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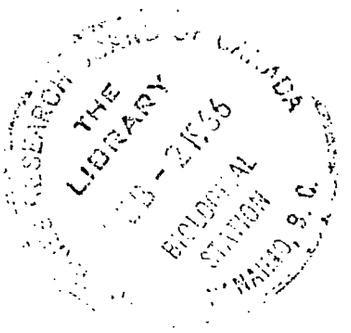

Concerning parasitic Crustacea, with special reference to the Danish fauna. III. Description of forms (continued)

By Henrik Krøyer

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Concerning Parasitic Crustacea, ~~(aquatic)~~ ~~especially~~ with ~~regard~~ to the Danish fauna.

by

Henrik Krøyer

III. Descriptions of Forms (~~continuation.~~)

Caligus (Lepeophtheirus) pectoralis.

(first volume, plate VI, fig.4).

The halfmoon shaped organs are lacking. The eyes are very small and almost amalgamated, and the H is not easily recognized with the naked eye.

The palps (gropers) (fig.4,a) are bifurcated with the branches narrow and pointed*).

The first pair of legs has each a spike on the inner edge of the second joint.

Each leg of the second pair (fig.4,b) has a large claw, but no protrusions on the inner edge of the second joint.

The furca (fig.4,c) is single bifurcated, its branches lancet shaped.

The sixth pair of legs (fig.4,d) is very small. First joint (proximal) has a little spike at the end of the outer edge. The second and third joints less obviously separated and the spike at the end of third joint's outer edge is seen with difficulty. The fourth joint, or the hand, of almost the same length as the combined length of second and third joints, the innermost of its three claws is almost of the same length as the hand and twice as long as the centre claw, which is only slightly longer than the outermost one.

foot note:

×) Nordmann claims that they are two jointed. But, like in all other caligus genera examined by me, I have found them made of one joint only.

The tail is short, without any obvious signs of joints.(9) Its appendices are very small.

After having indicated what is characteristic of the genus I shall now describe what is specific for the sexes, the habitude differing very much from eachother, and I shall first describe the female (fig.4,A) which seems to occur much more frequently than the male (fig.4,B).

The length of the largest specimens was 2½''' without egg strings; the width a little more than 1'''.

The cephalothorax is small compared to the abdomen×), is only slightly arched, and approaches a circular shape; the lengthh, however, may be slightly greater than the width and the back edge rather straight truncated.

The free, leg carrying, segment is not separated from the genital segment by any groove across but forms in connection with it a bottle shaped body whose lower (ventral) edge is flat cut.

The tail is much narrower than the male's; at the same time its appendices are much smaller and the tufts much shorter.

The size of the male is much less than that of the female (approximating 1½'''); the colour dark reddish. The cephalothorax much larger and especially wider compared to the the abdomen. It is also more quadrangular and far less arched than that of the adult female. The segment, carrying the sixth pair of legs, is clearly separated from the cephalothorax and the genital segment and has a somwhat rhomboidal shape. The genital segment (fig.4,e) is of a rather circular shape and is hardly of half the width of the cephalothorax. Each of its side rims (edges) is provided with three

×)The length of the cephalothorax is almost that of the abdomen's without the tail, its width only slightly greater than that of the genital segment.

spikes located close together and placed closer to the ventral than to the dorsal edge; also, the ventral edge is provided with three spikes on each side of the tail. In the genital segment on each side of the intestinal canal is a large oval organ to be noticed, like a sac or bladder. The length of the tail is almost half of that of the genital segment and the width is more than half. The length of the appendices is almost 1/3 of the length of the tail, and the three downward turned tufts are longer than the tail and appendices combined. (10/3

Finally it should be noted that I along with the common females have found a rather deviating specimen with wider and far less arched cephalothorax, with smaller genital segment and with the second pair of legs strongly protruding on the ventral surface of the cephalothorax. Although strikingly different in habitude from the ordinary female there does not seem sufficient reason to acknowledge it as a different variety since it occurs both at random with the common specimen and fully coincides with it in all aspects which provide genus distinctions: gropers (palps), furca, etc.

As far as this crustacea is concerned, which occurs very frequently, especially on the ventral fins of various flounder genera (Platessa, Flesus, Rhombus, maximus,etc.) and also singular on several other fishes, Müller has first given a poor illustration (Zool.dan.tab.33, fig.6) and an insufficient description under the name Lernaea pectoralis. Nordmann formed a new family(Lepeophtheirus) of this animal because it is lacking the halfmoon shaped organs which he assumes to be the eyes. Burmeister believed to find one single eye closely behind the front edge of the frontal plate at its middle. There is, however, no eye to be found at this location at all; on the other hand there is a small limited spot as is in the case of other caligus genera. - In regard to the male,

which so far has hardly been recognized ×), and which easily could be considered a different genus if found alone, because of its very different appearent appearance, a proof may be insisted upon that it is realy the male. In this respect I shall limit myself to note that I often have found it together with the female on the same flounder specimen; that as well its shape as the continuous lack of egg strings denote it as a male; that it in everything essential for the genus coincides with the female; and that the deviations are almost the same as between the male and female of the Caligus Curtus, although perhaps to a higher degree.

Caligus Sturionis Kr.

(B.1, plate VI, fig.6. the female)

With respect to the colour this caligus genus distinguishes itself from all other genera examined by me with a kind of a mother-of-pearl shine. As specific for its habitude is its inverted-heart shaped, longitudinally outstretched genital segment, its long tail, and its all together slim and outstretched shape.

The measurement from front edge of the cephalothorax to the tail end is 6''' of which the cephalothorax makes up for approx. 2½ to 2 3/4''', the abdomen makes up the difference. The length of the egg strings 4 to 6'''; the total length being 8½ to 10½'''.

The halfmoon shaped organs are missing.

The first pair of antennae has a proximal joint which is not much longer than the second joint.

The palps are large, stretching far in front of the mounth,

×) What Nordmann supposedly indicates as the male appears to me, as far as I can judge from his brief description, which lacks any illustration, to be simply a younger female. -5

bifurcates at the end into two branches. The shape of (12) 5
these is conical without any expansion in the middle.
The non-bifurcated proximal joint is rather long, narrow, somewhat conical (fig.6,a).

The first pair of legs' second joint is provided with a spike at the middle of the inward turned edge.

The furca (fig.6,b) is probably double bifurcated, but the two rather long, narrow, and almost linear branches are so slightly grooved at the end that the minute branches perhaps rather may be described as teeth than as branches.

The segment to which the sixth pair of legs is mounted is very indistinct and can hardly be distinguished from the genital segment.

The last pair of legs (fig.6,c) shows all four joints very distinctly. The proximal joint has a somewhat soft spike at the end of the outer edge; the second joint is the shortest, its outer edge arched, provided with a small hook at the end, above which appear two smaller knots, or maybe indistinguishable hooks. The third joint is rather long, linear shaped, along the outer edge provided with very minute cilia (which only show after pressing, however, under a very strong magnifying glass), and at the end of the outer edge provided with a spike whose length is almost half of that of the hand. The hand is only slightly shorter than the third joint, rather long, linear shaped, at the end, though, slightly widened; its outer finger is slightly bent, of length similar to the third joint's spike; the second finger is much longer, arched, only slightly shorter than the third finger. The third finger is as long as the hand, or more than twice the length of the outer finger, almost straight, and provided with a few very minute spikes almost toward the middle of the inner edge (fig.6,c$_{4}$).

The genital segment is rather long, somewhat narrow, but its width exceeds half of the width of the cephalothorax . It is inverted-heart shaped, or if preferred: somewhat conical. The

ventral edge is, as it were, rather straight cut off and (13) the slightly convex side rim converges upward.

The tail is long (almost as the generation joint), narrow, (almost ¼ the width of the generation joint), has at the beginning of the lower third of the length a slight constriction and, thus, seems as if to consist of two joints. Its appendices (fig.6, d) are very short and make up hardly 1/10 to 1/12 of the length of the tail. Also the tufts of the appendices are very short; the three ones in between almost of the length of the appendix, the outer one on each side, however, is far shorter.

In July, 1836, I found agreat number of this caligus genus on a sturgeon, caught at Aalbaek, but only females. I have not noticed it at any other time although I have frequently, as well before as afterwards, examined the sturgeon.

Caligus Salmonis Kr.
(B.1, plate VI, fig.7).

The length of the female from frontal plate to tail end 7''' of which the cephalothorax makes up for 2 3/4''', the abdomen 4¼'''. The egg strings are at least twice as long as the body, i.e. 14''' and more. The width of the cephalothorax is 2½'''.

The length of the male is 3¼''' of which the cephalothorax makes up almost 2'''. The width of the cephalothorax is 1½'''.

The proximal joint of the first pair of antennae is somewhat shorter than the second joint.

The palps (fig.7,a) are a little longer than the mouth, have a broad root, are bifurcated at the end, the branches are pointed, the inner being longer than the outer.

The first pair of legs have a spike or lap at the middle the inner edge of the second joint; the inner of the branches, in which this joint ends, is only approx. 1/3 longer than the outer one.

The second pair of legs show a little tuft toward (14) 7
the middle of the inner edge of the second joint. The proximal joint is much longer than the hook but of no considerable thickness

The furca (fig.7,b) is single bifurcated, the branches bluntly rounded, dimly lancet shaped.

The free, leg carrying segment is in the female very small in comparison to the genital segment and dimly separated from it; in the male, however, it is large in comparison to the genital segment, clearly separated from it and of slanting quadrangular shape.

The hand of the sixth pair of legs (fig.7,c) is shorter than the third joint, and this again is is shorter than the second joint. The outer edge of the proximal joint has no spike at the end. The second joint has in stead of a spike a rounded skin flap; third joint has a strong, somewhat bent spike which reaches to the end of the hand's outer edge. The inner finger is longer than the hand and almost twice as long as the outer finger. The length of the middle finger is half way between theese two. All four joints are clearly separated from each other. In the female the built of this pair of legs is much clumsier than in the male.

The genital segment in the female is unusually large; sometimes even of a length and width almost like that of the cephalothorax, of rather long quadrangular shape, in front, however, slightly narrower and rounded off. The notch of the back edge is unusually deep and distinct. On the ventral surface, above this notch, is mounted a halfmoon shaped, horny, organ of a yellowish colour, distinct from the colour of the rest of the body. The convex edge turns forward, the concave backward.

The genital segment of the male is very small in comparison to the cephalothorax (fig.7,d); its shape is oval and truncated at both ends. The outer edge, a little away from the lower edge, is provided with a knot from which four small tufts protrude; the lower edge has likewise at the corners

a knot or patch, which is larger, cleft, but only provided (15) with two short tufts.

The tail of the female is very long (like the genital segment), narrow (it is hardly 1/3 the width of the genital segment), linear shaped; at the end, though, a little retrenching; shows indication that it consists of two parts or joints. Its appendices are small and make up probably less than 1/10 of the total length of the tail.

The tail of the male (fig.7,e) may also be said to be long, since it along with its appendices is almost as long as the genital segment, but in comparison with the cephalothorax it is short. It has more than half the width of the genital segment, is narrower above but expand below and, thereby achieve a bottle shape. Its appendices are broad, have almost 1/3 of the length of the tail, and are, therefore, relatively much longer than those of the female. Of the four strong, feather shaped, tufts, with which each appendix is provided, the outer one is almost of the length of the appendix; the three others are almost of the combined length of the tail and the appendix combined. In the females the tufts are short and do not have the shape of feathers.

This caligus genus, which during the summer is rather common on the salmon, separates itself from the other genera known by me through its dark, almost black-blue colour.

Caligus diaphanus Mas?

(Plate I, fig.3)

Of this little caligus, whose length is 1''' or slightly more, I have only found one single specimen, a male, in the Northern Kattegat, and I don't dare with certainty to claim from which fish I took it. I consider it reasonable, however, that it was found on a flounder genus since I became aware of it among stored specimens of the caligus pectoralis. For a long

time I considered it a separate genus and described it under (9
(16)
the name caligus candatus. But much seems to me now to suggest that this is the male of the caligus diaphanus (first volume, page 623, plate VI, fig.5). I shall start with a brief description and, thereupon, hold together similarities and dissimilarities.

Descriptive for this animal is the wide, kidney shaped, or halfmoon shaped, appearance of the cephalothorax, and especially the long narrow abdomen which is almost of the same length as the cephalothorax.

The frontal plate is provided with halfmoon shaped organs.

The second joint of the first antenna pair is considerably longer than the proximal joint.

The second joint of the second antenna pair, the hook joint (fig.3,a), is cleft with a shorter inner and a longer outer hook.

Tha palps appear to me undivided and pointed.

The proximal joint of the second pair of legs (fig.3,b) extends from its root a long, stromg, spike, or point, against whose inner edge the second joint, or the hook, places itself. The hook, which is long but rather thin, has a tuft on the inner edge.

The furca (fig.3c) is single bifurcated with rather long and narrow branches, rounded at the ends.

The segment, carrying the sixth pair of legs, forms a slanting quadrangle.

The sixth pair of legs are rather strongly built (fig.3,d), and all its four joints appear very clearly: the proximal joint is almost as long as the following three joints combined, and these mutually of almost identical length. The second joint is at the end of the outer edge provided with a strong spike, which reaches to the end of the following joint; this again has a strong, but even longer, spike which reaches almost to the middle of the outer finger; this finger is only slightly shorter

than the middle one, which again is only slightly smaller (17) 10
than the innermost. They are all longer than the hand.

The genital segment is very long, narrow, bottle shaped, and shows a little spike at each side edge, and at each side of the lower edge a pair of small spikes or tufts.

The tail is long (longer than the genital segment), narrow (it has only half of the widt of the genital segment), and seems to consist of two destinct sections, of which the first is shorter than the second. Its appendices are of medium length and provided with five tufts: three long downward pointed, two short ones on the outer side.

What may seem to separate the just described animal from caligus diaphanus is the completely diverging shape of the cephalothorax and the most different reciprocal relation between the cephalothorax and the genital segment (which, however, as formerly explained in vol.I,page 648, in my experience is the only constant sex difference); further that the hook of the second antenna pair is cleft (but this is likewise in caligus curtus distinction mark between male and female). In the other more essential conditions: the length of the tail, the shape of the second pair of legs, the shape of the furca, the description of the sixth pair of legs, etc., they are thus tallying that the former diagnosis for caligus diaphanus by me completely fits the here described animal. It, therefore, to a high degree becomes credible that it is the male of the caligus diaphanus which I have described above. To place the case beyond any doubt, however, it probably is required to extend the examination to a greater number of specimens and, especially, that both"varieties" are found next to each other on the same fish.

To ease the determination of so far known Danish Caligus genera the following descriptions are included.

The following table may serve for an even faster separation of these six genera:

Chalimus Burm.

In the second part of the first volume of this publication (p.200) is was mentioned that the, especially as entomologist known, scientist, Burmeister has formed the family: Chalimus*) after a single specimen of a caligus-like animal removed from a mackerel near Helgoland. Eager to find this variety and investigate the circumstances for its appearance I have not let any opportunity pass by in my journeys; also, I have by and by come across a not insignificant number of various specimens on different fish (mackerel, gar-pike, etc.) both in the Kattegat and in the North Sea. - Since I on many points deviate from Burmeister in the description of these animals it may not be irrelevant to note that Burmeister true enough has carried out his investigations with a better microscope than what has been at my disposal; but I believe, on the other hand, that this may be fully made up for by the fact that I have with the greatest care and through all details examined many specimens, whereas Burmeister, as mentioned, only possessed one specimen. Anybody, closer acquainted with similar investigations, will probably admit that with regard to animals as small and as complicated in structure no completely sure and exhaustive result can be expected from one specimen, no

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*) Nov.act.phys.med.acad.Caes.Leop. Carol.XVII. I.,p.294 - 298, plate XXIII, fig.13-18.

matter how qualified the examination may be. Burmeister (20) 13
can surely not be blamed if his description of one or another condition turns out to be less correct. On the contrary gratitude is due to him for calling attention to this interesting shapeven.

Ghalimus Scombri Burm.

(plate I, fig.1)

The largest specimens almost 2''' length.

The shape is rather long and narrow and the cephalothorax does not outweigh the abdomen considerably. Although the segments which carry the fourth and fifth pair of legs seem less intimately grown together with the cephalothorax than is the case with the caligus genera, and especially the latter extends somewhat over the back edge of the cephalothorax, they must still be considered belonging to the cephalothorax*).

The frontal plate's extent from front to back is far greater than that of the caligus genus.

The clinging organ (fig.1,a), extending from the small notch, located at the middle of the frontal plate's front edge, is blck-brown in colour and of horny substance. It consists of a thicker root, a long wavy thread, and a button. The root, or that part which extends from the frontal plate, is again made up of three joints that all approach a spherical shape; the proximal one, where it is mounted to the frontal plate, is, however, a little indented; the second is a little flattened, orange shaped; the third, which merges into the thread, is

*) Burmeister's illustration and description give a less correct picture hereof, in so far that he pictures these segments as entirely separated from the cephalothorax. He also gives the approximate limits of the head, and counts it as a separate segment, which I have not found the least reason to do, at least no more than in the case of any other caligus genus.

is somewhat rounded-conical. The thread is plump, a (21) 14
couple of times as long as the root-piece, and much thinner than this. The button, finally, is circular and seems quite analogous with the horn button with which several Lernaea (Anchorella, Lernaeopoda, etc) are attached.

The position and the character of the eyes are as with the caligus genera*).

The first pair of antennae is exactly as on the caligus genera; only their position is a little more slanted and thus they are fitted closer to the side edges of the cephalothorax.

The second pair of antennae (fig.1,b) is small and they consist of two joints: a thicker proximal joint, and a second joint which does not form any hook but ends rather blunt**).

The mouth is exactly like that of the caligus family.

The palps are narrow, pointed, not bifurcated (fig.1,c)***).

The first pair of legs (fig.1,d) coincides fully with the caligus family except that they appear to me a little stronger in build****).

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*)Burmeister describes an organ, which he considers to be the eye, behind the clinging organ. But he has undoubtedly let himself confuse to suppose that the rounded, limited, translucient spot which may be found in this location in all caligus genera but in build has nothing in common with an eye, should be a sensory organ.

**)The result of my examination of the second pair of antennae is thus somewhat different from that of Burmeister, who lets it end in a little, arched and pointed hook which does not occur in nature.

***)I may with complete conviction claim that the palps consist of only one piece and in no way consist of three joints as depicted by Burmeister. He also, surely, depicts them far too small. In all by me examined specimens they extend to the end of the mouth, and the mouth is short, wide, clumsy; not long and pointed as depicted by Burmeister.

****)Burmeister depicts, wrongly, the outer of the branches -15

Like in the case of several caligus genera a small skin-patch is noticeable toward the middle of the second joint's inner edge.

The second pair of legs (fig.1,e) is like that of the caligus family. A tuft is noticeable on the inner edge of the second joint and the point of this joint is like separated from the rest of the joint in that it suddenly narrows in[X]).

I have not been able to discover the furca and also not the first pair of auxiliary hooks.

The third pair of legs (fig.1,g) consists of a larger proximal joint and an oar consisting of two joints. From the proximal joint's lower edge extends a couple of downward directed tufts. The first joint of the oar is rather long, oval, and extends a small spike or tuft from its upper edge towards the end. The second joint is also oval but shorter; its upper edge is provided with four short tufts[XX]) of which the proceeding always exceeds the preceeding in length; the lower edge has three long tufts that are rather broad at the root. Although all these organs, which I call tufts, seem to be too soft to be called spikes or claws, it must be noted that they appear to be articulated with the joint and each provided with individual muscles.

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in which this pair of legs ends as the longest. The inner branch, as with the caligi, is always longest. This error is because he has given this as well as the following pair of legs an unnatural position. The second joint turns down and inward, not up and outward as depicted by Burmeister.

[X]) According to his illustration Burmeister considers this narrow part as a separate joint, but does not mention the tuft which I have found in all examined specimens.

[XX]) In some specimens I have found the proportions a little different (fig.1,g[X]): the three first tufts very short, mutually of almost same length; the fourth much longer, almost as long as the three lower ones. This pair of legs is wrongly conceived by Burmeister, not only with regard to the number of tufts, position, and character, but especially in that he bestow on it two oars.

The fourt pair of legs, grown together at the root(23) (fig.1,h) issues two branches of two joints. The outer branch's first joint is short, logitudinally-oval, at the end of the inner edge provided with a tuft; second joint is shorter and provided with eight tufts*) of which the outer is short, the following are successively increasing in length; the 5th to the 7th are the longest. The first joint of the second branch is short, blunt, with a long tuft on the inner edge. Second joint is larger, oval, with 8 tufts of which, again, the outer is the shortest.

The fifth pair of legs (fig.1,i) are formed of proximal joints, grown together to an elliptic plate, which on each side issues two, though somewhat rudimentary, branches. The outer branch consists of three small rounded off joints**) of which the second is somewhat larger than the two others. The second joint issues from the end of the outer edge a small spike and from its inner edge a tuft; the third joint is provided with seven spikes or tufts of which the three outer are shorter, the three inner longer. The inner branch consists of only one distinct joint of rounded shape and provided with six tufts. Above this joint, however, may be another,less distinct, but this I have not been able to determine with certainty. A tuft, at least, is issued above the joint.

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*) Apart from these 8 tufts which are located at the end of the joint I have, on some specimens, on the outer edge found two short but strong tufts or spikes. Some of the tufts on this and the following pair of legs are feather shaped, but the side feathers are very few, short, and indistinct.

**) This, however, I do not consider absolutely certain. It might be that the first joint is the auxiliary hook, and that the oars, in other words, only have two joints. I believe on the first joint to have observed a small, inward turned, spike as indicated in the illustration.

The sixth pair of legs (fig.1,k) are coarse in build (24) 17)); the proximal joint is almost as large as the following joints combined, towards the end of the outer edge provided with a rather long tuft. The second joint is short, strong, somewhat triangular, with a strong spike at the end of the outer edge. Third joint and the hand are grown together so that they cannot with certainty be separated. What justifies the assumption, however, that the hand consists of two closely jointed joints is the circumstance that it towards the middle of its outer edge suddenly narrows and that, at this location, a strong spike protrudes, which indicates the end of the third and the beginning of the fourth joint. The hand is provided with three, slightly bent, claws which are almost identical in length; the outer, however, is a little longer than the two others).

The genital segment is lengthwise stretched quadrangular, provided with three small tufts at the lower corners; its width equals almost half of the width of cephalothorax and it consists in no way (neither does the tail) of more than one section).

The tail is also lengthwise somewhat stretched quadrangular, not much narrower than the genital segment and of almost the same length. Its appendices are rather small and their connection joint with the tail rather dim. They have six tufts of which the two outer are short, the three in between long, the inner one short.

A very closely related species differs through a narrower

) On some specimens, however, I have found the build more slender.

)Also with regard to the three last pairs of legs my observations vary somewhat from those of Burmeister. He describes the number of tufts on the fourth and fifth pair differently and recognizes only two joints on the sixth pair.

)I remark this because Burmeister, I think without justification, refer to four joints in the combined genital segment and tail.

abdomen, a slenderer build of the first and sixth pair of legs, different length of the third pair of legs' fourth tuft, etc.; however, I do not consider it specifically different from the here described genus.

Some may suppose that the many deviations with which the described specimens differ from Burmeister's description of Chalimus Scombri pro-ves, not tha Burmeister's description is wrong, but that it concerns a different genus. This, however, I am for various reasons uninclined to believe. Not to mention that Burmeister's Chalimus and the here described one are very concordant in habitude, it must be noted that the deviations by Burmeister in some respects cannot be expected to really exist in nature (f.inst. the position of the first and second pair of legs, etc.); also, in the case of unconditional confidence in B.s description, his Ch.Scombri and the present Chalimus cannot even be referred to the same family, but must be divided into several families of caligus-like parasites, distinguished by their clinging organs. It must also be kept in mind that I often have found the here described animal on the same fish (the mackerel), from which Burmeister's Chalimus was taken.

Chalimus Burm.nov.sp.

(Plate 1, fig.2)

This form, which I have found on a little turbot in the Northern Kattegat, is very different from chalimus scombri burm., and with the provision of accepting the validity od the family: Chalimus, this must be considered a new genus.

The length is 3/4''' to close to 1'''. Of somewhat wider shape than Ch.Scombri; the cephalothorax is much larger in comparison with the abdomen, which is both narrow (less than $\frac{1}{4}$ of

width of cephalothorax) and very short (less than 1/3 of the length of the cephalothorax).

The clinging organ is short, somewhat plump, and horny. The root consist of only one joint which is conical, a little blunt at the end, with two small incisions in the lower edge. The thread is stretched out straight, somewhat thicker toward the root and deminishing in thickness towards the button which is rather large and circular.

The first pair of antennae are identical to Ch.Scombri's. With the second pair of antennae and with the mouth I have also not been able to detect any difference of importance. The same seemd to me true about the palps, although I am not quite sure about this since I have not been able to separate (isolate) them due to their minute size.

The first pair of legs (fig.2,a) is of the for the caligus family usual shape,but shows on the second joint's inner edge no tuft or spike; the inner branch is long, thin, bent at the end; the outer is short and rather blunt.

The second pair of legs (fig.2,b) is distinguished rather through a considerable size than through diverged shape. The first (proximal) joint is much longer than the second and of considerable thickness; the second joint is bent, thick at the root, but ends very thin and pointed; it has no tuft on the inner edge.

On the distal joint of the third pair of legs (fig.2,c) I have noticed at the end edge only three short spikes, very broad at the root, and three longer spikes downward directed on the lower edge.

The fourth pair of legs coincide with the same pair in Ch. Scombri, only each oar seems to have one tuft less than on Ch. Scombri. This circumstance, however, may be accidental.

The outer oar of the fifth pair of legs seems tobe in two

joints; the inner, however, only one joint. The number (27) 20 of tufts I have not been able to determine with any reliability.

The free, leg carrying, segment (fig.2,d) is quadrangular, of greater length than width.

The sixth pair of legs is of a peculiar shape: they are short, rather plump, and seem to consist of only two joints. The first joint is much larger than the second, which ends in two short spikes.

The genital segment (fig.2,f) is short, of a little greater width than length, quadrangular in shape. The lower corners issue a little knot, or like a rudimentary leg, provided with two short tufts (fig.2,f)).

The tail (fig.2,g) is of almost the same length, width, and shape, as the genital segment, only its corners are a little more rounded. Its appendices are rudimentary and not distinctly separated from the tail; each of them carry six tufts.

I shall now proceed with the reasons according to which it appears to me most doubtful whether the forms that, according to Burmeister, should come under the Chalimus family really constitude a family. First I shall call th attention to the circumstance that among the not inconsiderable quantity by me found specimens not one was found with egg strings. The genital segment is little developed, ; is flat, and shows no sign to indicate inner egg sacs. In other words: None of these individuals may reasonably be considered a grown up female). "Well", it might be said, "but this is no reason to reject the Chalimus family, Let them be males." - But here I must call back to memory that

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) Burmeister also declares the specimen described by him to be a male.

the males occur generally much less frequently than do the females among the crustacea; and that this is also the case with the caligus-like crustacea in particular; and that only among very few genera, and only in very few cases, may be found as many males as females. To find the occurrence of males much more frequent than that of females I know absolutely no example of, neither in my own or anybody elses experience. I do, therefore, also not believe it credible to acknowledge them as fully grown males, and there remains nothing left but to consider them an evolutionary step. I shall point out a fact which to no small degree seems to me to confirm this viewpoint. During my stay at Agger at the end of August, 1836, I observed one morning a cod (Gadus Molva Lin.), which the fishermen had caught among other fish with gill netting, covered with unusually many caligi that I considered belonging to caligus curtus müll. To assure myself of this I provided myself with a few specimens before the fishermen carried away their catch. Examining the specimens after my return home I found that they were females of cal.curtus but noticed simultaneously, to my great surprise, that to each specimen of cal.curtus was attached two, or at least one, specimen of Chalimus Scombri Burm. (plate I,fig.1,m)). Of

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) They were attached to the side edges of the cephalothorax or to the genital segment. I did notice at the Sea shore that a couple of smaller individuals were included with each larger specimen that I loosened from the fish but thought it was due to a lot of slime which covered the surface of the fish and more or less enveloped the the parasites. I, therefore, did not find any specific reason to examine this aspect on the spot and, also, a rain storm caused the fishermen to hurry with their task, which prevented further consideration. Had I suspected the true relation I would, by buying the fish, probably have provided myself with more than a hundred specimen of Ch.Scombri at one time.

course, the question immediately arose, in what way the (29)22
latter were related to the former. To consider Chalimus
Scombri a parasite of the Caligus curtus, like the Caligus
curtus itself was a parasite of the cod fish, I believe so
unreasonable that I do not believe it necessary to linger
any further on this mode of explanation. Under different circumst-
ances one might have been tempted to consider them males of the
caligus curtus, especially since the connection between them
very easily would seem to such that it would allow a mating;
the circumstance, however, that the male of. caligus curtus
is already known prohibits such a conclusion. I also do not
consider it reasonable to assume that the connection between
them is quite accidental and indicates no closer relation
between them, especially since I have often since found them
thus together. I am, therefore, much more inclined to believe
that Chalimus Scombri Burm. is nothing else but the Caligus
curtus prior to the last change of hide. The following seems
to me to support this: the size of the largest specimen of
Ch.Scombri, found by me, is somewhat less than the smallest
numerous
of the/Caligus curtus specimens I have examined; and of these
the smallest specimens of the Caligus curtus were individuals
of the long stretched type and in all their habitude of striking
similarity to the Ch.Scombri. Perhaps the form of the palps
might here also come into consideration. I am still assuming
that the clinging organ of the Chalimus Burm. only is temporary
until, at the last change of hide, the second pair of antennae
achieves the form of strong clinging hooks; the halfmoon shaped
organs, the first pair of auxiliary hooks, and the furca are
added and, all in all, the animal becomes capable of clinging

to its prey without this clinging organ. It does not seem unnatural that the young caligus individual clings to older individuals of the same genus since it can hardly constitude much of a nuisance and, due to the nature of the attachment, it can easily obtain its food from the fish which serves as mutual domicile. The slight incision which may be found in the middle of the front edge of the frontal plate of all caligi, I believe, may be taken as a confirmation that they all at an early age have been provided with a clinging organ as the one descriptive for the Chalimus Burm.; it simply indicates the spot where the clinging organ was mounted prior to the last change of hide. With regard to the last Chalimus form, described by me, I consider it reasonable to think this may be the young one of Caligus pectoralis.

After thus having stated what I presently am capable of reporting for the enlightenment of this matter I may, until closer observation can provide certainty in the matter, leave it to everybody to accept whatever appears most probable to him. This much seems to me to be beyond any doubt: That he, who wants to retain the Chalimus family, must anyhow use a different characterization than that used by Burmeister.

Trebius caudatus Kr.

(plate I, fig.4)

Of this, so far unknown, animal I have during the summer of 1836 found two specimens (both females with egg strings) on Squalus galeus in the Northern Kattegat.

The length was 4''' of which cephalothorax almost made up for 1½''', the tail 1½''', and the three independent segments of the abdomen the rest.

Cephalothorax, which fully corresponds to that of the Caligus genera in form, is horse-shoe shaped, rather strongly

arched, provided with purple red eyes that are located close together, almost without any separation, in the for caligus genera usual place. The frontal plate lacks the halfmoon shaped organs, but has an incision in the middle of its front edge.

The first pair of antennae (fig.4,a) is of two joints, of shape like that of the caligus family, along the foremost edge provided with about 20 long, feather formed tufts (fig.4,a[X]). The second joint is almost as long as the first, is not any thicker at the end than otherwise but shows almost at the middle of its lower edge a protrusion from which a tuft extends[X]). At the end the joint has tufts like the caligus family.

The second pair of antennae form two-joints clinging organs whose distal joint, or hook, is very long.

On the sides, just behind these antennae, are seen a pair of auxiliary hooks like on the caligi.

The mouth is short, blunt-conical, just like in the caligus family.

The palps (fig.4,b) are long,(longer than the mouth), narrow, pointed, at the end bifurcated with pointed branches, the inner branch shorter than the outer.

The first pair of legs (fig.4,c) with two joints, thin, ending in two branches. In this they deviate from the caligi: that the shorter outer branch extend, not from the end, but from almost the middle of the second joint.

The shape of the second pair of legs (fig.4,d) is like that of the caligi females, and like it is noticed on many of these,

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[X]) It may perhaps herefrom be assumed that a new joint starts from this tuft carrying protrusion, but I have not noticed any further indication hereof, neither from examining the antennae under strong or weak enlargement, nor with or without pressing.

there is a tuft on the inner edge of the second joint; (32) 25
the joint suddenly turns narrower at the tuft, as if a new joint began. Besides, the joint is of a rather weak and slender build.

The furca (fig.4,e) is small, singular bifurcated, with short, broad, blunt-rounded branches.

The third pair of legs (fig.4,f) deviates to a larger degree from the caligus family in that it has the form of bifurcated swimming legs. From a halfmoon shaped proximal joint, on each side provided with a small tuft, extend two two-jointed oars of which the outer is much bigger than the inner one. The outer oar's first joint is at least twice as long as the second, rather long, almost of linear shape, and its outer edge ends with a small spike. The second joint is oval, has along its lower edge three strong, closely ciliated, spikes, or leaves,(fig.4,f), and along the inner edge four long swimming tufts, deminishing in length from the inner to the outer. - The second oar is hardly half as long as first joint of the first oar, consists of two disc shaped joints of almost equal size, and ends in three feather tufts.

The fourth pair of legs in the least detail resembles that of the caligus family.

The fifth pair of legs (fig.4,g) deviates considerbaly from the caligus family. First in soffar that the segment to which they are attached is separate from the cephalothorax; secondly in that they have two three-jointed oars. The proximal joints,extending from the inner edge of a large elliptic plate, are rather quadrangular, and issue a swimming tuft from their lower inner corners. From the outer half of this proximal joint's lower edge extend the two oars which are of almost identical length. The outer oar's first joint is as long as the two other joints combined, but narrow, provided with a spike at the end of its outer edge, and

with a long swimming feather extending from the middle of (33)26 the inner edge. The short, somewhat triangular, second joint issue likewise a spike from the end of its outer edge and a swimming feather from the end of its inner edge. The last, rather circular shaped joint has three short, but strong, spikes along its outer edge and five swimming feathers along its lower and inner edge. - The second oar's first joint is wide, disc shaped, provided with a swimming feather from the middle of the inner edge; the second, oval, joint has two swimming tufts on its inner edge; the last and smallest joint has four swimming feathers along its inner edge and thereupon a very small spike at the border of the lower and outer edge.

The sixth pair of legs (fig.4,h) is essentially similar to the fifth. The minor conditions in which it deviates is: that the proximal joint relatively is smaller, below narrower and somewhat rounded, and without tuft; that the outer oar is a little longer than the inner and only has four swimming tufts on its last joint; that the inner oar's first joint is a little shorter than the second, and that it is only provided with three swimming feathers on the third joint.

The shape of the genital segment is that of a half ellipse, the segment is narrower than cephalothorax and much shorter than the tail. The egg strings of the specimens examined by me were short; in one shorter than the tail, in the other specimen slightly longer. The eggs are extremely thin discs.

The long tail, which is almost of the same thickness as the egg strings, seems to show something like traces of three joints, of which the first is the longest, the last the shortest and least distinct.

The tail appendices (fig.4,i) are small, narrow, at the

end provided with six tufts of which the outer and the inner are the shortest, the others long.

Although the here described animal has so much similarity with the caligus family in its whole habitude that it, before submitted to a closer examination, is considered a caligus genus, there is full justification[xx] for the establishment of a new family, which I have named after a parasite of Juvenal's (Sat.V). The genus name is caused by the unusual length of the tail.

Pândarus bicolor Leach[x].

(plate I,fig.6)

This crustácea I have found on the fins of Squalus Galeus (from July til September) as well in the Northern Kattegat as in the North Sea, but only few specimens of females.

The length 5''' from the front edge of the frontal plate to the tip of the tail. Largest width 2 '''. The length of the egg strings upto 11'''.

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[x])I take it for rather certain that the here described animal is identical with the P.bicolor of Leach and Desmarest, especially since Squalus Galeus is also stated as the domicile for this. Desmarest's description, however, is so brief and taken from so unessential circumstances (f.inst. the length of the egg strings, which varies considerably) that nothing may be decided from this. His illustration deviates (plate 50,fig.5) in several respects from the specimens examined by me:1. with regard to the back edge of cephalothorax; 2. in the shape of the dorsum and the number of chestnut brown spots on it; 3. the shape of the genital segment, etc. But since Desmarest's illustrations are neat rather than life-like and since, in regard to the here mentioned genus, the text in a couple of connections is in contradiction to the illustration, I do not think that too much weight should be attached to these less important descrepancies.

[xx])Justification is: The form of the 3rd, 5th, and 6th pair of legs; the lacking backmost auxiliary hooks; separation of the segment that carries 5th legpair from cephalothorax. -28

The shieldings are of a more solid and horny (35) 28
substance than on most other crustacea. The basic colours is white-yellow but with dark spots in several places which shall be more detailed described in the following.

The cephalothorax, the length of which is almost 2''', has its dorsum arched but only to a lesser degree; in front it is rounded and a little narrower than in the back, where its edge has a flat halfmoon shaped incision. The cephalothorax has, in other words, some similarity to that of the caligus genera since also the front antennae are mounted under a frontal plate like it is the case with the caligi. On the other hand it completely lacks the grooves which form the H on the caligi, is of a very pronounced colour, a live, dark, chestnut colour, except for the outer edges, the two backmost corners, and a halfmoon shaped spot toward the centre (but closer toward the front). The frontal plate, which cannot be said to be articulate with the rest of cephalothorax, has at the middle of the front edge a rather deep incision behind which is noticed a small limited spot or circle. The back edge of cephalothorax shows some very small and rather dim grooves.

The first pair of antennae is very small (fig.6,b), has two joints, and is mounted to the back edge of the frontal plate's ventral surface at its border with the rest of the cephalothorax. The proximal joint is bent, bat shaped somewhat, on th last half provided with close to 20 tufts), especially toward the upper or front, edge. The distal joint is short (not half as long as the proximal joint), much thinner, cylindric, and ends in some tufts (5 to 6).

)These tufts are not shaped as pointed leaves or feathers like those of the caligus family.

The second pair of antennae (fig.6,d), which has three joints, (the joints not all very distinct), is mounted on the ventral surface and on the edge of a rather large inverted-egg shaped plate (fig.6,c). If considering this plate the base joint the antennae msut be said to have four joints and may then be said to be mounted on the sides of the mouth. whereas they otherwise must be said to be placed a little in front thereof. The joint following immediately after the plate is of greater length than width; the next, which is only dimly separated from it, is wider (of greater width than length); the last, distinctly separate, joint is a kind of a hook which at the root is rather thick and swelled but ends in a point. Through pressing two tufts appear on the inner edge. On the outer side of the base plate of these antennae is an even larger elliptic plate (fig.6,e) which above partly covers the root of the first pair of antennae[x]).

The mouth (fig.6,f) is very small, thick toward the root, very pointed toward the tip (almost tuft like).

The palps (fig.6,g) are extremely small and very difficult to prodruce[xx]). They are not located close to the mouth but at the lower edge of the base of the second pair of antennae. They consist of a rather broad blunt-conical joint at the end of which, close to the inner edge, a spike, or strong tuft, is articulated.

The first pair of legs (fig.6,h) is of a rather long and thin shape, consisting of two joints; the first joint the thickest; second joint issues at the end two branches of which the outer,

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x) I have seen no trace of eyes and I consider myself absolutely convinced that this genus does not have three eyes at the root of the mouth, as stated by Burmeister about his Pand.Carchariae but not illustrated on plate 25, fig.13, where they might be expected to be shown.

xx)I am not convinced that I have conceived them absolutely right.

much longer, seems to be an immediate continuation of the joint; the shorter inner branch, however, connected with it through articulation. There is no trace of tufts or spikes.

The second pair of legs (fig.6,i) is very thick and unshapely, without very distinct joints, and very difficult both to conceive and to produce. They seem to consist of two very broad joints; the second of these shows several knots and a minute horny hook that may represent the third joint.

The third pair of legs (fig.6,k) is very small, consisting of a base and two branches; the outer, or upper, of these has two joints, the second more than twice as long as the first, ending in three spikes or claws. The inner or lower branch consists of a very short, slanted cut, first joint ending in a tuft; a three to four times longer, crooked, second joint which on the lower edge beyond the middle shows a tuft, and at the end a very short, minute, claw, or distal joint, on which again a couple of tufts may observed.

The fourth pair of legs (fig.6,l), which, like the following, are gill-legs, appear to be rather well balanced between the grown together base plates and the oars, the latter, because of their strong spikes, simultaneously seem to form organs with which the animal may attach itself. The oars have two joints, the outer a little shorter than the inner; whereas the the first joint of the outer oar, which is provided with a strong spike at the end of its outer edge, is longer than the first joint of the inner oar. The second joint is egg shaped, provided with nine short, but strong, spikes along its inner edge. The last joint of the inner oar, which is rather long elliptical, has four spikes or tufts at the end.

In the fifth pair of legs (fig.6,m) the base plates have greater overweight over the oars than is the case in the preceeding pair. The oars have two joints with rather large elliptical or oval end joints; the inner oar with three spikes along the lower edge,

the outer oar with five; this latter also has a spike at the end of the outer edge of the first joint.

The oars of the sixth pair of legs (fig.6,u) have only one joint. The outer oar is rather long, almost linear shaped, with a little spike almost at the middle of the outer edge and with five large ones on the inner edge. The inner oar is inward bent, smaller than the outer one, at the end armed with a minute spike. The base plates of the fourth, fifth, and sixth, pair of legs, show more or less distinct grooves and stripes, indicating that they consist of several joints, grown together. Whereas the base plates of the fourth and fifth pair, united from both sides at the middle, have the lower edge in the middle arched outward, it is deeply cut in in the sixth pair.

The two from the cephalothorax separate segments, to which the fourth and fifth pair of legs are mounted, are grown together so that they form only one piece of almost the same width as the cephalothorax, whereas the cephalothorax is almost 2½ times their combined length[X]). It overlaps the following segment like a roof and its back edge shows three incisions whereby four rounded laps occur; the two side incisions are deeper than the middle one; the two mid laps are wider than the side laps and excel through a beautiful chestnut brown colour.

The segment, carrying the sixth pair of legs, is longer than the preceeding section, expanding on the dorsum like a shield, and has in the middle of the back edge an incision of an acute angle,

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X) Since Burmeister with regard to these two segments states (Act. nat.cur. XVII, 274) that they seem to belong together but that closer examination shows them to be separated as well as the other segments, it is not superfluous to note that they in the genus examined by me really are grown together so that the borderline between them cannot be determined with certainty.

forming two rounded flaps. The colour is chestnut brown (39) 32 with yellowish edges.

The Genital segment is quadrangular, of greyish white colour, rather large[X]), almost equally wide all over but a little narrower than the preceeding segment, dorsally slightly arched, the ventral side flat, the back edge somewhat indented; from this incision are issued three kinds of organs: on the dorsal part a rather white disc[XX]), which seems to have no analogue in the closely related families, and the importance of which I do not dare to decide; on the ventral part the tail (or the actual abdomen) with its two appendices; and between the dorsal plate and the tail the two long thread shaped egg strings which appear similar to those of the caligus family[XXX]). The tail is quadrangular, its lower edge slightly indented toward the middle; besides it shows two strange phenomena: the first, that the anal canal does not open at its lower edge but on its rear surface; second, that the appendices are mounted on the sides of the tail and are pointed outward; they are minute, of triangular shape, the base united with the tail, the top angle surrounded by five very minute spikes or tufts.

This genus is easily distinguished from Burmeister's P.Carchariae through the body's shape and colour and through the character of the tail and its appendices.

X)When separated from the preceeding segment, which partly hides it, it measures 2'''.

XX)Or somewhat oval across.

XXX)Although Burmeister's illustrations (plate XXV, fig.1 and 13) seem to indicate thatbalmost the same applies to P.Carchariae, it seems that he has not fully conceived this, since he does not mention the tail, considers the tail appendices analogus with the usual tail tufts, and makes no comment concerning the dorsal plate.

Dinematura ferox Kr.

(Plate I, fig.5)

Of the animal, described under the above name, I have only seen one specimen which is kept in the Society of Natural History (Naturhistorisk Forening). From which fish it has been taken is unknown to me, and I also do not know where it was found but assume it must have been in the Mediteranean. It belongs to the largest crustacea (parasitic) since the length from the frontal plate's front edge to the end of the tail's appendices is almost 15'''.

The cephalothorax is slightly arched, almost of same width and length (almost 5½'''long, 6'''wide). When including the two segments, carrying the 4th and 5th pair of legs, though they are separate, it may be said that its outline approaches a circular shape; if not including them, however, the deep incision in the back edge presents it with the shape of a horse shoe. The figure of H which shows on the dorsal part of the cephalothorax of the caligi can also be observed here; the cross bar, however, does not constitute part of the cephalothorax itself but is part of its back edge since the segments, carrying the 4th and 5th pairs of legs, as above mentioned, are separated from the cephalothorax; furthermore do the side bars of the H not reach to the edge of the frontal plate. Close on the sides of the cross bar the cephalothorax shows a small stripe-like impression and three similar impressions may be seen on each of the cephalothorax side edges, crosswise directed, and one on the middle of the front edge in the direction of the length of the body. A deep and spectacular, point shaped, impression is seen toward the foremost part of cephalothorax on the outside of the side bars of the H; a much smaller one is noticed on the inner side of these bars. The thin skin which on the caligi is spread out from the sides of the cephalothorax, and which seems to serve to complete a suction disc, are also found here. From the back edge of the cephalothorax extend (innermost in the incision) two small skin-like patches.

Like in the caligus genera there is a frontal plate, but it is much more distinctly seen here, that the antennae do not issue from this (although their first joint is partly covered by it) but from the cephalothorax itself. In the middle of the frontal plate's front edge, which is of a much darker (brown) colour than the rest of the plate, is found a deep incision like in the caligus genera.

The first pair of antennae (fig.5,a) consists of two joints: a larger and much thicker proximal joint which along part of its front edge is provided with 12-13 leaf-shaped tufts which are ciliated in the edge (fig.5,a); the small cylindric second joint ends with a larger and a couple of smaller tufts.

The second pair of antennae is long (at least 1½''') but rather thin, and consists of three joints: a short and thick proximal joint; a thinner but almost as long second joint; and a strong hook. The second joint is on the side turning toward the mouth provided with a small, white, translucient, body of spheric or bladder shape.

Between these antennae and the side edges of cephalothorax protrudes (on the ventral surface of the cephalothorax) on each side a convex lump, or a half sphere. It is these half spheres which have been considered the eyes, but this is probably not true at all[x]). On the outer side of these bodies, a little to the front, is noticed a less distinct lump.

The mouth is long (almost 1½''') but thin and strongly pointed. Otherwise of the usual character.

Of palps, two pairs are noticed, of which the first, a little smaller and much thinner, is located close to the mouth on the sides thereof; the other a little further back, between the first pair of

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[x]) I have all together not been able to discover any organs which in my opinion reasonably could be considered as eyes; also nothing similar to the halfmoon shaped organs of several caligus genera.

legs. The first pair (fig.5b) is almost half the length (42) of the mouth, is white, and consists of two joints. The proximal joint is broad and shows toward the middle of its outer edge a knot from which two tufts extend; the second joint is a little shorter, thin and pointed. The second pair of palps (fig.5,c) is of yellow-brown colour, horny substance, and consists of only one joint; the shape is pointed.

The first pair of legs (fig.5,d), which is essentially of the usual shape of the caligus family and consists of two joints, makes itself noticed due to the character of the two branches in which they end. These do not seem to be independent joints but immediate continuations of the second joint. A little from their source they swell up a bit, are crooked, pointed, and mounted with small rows of spikes on thei whole surface*). Between these two hooks extends from the second joint a bundle of tufts (close to 20).

The second pair of legs is large, strong, and formed of three joints: a short proximal joint, a large rugged hand, and a long claw. Against the claw responds a fang-protruding, cleft, or double, knot on the hand.

The third pair of legs (fig.5,f) are bifurcated swimming legs, in build of the same kind as the equivalent pair on the Porphyrops family; only somewhat different in the shape of the individual parts: the proximal joint is small; the outer oar a little larger than the inner one, its first joint large, especially

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*) When Nordmann on his Binocalus sexsetaceus has found spikes only on the inner side of the largest hook, and on the smaller hook two rows along its outer edge, this may be because he might have examined this pair of legs under the microscope and with the aid of pressing, in which case only the outer row of spikes would be seen on the described genus. With the aid of a very strong magnifying glass, however, the others will be noticed.

very broad (almost like the base), at the end of the outer (43) 36 edge, which is drawn out into a point, provided with a small spike; the second joint is much smaller, rather circular, armed with four strong spikes along the lower edge, and within these with three longer feather tufts of which the inner is the longest. The inner oar, which is hardly as long as the first joint of the outer oar, has three feather tufts at the end of the second joint, of which the innermost is a little longer than the others.

Closely behaind and in between the third pair of legs is seen a small, very strong, horn plate, the forward surface of which is concave, the backward convex, and the end edge is slightly emarginated. It corresponds to the furca of the caligus genera.

The fourth pair of legs (fig.5,g) has a very large basal plate (proximal joint) and two rather short but wide oars, each formed of three joints). The first joint of the outer oar is longer than the two following combined; its outer edge issues at the end a spike, its inner a long feather tuft. The same is the case with the very short second joint; the third joint has on its outer edge three spikes, on its lower and inner five feather tufts. The inner oar is of the same length as the outer; the first joint is short and issues a feather tuft from the end of the inner edge; the second joint is the longest, at the inner edge provided with two feather tufts at the end; the third joint has three spikes on the outer edge and three feather tufts on the inner. Also the proximal joint shows a feather tuft almost at the border of the outer and inner edge.

The fifth pair of legs is rather similar to the fourth, only it is larger. The inner oar is bigger than the outer, and

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) Nordmann states only two joints for each oar. This may be explained thereby that he might only have examined these parts with the aid of the microscope whereby the joints are less easily observed, whereas they appear quite clearly under a strong magnifying glass.

at the end of its third joint provided with four feather tufts but no spikes. Also, the feather tufts are (fig.5,h) of a strange character: they are strongly bent, or almost curled, very closely mounted with extremely fine, silvery shining hair, and seem to consist of two joints.

The sixth pair of legs (fig.5,i) are gill-legs, of an entirely different shape from the preceeding and also much larger (almost ½''' long). They have the white colour and the punctured surface which characterizes the organs that in the Amsipoda and Isopoda are considered respiration organs; they consist of a short but broad proximal joint, the lower edge of which is deeply indented, and two large outstretched-egg shaped distal leaves which to a large extend cover the genital segment and stretch down toward the insertion of the tail joints, although not quite reaching these.

The latter pairs of legs each extend from a free segment, i.e. a segment which is not grown into one piece with the cephalothorax, although the two first ones are placed in the rear incision of the cephalothorax. The first of these segments shows on the dorsum a large, halfmoon shaped, incision in the back edge, in which the following small segment seems embraced. The third segment is separated from the preceeding with something like a short neck, and expands on the dorsum into a kind of a carapace which in front issues a small lobe towards each side, and in the back edge has a very deep but narrow incision, whereby it obtains a similarity with certain insects' wing covers. The length of this shield, which covers part of the genital segment, is almost 3'''.

The genital segment is narrower than the cephalothorax (4'''wide), but of a considerable length (6½'''); its shape is long quadrangular but with rounded angles. The lower edge shows, seen from the dorsum, an incision which is first wide but then,

almost at half its length, becomes quite narrow. Through this incision is noticed three oval plates underneath: two of them are higher up, the third, below them, in between them; whether they belong to the genital segment or to the tail I do not dare decide. From the ventral surface the genital segment's incision appears equally wide above and below. At the upper edge of the incision, above the tail parts, which seem like wedged into it, are noticed on each side two small irregular horn knots.

The tail (fig.5,k) consists of two distinct but short joints; especially the first joint unusually short, wide, rounded above, cut off square below; from the second joint, which is rather quadrangular, extend the large, (more than 2½''' long), egg-formed, appendices which below show four very small tufts, three along the lower edge and one on the side edge but near the lower edge.

From the genital segment extend, besides the tail, two thread formed strings, which bend in different ways for almost ½" and, thereupon, infiltrate irregularly. They are brown, shiny, and of a horny substance, but show no indication of cross stripes or of containing eggs. The described specimen, due to other circumstances, must be assumed to be a male anyhow.

After having described this new Dinematura genus I shall now go into the other genera, belonging to this family. But it is necessary first to make a few historic comments about the family.

Raffinesque had mentioned a crustacea, Dinemurus, discovered in the fresh waters of Sicily. According to a remark by

Desmarest: that Müller's Caligus productus was not a caligus,(46) 39
but ought to form a new family, Latreille formed in the second edition of'Regne animal' a family under the name Dinemura and held out Caligus productus as an example of this family. Since Latreille does not mention at all the animal refered to by Rafinesque, or adds his name after the family name, but adds his own, there seems no reason to me to suppose what Burmeister claims; that Latreille intended to unite the by Rafinesque discovered, only very incompletely known, or almost unknown, crustacéan together with Cal.productus Müll. under one family. It seems to me much more reasonable that it has missed Latreille's attention that the name already was given away. Burmeister,thereupon, changed Latreille's designation Dinemura, as being contrary to the rules for composition of the Greek language, to Dinematura; a change which I consider rather fitting, especially because the by Rafinesque mentioned, unknown, animal, thus, quite well may retain its name Dinemurus.

What appears to me obvious from these comments is, that Cal.productus Müll. is prototype for the Dinematura family, and that it, thus, depends on the characteristics of this animal what other animals may find room in this family. That this preface is not superfluous the following shall show.

At the time when Müller wrote his book about the Danish Entomostraca all animals considered belonging to insects were normally kept the way we still store insects, i.e. they were stuck on a pin, as long as their size did not prevent this. That animals with a soft, leathery, covering were utterly deformed in this way I do hardly have to remind of. From Müller's description and illustration it seems to me more than likely that he has had

such a dried up, mutilated, specimen before him[x]). This circumstance, which has escaped the attention of Desmarest and Latreille, has caused the latter to give the family a completely wrong character, and caused the former to remark that Müller's animal must form not only a new family but a new sub-class of Siphonostoma. This would be absolutely justified if the animal in question really lacked the second pair of legs, the strong hook-legs, with which the caligus-like animals fasten themselves, which, however, is absolutely incredible. Also, the second pair of palps has on Müller's specimen been broken off and is, therefore, in the description and illustration depicted as knots. How little credibility may be attached to Müller's illustration may, furthermore, be seen from the fact that, by comparison of the illustration in natural size with the one enlarged, the former will be found with frontal plate and palps, the latter without these. That the genus, described by me, must be of the family of Müller's Caligus productus, apperas to me so certain that I may rather have some doubts

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x) Müller has not, as may be seen from his description, found this animal himself. He also does not mention from where he obtain the animal. There seems reason to believe, however, that he either has obtained a specimen from Herbst or in the insect collection at Copenhagen has observed a specimen, originating from him. It is because MÜller has misunderstood Fabricius (Fn.gr.p.264)that he includes this animal with the Nordic fauna; this misunderstanding is the more peculiar since Fabricius refers to an illustration (Vid.Selsk.Skrift.X,plate 7) where a quite different animal is rather clearly depicted. It is without reason that Burmeister corrects Nordmann because he refers Binoculus salmoneus (Fn.gr.page 264,p.s.) to Müller's Caligus productus, since Müller himself makes this classification; it must be because Burmeister has not read the p.s. note on the indicated page.

in classifying them as different genera.

A genus which with some certainty may be included in the Dinematura family is Milne Edward's Pandarus alatus*). It seems in all essential aspects to coincide with the one here described, and M.E.s description, which incidentally is rather incomplete**), becomes especially interesting because he has had both males and females in front of him. The females, according to him, distinguish themselves through a pair of rudimentary horny legs on the ventral part of the genital segment's rear end, and through linear shaped tail-appendices, whereas these on the males are wide and plate shaped. The egg sacs of the females are thread formed. On the males he has not noticed any appendices.

Whether Nordmann's Binoculus sexcetaceus really is a Dinematura remains, according to Nordmann's description, doubtful to me. According to him the last pair of gill-legs are formed after the same plan as the preceeding (strongly developed basal joints, oars rudimentary but with two joints) rather than that the so far described genera have large oars, respiration lobes of one joint and the basal joints, on the contrary, reduced. If further investigations show that it must be separated generic from Dinematura it may be best to let it keep Nordmann's family name Binoculus, although it is rathe unfittingly since the animal appears to have no eyes.

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*) Ann. des sciences natur.Tom.XXVIII (1833) page 78, plate 8.

**) The first pair of legs, thus, seems incorrectly depicted (fig.9) as well in regard to the joints as to the two branches which extend from the last joint. The free, leg carrying, segments are not mentioned in the description, and are also not with certainty depicted in the illustrations. Could it, furthermore, be accepted as certain that the eggs are thus placed in the egg strings as shown infig.1?

Concerning Burmeister's Dinematura gracilis I have(49) already earlier mentioned that it appears to me to be a state of development. But even if this were not the case it could in no way be a Dinematura, no matter how definitively this is claimed by Burmeister). It lacks two very important characteristics; wing-cover shaped carapaces and two palps. If assuming, which seems to be reasonable, that Mil.Edwd. has correctly distinguished between the male and the female of D.alata, then the lack of carapace and a pair of palps do not belong to the distinguishing marks between these. Even the lack of the one pair of palps may hardly allow to consider Burmeister's D.gracilis as a stage of development of a Dinematura,as it is already too far developed to allow the assumption that it through change of skin should obtain a pair of palps.

After having spent that much time in the description of several caligus-like animals, I think I may allow myself a few words about their arrangement as a family. As earlier explained, Burmeister includes in the Caligina genera (Vol.1, page 199 etc.) Cecrops, Caligus, Paudarus, and Dinematura (apart from Chalimus Lepeophtheirus, which in my opinion must be included, especially the former), whereas he groups Anthosoma, Dichelestium, and Nemesis with Ergasilina. It appears tome undeniable, however, that these last three genera have a consideracle identity with Caligina in almost all essential parts and that their agreements with Burmeister's other Ergasilina (Nicothoe, Ergasilus, Bomolochus, and Lamproglene) are unevenly fewer. It is, therefore, probably more natural to include them with the former. I shall attempt to give a short outline of this group which thereby (50) arises and which, by adding the two new genera Laemargus and Trebius, end up containing 9 genera. It should not be forgotten that the males of some of these genera are unknown.

) As to what genus they should be included I have no doubts. Act.Leopl. XVII, 284.

(succeeding page and a half (50-51) classification in Latin)

×) This characteristic can only be considered partly correct, since it is formed after Roux's very incomplete description and not very exact illustration (Crustaces de la Mediterainee Livr.IV). Roux does not mention any palps. I cannot be assumed, however, that they really are missing. In his description the number of joints of the first antennae is given as 7 or 8; his illustration, however, shows 9, or maybe 10, joints. The mouth is described as having three joints by which he undoubtedly assumes the broader root as a joint, the shorter upper lip as second, and the protruding point of the longer lower lip as third joint.

(The following, and final page, 52, continues the Latin description).