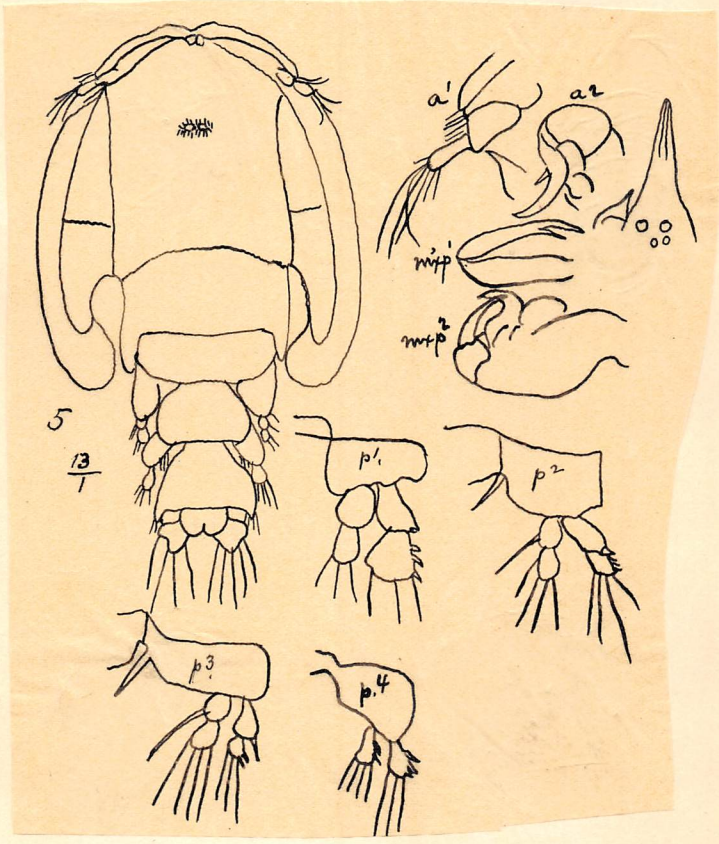
Carapace narrowed anteriorly, with nearly straight margins. Furca with a narrow elongate base, the branches diverging very much, striaght, considerably narrowed at the obtuse apex.

Plate I. Figs. 1 —— 3.



1. Larva of Calyptus rapax 0.86 mm. long.
2. Larva of same 2.3 mm. long. 0. Egg of Udonellidae. a', first antenna. E. gland & frontal filament x. fascia (fulcrum?).
3. Larva of Trebius caudatus.
4. Same, life size.

Plate I, Fig. 5.



Nogagus socialis. n. sp. ♂

Fourth legs small, with slender setae, the last of which is the longer. Gen. seg't of ♀ large, 1/3 of the entire length, concave post: with rounded corners: in the ♂ subrotund. Tail of ♂ 2-jointed. Caudal appendages of both sexes larger and wider than usual so that they touch one another and equal the width of the tail. (italics Ollssons). Found on Belones vulgaris.

The male hitherto unknown differs in its smaller size, more slender 2-jointed tail, and longer apical setae. Length scarcely 5 MM (in ♀ 6 MM). Carapace of the same shape as in the ♀ but 1/10 less than half the length of the creature. Post: antennae stouter: rostrum a little narrower. Fourth legs as long and stout as those of the female, reaching the last joint of the tail or a little longer.

Joints differing neither in shape, proportion nor armature from those of the female— Gen. seg't. rotund, scarcely longer than wide, both setigerous nodules set with 3 setae. In the angle of the tail another larger, hidden one is seen— Tail of the same length as the gen. seg't. distinctly 2-jointed the last joint twice the longer. Caudal appendages narrowed at the apex, equalling on the interior margin the first joint, on the exterior almost the 2nd. Median setae as long as the gen. seg't. Lenses of the eyes in the usual position, globase, separated by 2 diameters. In addition to the setiferous appendages there are 3 plumose setae on each margin of the gen. seg't. of the female, without doubt rudimentary legs.

Caligus rapax (Edwds?) Stp. & Lütken.

Palps simple, acuminate, Furca with divergent, almost straight branches, aperture at the base usually angular. Apical setae of the 4th legs minutely serrate, covered at the base by serrate lamellae: seta of the 2nd joint straight, the others slightly curved, the inner apical one twice the longer. Gen. seg't. of the ♀ ovate-rotund, post: margin trimeate: in the ♂ much shorter and narrower.

Found on Trigla gurnardus: Acanthias vulgaris:

Raja batis:: Molva vulgaris:: Gadus melanostomus: Chimaera monstrosa:: Gadus virens: G. morrhua:: Cyclopterus lumpus..

Edwds'. C. rapax can probably be referred here tho" it differs in several particulars— Krøyer described C. garnardi and C. lumpi as separate species,, but the specimens I have found do not differ enough to narrant a separate species. After some discussion Olsson places these last two as varieties,. giving as distinguishing characters— Shield in lumpi is higher,. the margins converging anteriorly,, nearly straight. In gurnardi the body is longer and has an evenly curved outline..

The smallest larva found by me was 0.6 mm long and 0.2 mm wide— Frontal filament as long as the body.. Ant! part of body very slender.. First antennae without joints, ciliated at apex. Mxpds. fully developed. Abdom.. feet of 1st.. and 2nd. pairs rudimentary, soft, without joints, scarcely ciliated. Post.! part of body long and narrow,. tail appendages with minute and simple setae.

A second larva 0.86 mm long had a wider tail: the anterior part of the body was not so attenuate:: 1st antennae now 2-jointed:: post! pair minute. Rostrum and intestine well differentiated:: 2nd-mx. long. subulate.. Anterior mxpds furcate at apex:: post! pair armed with a short and sharp hook.. 1st and 2nd. legs 2-jointed,. ciliate:: 3rd.. pair without joints or cilia.. Carapace not yet developed fully - no areas,. post! margin straight.. First seg't united with thorax:: 2nd-4th free:: post-abdomen without joints - eyes distinct in the middle of the shield..

A third larva 1.3 mm long had all the feet conspicuous.. The 1st pair distinctly 2-,. indistinctly 3-jointed:: the first 3 pairs setiferous at the apex.. The largest larva I have seen 2.3 mm long, had the carapace rounded anteriorly,. and a large thoracic area.. First antennae 2-jointed but short.. Gland which secretes the filament visible in the front of the carapace. Evolution from the nauplius to the smallest larva here described

is unknown.

Caligus nanus, Krøyer, on Gadus morrhua and G. aeglefinus, in connection with Caligus angustatus.

B. 2) Caligus diaphanus, Krøyer (not Baird).
Carapace transparent, subrotund, much wider than long. Post. mxpds. stout, basal process distinct. Furca with diverging, obtuse branches. Fourth legs short, the distal seta scarcely longer than the proximal. Gen. seg't. large, semielliptical, a little longer than wide; a little more than half the length of the carapace— Tail elongate, equalling or surpassing the gen. seg't. in length slender, 2-jointed, the 2nd. joint shorter, length 4 mm. Found on Trigla gurnardus—

This species is easily distinguished. Egg-tubes 3 mm long: eggs red - 40 in number— Palps simple, about half as long as the rostrum. In each post. angle of the gen. seg't. 2 or 3 setae are seen. Near the base of the tail the spermatophores are prominent— The other "cylindrical bodies" spoken of by Krøyer I have never seen.

Caligus angustatus, Krøyer, on Gadus morrhua and G. aeglefinus together with Caligus nanus.

Genus Lepeophtheirus, Nordmann.

No lunules— Otherwise as in Caligus.
A. Furca with divided rami.
B. Furca with simple rami.
1) Tail much shorter than gen. seg't.
2) Tail of ♀ elongate, slender, about equalling the gen. seg't. in length.

A. Lepeophtheirus hippoglossi, Krøyer.

Furca with bifid and truncate branches: branchlets of equal length, the inner ones parallel. Fourth legs 4-jointed with 5 setae, the inner apical one more than twice the length of the outer. Gen. seg't. ♀ bilobate, lobes rounded, with the tail less than half the length of the gen. segt— In the ♂

at the post! angles are 4 acute spines— ♀ 10–15 mm ♂ 6 mm. Found on Hippoglossus maximus:: Raja batis:

I possess a single ♂ which agrees with the description given by Krøyer. Young females, still lacking the spermatophores, with the gen. seg't twice shorter and narrower then in the adult, have the lobes present— On both margins very minute setae are conspicuous - on the ventral surface these are seen to originate in acute processes, the rudiments of the 5th. legs.

B. 1) Lepeophtheirus pectoralis, Müller

Carapace subtransparent, almost perfectly elliptical and convex. Furca with short lanceolate branches. Fourth legs very short, 3-j. obscurely 4-jointed, armed with 4 spines, the external apical one short, the inner one much longer. Gen. Seg't of the ♀ obcordate with rounded angles, of the same width and length - in the adult equalling the width of the carapace, and 1/5 or 1/6 longer. Length 6 mm.

Variety – L. gibber Carapace narrowed anteriorly -projecting at the center: post! area strongly tapering, scarcely convex. 2nd mxpds. enlarged. Gen. segt. smaller, the ant! margin more curved.

Found on the pectoral fins of Pleuronectes fl flesus, and also on the belly of Raja radiata (transferred?). I have not seen the male, which is distinguished by its elliptical - oval gen. segt. The var. gibber has already been described by Krøyer: in the form of its carapace, in its enlarged mxpds. an in the form of the gen. segt. it stands close to L crabro, Krøyer, from which it differs scarcely at all except in the rounded angle of the basal part of the furca and in the fact that there are only 4 setae on the 4th pair of legs.

Carapace almost wider than long, thoracic area elliptical— Gen. seg't. nodular, with 3 or 4 setae on either side. The female has the regular form except that the gen. segt. does not show the

setae as plainly since they are more ventral. The anterior subsidiary hooks are elongate, less curved and between them are the smaller hooks (antennal palps, Krøyer) near the bases of the 2nd antennae. Otherwise it is scarcely different from the regular form--palps with sublanceolate branches in front of the large rostrum--furca with narrow wings, the basal part much the longer and rounded--feet of the 1st pair armed at the tip with 4 setae diminishing post.,the penultimate joint carrying a minute apical setae--2nd feet with a striaght, retrovert claw, 3rd legs with a hook straight at first, then straight then introse- retrose--4th. legs with the basal joint larger than the others longer, and with a straight spine, the last joint armed with 3 spines- Gen. seg't hallowed post.: the tail only 1/4 the length of the gen. seg't. with minute rhomboidal appendages. These and others, which are common varieties of C. pectoralis, are enough to show that these animals are to be referred to this species.

B. 2). Lepeophtheirus branchialis, Malm (Stp. and Ltk.)

Carapace orbicular, the same length and width strongly convex. Furca with a narrow basal angle, longer than the branches: the latter large, acuminate, and not divergent. Both rami of the 3rd legs distinctly 2-jointed. 4th legs small, distinctly 4-jointed, the stout basal joint longer than the others, the 2nd joint with aminute subulate seta, the 3rd about equalling the last, the inner seta of the 4th. joint 3 times longer than the others. Gen seg't. 1/4 shorter than the carapace, linear, narrowed anteriorly, with minute appendages. Found in the branchial cavity of Rhombus laevis, and on the gills of Rhombus maximus.

From the genus Rhombus inhabiting the seas which wash our shores no less than six species of the genus Lepeophtheirus have been reported, thompsoni, Baird, gracilis, Beneden, branchialis Malm after Stp. and Ltk.: rhombus, Krøyer, gibbus, Krøyer gracilescens, Krøyer. Which of these are really distinct it is difficult to decide. Krøyer who described 3 of the, has left no certain

means of distinction. I consider Caligus branchialis to be the same as C. gracilis, Van Beneden, and that the latter is less exactly or justly described. I believe L. rhombus and L. branchialis to be the same, and that L. gibber holds the same relation to them as a variety that the variety gibber of L. pectoralis holds to it.

Caligus gracilis, Beneden, must be regarded as a valid species, if the abdominal feet of the 3rd and 4th. pairs are shown in the figures just as are in the copepod, to say nothing of the rostrum antennae, and other less different parts. The other figure of C. branchialis by Stp. and Ltk. differs in having the gen. segt. almost triangular and may perhaps constitute a variety, unless this part changes greatly at different periods.

Krøyer's rhombus differs from branchialis, only in the most minute details and can scarcely be recognized: a short spine at the tip of the 2nd joint of the 4th legs, while the inner terminal setae is somewhat shorter, a minute slender seta on the 2nd. antennae, acuminate processes on the 2nd. mxpds. Finally everything that Krøyer has said about rhombus would apply equally well to the present species, those with reference to the furca, the gen. segt. and the first mxpds being changed slightly. For the rami of the furca in this species could not be called "recti approximati" but rather carved, with a rounded basal aperture: In the mxpd. I have not found any seta: the gen. segt. is no more destitute of the setae in this species than in others heretofore described - since there are 3 setae on either side, and in some individuals there are prominent post: as noted by Claus and Beneden.

I cannot be certain about any teeth on the mandibles. The color, of which nothing has been said elsewhere, is transparent, the carapace and anterior part of the gen. segt. sprinkled with spots of yellow-brown. The spots which surround the lenses of the eyes are continuous and red. Basal joint of the 1st. legs, armed anteriorly with a slender spine.

Plate II. Figs. 8 & 9.

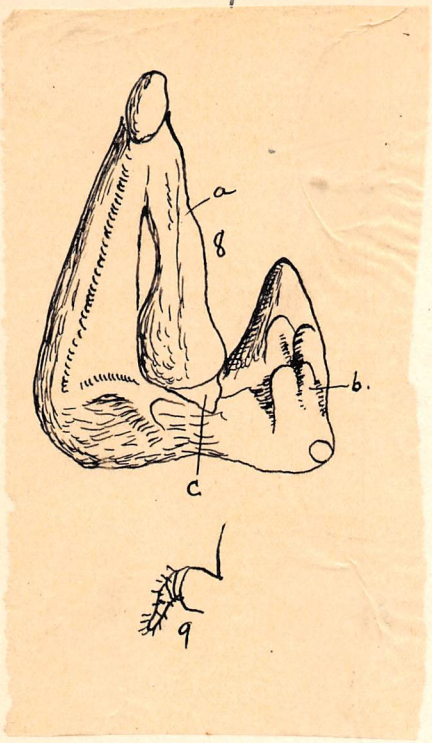


Fig. 8. Post' mxpds of Pandarus bicolor, a. Stylus fulcrius. b. lamina sulphurea. c. lamina acuta.
Fig. 9. Ant' antenna of Eudactylina acuta

Plate II. Fig. 11.

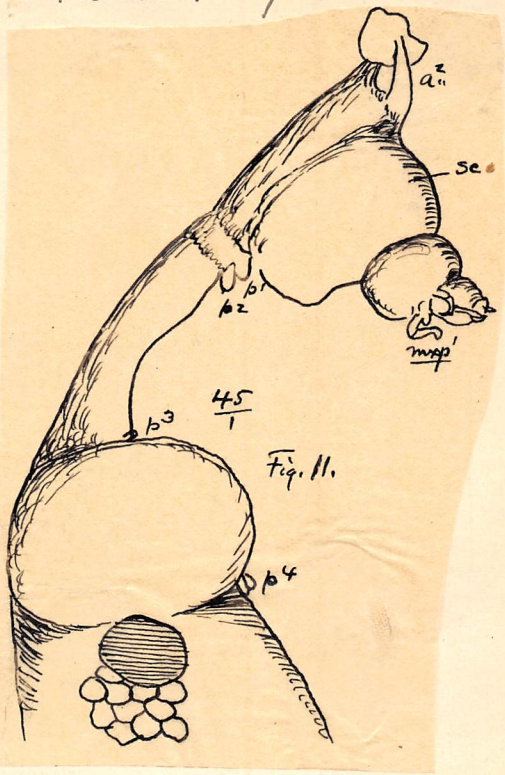


Fig. 11.

Fig. 10. Tenicules clavatus, natural size.

Fig. 11. Anterior portion same enlarged.

Lepeophtheirus salmonis, Krøyer.

Female: Carapace elliptical, less than half the length of the body. Furca with an elongate base narrowed anteriorly, the arms stout, short, with obtuse tips, divergent. Rami of the 3rd. legs as in branchialis. Fourth legs four jointed with 4 spines, the apical ones decreasing in length, the inner one almost twice as long as the others. Gen. seg.t. subrectangular, deeply hollowed post.l: in the ♂ oblong-elliptical. Tail not as long as gen. segt. Length ♀ 15 mm. Found on species of Salmo.

Caudal appendages even in the female wide and converging at the tips— Gen. seg't. in the young female narrowed anteriorly. I have always found extra spermatophores on the tubercles at the bases of the egg-tubes. The margin of the inner apical seta of the 4th legs serrulate as in sturionis. Length of carapace 13/26 - 13/30 of the entire length.

Genus Trebius, Krøyer.

Third and fourth abdomen seg'ts free. All the abdominal feet natatory, biramose. Rami of the 1st. pair 2-jointed, of the other pairs 3-jointed. No lunules.

Trebius caudatus, Krøyer

Carapace of ♀ a little longer than wide: of the ♂ subquadrangular. Furca with an elongate base longer than the branches: the latter simple attenuate. Gen. seg't. of adult female semielliptical; of the young ♀ rectangular; of the ♂ a rounded-oval. Tail of the ♀ 3-jointed, much longer than the gen. seg't; of the ♂ 2-jointed. Length ♀ 6-12 mm ♂ 5 mm. Found on Raja batis and R. fullonica.

I have collected 40 specimens, of which 8 were males. Three females carried young fastened by a frontal filament, but none had Udonellides. The dorsal surface is covered with red dots so close together that the whole animal appears red. They are always covered with a dense mucus. Carapace sometimes very convex, at others the post ♀ area

is sloping, so that a variety "gibber" might exist. Setae, or rather spines, on the gen. seg't. of the female stout, not ciliate, and often prominent.

A single larva of this genus has been found by Krøyer, less than half the size of the smallest one seen by me- 0.8 mm. long and 0.3 mm. wide, with a long filament. Forehead acute: ant. antennae 3-jointed all the joints large, the last one with a few cilia, the others without any- Post. antennae short, with a soft 2-jointed (?) terminus. Rostrum without palps. Mxpds. present, at least the anterior pair with hooks. Two pairs of abdominal feet present, the single basal joint of each pair with 2 one-jointed, ciliate rami. Caudal appendages scarcely noticeable. Ant. portion of the larva covered with old skin carrying the ant. one-jointed, slender antennae. Filament produced into a short thread between the basal and terminal nodes.

A larva a little longer (1.2 mm.) shows vestiges of the 3rd. legs. The last joint of the ant. antennae elongate as in the adult, the basal one with a seta, the eyes move conspicuous, the mxpds better developed, the caudal appendages smaller. No palps. Intestine well differentiated. Post. (?) area of the carapace broad, rounded posteriorly, with a distinct margin, filament more than half the length of the larva.

Larva 2 mm. long has all the abdom. feet, but the rami, except those of the first pair, are not jointed. Ant. antennae are covered with hairs: the claw of the post. mxpds carries a short spine. To the post. margin of the rostrum are attached 2 short, acuminate stylets, like palps: inside of the rostrum itself are the subulate mandibles. So far as known, therefore, the development is like that of Caligus. 2nd. Tribe Pandarini. Rostrum subulate, elongate. 2 or 3 post. segments of the abdomen free, in the female with dorsal elytra. Abdom. feet often with foliaceous rami, setae short and simple- Parasites on sharks (with the exception of Cecrops).

Nogagus. Leach.

Male. Cephalothorax divided. Three abdom. segments free, of which the 2 anterior are furnished with lateral processes. All the abdominal feet natatory, biramose, with stout plumose setae. Rami of 4th pair 1-jointed, of the others 2-3-jointed.

Female recognized with certainty only in N. paradoxas (Otto), and this may be the type of a new genus since the female of the type genus N. latreillii, Leach, is hitherto uncertain. Perhaps, as Stp. and Ltk. suggest, Nogagus is not a separate genus but is made up of the males of other genera.

Among the true Pandarini (excluding Cecrops and Laemargus) both sexes have been seen only in N. paradoxus (Otto) and Lütkenia asterodermi (Claus). Krøyer's doubtful female of N. latreillii is not well enough established to be here included.

On the body of Acanthias vulgaris I have found 2 new species of Nogagus, with a new female of Echthrogaleus. Yet these are so closely related to other Nogagus species, that I shall present only a single species. Krøyer's opinion that Stp. and Ltk's sections of Nogagi include, the one males and the other females, does not appeal to me, in order to connect 2 forms dissimilar.

Nogagus socialis, New species.

Carapace scarcely longer than wide, eyes not distinct. Ant. I antennae armed with very long, plumose, apical setae. Abdomen without elytra: 4th legs with 1-jointed rami, the others 2-jointed. Gen. seg't. small, semicircular, with acute posterior angles. Tail 1-jointed, appendages subquadrate with long setae. Length 4 mm.

Found on the body of Acauthias vulgaris in the Sea of Skagerrack, along with Echthrogaleus perspicax, during the month of August.

Although closely related to N. tenax (Stp. and Ltk). it is easily distinguished from all known forms. Color yellow: body sensibly narrowed post'

length, exclusive of setae, 4 mm.

Carapace with lateral processes a little longer than wide, more than half the entire body length, the post. margin a little hollowed: the lateral areas narrow, the transparent margin very wide.

Two large eyes, placed close together, with globular lenses, a little in front of the transverse line— Frontal margin broad, curved, a little incised: with 3 marks arranged in a triangle, scarcely distinguishable in color. Frontal plates narrow, slightly curved. Basal joint of the ant. antennae a little longer than the 2nd. joint, with plumose setae: 2nd joint linear its setae small and simple, the 3 apical ones plumose with one on the inner margin, the former 3 times as long as the joint, similar to the armament in N. borealis.

Post. antenna with an elongate hook and a single seta— At its base and outside is a swelling (antennal palps), scarcely acuminate, and toward the margin another stout, conical, obtuse one (hamulus anterior). Rostrum subulate with obtuse palps. Ant. Mxpds. with a large claw scarcely hairy: post. one stout, chelate, the smaller claw arising from a large lateral articulate process, the larger one with setae or spines, 2 straight.

First abdominal seg't. fused with the carapace, no furca distinguishable: 2nd. seg't. with a lateral process on either side, reaching back on the ventral surface to the ant. margin of the 4th. segt.: 3rd. seg't. wider than the 4th., both of them with rounded lateral margins but without processes or elytra. Spines on the 1st legs 3 (?), on the 2nd. 4 and 3, on the 3rd. land 2, on the 4th. 3. The post. angles of the gne. seg't armed with a straight spine and a seta--sexual organs not distinguishable.

Genus Dinematura (Latreille) Stp. & Ltk.

Female. Cephalothorax divided into areas: 3 free abdominal seg'ts. and none of them fused: the last one with 2 elytra. Abdom. feet of the 3rd. pair with 2 3-jointed rami set with plumose setae.

Feet of the 4th. pair winged at the base, the rami large, foliaceous, one-jointed, without plumose setae. Tail 2-jointed, without lateral wings or dorsal folia— Male unknown, possibly Nogagus.

Dinematura ferax. Krøyer.

Female. Smaller claw of the 1st. maxillary feet recurved, and covered with spines. Rami of the 4th. feet oblong, much more than half the length of the gen. seg't., which latter is 3 times as long as the elytra, which are truncate anteriorly and rounded posteriorly. First joint of the tail very short, the elytra directed outwards, the dorsal foliae stopping at the end of the gen. seg't. or in front of it. Caudal appendages large and prominent, oblong, obliguely truncate anteriorly— Length 32mm

Found on Scymnus borealis near Hammerfest in "Finmarkia" (M. Sars). Egg-sacks four times as long as the body—

Dinematura lamnae (Johnston) Baird.

Found on damna cornubica.

Genus Echthrogaleus, Stp. & Ltk.

Cephalothorax divided. Three abdomen segments free, the 2 anterior ones without a dividing suture or with an indistinct one, and no elytra. The third seg't. in the ♀ with 2 large elytra.

The 3 anterior pairs of abdominal feet with 2 3-jointed rami, the plumose setae smaller in the ♀. The 4th pair in the ♀ not winged at the base, the rami foliaceous and 1-jointed, the setae minute and non-plumose. The tail in the ♀ 1-jointed, with a single dorsal folia which is almost as wide as the gen. seg't.. The male a Nogagus.

This genus can scarcely be distinguished from Dinematura. The species about to be described is an intermediate form, approaching the true Dinematura in many particulars, altho for other reasons it is

necessary to classify it as an Echthrogaleus.

For it is distinguished by the fact that the 2nd. and third abdominal seg'ts. are scarcely fused, but are separated by a suture, the plumose setae of the abdom. feet are well developed, the elytra are separated one from another, the gen. seg't. is less deeply divided, by a wide fissure, the tail is not flattened and is covered by a rudimentary dorsal foliam, the appendages are prominent. The males are hitherto unknown: from the male of the single species known to me general statements are not easily drawn—

Echthrogaleus perspicax, new species

Cephalothorax much wider than long, three eyes arranged in a triangle, the anterior ones larger, and also 3 brown spots, one in each lateral area and one on the mid-line just behind the frontal plates. Front margin wide. Second abdom. segt. with a sublinear process on either side, concavea at the tip, the suture separating this seg't. from the 3rd. less distinct in the ♀. Elytra not contignous, dotted, the external post. angles rounded. Rami of the first pair of feet 2-jointed, the 2nd. and 3rd. pairs in the ♀ 2-jointed, in the ♂ 3-jointed, the 4th. pair in the ♂ 2-jointed.

Gen. seg't. rectangular with rounded angles, in the ♀ deeply lobed posteriorly, the lobes far apart. Tail of the ♀ rounded with a rudimentary dorsal folium, in the ♂ 2-jointed. Caudal appendages wide and not concealed. Length ♀ 8 mm., ♂ 6-7 mm. Found on the body of Acanthias vulgaris, 3 adult ♀s, 1young ♀, and 5 ♂s. in Skagerrack Sea. The female is distinguished easily from all described species by the fact that the eyes and the caudal appendages are prominent.

The ♂ differs from Nogagus gracilis, Burmeister, and N. paradoxus, Otto, especially in its abdominal feet: from N. grandis, Stp. & Ltk. and N. Latreillii, Leach, in its Caudal appendages: from N. validus, Dana and N. angustulus, Gerstaecker, in the

form of the carapace:: from all others in its 2-jointed tail.. Carapace of both sexes half the entire length or more, suborbicular, the lateral areas separated and each having anteriorly a black spot over the muscles radiating from the base of the rostrum- A spot of the same color (yellow in the young) on the mid-line in front. Transp. edge of the carapace narrow, wider in the male.. Ant! margin and especially the frontal plates very wide with a guadrate opening in the center.

L Larger eyes a little in front of the transverse line, scarcely 2 diams. apart, the lenses surrounded by white matter: the smaller eye, a lens only, on the mid-line itself, making a more or less curved line with the anterior ones. When the animal is viewed from the ventral surface they are generally concealed by the base of the rostrum. The singular and perfect eyes have given occasion for the specific name (perspicax).

Basal joints of the ant! antennae nearly rectangular, apical joints shorter and linear, destitute of plumose setae.. Claw of the post! pair elongate, armed with a seta, the middle joint with a similar seta, stouter in the ♂. Near the base is a projection without any claw and another similar one near the margin.

Rostrum subulate with obtuse palps. Anterior mxpds. with simple claws without setae or teeth.. Post! pair stoutly chelate the larger claw armed with a minute seta, the smaller claw arising from a large lateral processon the middle joint.. At the base is a tubercle and another larger one, subacuminate, between the bases of the ant! mxpds. (as in Dinematura latifolia).

Second abdom. seg't. with an oblique lateral process on either side, sublinear, about as long as the joint itself, the ant! margin longer than the post! Third joint of the ♀ coalesced with the preceding one at the center or separated from it by a well-defined suture.. Elytra of adult female rhomboidal, with rounded angles, armed with a minute tooth at each anterior external angle: much smaller in the young females and separated from

one another almost like lateral processes. These elytra are covered with a beautiful reticulum of obscure dots and transparent lines, surrounding the margin, but wanting in the young. Female with 26 chitin tubercles, chiefly at the base of the anterior feet. Similar tubercles are seen in other Pandarini, especially in the genus Gangliippus. The basal joint of the inner ramus of the 3rd. pair of legs is densely set with long cilia in the female, along the margin.

The exterior margin of the rami of the 2nd. pair of legs and a part of the basal joint of the 3rd. pair are covered with minute and sharp spines: there are also a very few of these spines on the rami of the 4th. legs. The following is an account of the arrangement of the plumose setae and spines—

		Female spines	setae
1st. legs	exopod	0 & 4	0 & 3
	endopod	none	0 & 3
2nd legs	exopod	I & 3	1 & 7
	endopod	none	1 & 9 & bas.
3rd legs	exopod	1 & 4	0 & 5
	endopod	none	0 & 4 &bas
4th legs	exopod	6	3 rudimen.
	endopod	none	4 rudimen.

		Male	
1st. legs	exopod	1 & 3	0 & 4
	endopod	none	0 & 3
2nd. legs	exopod	1&1&2	1&2&5
	endopod	none	1&8&bas.
3rd. legs	exopod	1&1&3	1&1&5
	endopod	none	1&4&bas.
4th legs	exopod	1&5	1&5
	endopod	none	1&5

Geng. seg't. similar in both sexes, somewhat larger in the ♀, with much larger post. lobes, especially in the adult♀: shorter in the young female, narrowed anteriorly, with narrow lobes. Each lobe in the ♀ armed with a tubercle on the ventral surface, carrying 2 or 3 spines. In the male these usually project from the margin and carry 2 setae, while within are 2 yellow sperma-

tophores and in front of these 2 large opague bodies. Tail of the ♀ much wider than long, rounded, in the young pentagonal and scarcely covered. I have not been able to find even the most minute dorsal folium on the tail in the young. First joint of the tail in the male short, wider than long--2nd. one larger subpentagonal as in the young female. Caudal appendages with truncate external angles, and the interior margins much curved, shorter in the ♀, with 4 short plumose setae. I have not seen the egg-cases.

Echthrogaleus coleoptratus, Guérin.

Post ! mxpds not truly chelate. Second abdom. seg't. coalesced with the 3rd, a process on either side widened at the apex. Elytra contiguous, dotted. subquadrate, a little widened posteriorly, with rounded interior angles, and acute external ones.

Gen. seg't. depressed, wider anteriorly, almost ovate, with large contiguous lobes. Tail with an orbicular dorsal folium, appendages oblong and truncate, concealed, armed with minute setae. Exopod of 2nd and 3rd. legs 3-jointed.

Length 6 MM. Egg-cases of my specimens 60 MM. Male unknown. Found on the body of Acauthias vulgaris in the Sea of Bahusia. My specimen agrees with the description and figures of Stp. and Ltk. except in color. For the ant ! portion of the median area of the carapace is yellow-brown, the lateral areas almost rose-colored, the elytra not distinctly colored. Near the front are 2 white conspicuous dots (scarcely eyes): on the back 2 others much farther apart and scarcely distinguishable (eyes ?). In each anterior external angle of the elytra of my specimen is a straight spine, pointed obliquely backwards and outwards.

Genus Pandarus, Leach.

Cephalothorax undivided. 3 abdom. seg't. free (the anterior ones usually coalesced inter se). of which the first is armed with separate elytra, the 2nd. and 3rd. with elytra coalesced at the

center. Tail 1-jointed. All the feet destitute of plumose setae; rami of the 4th. pair 1-jointed. Male unknown.

Pandarus bicolor. Leach.

Female. Body oblong. Cephalothorax of a dark chestnut color, except the post! margins and a lunate dorsal area. Post! margin crenulate- Ant! and median elytra of about the same length the latter with the post'. median portion often a dark orange or chestnut- Tail transversely rectangular, the dorsal folium broadly obovate; lateral appendages triangular. Length 9-11 MM. Male unknown. On the body and especially the fins of Acauthias vulgaris.

This species hitherto reported only from Galens canis and Carcharias glaucus. My examples agree well with Krøyer's description and figures. I add a few details- The dark yellow or orange area of the carapace varies in size, but is never wholly lacking. I have not been able to find any eyes even in the less colored specimens. Palps at the sides of the rostrum 3-jointed, the basal joint minute and rounded, the central joint enlarged at the apex with rounded angles, the last joint slender and subulate. Between the bases of the anterior mxpds. are two oblong tubercles: at either side of the 1st. pair of feet is another large one, or rather a large soft lamina. In the median area between the 2nd. pair of feet is a t transversely elliptical one, dividing the long! line. Finally in each internal angle of the basal portion of all the abdominal feet are small ones of the same kind.

The feet agree with Krøyers description in the number and length of the joints, but the number of the spines does not agree as well. The post! mxpds. are difficult to make out, the joints are indistinct and angular, the apex is obtuse, subconical and directed forward, and its inferior face is covered with knobs among which 2 sulphur-yellow kaminae stand out boldly. The median part is directed out-

wards,, with an acutely triangular lamina projecting ventrally. The basal part extends alongside of, and therefore in the same direction as,, the terminal one,, to the oblong tuber of which I have spoken above..

From this tuber descends a similar style,, supporting the middle part of the mxpds (a process of it ?),, which renders it difficult to move the mxpds either outward or inward.. I have described this in detail since it has never been done before- It seems to me a less variable character, by which to distinguish the less known and hardly different species of this genus. Embryo a nauplius with 6 legs,, a distinct eye and striaght, almost retrovert caudal stylets, Animal often covered with colonies of Bryozoans..

Genus Cecrops,, Leach..

Cephalothorax divided.. Ant! antennae 2-jointed joints of the 2nd and 3rd pairs of legs coalesced among themselves:: no elytra; the last joint in both sexes covered by 2 elytra, fused at the center. Abdominal feet with simple setae or spines (often serrate).. Basal joint of the 4th. legs very large, with minute,, 1-jointed rami.. Egg-tubes covered by the large lobes of the gen. seg't.. which are produced into a shield..

Cecrops latreillii,, Leach..

Color yellow, spotted below and with shining streaks on the upper surface- Cephalothorax of the same length and width, broad in front and deeply incised,, claws of the antennae and posterior mxpds a dark chestnut- Tail transversely rectangular,, concealed in ♀, prominent in ♂;; appendages minute and rounded.. Length - ♀ 20-25 mm., ♂ 13 mm.

Found between the gill lamellae of Mola nasus.. Ant.. antennae, rostrum with obtuse palps, and ant! mxpds minute.. Post mxpds with large claw - otherwise as in Pandarus bicolor, the support (fulcrum) reaching from the transv! node to the middle of the mxpd.. Abdom! feet of the first pair minute, rami 2-jointed; the others in the ♀ with a large branchial basal portion, the rami small and usually

2-jointed: 4th. legs with 1-jointed rami in ♀, the endopod with the basal part fused, and carrying a folded collar or yoke.

Gen. segt. of ♀ about half the entire length elliptical emarginate, often inflated, carrying the tail on its ventral surface: In the ♂ minute, transv: elliptical, covered with elytra, with 2 setiferous papillae on either side below. The glandular areas are shining white in color. The young according to Krøyer differs chiefly in having eyes in the frontal plates. "Animal aetate juvenili Krøyero testaute oculis in segmento proprio (lamina frontali) sitis imprimis differt".

Genus Laemargus, Kroyer.

Cephalothorax almost undivided. Ant: antennae three-jointed. Joints of the 2nd. and 3rd. pairs of legs not fused uiter se: no elytra: elytra of the 4th. pair fused at the center. Abdominal feet scarcely setigirous, rami of the 4th. pair large 1-jointed- Egg-cases as in Cecrops.

Laemargus muricatus, Krøyer.

Cephalothorax much wider than long, lateral margins dentate, dorsal surface with a few retrovert teeth. Elytra and gen. segt. with serrate-dentate margins. Tail much longer than wide, with oblong appendages; prominent in the ♂. Length of ♂ 13 mm.

Found on the Norwegian Coast (on Orthagoriscus?) Closely related to Cecrops. Antennae elongate and slender, rostrum large with minute and sharp palps. I have looked in vain for the setigerous papillae on on the gen. seg't. Eyes plainly seen in the young, not distinguishable with certainty in the adult.

IV Family, Dichelestidae, Edwards

Body elongate, sublinear, segments less distinct: cephalothorax shorter, distinctly separated carapace usually smaller. Abdomen rarely covered with elytra, gen. seg't large, tail usually dis-

tinct and jointed. Ant! antennae usually with numerous joints, and not fused with the margin of the carapace: post! pair unguiculate,, often enlarged. Rostrum distinct.. 4-8 pairs abdominal feet,, post! pairs enlarged,, biramose, often rudimentary. Egg-tubes with uniseriate eggs. Male and female attached to the gills or skin of fish, often parasitic in aunelids. This family, part of which (Authosoma, Krøyeria) is related to the Caligidae,, and part (Pemculus,, Clavella,, Lernauthropus) to the Chondracauthidae,, seems even related to the Lernaeidae,, as noted recently by Metzger in confirmation of the opinion of Stp.. and Ltk. which was rejected by other writers..

Genus Authosoma,, Leach-

Authosoma crassum found in the mouth and on the gills of Lamna cornubica in Öresund sea..

Genus Eudactylina,, Beneden.

Ant. antennae stout,, close together - 6-jointed:: Body slender,, the 3 last joints of the abdomen distinctly free- gen.. seg't small,, tail 3-jointed- Second mxpds large,, chelate, the claw with a second deep fossa.. 8 abdom.. feet, biramose, rami 2-3-jointed, setae simple.. Male unknown.

Eudactylina acuta, Beneden

Cephalothorax narrowed and bent downward anteriorly.. Styles of the gen. seg't. long, setiferous,, unjointed. Tail narrower than the abdomen, sensibly tapering posteriorly.. Egg-tubes short, wide, of a beautiful brown color- Length without egg-tubes 2 mm.

Found on the gills of Acanthias vulgaris, Skagerrack.. Easily overlooked on account of its color and small size, only observed and briefly described hitherto by Van Beneden.. I wish to fill in this description and correct it as far as possible.. Body linear,, flattened beneath, convex above,, cephalothorax and tail bent downward much..

Color of the living animal brown, intestine

black, becoming yellowish in alcohol. Length 2 mm or a little less, width 0.5 mm. Ant. I antennae contiguous at their bases, stout, with short setae--segments about 6 (6-7). those in the center short, the first and last much longer. Setae at the tips of the seg'ts and on the sides of the last joint. A claw on the 3rd. joint. Beneden has enumerated 2-3 joints in these antennae, which number is especially noticeable in this family. Post. I antennae elongate with 5 (?) joints. Last joint produced into a hook and with a curved seta on the under side bent in towards the tip of the hook; third joint also with a seta.

I have not seen the rostrum, but at the side, between the antennae and maxillipeds there is a prominent body bicuspidate at the tip.

Anterior mxpds slender, unguiculate, the upper margin densely covered with setae: posterior pair 2-jointed, the basal joint the more slender, the terminal one the larger, often functioning as forceps, the upper hook shutting into a deep indentation in the other one so as to leave an elliptical foramen. First legs smaller than the others, all of the same type, biramose, the outer ramus 3-jointed the other 2-jointed. Setae short, non-plumose, inner apical seta twice the length of the one next to it. Styles (rudimentary feet ?) of the gen. segt. stout, straight, twice as long as wide, with rounded ends and few setae. 1st. seg't. of the tail equalling an exceeding the remainder in length. Caudal appendages oblong, with 5 simple setae. Length of egg-tubes, 1.25-1.20 mm. I have not seen the males -- perhaps they are smaller than I could discern-

Here belongs perhaps Sabellacheres gracilis, Sars. fastened to the skin of Myxicola sarsii, found at Tromsö, Denmark. It differs chiefly in having a single dorsal egg-sac with the eggs in several rows.

Genus Clavella, Oken

Cephalothorax very short, wider than long: abdomen much narrowed, short, gen. segt very long and linear, tail rudimentary. Ant I 2-6 jointed. Rostrum stout. Only one pair of mxpds, 2 pairs of abdominal feet, which are biramose. Male unknown.

Clavella scari, Kroyer, is mentioned but not described, yet it should be classed with the Chondracauthidae as its poorly developed antenna, its legs, nodose gen. seg't, pygmy male, and multiseriate eggs, show— Clavella mulli, Beneden, is described as having its anterior antennae 2-jointed.

Clavella Hippoglossi, Cuvier.

Anterior antennae usually at some distance from the posterior, and near together; 6-jointed. Cephalothorax reniform. Abdomen moderately dilated, with bilobed margins (see from below). Abdom. feet rudimentary, with branches the same length, 2-jointed. Gen. seg't. flattened, post l lobes very short. Tail not jointed, very short, appendages subulate, articulate. Length 8 MM. Breadth 2 MM. Male unknown.

Found on the gill filaments of Hippoglossus maximus at Skagerrack Sea. The species is insufficiently described in the work quoted and I make these additions.

Cephalothorax surrounded by a transp. membrane, almost 3 times as long as wide, concave posteriorly. This concavity is filled by the proximal seg't of the abdomen. Frontal plates not separated, straight the transparent membrane curved: in the center of the ventral surface is a rounded chitin area, at the sides of which are shining spheres like lenses. Ant I antennae on the ventral surface, turned backward, scarcely reaching the margin, stout, the joints sensibly diminishing in length and width, yet the last one is the longest and indistinctly 2-jointed: 3 simple setae a little shorter than the joint.

Very short seta on the other joints also: 6

joints in all, sometimes well separated, sometimes fused. Post. antennae with the basal joint longer than the one next to it, the last one changed into a long claw bent over till the tip almost touches the base. Rostrum short, a little longer than wide, with an obtuse tip, the palps scarcely visible (I think I have seen a shorter palp at the side of each appressed close to the rostrum).

Mxpds. 3-jointed, the last joint slender, lightly curved, a little longer than the one next to it: the basal one short, curved around to the exterior with the convex side backward. I call this terminus a neck or abdomen. True abdomen with 2 seg't., the 1st. much narrower than the second, dilated posteriorly, with long, elevated ridges extending even through the 2nd. seg't., twice as wide by reason of the lobes.

Abdom. feet of both pairs with 2-jointed rami (not one-jointed as Beneden says), usually alike, the 2nd. pair a little longer: the 1st. joint with 1-2 short setae, the 2nd. with about 4 simple setae longer than the joint itself. The basal part is enlarged into a rounded lateral lobe with a serrated margin, giving off branches which extend obliquely inward. I cannot interpret the lateral dorsal lobe above this seg't (not an elytrum?).

Gen. seg't. very long, in the adult 7 times as long as the cephalothorax and abdomen, linear, narrowed anteriorly, with 2 long. furrows just above the intestine, a long lateral uterus on either side, short oviducts, and oblong ovaries near the mid-line, almost contiguous anteriorly. Post. lobes short and rounded with no appendages. Spermatophores large. Post. half of the intestine twice as wide as the gen. seg't. Tail situated in the emargination shorter than the lobe, twice as long as wide, with a rounded post. margin. Caudal stylets 2-jointed, slender, subulate, of about the same length as the tail, with no apical setae, but with a seta on the inner border near the base of the last joint, and with a few hairs on the basal joint. Egg-tubes longer than the entire animal.

There are no males among the numerous specimens I have examined, but there are a few young females 3 mm. long. These were fastened to the gills and furnished with caudal stylets distinctly 3-, indistinctly 4-jointed, the last joint the longest, with a lobe or stylet outside the base of the post. antenna.

Genus Peniculus, Nordmann.

No ant. antennae. Cephalothorax longer than wide, with a rostrum. The 4 abdom. seg'ts. narrow, except the last one. Four pairs of abdom. legs - each with a single, foliaceous, unjointed ramus. Gem Gen. seg't. very long, tail rudimentary. Male unknown. This genus is often referred to the Chondiacauthidae, but it certainly is closely related to Clavella, altho the ant. antennae are lacking in the female.

Genus Peniculus clavatus, Miller.

Cephalothorax cordate, compressed, with a smooth back. Rostrum stout and placed in a specially prominent position: on either side are the palps and mxpds- Third abdom. seg't. much longer than the others: gen. seg't. enlarged post. into a club-shape, compressed and truncate. Length 7 mm. Male unknown. Found on Sebastes norvegicus, and S. minor (S. viripsrum, Krøyer): 6 ♀s adhering to the dorsal fin.

My specimens agree well with Lernaea clavate, found by Müller. But they differ in many respects from the Peniculus clavatus reported by Krøyer from Greenland, possibly because he had 2 specimens only and those in poor condition. These differences are as follows-

Color brown, gen. seg't. covered with obscure circular spots: egg-strings uniseriate, each egg often with a black spot at the outer end (noted by Müller). Animal divided into 3 regions, Cephalothorax or head, the neck which contains 3 abdom. seg'ts. and the body made up of the last abdom. seg't and

and the gen. segt. Cephalothorax narrowed anteriorly, fastened by claws, the lateral margins curved the post'l margin emarginate, the back smooth, each side of the carapace turned downward, leaving the central portion very prominent, and armed beneath with the mxpds, palps, and rostrum. I have been unable to distinguish ant'l antennae either on the ventral surface or at the ant'l margin.

Post'l antennae fastened by a curve in the skin of the fish so that they cannot be torn away- They seem to be made up of a single joint. Rostrum stout, obtuse, the mouth-opening often hidden: 2 straight mandibles inside of the rostrum. On either side is an appendage which is interpreted as a palp like that in Clavella. Its basal portion is wider, the apical portion narrower and bent at a rounded angle.

Mxpds 2-jointed, basal joint stouter, nearly straight, the inner margin with a short and stout spine, the 2nd joint linear, slender, obtuse at the end, curved outward. Near the mxpd is a small tubercle. First legs more rudimentary than the others retrovert, much longer than wide, with simple setae: the 2nd pair in the form of a more definite segt, triangular, and armed with 2 setae: the 3rd pair at the post'l margin of the segt. and more or less elongate: the 4th. also at the post'l margin and almost globase.

Gen. segt almost 3 times as long as the cephalothorax and abdomen, both the width and height sensibly increasing post'l with 2 dorsal long'l ridges a little elevated, with a depression between them, at the sides numerous circles (eggs?), defined by obscure lines. At the end of these ridges on either side dorsally is a papillae armed with 4 setae, scarcely visible, but seemingly the rudiments of the tail appendages. There is a similar pair of ventral papillae, without setae. Egg-tubes 2 or 3 times as long as the whole body--eggs numerous, wide but very short.

V Family, Chondiacauthidae. M-Edwards.

Body of ♀ with indistinct seg"ts. Cephalothorax well separated, but without a carapace: gen. seg"t much elongated. Ant ł antennae often with few joints, sometimes confluent: post ł pair with claws. Mouth remote from the antennae: mouth-Tube short or wanting. Mxpds of ♀ small. Abdom ł legs usually 2 rudimentary pairs, or at least unfit for swimming. Eggs not uniseriate. Male a pygmy, pyriform attached to the ♀.

Often fastened to fish"s gills by post ł antennae. ant ł part of the body of the ♀ usually buried as far as the mouth in the host- Family separated with difficulty from the precedings but differs in egg sacs and pygmy male. Rostrum described at least in Trichthacerus and Blias.- Diocus with 1st. antennae 7-jointed (2nd ł. pair in fig. by Stp. and Ltk. 4-jointed). In other respects this family approaches Lernaeocera. especially Chondracauthus triglae.

Genus Chondracauthus, Roche

Body of the ♀ usually furnished with horns or processes- Anterior antennae 2-3-jointed: joints often confluent. No rostrum. Two (3?) pairs of mxpds- Two pairs of abdom ł legs: often changed in the ♀ into processes: minute in the ♂; each one usually with a single ramus.

The numerous species, it seems to me, may be classified as follows- 1. Those without processes. 2. Those with post ł processes only. 3. Those with lateral but no median processes- 4. Those with both lateral and median (dorsal or ventral) processes- In them all the feet resemble the abdom ł processes.

a. With posterior processes only.

Chondracauthus cornutus, Müller.

Cephalothorax convex, semielliptical, wider and thicker than the abdomen: gen. seg"t. depressed, divided by a transv ł fold, narrow -linear in the young, wider in the adult (length 2 or 3 times the width), post ł processes smooth, obtuse, a little longer than the tail- Ant ł antennae large (half as long as the Cephalothorax). Abdom ł appendages

elongate, furcate at the apex— Egg-sacs subcylindrical, shorter than the body. Length 8 MM. Male pyriform, with slender 3-jointed antennae: abdom & legs very short, simple, not jointed. Length 0.4 MM. Found in the gill cavity of Pleuronectes flesus and P. limandae on the shore of Bahusia, and on P. platessae in Skagarrack Sea.

Male mentioned first because it helps in the right interpretation of the appendages of the ♀. Muscles, antennae, 2 pairs of mxp'ds (2nd 3-jointed). abdom & legs, and caudal appendages evidently agree with Nordmann's figures— The acute laminae, sharply serrate, situated near the mouth-opening, I interpret as mandibles— The acute "palps" behind them I cannot distinguish with certainty. The mouth seems to me guarded by a wall anteriorly. Inside the 2 post & seg'ts of the body are spermatophores apparently, for they are made up of a pellucid membrane of large size inside of which minute globules are gathered into 2 long & masses. Intestine wider anteriorly— Inside the bases of the caudal appendages, which are without setae, is a seta. The back is often yellow, especially where the muscles are inserted.

In the young ♀ the ant & antennae are 3-jointed (not 2-jointed as Beneden says), yet are separated by no suture: the median one is larger: the last one has 6 apical setae and one on the post & margin. Post & antennae have a quadrate basal joint. Outside of this is an elongate unjointed appendage, like the antennal palp in Dicocus gobinus.

The other appendages of the cephalothorax, especially the post & onesdiffer somewhat from Beneden's figure. The first pair, altho like the second, I interpret as mandibles, just as in the male. Mxpds minute, not truly chelate and like those of the Pandarinae, with claws or rudiments of them— Abdom & seg'ts separated by a suture: the appendages with spines along their margins: inside the muscles are plainly seen— The lobes are sometimes obscurely 2-jointed, with a seta on the external margin of each joint, their tips a golden-yellow in the adult. The tail seems to be made up of 3 joints,

the last joint suborbicular with the 2 2-jointed appendages on its ventral surface, the basal joint of the appendages stout, the terminal one subulate, without setae. Caudal appendages on either side of the last joint of the tail, but curved so as to be partially concealed. Among numerous specimens (50 or more) none is like Krøyer's figure, for in all both sections of the genital portion are the same width.

Chondracanthus annulatus, n.sp.

Body slender, narrow tapering anteriorly. Cephalothorax obtuse, triangular. Abdomen with 2 distinct joints. Gen. portion divided by a transverse median stricture, the post⁞ angles produced in to very short obtuse processes shorter than the tail. Both pairs of antennae very minute: abdominal appendages simple, subcylindrical: egg-sacs much longer than the body. Length 10-12 mm. Male similar to that of preceding species but stouter: tail much elongated and curved: first abdominal legs larger: anterior antennae 2-jointed- Length 1.40 mm. 6♀, and 4♂ found on the gills of Raja batis. Species easily distinguished from all that have been described, closely related to none, but seems nearest to Ch. limandae, Krøyer.

Male easily distinguished with the naked eye fastened in the anal aperture of the female. The tail of all I have seen is curved under like that of the decapods, convex on the back, coming to an edge ventrally. Behind the post⁞ abdominal feet is deep stricture and there follow 2-3 less distinct ones. Ant⁞ antennae 2-jointed, joints scarcely visible, basal one larger, terminal one more slender and attenuate, with lateral setae and about 4 apical ones. Post⁞ antennae clawed, usually stout and short and showing powerful muscles.

Two pairs of mxpds. the post⁞ 3-jointed, ant⁞ 2-jointed: claw on the first pair larger, serrate. In front of the mxpds are the palps, 2-jointed, distinctly subulate at the tip, some obtuse knobs (labia ?) and an elongate organ (mandible ?) alongside of them. Abdom. feet simple, without joints,

the anterior ones tongue-shaped with two setae, the post! about half the size with a single seta. Caudal appendages subulate, without joints, armed usually with 4 basal setae.

Antennae of ♀ as in ♂, ant! ones more slender, the basal joint 3 times as long as the 2nd. one. Post! mxpds. 3-jointed as in ♂. Other appendages of the cephalothorax could not be distinguished by reason of their smallness. Abdom. append. linear, 1st. pair smaller with truncate apex, 2nd. with rounded apex. Tail short, broadly rounded, the last joint stout and rounded, with 2 ventral appendages, subulate, not very conspicuous.

Body slender, somewhat depressed, red-yellow, more than 3 times as long as wide, narrower than the cephalothorax and 1st. abdomen seg't. Four sutures visible, the 1st. a very deep one at the end of the cephalothorax, the 2nd. moderately deep separating the seg'ts of the abdomen, the 3rd between the abdomen and gen. seg't, less distinct on the back, the 4th. in the center of the gen. seg't, plainly visible. There is also an elevated stricture on either side of the dorsal surface of the cephalothorax, in front of the post! margin. Cephalothorax subtriangular, with obtuse, rounded angles the same length and width, almost flat ventrally, convex dorsally, divided in front by a long! chitin line, antennae hidden.

Abdomen twice as long as cephalo., post! joint the larger— Each part of the gen. seg't. is of the same width and the 2 together are not quite twice the length of the anterior part of the animal. Post! processes rounded at the apex, and of about the same width and length— Egg-sacs cylindrical: eggs in 5 rows, very numerous longitudinally— Length 10.5 mm.: greatest width 3 mm. Egg-sacs 25 mm.

b) With posterior and lateral processes

Chondracanthus gurnardi, Krøyer.

Cephalothorax composed of a sort of head, transversely elliptical, with a very short anterior an-

tennal lobe, and a neck, carrying in its post! dilated portion the mouth. The rest of the body depressed, a little longer than wide, convex above, concave beneath, divided by a deep suture, with 4 lateral and 2 convergent post! processes. Ant! antennae 2-jointed. Abdom. appendages forming almost a transverse line in consequence of the bending of the abdomen, bifurcate with short rami. Egg-sacs stout, almost as long as the entire animal. Length 5 mm. Male like Ch. cornutus, with indistinct joints. Ant! antennae less developed and without hairs. Length 0.6 mm. Found rarely on the gills of Trigla vulgaris: 19 fishes examined yielded 16 ♀s and 6♂s.

Species close to Ch. triglae, sometimes difficult to distinguish from it. Krøyer noted the diversity, but having only a few specimens, was not able to establish a diagnosis. My specimens all show 4 lateral processes while those described and figured by Krøyer, Nordmann, Milne-Edw'ds, Guérin-Méneville-Baird, and Van Beneden have usually 8.

Male (never before described) pyriform, 0.6 mm. long, greatest width 0.4, solitary. Ant! antennae scarcely visible (often looked for in vain), closely appressed to the body, quite long, not setiferous, basal joint the larger: post! pair straight and stout. Post! mxpds 3-jointed; ant! hook the larger. A subulate palp present and in front of it a prominence. 4 simple, inarticulate, abdominal feet, the ant! ones the larger, elliptical, much longer than wide, with an acuminate tip: post! ones very small, attenuate at the tip. Stricture behind them less noticeable. Post abdomen with confluent seg'ts, large, about 1/4 the entire length. Caudal appendages subulate, inarticulate, armed with 4 setae near their bases. Head and neck as far as the mouth buried in the flesh on the back of the gill arch, by which mode of fixation as well as by the lateral lobes of the cephalothorax (horns) this species resembles certain of the Permellidae, especially Lernaeenicus nodularis, Stp. and Ltk. Head and neck transparent when alive, genital seg't of an ivory color, covered with obscure markings, external ovaries white or reddish. To Krøyer's discription I can add the

following data— Ant.l antennae not wanting but distinctly visible on a lobe in front of the post.l pair: they are situated some distance aprat opposite the yellow frontal spot, symmetrical, the ant.l margin convex, the post.l lightly concave, distinctly 2-jointed, the basal cylindrical joint much longer than wide, opical one also longer than wide, sensibly attenuate at the tip, without setae. The lobe or antennal region subrectangular, much wider than long, frontal margin with a central incision. Head swollen with a lunate margin, in front of which is a yellow line as in the preceding species. Neck narrow and of varying length, 1/3 as wide as the head. Behind the mouth at the base of the neck are 4 small mxpds, unguiculate, post.l pair 3-jointe; ant.l pair with only 2 joints. In front of these is a 3rd pair scarcely visible. Abdom. appendages with divergent rami, the 2nd pair situated above the first and often in front of them, growing out of the ant.l external angle of the 1st. section of the gen. seg't (or rather of the joint coalesces with this section). Tail acute, short, About 7/ long.l series of eggs.

Chondracanthus merluccii, Holt.

Body subterete, seg'ts less distinct. Cephalothorax elongate, truncate anteriorly, increasing in width and height post.l ,, longer than the abdomen Animal with retrovert post.l processes a little shorter than the gen. seg't, and three additional pairs of processes— the 1st. on the cephaloth. the second on the abdomen, both lateral, usually converging, and the 3rd. very long and ventral, just in front of the center of the gen. seg't. Ant.l antennae 3-jointed— Abdom.l appendages bifurcate, post.l branches elongate. Egg-sacs about as long as the body. Length 8 MM. (with the post.l processes 12 MM.)

Found on Merluccius vulgaris on the coast of Norway. Male (described only by M-Edw'ds as "very minute, of the same form as the male of Ch. covnutus") found fixed not only in the usual

position, but also at the ends of the post: processes. Back with semicircular outline - body narrowed in front, mxpds large. Ant: antennae 3-jointed, basal joint much the larger:: post: pair stout with curved claws.. Behind the neck on either side is an elongate-acuminate serrate lamina (mandible), then the "palps", 2-jointed with a short tip, and finally the mxpds with serrate claws- Basal joints of the abdominal legs cylindrical; terminal ones larger ovate-oblong, with slender tips.. Caudal appendages subulate with 2 indistinct sutures, and a few setae on the ventral surface. In the body are numerous transverse and oblique muscles and 3 sutures.

Ant: antennae of the ♀ 3-jointed, 1st. joint 3 times as long as the second and third, or at least equalling them both, the last joint with 4 short setae. An ant: yellow spot in front between the antennae.. Processes or horns on the ventral surface of the gen.. seg"t.. turned outward or backward. Tail, scarcely longer than wide, made up of 3 parts, the median one linear, dilated at the tip and armed below with 2 short subulate appendages, and 2 shorter, stouter, lateral ones, with yellow tips (genital apertures) where the egg-sacs are fastened-. The latter are never longer than the body..

C) With median processes only.
Chondracanthus lophii, Johnston.

Cephalothorax rounded. Body depressed, with confluent seg"ts, 5 pairs of lateral processes, of which the fourth is the largest, and one postero-lateral pair, together with 7 dorsal and 2 ventral horns. Ant: antennae 3-jointed.. Four bifurcate abdom: appendages.. Egg-sacs very long, almost 3 times the length of the animal, forming a spiral.. Length----16 mm. Male very similar to the ♀ Ch. cornutus, except that the ant: antennae (?)are much shorter and stouter, and hardly distinguishable by reason of their size. Length----0.9 mm. Found on the gills and especially on the skin of the gill cavity of Lophius piscatorius:: 5 fish yielded 90 ♀♀ and a single fish almost 40..

No ant¹ antennae in the ♂, except outside of the post¹ pair an indistinct conical protuberance carrying 2 minute setae. Mandibles indistinct, small; palps large, very similar to the first pair of mxpds. In the basal joint of the post¹. mxpds are 2 striated muscles, meeting at the apex of an acute angle, in the 2nd. joint a single one ascending to the claw. Abdom¹ feet inarticulate- the 1st. pair ovate-acuminate, the post¹ pair oblong.

Female white, egg-sacs rose color rolled into spirals more vivacious and snappy than its near relatives. Embryos brown, nauplius-shaped, lacking eyes; caudal setae retrovert.

Chondracanthus nodosus, Müller.

Cephalothorax wider than long, lateral nodes less prominent. Rest of body slightly depressed with 6 short lateral processes on either side and one posterior, beside 4 median dorsal nodes and one ventral. Ant¹ antennae 2-jointed. Abdom¹ appendages trifurcate, rami of medium length. Egg-sacs large, a little shorter than the body. Length 10mm Male scarcely distinguishable from that of Chond. cornutus, ovate in form, post abdomen very short. Length 0.5 mm.

On the gills of Sebastes norvegicus. Male hitherto unknown has elongate, slender, ant¹ antennae, 2-jointed or obscurely 3-jointed. On the linear terminal joint are 5 long apical setae and one lateral; on the stouter basal joint a few setae Mxpds of the usual form, showing internal muscles, the ant¹ pair with serrate claws: the post¹ pair with a long median joint, very slender or pectinate at the tip. In front of the mxpds on either side a short palp directed forwards, then a lamina slightly curved, subulate and pectinate (mandible). In front of the mouth opening is a transv¹ wall (labrum?). Abdominal feet very small, scarcely longer than wide.

Post abdomen very short with no strictures,

but itself separated by a deep stricture. Caudal appendages on the ventral surface in front of the apex, subulate, with a few basal setae. In the post! part of the body two oblong spermatophores, filled with globules, in front of which undulate vasa deferentia can be seen. Length 0.5 mm. Width 0.36 mm.

Ant! antennae of ♀ 2-jointed, terminal joint a little longer than wide, ⅓ or ¼ times shorter than the basal.. Post! processes retrovert, sometimes parallel, sometimes convergent. Tail usually trifoliate as in the preceding species— Young ♀ 6 mm. long much narrower, otherwise no different except for the absence of the post! ventral,. and the lateral nodes.

Genus Lamippe, Bruzelius.

Lamippe rubra, Bruzelius. Found in the body cavity of Pennatula rubra,. on the shore of Bahusia.

VI. Lernaeopodidae, M-Edw'ds..

Body without seg'ts, or with less distinct ones. the two parts easily distinguished, cephalothorax (or head), and gen. part, sometimes separated by an intermediate neck (abdomen).. Tail rudimentary— First antennae usually minute:: 2nd pair with hooks. A suctorial mouth at the end of the cephalo th.. between the antennae, ciliate.. 2 pairs mxpds,. the interior (ant!)with hooks, the exterior large arms in the female, or rarely when coalesced forming the means by which the creature is affixed.. Abdominal feet usually lacking in the female. Eggs multiseriate. Males of diverse forms, pygmies,. fastened to the ♀..

Parasites on the gills, fins, eyes, and other parts of fish, fastened by the tips of the arms, which form a bulla or horny lamina inserted in the skin of the host.. Family easily separated, very closely related to none, but the genera are more difficult to circumscribe, and often very similar,. but when the males of all are known it will be easier

to locate them.

Genus Lernaeopoda, Blainville, Krøyer.

Tips of the arms fused. Cephalothorax short, ovate. Gen. portion sub-clavate, not jointed— Only the males of L. galei and L. elongatus known.

a) With no caudal appendages.

Lernaeopoda edwardsii, Olsson.

Cephalothorax elongate ovate, stricture median (in front of the arms), bent down a little. Arms as long as the gen. part, making an acute angle with it. Bulla large, petiolate, orbicular; its external face flat, the internal convex. Gen. portion pyriform, convex on the back, flattened on the ventral surface, scarcely twice as long as the cephalothorax, with no neck. Egg-sacs a little shorter than the body. Length 5 mm. Numerous ♀ specimens from an unknown location in Norway.

Very similar to L. carpio, but differs in the shape of the bulla. For the short petiole is sensibly dilated toward the internal face of the bulla so as to form a conical anchor, yellow-brown, dilated toward the margin— In addition the cephalothorax is less flattened and usually longer, while the arms are much elongated. Egg-sacs cylindrical, rounded toward either end, with 3 rows, 30-50 eggs long.

Tail rudimentary— Gen. portion separated by a deep fissure from the cephalothorax: its back, toward the bases of the arms, is elevated. On either side of the rostrum is a straight, linear palp, armed at the apex with 2 conical spines. Exterior antennae stout, 2-jointed, basal joint wider than long: terminal joint longer, with a deep fissure, the dorsal ramus carrying a globase apical joint covered with small spines, the other ramus inarticulate, emarginate, with terminal spines, of which the largest is situated at the inner ventral angle. Inner antennae slender, acuminate, with 3 (?) joints. Ant. mxpds. stout, chelate, with short and stout claws— Arms sublinear. It was necessary to give

this species a new name since it differs as much from Krøyers L. salmonea as from his L. carpionis and others. I did not get a chance to consult Mayor's description (1824).

Laxlusen (Pediculus salmonis) of Gissler, an animal poorly described as found in northern Sweeden differs in its petiolate bulla and bent head from L. salmonea, Krøyer and seems to belong rather with L. edwardsii or L. carpiouis. (L. salmonea, Fabricuis). Where Larnaea salmonea Linmaeus, belongs cannot be told from the short description given.

Lernaeopoda salmonea (Linmaeus?), Krøyer (but not Fabr. or Mayo.)— Lernaea salmonea, Linmaeus? Many synonyms excluded.

Lernaeopoda elongata, Grant.

Cephalothorax ovate, scarcely longer than wide, straight. Arms straight and longer than the animal. Genital portion clavate, smooth (in adults), 4 times as long as the cephalothorax, with no neck. Tail short, obtuse: anal fissure deep. Ovisacs elongate. Length of animal 24 mm., of arms 31 mm. Found attached to the cornea of the eye of Scymnus borealis.

This species, obtained in the Artic ocean, differs in size and habitat from others and is well known from Nordmann's and Krøyer's descriptions. The penultimate joint of the mxpds carries a minute claw. The interior antennae have 4 short joints: exterior pair are stout and indistinctly jointed. Arms in the center of each side of the cephalothorax. Many cicatrices are visible in each cornea.

Lernaeopoda stellata, Mayor
Found on the fins of Acipenser sturio.

b) With two caudal appendages

Lernaeopoda longimana, n.subsp.

Cephalothorax elongate-ovate, straight, the huge mxpds almost reaching the apex of the rostrum. Arms elongate, slender, longer than the gen. seg't.

with which they form an acute angle, reaching the center of the ovisacs. Bulla orbicular, petiolate, a little convex. Neck usually distinct, subcylindrical, almost twice the length of the cephalothorax. Gen. seg't. oblong with stout lanceolate appendages at its center; tip short and acute. Egg-sacs short, equalling the neck, but shorter than the gen. seg't. Length 7-8 mm. Male unknown. Found frequently on the gills of Raja fullonica and R. batis.

More than 30 specimens (I have seen 10 times that number) show the same characters, and hence I have made this a distinct form unlike L. galei. Krøyer, which is found with 6s on the fins of Galeus canis. Chiefly the arms and neck are much shorter and the egg-sacs longer, altho a single example seen by Krøyer agreed with mine in length. Afterward Beneden described females taken from the genitals of Scyllium canicula, from the anus of Mustelus vulgaris, the fins of Galeus canis, and the nostrils of Trygon pastinaca under the name of L. galei. Among these some possessed elongated arms (from Scyllium) but seem to differ from my longimanus in that the appendages are rounded at the tips and the egg-sacs are elongate. Since I have not seen examples of their males I am unable to place the synonomy.

Let I will say that the gills and external skin are not usually infested with the same parasite, and that I have examined numerous examples without finding any males. Color of living specimens transparent, bulla uterus and sacs white, petiole and base of bulla yellow, yellow lines and spots scattered everywhere. Ovisacs when empty a pale green. Cephalothorax small (1.25 mm. long), elongate-ovate in dorsal view, with an obtuse apex, in side view almost a straight line from the neck (i.e. in front of the point of insertion of the arms) to the apex, and in the same direction as the ant. mxpds. The apex itself is bent so as to form almost a r.a. (a little obtuse) with the line. The surface between the nape and the neck also forms an obtuse angle with the same line. The figure of the cephalothorax therefore differs considerably from that expressed

in Kroyer's and Beneden"s figs. of L. galei.

Interior or first antennae elongate with 3 (4?) joints, the last one with 3 spines. Exterior pair bifurcate with small spines, larger ones also at the apex: the ramus nearest the mouth with a globular joint. "Palp" on the lower surface of the rostrum, armed with 3 spines. Mxpds large, 3 jointed, basal joint very short with a recurved, acute, bifid claw.

Neck and gen. seg't. usually without distinct joints: gen. seg"t. a little longer than the neck but stouter, oblong, smooth. Tail rudimentary- Caudal appendages much shorter than the cephalo- thorax. Ovisacs with 3 rows of large eggs, 10 or 12 eggs in each row. Genital apertures elongate and ventral.

Genus Vanbenedenia, Malm.

Arms as in the preceding genus but straight and almost dorsal, covering the cephalothorax. Latter elongate, carrying the mxpds on its swollen base. Gen. seg't. without joints.

The genus Tracheliastes and Lernaeopoda seem to agree with Charopinus somewhat in the direction of the arms.

Vanbenedenia Krøyeri, Malm.

Cephalothorax a little narrower anteriorly, arms rigid subcontignous. Bulla somewhat rounded and in front of the rostrum. Gen. part separated by a narrow and very short petiole, elongate (3 times longer than wide) a little depressed, with no appendages, with a row of spots along either side. Length ---36 mm. Greatest width ---11 mm.

Male oblong, cephalothorax and post. part smooth and usually neither distinctly separated, nor jointed, but about the same length. Total length 1.5 mm. Width --0.5 mm. Found on the spines of the large dorsal fin of Chimaera monstrosa. 2 ♀♀ and 1 ♂.

The male hitherto unknown is similar to the ♂ of Lernaeopoda elongata, and especially of Achtheres percarum and was found at the gen. aperture of the smaller specimen. It should be noted that a slender cord, very like the suspensorium of the genus Caligus, was adhering to the larger mxpds- And perhaps some one will claim that this was really a young female. But while the generative organs are indistinct, I have judged this specimen a male both by the place where it was found and by its similarity to the male of Achtheres percarum.

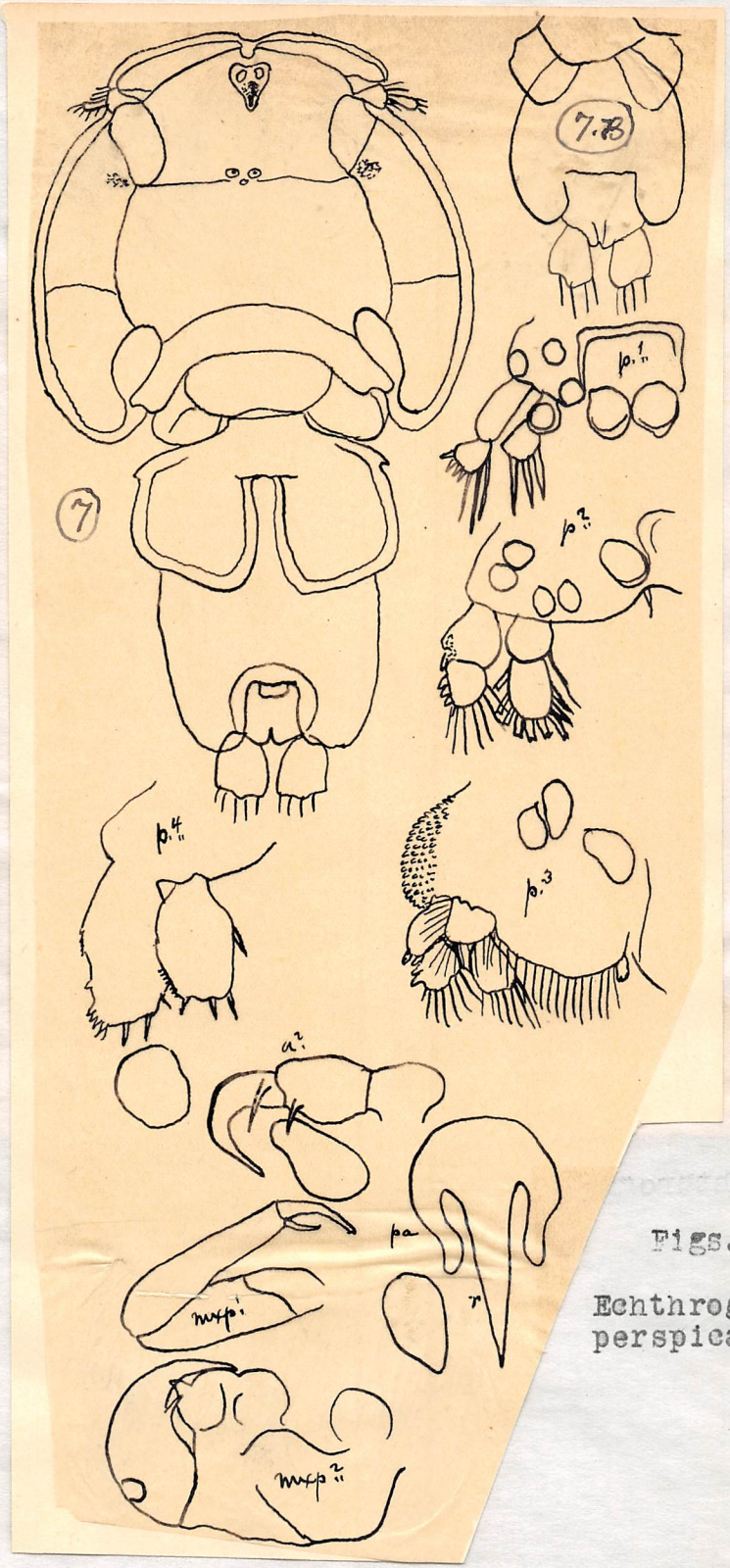
Cephalothorax obtuse at the apex. Rostrum obtuse, mouth-opening large and ciliated. Mandibles elongate, denticulate, 2 of the teeth larger than the others, not included in the rostrum. Palps at the side of the rostrum biramose, each ramus 2-jointed, acute. Second antennae usually with 3-joints, the last of which is armed with one large and 3 very small spines. A second ramus armed with a spine is present.

I have not seen the first antennae, but a sharp appendage, inarticulate, fills their place. The outer mxpds are the larger, inarticulate, with a small claw: the inner pair are chelate, armed with 2 larger and 2 smaller claws. Beside these a claw can be obscurely seen. No caudal appendages.

Females covered with Campanulariae were fastened in front of the tip of the acute spine. None were found on four of the Chimaeras. For a description and figures, I refer to Malm. Especially noticeable was a series of spots along either side of the gen. portion where the oviducts usually lie. Each spot is orbicular, no less noticeable on the ventral surface than on the dorsal, often glistening while at the center, never translucid, but surrounded by a translucid ring so that the animal appears entirely transparent. Ovules difficult to see on account of their small size.

Not far from the anterior margin on the dorsal surface is an oblong ovary separate from the intestine below which (i.e. on the ventral surface)

6. Echthrogaleus perspicax,n.sp. ♂.



Figs.7 & 7B

Echthrogaleus perspicax,n.sp.

are red spots seen in reflected light.

Genus Charopinus, Krøyer

Female. Arms dorsal, consisting of 2 very large laminae by which the animal is attached. Cephalothorax elongate carrying the mxpds on its back near the apex. Male. made up of two parts, the anterior one stout and subpyriform, the post! elongate slender, made up of 6 joints, of which the 2 anterior ones carry stout mxp'ds, the 2 middle ones rudimentary abdominal legs, and the last one the caudal appendages.

Charopinus dalmanni, Ratzius.

Cephalothorax subcylindrical with a node on either side forming a right or acute angle with the neck and cordate gen. seg't. Laninae of the arms cartilaginous, semi-lunar. Tail rudimentary, appressed to the ventral surface, the 2 appendages large, smooth, and curved. Length of cephalothorax 9 mm. of post portion (the appendages excepted) 15 mm.

Male curved, the anterior part pyriform with a long rostrum, the post! part with subulate caudal appendages, armed with lateral spines. Length ---- 2 mm. Found in the nostrils and on the gills of Raja batis, and in the nostrils of other fish at Christianssund.

For further particulars see Krøyer's full and accurate description. The figure of the male agrees entirely with Krøyer's in its lateral appendages: the anterior antennae elongate, 5-jointed, the post! pair stouter biramose, the upper ramus obtuse and set with small spines, the inferior one armed with a single stout terminal spine: the palps with 3 subulate digits and an articulate basal appendage: the ant! mxp'ds very stout with an elongate slender claw: the post! pair with a chelate claw shutting against a process-- I have not seen any rudiments of abdominal legs-

In the middle of the gen. seg't. is a globular golden yellow body, and on the ventral surface at

the sides 2 small processes. Caudal appendages acutely conical, with confluent joints, armed on the dorsal side with spines. 6 distinct seg'ts. in the post! part of the body— Egg-sacs stout, with longitudinal rows of beautiful eggs.

Genus Brachiella, Cuvier.

Apices of the arms fused. Cephalothorax elongate, subcylindrical, carrying the mxp'ds near the apex— Gen. portion without joints—

Brachiella rostrata, Krøyer.

Cephalothorax subcylindrical, curved but not inflated at the tip, scarcely equalling the length of the rest of the body— Arms lacking appendages, Gen. portion flattened, elongate, with rounded subrectangular corners and 2 conical post! appendages. Length of straightened---15 mm. Male with a figure like the hymenoptera, a gibbons cephalothorax and an oval subpetiolate abdomen. Length 1 mm. Found on the gills of thippoglossus maximus.

Male hitherto unknown unless a specimen found by Krøyer on Hippoglossus pinguis in Greenland can be referred here. Similar to the ♂ of Brachiella thynni, Cuvier as figured by Stp. and Ltk., but more gibbons and with the epidermis inflated on either side no less than in the ♀, adhering anteriorly to the margin of the head only— Usually found at the genital aperture of the ♀. Cephalo-thorax and rest of the body of the same length, the former convex dorsally especially toward the post! end; the latter oblong-oval, flattened ventrally, convex dorsally, with transverse muscles but no joints. Post! appendages short, subulate. Post! mxp'ds with 3 large joints, the last a claw. Rostrum straight, ciliate, carrying a palp on either side, which is large, deeply bifurcate with subulate rami. Inner antenna cylindrical, 4-(obscurely 5)jointed with spines: outer antenna 3-4-jointed, furcate, the shorter ramus naked, but the longer one armed at the tip with 3 claws.

Female. Interior antennae with a sensibly decreasing curve, 4 or sometimes 5 joints: exterior pair stout, biramose. Inner structure difficult to explain by reason of abundant chitin. Mx'pds with a cylindrical basal joint, the middle joint a little constricted, and an acute claw similarly constricted near the base. Tail short and rounded near the tip. Post: appendages with an ovate base, forming a short petiole and no terminal spine. Egg-sacs of the same length as the general portion or a little longer.

Young Female. 8 MM. long does not differ at all, but another one only 4 MM. long differs in having a clavate cephalothorax (head much longer and stouter than the neck), the general portion oblong linear, shorter than the head; arms slender, elongate, reaching even to the tips of the appendages. Head separated from the neck by a suture, which can be seen even in the adults, subrectangular, much longer than wide, a trifle shorter (in adults 5 times as long:) than the neck, in the middle of which are the arms.

General portion, half the entire length, separated from the neck by a less distinct suture. Arms cohering by a petiolate orbicular bulla. Tail and appendages as in the adult. Rostrum elongate with no palps in front of it. Exterior antennae 4-jointed, converging, with chitin sutures. Mxp'ds. contiguous, separated by a chitin suture, armed near the tips with a small claw.

Brachiella obesa, Krøyer—

Cephalothorax subcylindrical, curved, the head wider and truncate. Arms short, exappendiculate. General portion shorter than the cephalothorax, transversely elliptical, flattened, with 2 slender linear, post: processes— Length 4 MM. Male unknown. Found fixed to the gill arches in the throat of Trigla gurnardus.

Only a single example of this parasite was hitherto known, obtained by Krøyer in 1836 from an unknown host. On account of the elongate cephalothorax, very different from what we find among the

Hernaeopodidae, I have transferred it to the Brachiellae— I have not been able to consult Claus' description and figure of Brachiella triglae.

Cephalothorax 1/2 longer than the gen. seg't. made up of 3 parts, of which the post! bearing the arms is separated by a suture on either side, but has the same direction as the gen. seg't. The median part forms an obtuse angle with the anterior one, and is about equal to it in length (if one measures from the angle it will be longer for the angle is in front of the suture) but narrower. Finally the anterior part (or head) is distinctly separated, longer and stouter, making an obtuse angle with the median part, and almost a r.a. with the general seg't.

Mxp'ds situated behind the base of the head, not reaching its apex, apparently of 2 joints only, basal one twice the longer. Head longer than wide, flattened, increasing in width towards the apex and decreasing in height - with a truncate anterior margin. Exterior antennae situated opposite and a little behind the margin of the anterior pair but in front of the rostrum. The former reaching beyond the apex of the latter, the branches biramose, of about the same length, each made up of 3 joints, the middle one the largest. Interior antennae minute and slender, 4-jointed, the basal joints exceptionally short. Rostrum cylindrical, a large palp on either side at the base (longer and stouter than the inner antennae.)

Arms turned inward, half the length of the cephalothorax with a minute dark bulla. General seg't slightly flattened, transversely elliptico-trapezoidal, emarginate anteriorly, post angles not very prominent. Tail short with a smooth sublinear appendage nearer the ventral surface on either side, of which Krøyer was in doubt when he described the species. Egg-sacs a little longer than the general seg't, stout: eggs large in 5 rows. 10-14 in a row. Entire body with an inflated

skin as in the preceding species.

Genus Anchorella, Cuvier.

Arms short, joined for their whole length, or at least approximately so. Cephalothorax elongate cylindrical, the mxp'ds near the apex, making an acute or right angle with the general portion.

Only a few males known, ovate, with a conical rostrum, short stout mxp'ds and no tail. Genus distinguished by its joined arms, but in some species (A. urolophi, Krøyer) approaching Brachiella in which they are joined at the apex only.

a) With a distinct tail

Anchorella uncinata, Müller.

Cephalothorax a little longer than the general seg't; head indistinct. Arms arising from the cephalothorax, with a blobase, scarcely peticlate bulla. General seg't. flattened, often subquadrate, with a very short petiole. Tail large, much longer than wide- Length of general seg't. 4.5 mm.: of cephalothorax 5.5 mm. Length of male about 0.75 mm. Found on the gills and especially in the throat of Gadus, morrhua, and on the gills of G. virens, G. aeglefinus, and G. barbatus.

Anchorella bergyltae, Krøyer

Found on the gills of Labrus maculatus at Bergen.

b) No tail or only an indistinct one

Anchorella rugosa, Krøyer

Cephalothorax transversely rugose, stout, 1/4 longer than the general seg't: head distinctly separated, wide. Arms almost rudimentary, as if dilated into discs, coming out of the upper part of the general seg't. The latter rugose, wider than long, subquadrate, truncate posteriorly. Length of general segt. 3 mm.: of cephalothorax --3.75 mm. Found on the gills of Anarricha lupi-

Anchorella emarginata, Krøyer

Cephalothorax slender and very long, more than twice the length of the general seg't; head distinct- Arms arising from the upper part of the general seg't, very short, with a small and peticlate bulla. General seg't quadrate-cardate, emarginate posteriorly- Lengt h of general seg't. 3.25 mm: of cephalothorax --6-7.75 mm. Male of the usual form, found attached to the cephalothorax, about 1 mm long. Found on the gills of Anarricha lupi.

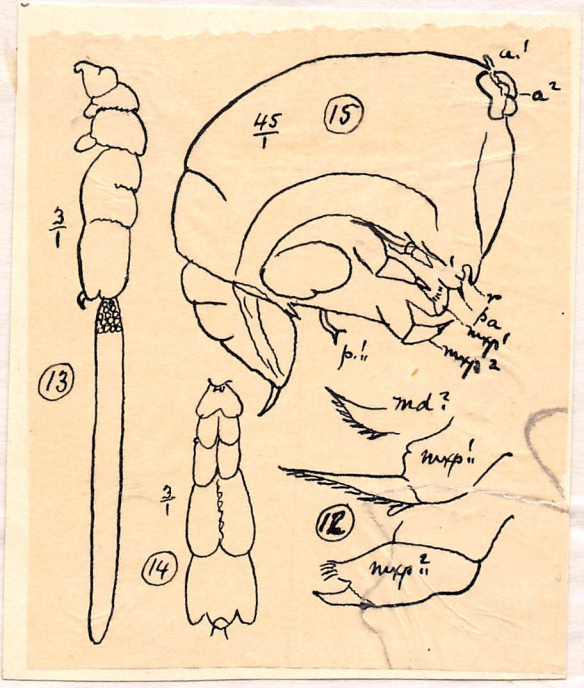
I have not been able to satisfy myself of the validity of the 2 preceding species, and more notes must be taken of the roughness and the length of the thorax- Neither of the species seems sufficiently constant but they both vary- I cannot distinguish between A. rugosa of Beneden and from Anarrhicha lupi, and A. emarginata of the same author from Alosa fiuta.

Edwards moreover records having found A. emarginata on Anarrhicha lupi, but which Beneden denies. A. emarginata ♀ has the exterior antennae 3-jointed introvert, with their apices contiguous, situated in front of the rostrum, covered with little spines, each armed with an interior, 2-jointed, conical ramus. The interior antennae are 3-jointed, each with a short basal joint and a terminal spine. Mxp'ds 2-jointed, the basal joint stout, ovate: the second joint or claw very slender, bifid at the tip (inner claw 1/3 the shorter). A. rugosa is very similar.

VII Family Pennellidae, Burmeister.

Body of various shapes, usually elongate and made up of 3 parts. The short head is fastened in the skin of the host by anchor processes or horns (2nd. mxp'ds?) Neck more or less elongate: post! portion stouter and without joints. This is the genital part or in the Lernaeocerae the general seg't. and abdomen.

Tail recognized in only a few instances- Mouth a sucking tube- Antennae, mxp'ds (ant!), and abdominal feet very small, sometimes absolutely wanting. Eggs sometimes in sacs, sometimes in strings Males recognized in a few instances, pygmies, sim-



I2. Chondracanthus cornutus
13. Chondracanthus annulatus,n.sp.
14. Same in ventral view.
15. Male of same,showing appendages

Plate II, Figs 16 —— 22.

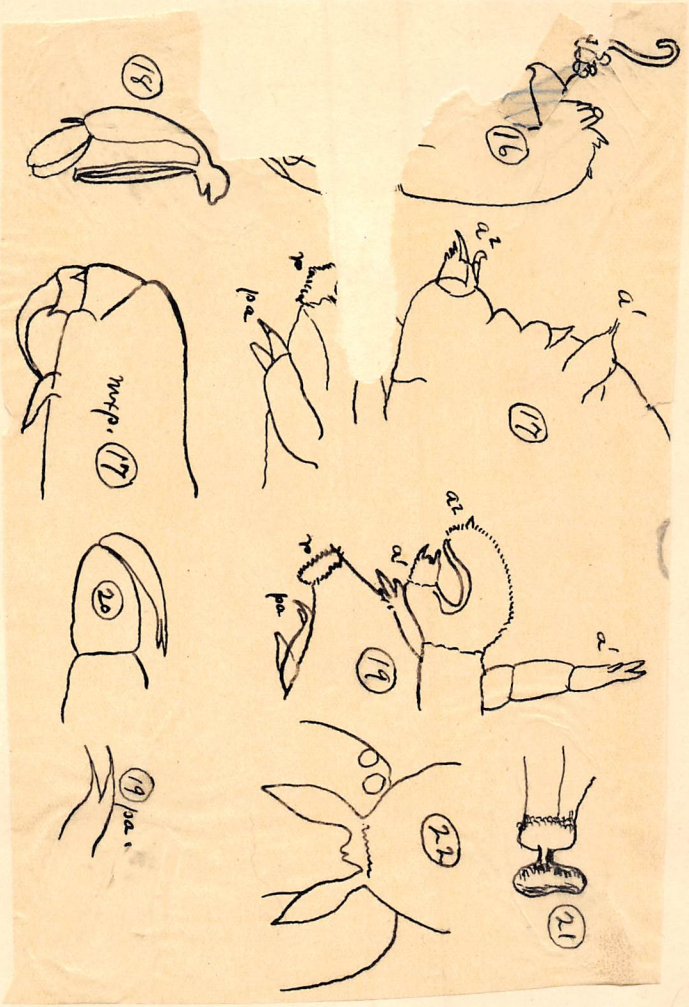


Fig. 16. Vanbeneedenia Kröyeri, ♂.
" 17. Anterior end of same, enlarged.
" 18. Ismaeopoda longimana, ♀.
" 19. Anterior end of same enlarged.
" 20. Anterior mxpds.
" 21. Bulla.
" 22. Posterior end of body.

Plate II, Figs 16 —— 22.

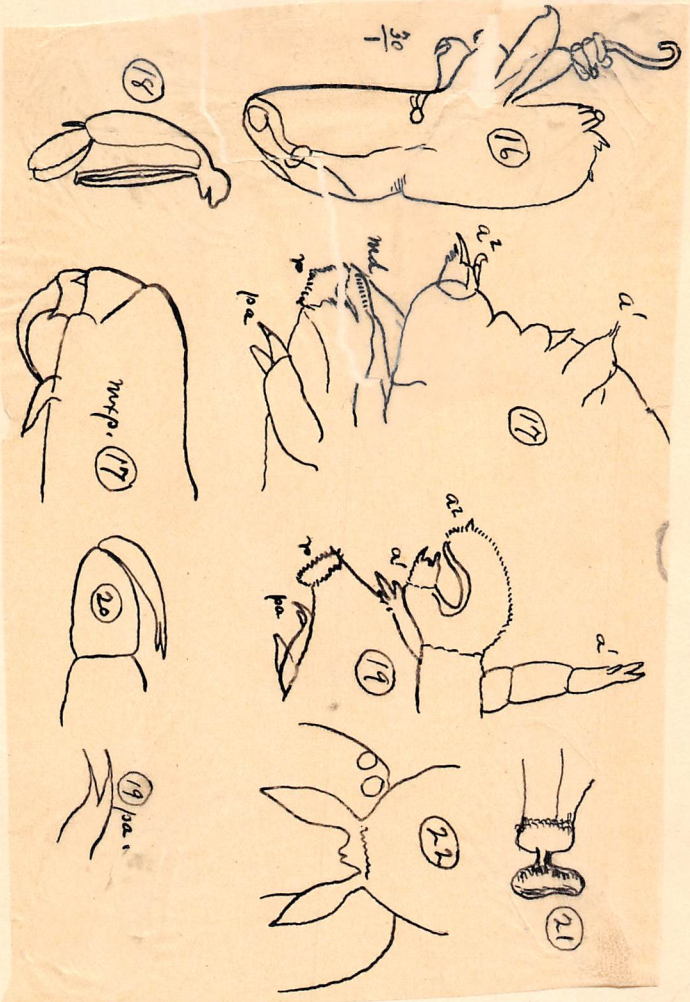
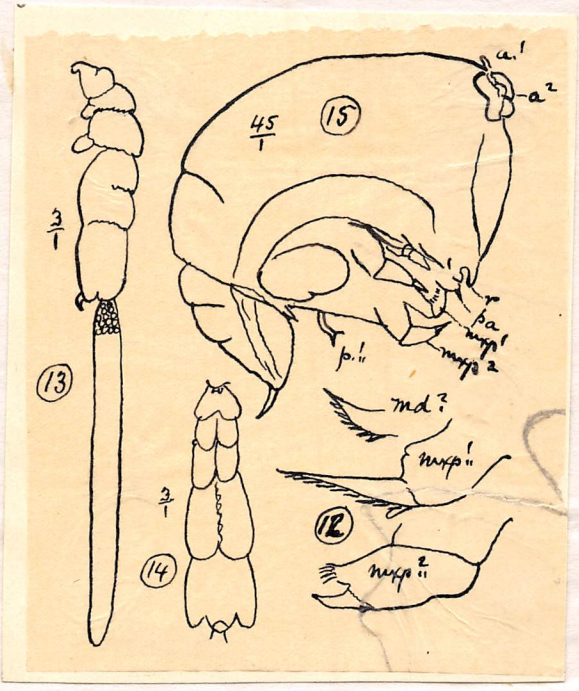


Fig. 16. Vanbenedenia Kröyeri, ♂.
" 17. Anterior end of same, enlarged.
" 18. Lernaeopoda longimana, ♀.
" 19. Anterior end of same enlarged.
" 20. Anterior mxpds.
" 21. Bulla.
" 22. Posterior end of body.



12. Chondracanthus cornutus
13. Chondracanthus annulatus,n.sp.
14. Same in ventral view.
15. Male of same,showing appendages

ilar now to those of the Chondracauthidae and now to the Dichelestúdae. The family is made up of deverse elements analogaus rather than closely related, if it be permitted to judge from the diversity of the males, which are rather primaeval in form and from the external ovaries, the constancy of which is not to be ignored.

With the Chondracauthidae very closely related are Madesicastes triglarum, Krøyer (♀,♂.) Lesteira lumpi Kr. While differing from them is the female of Silenium polynoës Krøyer (Herpyllobriss areticus, Stp. and Ltk.) which carries pygmy males similar to the males of the Ergasilidae and Chondracauthidae.

On the other hand both the larvae of Pennella varians Stp. and Ltk. have no little similarity to those of Lon chidium (Krøyeria) among the Dichelestridae, and the larvae or young males not less than the females of Lernaea branchialis according to Metzger are similar to the Dichelestiidae. This seems to detract from the affinity of the Pennellidae with the Dichelestiidae.

Genus Lernaeenicus, Lesueur, Stp.&Ltk.

Body elongate: cephalothorax or head with undivided horns: neck long, armed anteriorly with 8 minute abdominal feet (swimming): general seg't. straight, with no lateral appendages. Egg-tubes straight

Lernaeenicus sprattae, Sowerby.

Head subrotund, armed posteriorly on either side with an elongate lateral horn, slender and turned outward and backward, and a shorter horn or raised node at the center of the dorsal surface. Neck at first stouter and confluent with the head, then very slender and carrying posteriorly about 12 raised rings- Moniliform.

Generals seg't. twice as long as the neck, terminated post: by a stout, smooth, obtuse process (the tail?)- Length---20 mm. or with the egg-sacs 35 mm. Male unknown. Found in the eye of Clupea

spratta.

Lernaeenicus encrasicoli, Turton.

Very similar to the preceding, but with the neck stouter and without any wings or nodes. Lateral horns stouter and directed outward. Found on the pectoral fin of Clupea spratta.

Blainville's Lernaea surrirensis found in the eye and under the pectoral fin of the same fish in the vicinity of the town of Harve may be referred here with little doubt, since his description agrees very well with the present species, The 2 species above seem very closely related but distinct, and the moniliform neck situated outside the cornea of the eye is not easily detected. In both of them the mouth with adjacent parts, antennae, and abdominal feet, all of which were unknown, I have detected, but on account of insufficient room I have not been able to insert the figures.

Head longer than wide, elliptical, much depressed anteriorly with an obtuse rounded apex, or in L. sprattae, with a prominent rounded apex. Lateral horns of the latter longer (exceeding the length of the head) and seemingly more slender, and the horns on the two sides not always the same length- The direction of the horns is not always constant, since 2 specimens of Lencrasicoli differ in this respect.

I have found the 3rd. occipital horn in every specimen examined. This was overlooked by Baird but mentioned by Blainville. It is situated between the lateral horns, longer than wide, with a subrotund apex. On the ventral surface but in front of the horns are 2 lateral ridges (muscles?) nearly semiglobular and not corneous, separated by a groove.

The mouth is situated in front of the apex (between the apex and the ridges), with the mouth-

parts in the groove as in L. branchialis. On the upper side between the occipital horn and the apex in L. encrasicoli is an ovate figure, partly covering the bases of the antennae, narrowed posteriorly, with crenate margins-seemingly the vestige of a carapace. In place of this in L. sprattae is a black spot with a pellucid center situated above the mouth.

Close to the apex in front are the 2nd. antennae with 3 distinct joints, the 1st. and 2nd. twice as wide as long, the inner margin bearing a conical style; the 3rd. changed into a long and curved claw. Thus the chela projects partly beyond the anterior margin of the head. Antennae sometimes visible near the simple eye.

In L. encrasicoli also the 1st. antennae are 3 jointed, elongate, slender, bearing setae at the tip and on the inner margin. The bases seem to be located below the bases of the post! pair of antennae. On the ventral surface can be plainly seen the orbicular aperture the mouth on either side of which is a lamina, much more convex and ovate, wider anteriorly, and near the post! margin another similar one, wider than long, all situated, together with the mouth, in the bottom of a rectangular excavation. These I dare not interpret from their situation alone, but I have found similar members in Lernaea branchialis as well as in both species of Lernaeenicus.

The post! laminae at the margin on either side or rather the slightly curved claw above them I interpret as the anterior mxp'ds. The elevated parts behind them and possibly the ridges themselves belong to the mxp'ds.

In the anterior part the neck, or rather in the head, immediately behind the lateral horns are the abdominal legs, of which there are 4 pairs very close to each other, all jointed by median plates as in the Caligidae. The second feet are composed of a single basal joint, elongate, oblong, and 2 2-jointed setiferous rami, which are shorter than the basal joint. There are many apical setae (6 on the endopod) as long as the foot itself. 3rd and 4th legs like the 2nd pair except that they have no endopod-

The first pair consist of a basal joint only- Gen. seg't. smooth and but little flattened, considerably nar rowed anteriorly where it passes into the neck or petiole- Color white.

Genus Lernaea (Linnaeus) M-Edwds.

Body usually with 3 horns, often much branched- Only rudiments of the abdominal feet. Gen. seg't. irregularly curved. Egg-sacs thrown into numerous irregular folds.

Lernaea branchialis, Linnaeus.

Head with 3 (often many) furcate horns at the apex. Neck cylindrical. Gen. segt. stouter than the neck and usually a little longer - bent into the form of the letter S, with no appendages. Length (straightened) up to----35 MM. Found on the gills of Gadus aeglefinus, Morrhua, G. minutus, G. merlangi, and Labrus mixtus.

The specimen from Labrus differs only in the narrower gen. seg't. Egg-sacs long, carrying the embryos developed into a naupluis-form, with the caudal setae turned outward, in no way differing from the embryos of the Lernaea from Gadus.

The tail or the part situated behind the genital aperture, has a dorsal furrow and an emarginate apex- The horns both lateral and occipital are beautifully ramose. Second antennae 3-jointed, bearing chelae, very minute, situated behind the apex on the dorsal surface. In front is the mouth with 2 lateral mouth parts and in the center posteriorly the lateral appendages, all of which, as I believe, have a median stricture. There are 8 abdominal feet, jointed, and with short setae.

Genus Lernaeocera, Blainville

Lernaeocera cyprinacea, Linnaeus, Found on Cyprinus carassius, Linn.

Thus our fauna of parasitic copepods includes 57 species hitherto known— of which 30 are reported also in Denmark. 22 or 23 in Great Britain, 13 in Belgium, 7—10 in the Islands Faroe or Greenland.

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By Petrus Olsson

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Introductory Study

concerning the Copepoda parasites of the Scandinavian fauna

During my research work, devoted to the Helminths, of which a partial description has already been published on the columns of this Periodical, an opportunity was also given to me to observe the life of the Crustacean parasites and collect some specimens of same.

In fact, I have collected the above-mentioned species of Copepoda, some of them in the Kattegat Sea near the town of Wordborgum, and others on the western shores of Norway (during my travel there in the year of 1867) but I found most of them in the western part of the Skagerrak Sea and at the shore line of the Middle Bahusia Sea. Besides that, I have had the advantage to study the relative collection of the Museum at Lund, which I was eager to see, and did so through the kind cooperation of its Director. Scandinavian species, which have already been described in the past, but not seen by me, are occasionally mentioned here, but they will certainly not be given a description again: species detected at the shore lines of Denmark and Iceland, not found in the vicinity of Sweden and Norway are also excluded.

Whatever species I saw within the limits mentioned above and marked as known by me, I made an attempt in right good earnest to indicate by the most adequate definitory marks or diagnosis their habitats, wherever I noticed their existence.

Many authors have written about these animals; in this respect, please refer to the works of the very illustrious Van Beneden (1.) and of Mr. Van Nordmann (2.), furthermore of Messrs. T. Thorell, Steenstrup and Lueckhen, M. Sars, who have written about some few Northern species and others, but it was Prof. H. Kroeyer (3.) who, amongst all other researchers, after a thorough research, produced descriptions in the greatest number about the greatest amount of species, brought either by the currents of far distant Oceans, or taken from the waters of Denmark and Norway as well; he also took care in representing same by drawings, and did it in the same diligent way.

In view of the fact that nobody has written about this part of our Fauna or examined it in particular, I thought, perhaps I would not be regarded too pretentious, even though being not thoroughly initiated with this part of Zoology, if I would undertake to put forward my observations in this introductory study, throwing some lights in regard to the Scandinavian Fauna.

1. Annals of Natural Science, Series No. 3 XVI 77

2. Mikrogr. Beitr. II. 49, and in the Bulletin of Naturalists of Moscow, 1864. T. II, 461

3) Naturh. Historisk Tidsskrift Volume I - II. (1837-1838) and Volume II, 3rd Series (1839-1844)

Species belonging to this family have a rather vertically flattened (depressed) body, on which the cephalothorax (the anterior end of the body, including the head) is expanded, showing a shieldlike appearance and is tightly coalescent with the whole abdomen or with one or more segments (as the case may be). The first segment of the posterior part of the abdomen (site of the genital orifice) especially of the females, is large, the others (the cauda) are, however, less developed on the tip of the cauda, two setae (two setigerous, literally: appendages) are visible. Anterior antennae with two movable segments and attached to the side of the frontal plates (i.e. to the anterior margin of the carapace or scutum) the two posterior antennae are bearing small hooklike processes, four maxillipeds, and are hidden under the scutum. The rostrum (the mouth parts) includes two mandibles. There are eight abdominal legs, four or even more being birenous, natatorial or branchial, provided in most of the cases, with plumose setae. The outer filaments are ovigerous, the eggs are arranged in a single row (uniseriate) and levelled. The male and female are parasitic on the body surface of fishes or in the gill cavity, but sometimes they are free swimming.

This well defined family is related to both the one described above and the one here below.

The biarticulated antennae, and the frontal lamina, the latter quite well fitted to serve for the former as a basal joint, are distinctive features of this family, the Lernaeida and Pandarinae (according to the sketch of Edwards) are, indeed, ornated with triarticulated antennae.

1. Tribe of Caligini: Individuals have an egg-shaped, blunt rostrum; only the last segment of the abdomen is loosely jointed; (in the Trebius a proximal loose jointure is observed), animal is sometimes provided with dorsal leaflike processes (Elytrus, meaning a rough, outer winglike process). They have very good natatorial feet with plumose setae.

Genus Caligus (Mueller) Nordm.

The animals belonging to this Genus have two sucking discs (lunules) on the frontal lamina. They also have two eyes. A ventral furca is situated behind the maxillipeds. They are provided with three pairs of natatorial feet, the first with inner ramus, (branchiilike process) sometimes the plumose setae are wanting, the second pair is large, with biarticulated segments, the fourth paid is set on the loose segment of the abdomen, with only one ramus, with simple (not compound) setae.

This is a vast Genus, although the Lepeophteirs are not included, and for the sake of an easier examination, I would divide it as follows:

A. The fourth abdominal leg provided with four setae.

1. short inarticulated cauda (the genital organ of the female is shorter)
2. articulated cauda. Here reference is made to the Caligus Pallas Kr., unless the form is monstrous.

B. The fourth abdominal leg is provided with five setae; the
cauda, in most of the cases, is longer (than in case A above)

1. female's cauda inarticulated,

female's cauda articulated,

2. the fourth abdominal leg is provided with four setae.

Divisions of above A.
[illegible] - short inarticulated cauda (sometimes with very short basal segment)

1. Caligus Curtus. Muell. Kr.

The scutum of the female is elliptical, that of the male is wider, and rounded. The furca is provided with not quite parallel rami, which are truncated (bitten off at the edges). The proximal inner seta of the fourth leg is at least three times longer (than the rest) and serrated. The female's ringlike genital orifice is neither longer, than wider, the inner part is rectangular and concave (accepted), that of the male is slightly square-shaped. The length varies between 10 to 14 millimeters.

One eyed, living on fish Linne (partially)Swedish Fauna ed. alt. (1761) 497; Caligus curtus (short Caligus) O.F. Mueller Entomostraca (1785) 130 Tab. XXI: 1-2 Kroeyer Nat. Tidsk. I (1837) 619 Tab. VI, 2; id. ibid. 3 R. II. (1863), 180; Steenstrup and Luetken. "Bidrabne, Kavs Snyltekrebs og Lernaeer" in Danske Vidensk. Selsk. Skrifter 5 R.V. (1861), 353; C. Muelleri Desmarest General Considerations concerning the crustaceans (1825) 342 Tab. 50 4 (mutilated); Nordmann Mikrogr. Beitrage (Completions) II (1832), 23; Baird History of British Entomostraca (1850), 271 Tab. XXXII: 4-5; Caligus bicuspidatus (bicuspide) Nordmann l.c.17,137; Caligus elegans (elegant) R. Beneden in Annals of Natural Science XVI (1851) 91; Caligus Americanus Dana sec. Stp. Lkk.

Habitat: Attached to the body surface of the Gadi Morrhua[illegible], Gadi virentes [3], Molvae vulgaris, Raja Batidis, in the Kattegat Sea, in the Skagerrak, and more often in the Ocean; (in the Storegggen at the 63° of boreal latitude) also found attached to the Acanthia vulgaris, Raja radiata and Fullonica, Chimaera Monstrosa, Lophius piscatorius, Triela Cuculi, Sebastis Norvegicus; I collected some individuals of this species, but it is supposed that these are aberrants or perhaps passing migrants.

This species is also found in the stomach of the Lophius piscatorius, besides the Anchorella uncinata, from which one can infer that this fish is fed upon Gadi (please refer to my work written on that subject, published on the columns of this Document, Volume IV. 54).

I noticed that among those very numerous specimens I have collected I found some females with biarticulated cauda, having very short basal joints.

Doubting any identifications of the latter specimens, because most authors characterize Caligus Curtus by an inarticulated cauda, I was led to examine these specimens very carefully and I was unable to find an inarticulated cauda. At first, I tried to classify these specimens as Caligus Acclofinus Kr., a closely related species, which is well described, (mostly) because my specimens were collected mostly from Raja batida, and had the type of cauda characteristics of that species.

I understood also that the female's genital organ is not smaller than that of the male's, which is counted with fine setigerous nodules (with rudimental cells of the caudal legs), although the nodules of the former are found in greater number on the ventral side of the animal.

The animal in question carries very frequently a quite great number of eggs, produced by a certain Udonella, and often enough, also the Udonella itself (Udonella caligorum), especially on the lateral margins of the scutum, imitating the whitish fringes, and in a way, that they are hardly distinguishable from the ash-coloured scutum. Also I detected some larvae of the Caligus curtus in an affixed position, on the margins of the chields (clypeus), joint by a long frontal funicule. These are a little younger than those seen by Kroeyer, measuring 2mm of length, the funicule is seven times longer, than its basal joint, which is thicker at this point; it seems to be composed of three closely arranged nodes, two of them set parallel, and the third, at the front, is twice as long. Lunules and rudiments of the caudal legs are wanting, the eyes are situated a little before the middle of the scutum; other characteristics are similar to those mentioned by Kroeyer.

2. Caligus Acclofinus Kr. ? l.c. 3 R II. 163, 181 Tab. VII. 3 [4]
Habitat: attached to the Cadus Acclofinus and Raja Radiata, in the Straights of Oeresund (Kroeyer).

3. Caligus abbreviatus Kr. l.c. 135, 174 Tab. III. 3 [5]
Habitat: on the body surface of the Labrus Maculatus (?), roaming near to the city of Bergen, in Norway (Kroeyer).
Beta - Cauda articulata = cauda articulated

4. Caligus fallax Kr. l. c. 166, 182 Tab. XVII. 3.
(monstruus in form ?)
Habitat: on the body surface of Cadus morrhua, in the Straights of Oeresund, only one specimen was found by Kroeyer among his collections of Caligus curtus.

B. The fourth abdominal leg is provided with five setae.

Alpha. The female's cauda is inarticulated.

5. Caligus Edwardsi Kr. The scutum is narrower at the front with not quite straight margins. The elongated furca at the basis is narrower, with straight rami which are branching off widely, the width is decreasing towards the end, terminating by a blunt apex. The fourth abdominal leg is small, provided with slender setae, the last one is longer, than the others. The genital orifice (single aperture) of the female is large, measuring a one third of the body length, and the rear portion of it is scooped enough, having rounded angles; the male's genital organ is not quite round, however.

The male's cauda is biarticulated. The caudal appendages of both sexes are generally larger, and wider than in other species, and to the extent that they touch each other, and expand over the width of the cauda. The length of the body varies between 5 and 6 mm.

Caligus Belones Kroeyer l.c. 3 R. 11. 155 Tab. VII. 1.

Habitat: on the body surface of the Belone [illegible], I have captured five of them in the Skagerrak Sea, during the month of August and only one of them was male.

The male, unknown up to date, (i.e. before its capture, mentioned above) differs from the female by its lesser size, by its quite different genital organ, by its more slender, and biarticulated cauda, ornamented with longer apical setae. The length of its body, measured from the front to the posterior caudal appendages, hardly reaches 5 mm. (Whereas the female's body length exceeds 6 mm). The shape of its scutum is about the same as in the female, but only makes up the half of the tenth part of the animal's complete body length. The rear antenna is rather sturdy, the rostrum perhaps a little narrower. The fourth abdominal leg in length, and thickness equals with that of female, but if stretched out, it touches or overlaps a little the last segment of the cauda; the segmentations of the male, neither inform, nor in proportion, or in armature, are inferior to the segmentation of the female. (The form provided by the eminent Kroeyer is not quite accurate, but his description is very good). The genital organ is round shaped, a little longer than wide, on both sides a setigerous nodule is situated, each provided with three setae.

Footnotes on the bottom of page 7:

4) Very much similar to the Caligus Curtus, however, it appears to be distinct from the latter in having wider furcula, and branching off rami.

5) This species is easily recognizable, by its large scutum, by its rather wider than longer genital orifice, excavated at the rear part, by its very short cauda, comprising a hollow, produced by (effects of ?) excavation; by its quite wider than longer appendages; the fourth abdominal segment is furnished with a solid genital orifice, and with thin legs, as well.

6) On account of the form of the furcula, on account of the duplicity of the antennae, on account of the occurrence of a second pair of rostrum, the appearance of this specimen could be, in all probability, considered as monstrous, or being in a less evoluted stage. That form is also very remarkable for its anterior antennae, its loosely attached third abdominal segment, and absence of a (gap ?) (Here the word "apro", having been not found in any Nomenclature available, leaves in obscurity this sentence)

Text itself follows:

On the cauda in the angle, another bigger in size appears to be accumulated. The cauda's length equals to that of the genital organ; clearly biarticulated (the cauda), the last segment's length is doubled. The caudal

appendages are inserted at the tip, the first segment bears an inner margin, the second beset with an exterior margin, and the length of this segment (the second) is nearly equal to the first one; three even setae of medium size are on the genital organ.

It may be added, I happened to discover that the eyes are provided with lenses, which were unknown hitherto, I found them at their expected place, showing a spherical form, separated one from the other, by a space a little longer, than the double of their diameter. Besides, I discovered setigerous appendages, with three plumose setae, on both margins of the genital segment of female individuals of this species, being, no doubt, rudiments of legs, and that's why remarks about their absence should be disregarded, and I doubt if they should have ever been given too much credit.

6. Caligula rapax (Edw.) Stp. Ltk.

Acuminated (tapering gradually toward the end), simple palps; with not quite straight branching off rami. The apperture is angular (in most of the cases) at the basis.

The fourth abdominal leg's apical setae are very slightly serrated and at the base they are covered by serrated lamellas; the second segment's seta is straight, the rest is slightly bent, the innermost apical seta is twice as long, the female's genital organ is rounded, and egg-shaped with truncated margin at the rear, the male's genital organ is much shorter and narrower. The male's cauda is biarticulated, having 6 or 7 mm of length.

Alpha) Gurnardi: with elliptical scute.

Beta) Lumpi: the anterior scute is slightly contracted.

Caligus rapax Edwards? Crust. III 433 Tab. 38, 9; Baird l.c. 270 Tab. XXXII: 2-3; Steenstrup and Lutken l.c. 359 Tab. II, 4. - Alpha) Caligus Gurnardi Kroeyer l.c. 3 R. II, 150 Tab. II, 3. beta) Caligus Lumpi Kroeyer ibidem, 147, 177 Tab. II, 2.

Habitat alpha) Trigla Gurnardus in Skagerrack (collection 10, 11, 12 pull.) * Acanthias vulgaris ibidem (12 7), Raja Batis ibidem (aberrant) - alpha) or beta) * Molva vulgaris ibiden (5) * Gadus melanostomus on Pungas - Beta) Chimaera monstrosa in Skagerrack (1 aberrant) * Gadus virens ibidem (22) on the body (?) and in the mouth, G. morrhua ibidem, in the mm mouth (16) Moreover, on the Cyclopterus lumpus in the Kattegat (Kroeyer, Malm ap. stp. Ltk.)

Here, reference is made to the description of the eminent Edwards, but the appearance of the specimen described first and foremost differs from others, by its anterior margin with arch-shaped contour, by its longer cauda, by the last shorter seta, on the fourth leg (this seen in a few males by me) the specimen described by Edwards as collected on undetermined location, in the Sunding, whereas mine was collected from Acanthias vulgaris, and yet both seems to belong to the same species. Professor Kroeyer has described the C. Gurnardi and C. Lumpi as two species, but after a thorough study of his descriptions and of this platis and also of the specimens I collected myself, I could not come to the conclusion that in fact, they belong to two different species. It might appear strange that males of the above two species had not been found in Gadidae

[illegible] while in other fishes they are not so rare, and it also seems

distinguishing the two species. I might call these varieties that are linked together by intermediate forms, these varieties are sometimes found in the same fishes and unless I am mistaken differ from each other by the more or less developed lateral areas of their scutum. The frontal lamina varies in shape and size, as it could already be seen from the illustrations of Kroeyer himself. It seemed to me that the direction of the antennae is not stable at all. The scutum of the variation Be is higher in front, and its margin is not smooth anteriorly. The shape of the Scutum of variation Alpha) is longer, and its margin forms an arched line. I have seen seta of the posterior antenna only on those specimens taken from Acanthia, provided with elliptical scutum, as for the specimens taken from the [illegible] and [illegible]. I looked in vain for setae. This perhaps demonstrates that there are no two different species, for this seta is not significant as a character to distinguish between species.

I don't think that the hamuli, (hamulus - a hooklike process) the rostrum, the palps, the maxillipeds, the furca, the abdominal legs of the same sex, do display a different appearance. The genital orifice and even the cauda varies in length and size, the former carries outside three plumose, very thin setae, the latter's appendages are ornated with medium size setae, the length of which is nearly equal to that of the cauda. The animal is often carrying an Ujonella or the ovules of same. The larvae, when captured were found affixed in most of the cases to the female, and also, but less frequently to the male. Kroeyer made mention about larvae measuring a length of 2/5 - 1 2/5 linge (equivalent to 1.2 - 4.2 mm); the young of this genus were unknown hithert For this reason, I gave here a description of some and shall depict same on the Table hereto annexed. The smallest larva found by me is twice smaller (0.6 milim in length, and 0.2 mm in width) than that captured by Kroeyer. The thin filament by which the larva is attached, has the same length as the animal itself. The anterior part of the body is very much reduced, the anterior antennae are not articulated, but are provided with ciliated tip (apex).

The maxillipeds are well developed, and reduplicated; the first and second pair of the abdominal legs are vestigial, tender, inarticulated, and poorly ciliated. The part of the body, situated behind the abdominal legs, is relatively long, narrow, with thin caudal appendages, bearing simple setae. The rostrum, and the posterior antennae could not be observed in a softening and dissolving substance; although seeing them was much desired. A larva a little larger (measuring 0.36 milimeter) (than the former mentioned above) has a wider cauda, but the anterior part of the body is not so reduced, as in the case mentioned above. The anterior antennae are already biarticulated. The rostrum and the intestine are well distinguishable and on the both sides of the former is a long awl-shaped stylus. (Is it a palp?) The anterior maxilliped bear furcated apices, the posterior one, a short and sharp spear. The first and second pair of abdominal legs are faintly biarticulated and ciliated, but the third pair are not articulated, and not ciliated. The scutum is not yet evolved, i.e., not divided into areas, and its rear is terminated by a straight line. The first abdominal segment is fused with the cephalothorax, the second, third, and fourth segments are movable, the postabdomen is inarticulated. The eyes

in length, agrees with this description.

A second specimen of the same length differs in that its scutum is fairly longer and somewhat scooped at the rear. Its abdominal legs are somewhat projecting. The length of the funicule is equal to half the body length. On specimen of 1.3 milimeter in length (the expected length of a larva, in its first evolutional stage - according to Kroeyer) all abdominal legs are quite conspicuous: the first pair is distinctively biarticulated (not quite triarticulated), and this pair plus the two proximals are provided with piligerous apex. The largest larva observed by me (measuring a length of about 2.3 milimeters) displays a scutum well rounded anteriorly and a large posteriorly. The anterior antennae are biarticulated, but not completely developed. (See Fig. 2) On the frontal part, there seems to be developed glands that could be responsible for secreting the chitaneous suspensory funicule. The cells still spherical in shape, surround the median transparent tubule. On the inner emarginature of the front, the site of a new node or bulb, may already be seen clearly. Whence comes a chain of nodes (sometimes bearing shed skin), as I saw it at many times, on the suspensory funicules.

The processes of evolution from a Nauplius to a tiny larva, was described, but remains to be clarified. It appears that the evolution is slightly retrogressive.

7. Caligus nanus Kr. l.c. 3 R. 160, 180, Tab. II, 4 7)

Habitat: On the body surface of the Gadus morrhua and aeglefinus, found by Kroeyer, together with Caligus angustatus, in the Straights of Oeresund.

Beta) The cauda of the female is articulated.

8. Caligus diaphanus Kr. (not Baird)

Scutum translucent, not quite round, rather wider than long. The posterior maxillipeds are robust, and distinct from the basal plate. The furca is provided with divergent, blunt rami. The fourth abdominal leg is short, ~~[illegible]~~ barely longer than the inner seta of the proximal legs. The genital organ is thick, hemielliptical, slightly longer, than wider, exceeding half the length of the scutum. The cauda is elongated, equals or exceeds the length of the annulus; it is slender, biarticulated, the second segment being very short. It measures four milimeter in length.

The male is unknown.

Caligus diaphanus Nordman Mikr. Beitr. 11. 26; Kroeyer l.c. l. 623 Tab. VI., 5 ibidem. 3. R. 11. 153, 177. Tab. VII. 5.

Habitat: Trigla Gurnardus. I collected five females, all on one occasion in the gill cavity; this finding occurred in the Skagerrack Sea, during the month of August.

This is a species easy to distinguish.

Ovigerous tubes measuring about 3 milimeter, with reddish ovules, (i counted about forty (40) of them). The intestine blackish in colour. Palps are not compound and are set almost in the middle of the rostrum. On both outer angle of the genital orifice, two or three setae are seen; close to the origin of the cauda, prominent spermatophores (a tube carrying spermae) are found; but at that location, I never saw the so-called "cylindric bodies". (please refer to Kr. l.c. I. 624. fig.)

Caligus angustatus. Kr. l.c. 3. R. 158. 179 8)

Habitat: on the surface [2] body of the [1] Cadi Mormhua, and aeglifinus, sparingly with C. Mormus (Krosyer)

Genus Lepeoptheirus, Nordm.

Without lunules. In every other respect is closely identical with Caligus.

Footnotes to Page 10 (Printed text)

7) First of all, the species is distinguishable from others by abdominal leg which bear even apical setae. Furca with elongated linear rami. The male's (?) cauda is biarticulated.

8) Species distinguishable by its triarticulated cauda, its pearshaped genital organ, and its scutum, which is arch-shaped anteriorly.