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Translation Series No. 685

Contributions to our knowledge of invertebrate animals,
with special reference to the fauna of the North Sea

By Heinrich Frey and Rudolph Leuckart

Original title: Beiträge zur Kenntniss wirbelloser Thiere
mit besonderer Berücksichtigung der Fauna des nord-
deutschen Meeres.

Published by: Friedrich Vieweg und Sohn, Braunschweig, 1847.

Translation of pages 158-170, by P. Bruggemann,
Bureau for Translations, Foreign Languages Division,
Department of the Secretary of State of Canada

Fisheries Research Board of Canada
Biological Station, Nanaimo, B. C.

1966

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(Pl. II, Fig. 8) and is also provided with a small, lanceolate appendage that corresponds to the lower cirrus.

Footnote:

¹ Verry common around Cuxhaven are besides Ligia oceanica (L.) Fabr. also Corophium longicorne (Fabr.) Latr. and Sphaeroma marginata M. Edw. (?), which appear to be lacking in the fauna of Heligoland.



FOREIGN LANGUAGES
DIVISION

DIVISION DES LANGUES
ÉTRANGÈRES

TRANSLATED FROM - TRADUCTION DE German		INTO - À English
SUBJECT - SUJET Biology - parasitic crustaceans		
AUTHOR - AUTEUR Heinrich Frey and Rudolph Leuckart		
TITLE IN ENGLISH - TITRE ANGLAIS Contributions to ^{our} the knowledge of invertebrates animals, with special reference to the fauna of the North Sea.		
TITLE IN FOREIGN LANGUAGE - TITRE EN LANGUE ÉTRANGÈRE Beiträge zur Kenntnis ⁿ wirbelloser Tiere - - -		
REFERENCE - RÉFÉRENCE (NAME OF BOOK OR PUBLICATION - NOM DU LIVRE OU PUBLICATION)		
PUBLISHER - ÉDITEUR Friedrich Vieweg und Sohn		
CITY - VILLE Braunschweig	DATE 1847	PAGES 158-170 in.
REQUEST RECEIVED FROM REQUIS PAR	OUR NUMBER NOTRE DOSSIER NO 9663-4	
DEPARTMENT MINISTÈRE Fisheries	TRANSLATOR TRADUCTEUR P. Bruggemann	
YOUR NUMBER VOTRE DOSSIER NO	DATE COMPLETED REPLIE LE May 2, 1966	
DATE RECEIVED REÇU LE April 7, 1966		

C O N T R I B U T I O N S T O T H E K N O W L E D G E
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B y D r . H e i n r i c h F r e y
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W i t h t w o c o p p e r p l a t e s

Dedicated to our revered teachers
Prof. Rud. Wagner and Prof C. H. Fuchs

P R E F A C E

The following contributions to the knowledge of invertebrates comprise a series of monographs for which the material was acquired by the authors during a prolonged sojourn, devoted mainly to zoological work, at the northwest coast of their fatherland and especially on Heligoland. The observations related in them were—with the exception of the last paper on the fauna of Heligoland, which is the sole property of Dr. Leuckart—made by both authors in co-operation. In the course of the work a certain partitioning of the material was unavoidable and if here and there a paper appears more sketchy, this, it is hoped, will be excused. The wealth of the ocean provided the authors with such a great amount of striking forms and manifestations of life that they could not give all important and interesting circumstances the same amount of attention. The plates that accompany the text have been drawn with all possible care by the authors and have been engraved under their supervision.

Göttingen, April 1847.

Dr. Frey Dr. Leuckart

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Hippolyte vittata Rathke. The description of this animal, which Rathke (loc. cit., p. 10) gives, fits almost completely a Hippolite that we once dredged from the deep sea near Heligoland. The thorax of our animal is strongly compressed laterally and arched knob-like in the middle. Distad this knob gradually goes over into the dorsal shield, whereas it is bordered anteriorly by two ridges, which form the inner wall of the eye socket and can be traced as the lateral edges of the proboscis, where they converge to its apex. The proboscis—simply a prolongation of the knob—projects between the eyes in the form of a triangle that is pointed anteriorly and which bears on its median line a comb with four teeth, which at the back disappears gradually into the median line of the knob. The eye socket is defined on the outside by a thorn. The anterior edge of the thoracic shield continues at an obtuse angle into the lower lateral edge; this in turn is bent at about the middle at an obtuse angle posteriorly. The covering scale of the outer antennae has at the end of the outer straight edge a small tooth and its curved inner edge is beset with a row of long and delicate hairs. The outer branch of the inner antennae is very thick, flattened and pointed towards the end; the inner is slightly shorter, smooth and flagellum-like¹. The short basal joint of the two outer fan scales is provided with a strong projecting tooth at its posterior outer angle. The central leaf is blunted at the end and it carries, in addition to a short thorn on the outer corner also two pairs of bristles, of which the inner ones are shorter and thinner. The colour of our specimen was a fine emerald-green.

Hippolyte costata n.sp. The proboscis of this species, which belongs into the first division of the genus Hippolyte erected by Milne Edwards (Hist. nat. des crustacés, II, p. 371), is extraordinarily short. It does not reach by far the end of the eye stalks and is cylindrical. It is only slightly compressed laterally. At its root it bears on the upper edge a blunt triangular protuberance,

¹ Rathke's description differs here.

which hardly deserves to be called a tooth. At the outer edge of the eye socket stands a pointed tooth, a second, larger one, which has at its root a small accessory tooth, sits at the transition point between the anterior edge of the thoracic shield and the lower lateral edge. On the anterior half of the thorax run equidistantly five elevated longitudinal ribs, one central one and two lateral pairs. The central one, which is prolonged anteriorly into the proboscis, carries slightly distad of its middle a tooth, the point of which is directed towards the front. The two outermost ribs have a similar tooth on their anterior end. The covering scale of the outer antennae is leaf-shaped and narrows anteriorly. The inner corner of the anterior end is rounded, the outer, which is separated from it by a deep incision is drawn out into a pointed tooth. The inner edge is beset with long hairs. The hindmost gill legs (according to their morphological meaning¹ [p. 160]

the legs of the metathorax) surpass these covering scales. They are rather thick and provided on the individual segments with a multitude of thorns. Still stronger is the first pair of legs, which belongs to the first segment of the proabdomen. The hand is not insignificant, of uniform width and in front truncated obliquely from the outside to the inside. The finger is articulated at the outermost corner, only slightly curved and longer than the anterior truncated edge, which is terminated on the inside by a strong tooth. The following pair of legs is extremely thin, filiform; the three remaining ones in contrast are large and strong. between the basal segments of the third pair sits in the median line a very strong thorn that is directed anteriorly. The last abdominal segment is three times as long as the preceding one. It is cylindrical and is strongly narrowed posteriorly. The central leaf of the tail fin is very long, even longer than the end segment of the abdomen. It narrows distad and bears at its end two pairs of thorns, of which the central ones are smaller. At the outer corner stands a short spine, which is

¹ As regards the interpretation of the exoskeleton in the crustacean see the statements of Erichson in *Entomographia*, I, p. 12.

followed by two similar thorns in the lower third of the lateral margins. The anterior part is without such thorns. The lateral leaves of the [tail] fin are elongated oval. In the two outer lamellae the outer edge is straight and ends in a tooth. The inner edge, in the inner lamellae also the outer edge, bear long hairs. — Length 10.5 mm. Colour yellowish-white. Rare.

Mysis inermis Rathke (?). In the structure of the external antenna covering scale and of the fan, as well as in size and coloration our animal agrees entirely with the description of M. inermis Rathke. The animal is rare around Heligoland, whereas M. flexuosa is found very frequently. Different is the condition of the frons, which, although rounded at the apex, bears on the median line downwards quite distinctly a short, strong and straight thorn, as probably¹ also in M. oculata Krøyer. We would even conjecture that the last-named species is not different from M. inermis Rathke, especially if it should turn out that we have in our animal the true M. inermis.

Orchestia littorea Leach. In addition to such specimens that agree in every respect with the existing descriptions of O. littorea, we have in our collections also several specimens that, as it appears to us, belong to a separate species that is very close to O. littorea (above O. bottae M. Edw. -?-). They are smaller and less strongly built. Their lower antennae are slightly shorter, and, what is especially characteristic, the penultimate segments of the hindlegs (which belong to the last — fifth — segment of the proabdomen) are only slightly or not at all wider than those of the preceding extremities. Otherwise the conditions and especially the shape of the chela agree in every way with O. littorea. The differences mentioned are not simply sexual differences.

Gammarus elongatus n.sp. The body is stretched and in proportion to its length very narrow; the back is rounded and only slightly compressed laterally. The

[p. 161]

¹ Unfortunately, it was not possible to compare this with the description of this animal (Naturh. Tijdschrift. , II, p. 255.

epimeral pieces are of a fair size not only on the first four thoracic segments but also on the second and third abdominal segments, and are here more strongly developed than there. Their posterior corner projects in an acute angle. The upper antennae, the basal joints of which diminish distad only little in length, but considerably in thickness, are about one-third longer than the lower ones. The flagellum consists of 24 segments, the appendage of five. On the lower antennae the anterior segment is wider than long, the other two are of the same length but of different thickness. The flagellum consists of 12 joints. The hand of the forelegs (of the mesothorax) is less strongly developed than on the succeeding pair. It is elongated oval and the finger sits on the anterior end. It bears a few short and strong thorns on the inner margin. The hands of the second pair of legs are of rather the same width, narrowed only slightly posteriorly and the anterior edge is cut off obliquely inwardly as far as the claws are folded back. The edge here bears fair-sized thorns ^{does} as the first pair of legs. Of the remaining extremities (on the five segments of the proabdomen) the last two pairs are the longest and strongest. Their femurs are leaf-like and oval, narrowed downwards and lamellate at the posterior margin. The last three pairs of legs bear on the anterior and posterior edge numerous strong thorns, which are less developed on the anterior pairs. The first three hind legs (of the postabdomen) are of about equal size, their basal segments half as long as the appendages, which are provided with long cilia. Of the three remaining pairs the foremost is the largest. The two appendages are only little shorter than the basal segment. This is more pronounced in the following pairs of legs, in which the inner appendages are slightly longer than the outer. On the last hindlegs the two appendages are, in contrast, especially the outer, far longer than the basal segments. They are flattened, lanceolate and they bear, in addition to the thorns, with which the other appendages are also provided, also cilia. The anal projections attain a fair length. They are cylindrical and provided at the ends with a few thorns. On the last three abdominal segments is a cluster of three to four thorns that sit on a small

hump on the median line, similar clusters are situated one each to both sides of the median line. The length is about 10.5 mm.

Gammarus sabini Leach. We obtained around Heligoland only one single specimen of this rare amphipod. The flagellum of the lower, longer pair of antennae consists of 38 joints (not 28, as stated by Rathke), the appendage of the flagellum of the upper antennae of 5 (not of 4). Otherwise the description of Rathke (loc. cit., p. 71) agrees in all details with our specimen. The dorsal ridge, which especially characterizes this animal together with a few related species, extends over all segments, although not in the same degree of development. On the last two postabdominal segments and the thoracical rings proper it is weakest. Its extreme anterior prolongation forms a blunt point on the frons. The ridge is highest and drawn out into a sharp tooth on the three posterior segments of the pro-abdomen and the two anterior ones of the postabdomen. The next ring also still shows a high but blunt tooth. The ridge is interrupted for some distance [p. 162]

on the fourth segment of the hindbody anteriorly of the middle. Distad of this it appears as a small rounded ledge. The lateral faces of the three anterior postabdominal segments are excavated in bow-shape on the posterior margins. On the next ring this excavation forms an angle that re-enters sharply anteriorly.

Gammarus angulosus Rathke. The dorsal ridge is here much weaker and forms tooth-like projections only on the four anterior rings of the postabdomen. On the fourth segment the tooth is here also blunt. The last two rings are here also the shortest, on them the ridge forms an elevated half-moon-shaped plate. The posterior lateral edges of the postabdominal segments are as in G. sabini.

Melita palmata (Mont.) Leach. We believe to recognize the true G. palmatus Montag., which perhaps cannot be separated from Edward's G. dugesii, in an amphipod that can be described in detail as follows. The upper antennae are longer than the lower. The central of itsⁱ three basal joints is by far the longest, the lowest the thickest. The flagellum consists of 25 joints, the appendage of two. At the insertion of the lower antennae is a strong tooth

that is directed towards the front. The basal segments increase in size so that the last of them is about three times as long as the first. The flagellum has eight joints. The fore-legs (those of the second thoracic segment) are small and slim and are folded back under the body. The last two joints of these are the largest. The penultimate one is oval, the last triangular, enlarged toward the outside and drawn out into tooth-like projections at both anterior corners. The hook-finger has a broad basal part and a short, thin, strongly bent point. The hand of the second pair of legs is conspicuous and powerfully developed. It also is triangular and has a straight anterior margin with a rounded re-entrant angle. The hand is very thin at its inner margin and only the outer margin is inflated. The hook is inserted at the outer angle of the anterior margin and when flexed touches the inner face of the lamellar extension of the hand. The third, and still more so the fourth pair of legs is again developed only slightly and very thin, whereas the succeeding extremities of the proabdomen increase in size towards the back. Their basal joints are very thick and their posterior lamellar margin toothed as a saw. The hindlegs (of the proabdomen) diminish in size towards the back. Its end segments are everywhere developed equally and those of the fourth and fifth pair are shorter than the basal joints. The last pair lacks everywhere the end joints. Only the bristles which sit on them remain. The fourth postabdominal segment bears in the median line of the back at about its centre a strong thorn that is directed backwards. On the next segment a straight up-standing thorn is inserted on each side of the median line.

Amphitoe gibba n.sp. Our species is easily distinguishable from the related A. norvegica Rathke and A. rathkii Zadd. (Synops. Crustac. Prussic Prodrum., p. 6) by the second, third, and fourth segments of the postabdomen being narrowed in their anterior half, whereas the posterior halves project in the form of a hump, [p. 163]

which gives this part of the body a peculiar shape. The frons is not quite unarmed, but forms a blunt hump between the upper antennae. These are slightly shorter

than the lower and consist of 17 to 32 joints¹. The anterior edge of the individual segments bears on the ventral surface a tuft of three or four long, bristle-like hairs. On the upper surface sit a few smaller hairs. The lower antennae, whose basal segments are longer than those of the upper antennae, have a still larger number of joints. The peripheral ends of these segments are provided with shorter, however still distinct hairs that are arranged almost in a circle. The projection of the frons on which the lower antennae are inserted is extended on the ventral surface into a short, straight tooth. Our species agrees fully with A. rathkii in regard to the shape of the legs of thorax and abdomen, as well as of the lamellae of the brood pouch. Size 4.2 to 7.3 mm.

Podocerus Leach. It has so far been overlooked that in this genus the upper antennae have in addition to the flagellum also a special appendage, this is very short and consists of a single segment that bears on its point a few hairs.

Ligia granulata n.sp. Our species is distinguished from its next relative, L. oceanica Fabr., immediately by its much smaller size (it measures only 8.4 to 10.5 mm) and more slender body. The surface of the back is beset with a large number of roundish humps. These stand, especially along the posterior margin of the segments, in transverse rows, but they never become as large, irregular, or flattened as in L. oceanica. The antennae, which are very slender, reach to the end of the fifth body segment. The head is relatively very large, the thorax narrow, fairly strongly convex. The lateral edges are less developed than in L. oceanica, the last abdominal segment slightly larger. The last pair of the hindlegs is as long as the whole abdomen. The basal segment is less wide and

¹ The growth of the antennae and the multiplication of the segments takes place at the central end of the 4 to 6 lower segments of the flagellum. Here is formed below the outer covering a new segment each, which grows gradually and becomes free during the next moult.

flat than in L. oceanica and bears on its upper and lower surface a longitudinal convexity. The posterior, trimmed end is armed with a tooth only at the outer angle. The dorsal surface is grey with black spots that merge into broad transverse bands, especially at the posterior margin of the segments. Frequent.

Stenosoma lineare (Penn.) Leach (?). The animal in which we believe to recognize Pennant's Oniscus linearis has a very long (35 mm) and narrow (3.1 mm) body. The head is ^{of} fair size, transversely oblong, and extended at each side into a lunate covering scale above the place of insertion of the lateral antennae. The following seven body segments (which correspond to the last two thoracic segments and the proabdomen) are, except the first, only little wider than long. At the lateral margins, where the legs are inserted, they project as a rounded, blunt protuberance. This, however, does not occupy the same place in all segments, it shifts gradually from the anterior angle to the posterior. The postabdomen has [p. 164]

three anterior, small segments, of these the last one is only indicated by a lateral incision and in its centre completely fused with the next segment. This has a very considerable length and is constricted in its anterior half, as well as at the end. It attains its greatest width behind the middle. Medially runs a shallow longitudinal groove that ends in a blunt, keel-shaped protuberance. The posterior edge is not straight, but prolonged on each side into a short, blunt tooth. The inner antennae are very short and hardly reach the middle of the third segment of the outer antennae. The basal segment is as wide as long, the remaining three segments are flagellum-like. The lowest segment of the outer antennae, which reach beyond the end of the abdomen, is very short, even shorter than the corresponding segment of the inner. The next four segments, however, increase quickly in length so that they surpass the entire flagellum, which consists of about 16 joints. The dorsal surface is covered with numerous small, irregular granules and marked with six dark longitudinal bands. They are very conspicuous on the yellowish ground and extend from the anterior margin of the head to the first

segment of the postabdomen. The last segment is of one colour and has a dark border only on the posterior margin. Rare, in the depth of the sea.

Podalirius typicus Kröy. Kröyer's description (Tijdschrift. Nye Række, vol. I) of this caprelline, which parasitizes Asterias rubens, is very accurate. It is characterized especially by the lack of a developed pair of legs on the fifth body segment (the third segment of the proabdomen), where it has instead only a very short and thin appendage, which bears a few bristles on its blunt end and is indistinctly two-segmented. Some distance in front of this appendage there is on the ventral surface, closer to the median line, a leaf-shaped longitudinal ridge of half-moon shape. We see in this, like Kröyer, the indication of a third pair of gills.

Phoxichilidium coccineum (Johnst.) M. Edw. To the very accurate description by Kröyer might perhaps be added that in ♀ specimens the second segment of the legs is longer than in the ♂, whereas in contrast the four curved teeth on the inner edge of the crescent-shaped base of the hand are much less developed; the fourth segment of the legs is not flattened but almost cylindrical. According to Johnston (Zool. J. III, p. 489) and Philippi (Wiegmann's Arch. 1843, Part I, p. 177) the ovigerous legs consist of only five segments, whereas according to Kröyer they have seven segments. We must, however, concur with the former statement. What Kröyer considered to be the very short fourth segment, does not seem to us to deserve that name. It is distinguished from the next segment only by a ring-shaped constriction, not as in the others by an articulation or suture. Kröyer appears to have interpreted as the first segment the short, blunt convexity on which the legs are inserted. The difference can be explained only through this assumption. What we, in agreement with the first-named two researchers, consider to be the first segment, is short, thick, and of oval shape. The colour of the specimens collected by us was not always reddish, it was often quite light.

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Phoxichilidium mutilatum n.sp. The body of this small (1.6 mm), brownish-yellow

phycogonid, which we found frequently on the polyp stems of Tubularia, is relatively wide and very thickset. The thick, cylindrical proboscis is hardly twice as long as its transverse diameter. The last thoracic segment is much less developed than the preceding ones; the abdomen is short and narrowed towards the point. The basal segment of the mandibles extends not quite to the end of the proboscis. The chela is thickset and has a strongly curved finger. Among the extremities the three anterior pairs are of equal length. They are twice as long as the body. Their three anterior segments are the shortest of the six; the next, however is the longest. The hand is only slightly curved and bears on the inner edge of the root a single, very sharp tooth, against which the strong finger folds. In our species the last pair of legs is surprisingly stunted. It is only half as long as the others, lacks hand and finger and is fused immovably with the corresponding body segment. The number of segments is reduced to four; of these the first, which is equal in length to the following three, appears to have resulted from the fusion of several segments. The specimens, which we observed, had in place of the ovigerous legs a blunt, cylindrical extension, into which extended even an appendage of the gut. Probably they were only ♂♂. If the ♀♀ were also lacking ovigerous legs, the species might represent a special subgenus of Phoxichilidium.

Caligus leptochilus n.sp. This species is closely related to C. curtus, which has been described accurately by Kröyer (Naturh. Tijdschrift., I, p. 619 and Oken's Isis, 1841). The size of the animal, however, is smaller (♀ = 5.2 to 6.3 mm), the so-called last thoracic segment (which we should consider to be the first of the postabdomen) is relatively shorter and higher. On its median line is a blunt edge, from where the dorsal surface slopes to both sides. It also continues to the last body segment. This last is longer than in C. curtus and also than in minimus Otto; it is good half as long as the preceding segment. The structure of the sixth pair of legs is very characteristic. The first segment is longer than all the rest taken together, slender, and much less thick

than in curtus, the two following segments agree with this in their structure. The fourth segment bears a strong thorn on its outer margin, about half-way down its length, this is lacking in curtus. At its end it is trimmed obliquely posteriorly and bears three finger-shaped bristles, of which the central one is twice as long than the two outer ones. The end segment also bears on the inner side of its end a tooth, which, however, is only short. The egg sacs are hardly twice as long as the postabdomen. The suction cups are notable on account of their size. Place of abode as in C. curtus.

Chalimus Burm. Like Kröyer, we sometimes found a parasite on the outer cover of Caligus curtus, which undoubtedly belongs into this genus, but it appeared also to us to be only a developmental stage of this animal. It was attached [p. 166]

by the unpaired, filiform appendage of the frons. Its size was only small (1 mm), the segments of the anterior and posterior parts of the abdomen were shorter than in Ch. scombri and more compact. The antennae were conspicuous on account of their size and extended very far to the sides.

Nogagus gracilis (Burm.) M. Edw. Burmeister gives this animal, which he otherwise described so accurately, three abdominal rings (which appear to form with the preceding segment the postabdomen proper). We did find only two, of which the last, which had an incision on the median line of the posterior margin, appeared to have resulted from the fusion of the basal segments of the legs, which are modified into swimming flaps. There are four tail bristles, which are pinnate as in Caligus. The posterior extensions of the cephalothorax were longer and more pointed than in the specimen described by Burmeister; they exceeded the next segment, which had only feebly developed lateral extensions.

Pandarus bicolor Leach. Milne Edwards is wrong to suppose (Hist. nat. des crustac., III, p. 470) that the parasite described by Kröyer under this name was not the true P. bicolor of Leach. The differences to which Edwards calls attention are not essential and are gradually lost through a series of intermediate forms.

The posterior edge of the cephalothorax is provided as a rule with three pairs of blunt teeth that form a row; the outer pair of these is frequently lost, occasionally also the inner pair disappears at the same time. The males are rather shorter and plumper than the females. The colour varies considerably. The chestnut-brown spots of the last two proabdominal segments not rarely become lighter or even disappear completely. In this case the corresponding spot on the cephalothorax becomes lighter and smaller and shows very distinctly that it is composed of two lateral spots that are joined anteriorly in the median line.

Pandarus lividus n.sp. This new species is immediately distinguishable from P. bicolor in part through its light yellow coloration (without all chestnut-brown spots), in part also by the body being wider and much more flattened. The posterior edge of the cephalothorax bears in its central straight part two pairs of teeth that stand side by side. The cephalothorax is relatively more strongly narrowed towards the front and into its structure enter also the first rings of the proabdomen. The lateral flaps of the following body segment are surpassed towards the back much more than in P. bicolor by the flaps of the third ring that lie between them; these flaps are more deeply incised in the median line than in bicolor. The flaps of the fourth body ring are more strongly rounded and wider in our species. The fifth ring, with which the proabdomen begins is also wider, very much shorter and rather strongly narrowed towards the back. The central excavation of the posterior margin is deeper and the appendage, which is inserted there, is slightly shorter and wider. The lower lateral appendages are also shorter, wider, and blunter. This species is similar to bicolor in size. The external cover is shiny, rather smooth and without a trace of the [p. 167]

longitudinal wrinkles that occur in P. bicolor. We have found no females with egg sacs. The species is like bicolor parasitic on Spinax acanthias.

We find another new parasite that probably belongs to the family of the ergasilines in the gill sac of Amarucium rubicundum, described above. Unfortunately,

we could not examine in detail the single specimen found.

Chthamalus permanus n.sp. The case of this animal (analogous to the non-calcareous stalk of the lepadetes and here also formed by the fusion of the legs of the prothorax) is less flattened than is usual in the other species of the genus Chthamalus, bluntly cone-shaped, cut off above and provided with a wide, quadrangular opening. This genus is easily distinguished from Balanus by the lack of a calcareous basal plate. The external face of the case in Chthamalus shows a number of deep longitudinal furrows, these disappear gradually upwards, whereas their number increases at the base. The composition of the case of six parts is to be seen plainly on the exterior only at the edge of the upper opening, where the pieces overlap towards the dorsal side. The composite structure is very conspicuous in contrast on the inner, smooth surface; there the individual pieces project with a conspicuous tooth-like projection over the preceding pieces towards the ventral face near the ring-shaped prominence to which the cover is attached. The three tergitic parts of the case are the smallest. The cover (analogous to the shell of Lepas and Cypris = cephalothorax) is only slightly elevated in its median line and it protrudes almost not at all from the opening that it closes. The dorsal parts are hidden, except for their blunt point, below the corresponding parts of the case. Very characteristic for our species are the connections between the dorsal and ventral parts of the lateral cover pieces (which correspond to the episterna and epimera). Both possess on their inner, apposed edges a longitudinal ridge that engages a corresponding longitudinal furrow. On the dorsal piece the longitudinal ridge faces outward, on the ventral inward. The two edges that thus join do not form a straight face but appear to be excavated in an S-shape, which can be seen very distinctly by looking at the cover from above. Diameter of the case up to 16.8 mm, color white. Very frequent on the stone blocks of the shore wall at Cuxhaven, but also on the cliffs north of Heligoland (?). Dr. Philippi received the same species as Balanus punctatus Montag. from England but recognized long ago that it was new and labelled it in his

collection as Ch. germanus.

Chthamalus philippi n.sp. Philippi and later also Kölliker have found this new species at the southern point of Heligoland, where it is very frequent. The case is strongly compressed. It attains with a diameter of 10.5 to 12.6 mm a height of barely more than 2.1 mm. On the exterior of the case are to^{be}/found also very deep longitudinal furrows, which ascend almost to the upper opening. The ribs that lie between them are in part very much elevated, broader towards the periphery and then usually split finger-shape two to three times. The limits between the individual pieces of the case, which show the same size proportions as in the [p. 168]

preceding species, are very distinct at the upper opening and indicated by triangular, depressed fields. The inner, smooth surface of the case shows well the individual pieces of the case, because their edge projects usually a little into the interior. In the upper opening of the case one sees, as in Ch. germanus, almost only the two flat ventral pieces of the cover; they possess externally on their basal part a few transverse wrinkles that parallel the adjacent edges of the opening. On the dorsal surface both are joined to the tergitic pieces of the cover, the anterior edge of which is provided with an arrangement similar to that in Ch. germanus. Ridges and furrows, however, are very much less pronounced and the joining line is therefore only slightly curved.

A d d i t i o n s

To p. 9. About the structure of Lucernaria cf. in addition to the works cited (by Lamouroux, Delle Chiaje, Ehrenberg, and Johnston), especially the very valuable statements by Sars (Bidrag til Sørødyrenes Naturhistorie, first half, Bergen 1829, and from it Oken's Isis 1833, p. 228), which, however, also do not give a quite complete picture of the entire organization conditions of this interesting polyp.

To p. 91. Sars (in the 8th section of his Fauna littoralis Norvegiae) describes the asexual propagation also in a capitibranchiate, Filograna imolexa, in which also the posterior part of the body buds and is later pinched off.

EXPLANATIONS OF THE PLATES

First Plate

- Fig. 1. Vertical cross-section of Actinia holsatica.
- Fig. 2. Vertical cross-section of Veretillum cynomorium.
- Fig. 3. Vertical cross-section of Lucernaria fascicularis.
- Fig. 4. Vertical cross-section of Pelagia noctiluca (copied from R. Wagner's Icones zootom. Pl. XXXIII, for comparison with the polyps turned over.
- Fig. 5. A sexual gland of Actinia holsatica with the corresponding mesenteric strands, anterior view, highly magnified.
- Fig. 6. The same, lateral view.
- Fig. 7. Intestines of Teredo navalis. The mantle has been opened by a longitudinal cut.
- Fig. 8. Branchial projection of Eolidia papillosa with liver follicles and capsule for the angle organs.
- Fig. 9. Nervous system of Eolidia papillosa.
- Fig. 10. Alimentary canal of Eolidia papillosa.
- Fig. 11. Sexual apparatus of Eolidia papillosa.
- Fig. 12. Brain of Polycera fusca.
- Fig. 13. Alimentary canal and sexual apparatus of Polycera fusca.
- Fig. 14. Brain of Tetrastemma variabilis.
- Fig. 15. Brain of Borlasia rufa.
- Fig. 16. Alimentary canal of Borlasia rufa.
- Fig. 17. Anterior part of Convoluta paradoxa, with the auditory organ.
- Fig. 18. Auditory organ of Monocelis lineata, highly magnified.
- Fig. 19. Larva of Leucodorum ciliatum (?).

Second Plate

- Fig. 1. Four embryos of Syllis prolifera formed through budding, in various stages of development, highly magnified.

- Fig. 2. Anterior part of Amphibotrium kroeyeri, with everted pharynx.
- Fig. 3. Fabricia quadripunctata.
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- Fig. 4. Head part of Aonis wagneri, dorsal aspect.
- Fig. 5. The same, ventral aspect.
- Fig. 6. Vertical cross-section of the lateral part of a body segment of Aonis wagneri with the appendages.
- Fig. 7. Oar plate of Nereis pelagica.
- Fig. 8. Lateral appendages of the body of Ammotrypane.
- Fig. 9. Oar plate of an anterior body segment of Nereis succinea.
- Fig. 10. Oar plate of an anterior body segment of Nereis depressa.
- Fig. 11. Oar plate of a posterior body segment of Nereis succinea.
- Fig. 12. Oar plate of a posterior body segment of Nereis depressa.
- Fig. 13. Gut of Mysis flexuosa with the liver tubes.
- Fig. 14. Cross-section of Mysis flexuosa with dorsal vessel and the most important arterial blood vessels.
- Fig. 15. Male sexual parts of Mysis flexuosa.
- Fig. 16. Contents of the testicles of Mysis flexuosa.
- Fig. 17. Female sexual parts of Mysis flexuosa.
- Fig. 18. Oolith of Mysis flexuosa, with and without capsule, highly magnified.
- Fig. 19. Cross-section of a gammarid with dorsal vessel and the most important arterial and venous streams. The former are indicated by dashes, the latter by dots.
- Fig. 20. The same cross-section of a caprellid.
- Fig. 21. Spermatozoa from the testicles of Lernaea branchialis.
- Fig. 22. Gut of Lernaea branchialis with the surrounding mass (liver?), the female genitalia and the head appendages of the exterior covers.
- Fig. 23. The same, without the head appendages.