III.—SOME ADDITIONAL NOTES ON COPEPODA FROM THE SCOTTISH SEAS.

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(Plates XIII.–XV.)

The descriptions of several of the new or rare Copepoda obtained during the investigations that have been carried out under the direction of the Fishery Board for Scotland, and published in the earlier Annual Reports of the Board, were for various reasons somewhat incomplete. In some cases only the female was available for description, the male being at the time unknown; while in others, where the species, though rare, was already established, only the fact of its occurrence in our seas was recorded and the description of it left to some future occasion.

In the remarks which follow I have, with the help of the drawings prepared for me by my son Andrew Scott, A.L.S., endeavoured to describe somewhat fully three curious forms obtained from different Scottish localities, where they have occurred in sufficient numbers to permit of a more accurate study of the peculiar characteristics by which they are distinguished than was possible at the time they were first recorded.

These species include the two Harpacticoida *Harrietella simulans*, T. Scott, and *Laophontodes typicus*, T. Scott, of which only the females have been previously recorded, together with a description of what appears to be the male and female of a remarkable species known as *Notopterophorus papilio*, Hesse, found as a commensal in the branchial chamber of large Ascidians.

Descriptions are also given of two Copepod parasites of fishes which do not appear to have been previously recorded, and which belong to a somewhat aberrant genus of the Caligoida, viz., *Nogagus*.

These different forms are described in the sequel in the order in which they are here referred to.

It may also be stated that the species mentioned above, though only now described, have been in my possession for several years, the publication of their description having been for various reasons delayed.

Division Harpacticoida, G. O. Sars.

Fam. Laophontidæ, G. O. Sars.

Genus *Harrietella*, T. Scott.

Harrietella simulans, T. Scott. Pl. xiii., figs. 1–5.

1894 (?) *Laophonte simulans*, T. Scott, Twelfth Annual Report of the Fishery Board for Scotland, Pt. III., p. 248. Pl. vii., figs. 24–32.

1906. *Harrietella simulans*, T. Scott., Ann. and Mag. Nat. Hist. Ser. 7, vol. xvii., p. 464, pl. xi., figs. 9 and 10.

The structure of *Harrietella simulans* is in some respects similar to that of *Laophonte*, Philippi, and, therefore, while differing considerably in one or two points, it was, when first discovered, ascribed, though

with some doubt, to this genus, especially as only the females had at that time been noticed. The discovery of additional specimens allowed a more thorough examination to be made of the structure of the species, and it then became evident that its place in *Laophonte* was untenable, and this rendered its removal to another genus—*Harrietella*—necessary.

But while the female of this species has been known for a number of years, the male has apparently remained undescribed. I, therefore, in the following additional notes on the species, include a short description of the male form.

The species is a very small one, the female being scarcely half a millimetre in length, but the male is still smaller. It is a demersal form, and, like a number of other such forms, its distribution is somewhat restricted. I have rarely noticed *H. simulans* among the numerous bottom forms occasionally captured with the dredge, even at some of the more favourable collecting grounds in the Firths of Forth and Clyde; yet when a piece of decaying wood, the surface of which is perforated by boring molluscs or crustaceans, is brought up in the dredge or trawl net, numerous examples of this particular Copepod may be obtained living apparently in the crevices of the wood. When the pieces of decaying wood are carefully removed from amongst the other debris and washed in a bottle containing methylated spirits, and the sediment examined under a hand lens, quite a number of little animals may sometimes be obtained.

In *Laophonte* the body is usually of a narrow, oblong form, but in *Harrietella* it is broadly ovate and considerably depressed; and while in *Laophonte* the female carries only one ovisac, there are two in *Harrietella*. In the structure of the mouth appendages—the mandibles, maxillæ, and maxillipeds—there is a fairly close resemblance between the two genera, and the same may be said concerning the two pairs of antennæ and the first pair of thoracic feet. The second and third pairs in both the male and female, and especially in the male, though in their general structure somewhat resembling those of *Laophonte*, they are distinctly more robust. In both pairs the inner branch is composed of two sub-equal joints, the first being rather shorter than the other. In the male, the inner branch of the second and third pairs, which does not reach the end of the second joint of the outer branch, is furnished with two apical setæ. The outer branch is elongated and stout, and composed of three joints of nearly equal length; the first and second are each provided with a single moderately-long spine on the outer margin, and the third joint, which is furnished with a similar spine on the outer edge, bears also three strong terminal spines (fig. 3 represents one of the second pair of feet). The fourth pair in the male resembles that of the female in having the inner branch short, narrow, and uni-articulated, and provided with two short apical setæ; but while the outer branch in the female is two-jointed, that of the male consists of three joints, the first two being each provided with a moderately long and stout plumose seta on the outer margin, and the third with four similar setæ round the distal extremity. The outer branch of the fourth pair in the male, like the same pair in the female, is remarkably stout (fig. 4).

The fifth pair in the male consists of an oblong basal joint, provided with a spiniform seta on the inner distal angle and a setiferous appendage on the outer, and a small one-jointed branch bearing a few plumose bristles (fig. 5).

In the male, the last two segments of the metasome, though nearly uniform in width with those of the urosome, are distinctly narrower than the preceding segments, and in this respect there is a marked difference between the two sexes when seen from above.

In the female the width of the posterior segments decreases gradually instead of abruptly.

The antennules of the male are modified to form powerful grasping organs, as shown in the drawing (fig. 2).

The distribution of this curious species appears to be local rather than rare, and since its discovery in the crevices of decaying fragments of wood, its occurrence in similar situations has occasionally been noticed both in the Firth of Forth and the Firth of Clyde, and it may probably be found in such situations round other parts of our shores.

Genus *Laophontodes*, T. Scott.

Laophontodes typicus, T. Scott. Pl. xiii., figs. 6–15.

1894. *Laophontodes typicus*, T. Scott, Twelfth Annual Report of the Fishery Board for Scotland, Pt. III., p. 249, Pl. viii., figs. 2–8.

It is thirteen years since a description of this species was first published in the Board's Twelfth Annual Report. The description was prepared from female specimens, the male being at that time unknown; and as, so far as I know, it has not yet been recorded, the following observations on its structure, with some additional remarks on the female, will render the former description more complete.

This species, like the last, is very small, the largest of our female specimens is scarcely ·5 millimetre (about $\frac{1}{50}$ of an inch) in length, while the males are only about one-sixtieth of an inch; they may therefore be easily overlooked.

In both the male and female the body is elongated and narrow, and is considerably depressed (fig. 6). The male, though smaller than the female, does not differ much from it in general appearance.

The anterior antennæ in the male are composed of the same number of articulations as those of the female, but the last three joints are considerably modified, as shown in the drawing (fig. 7). The third joint is small, the next is dilated and gibbous, while the last forms a slender hook-like process.

The mandibles are very small, and the biting-edge is armed with a few prominent teeth. The mandible-palp consists of a single small one-jointed branch bearing several setæ (fig. 8).

The maxillæ are similar to the same organs in typical species of *Laophonte*, and consist of a broad masticatory lobe provided with several elongated slender spines, and a small bilobed palp (fig. 9).

The first maxillipeds are small but moderately stout, and the basal joint, which is somewhat dilated, is provided with a small setiferous process on the inner margin, while the end joint terminates in an elongated and moderately strong claw (fig. 10). The second maxillipeds are as previously described.

The first pair of thoracic feet are in structure nearly as in *Laophonte*, the inner branch being short and three-jointed, while the outer, which is two-jointed, is stout and furnished with a strong terminal claw (fig. 11). The second pair, like the first, is somewhat similar in the two sexes; the outer branch is slender and elongated and composed of three sub-equal joints, while the inner is short and two-jointed; the first joint of the inner branch is extremely small, but the second, though very slender, is of moderate length and furnished with two slender apical setæ. The third pair in the female is similar in structure and armature to the second, but the inner branch of this pair in the male has two peculiar

and moderately stout terminal appendages, one of which forms a short hook-like process, while the other is straight and terminates in two slender setæ of unequal length (fig. 12).

The structure of the fourth pair appears to be similar in the two sexes; the outer branch is moderately slender and elongated, and composed of three sub-equal joints armed with long spiniform setæ on the outer margin; the inner branch is very short and two-jointed, the first joint being extremely small, while the second is slender and moderately elongated, and furnished with three small terminal setæ (fig. 13).

The fifth pair in the female consists of a small basal joint to which is articulated a narrow elongated plate about four times longer than broad, and provided with a number of setæ arranged as shown in the drawing (fig. 14). In the male the fifth pair is similar to those of the female, but smaller and less spiniferous (fig. 15).

The furcal joints in both the male and female are elongated and slender and set widely apart; they are each furnished with a long and stiff apical bristle and a few small hairs (see fig. 6).

I have obtained this species in the same situations with the *Harrietella* previously mentioned, but it seems to be a rarer form, and males especially appear to be very scarce.

Notodelphyoida, G. O. Sars.

Fam. *Doropygidæ*.

Genus *Notopterophorus*, Costa.

Notopterophorus papilio, Hesse. Pl. xiv., figs. 1–19.

1865. *Notopterophorus papilio*, Hesse. Observations sur des Crustacés rares ou nouveaux des côtes de France, *Ann. des Sci. Nat.*, 5th Sér. zool., vol. i., p. 338, pl. xi., figs. 1–13.

1878. *Notopterophorus papilio*, G. S. Brady. A Monograph of the Free and Semi-parasitic Copepoda of the British Islands (*The Ray Society*), vol. i., p. 142, pl. xxxi., figs. 3-12.

The Entomostracan to which M. Hesse has given the name mentioned above is one of the most remarkable among a strange group of species found living as "unbidden guests" within the branchial chamber and sometimes in the alimentary canal of various simple and compound Ascidians.

The distinguishing characteristic of *Notopterophorus* is, as the name implies, the peculiar wing-like appendages of the cephalo-thorax, which give to the creature its somewhat grotesque appearance. These appendages, which are situated on the dorsal aspect, appear to be six in number, and assume the form of very thin and almost transparent plates, each of which terminates in long, slender, whip-like filaments. The frontal plate, which is obscurely triangular, has a hood-like structure, and appears to be furnished with three filaments—one central and one at each of the lateral extremities; this plate seems to be an expansion of the first thoracic segment. The next four plates occur in pairs; the first pair spring from the second segment of the thorax, and the following pair from the third segment, and each single plate bears two whip-like filaments. The posterior plate, which is of one piece, moderately large and broadly triangular, and which springs from near the distal end of the last segment of the thorax, is apparently provided

with three slender processes; two of them are prolongations of the lateral angles, and the other of the intermediate angle by which the posterior edge of the plate is divided into two sub-equal portions. It has to be noted, however, that these dorsal expansions are so extremely delicate that, though many specimens have been examined, it was rare to find one with the appendages uninjured. The following is M. Hesse's description of the posterior dorsal plate:—"Enfin la sixième expansion membraneuse que est aussi triangulaire comme celle placée sur l'occiput, est fixée un peu audessus de la base de l'abdomen qu il recouvre, et semble destiné à protéger les oeufs ou les embryons. Son bord inférieur présente deux découpares, terminées per trois lanières, dont l'une est au milieu et les deux autres à l'extrémite du bord inférieur."

The cephalo-thorax in the female is comparatively large, and consists of five segments; in adult specimens, however, the segments are not very clearly defined. The first four do not differ much in size, but that which forms the head or *cephalosome* is rather smaller than the others. The last segment is fully twice the length of the preceding one, and is composed of two coalescent segments—the fourth and fifth segments of the *metasome*. This double segment is destined, as in other members of the *Notodelphyoida*, to be a receptacle for the eggs and developing larvæ, and when packed with eggs or larvæ it becomes considerably enlarged, and is also more highly coloured than other parts of the animal. (See fig. 1.)

In the female the abdomen—*urosome*—is moderately elongated, slender, and cylindrical, and is composed of five segments, but the prefurcal segment is very small and of a peculiar structure, and seems to overlap the base of the short furcal joints. These joints, which are somewhat arcuate, are each armed with about four very short but strong curved spines (fig. 19).

Neither the male nor the young female appears to be furnished with the prominent dorsal appendages possessed by the female that has reached the ovigerous stage. Figure 3 represents a young female with an adult male adhering to its dorsal surface, in both of which the wing-like expansions are wanting. The female appears to have reached the stage when these expansions are beginning to be developed, but in the male no trace of them can be observed, though its structure shows it to be a mature example.

In the specimens under consideration the antennules (anterior antennæ) are in both sexes apparently nine-jointed. In those of the female the first two joints are of large size, but the remaining joints are considerably shorter and narrower, and the second and third from the end are smaller than any of the others. The male antennules are moderately stout and taper gradually towards the distal extremity; the first two joints are not so dilated as the first two in the female, but the remaining seven joints are rather larger. (See figs. 4 and 5.)

The antennæ (posterior antennæ) of the male, though considerably smaller than those of the female, are similarly armed with strong terminal claws, as shown in figs. 6 and 7.

The mandibles are well developed and possess a broad, biting edge, armed with several irregular teeth; the mandible-palp is moderately large and two-branched; the proximal branch appears to be uni-articulate, but the other is two-jointed; both branches bear plumose setæ (fig. 8).

The maxillæ (fig. 9) are also moderately developed and supplied with numerous plumose setæ.

The first maxillipeds have the basal part greatly enlarged and provided with a number of long plumose setæ on its inner margin; the

second joint bears a long stout and curved spine; the end joint is narrow, about twice longer than broad, and furnished with a few terminal setæ (fig. 10).

The second maxillipeds are moderately stout and elongated; they are also apparently three-jointed, and bear a number of plumose setæ, as shown in the drawing (fig. 11).

All the thoracic feet, both in the male and female, are short and moderately stout, and the general structure of the first three pairs is somewhat similar in the two sexes, though they differ somewhat in the armature and in one or two other minor details.

In the first pair the inner branches are composed of two and the outer of three joints; there is not much difference in the length of the two branches. The second joint of the inner branch is rather longer than the first, while the middle joint of the outer branch is much smaller than either the first or the third joints. Both branches are similarly armed in the two sexes. The outer are furnished with several stout spines on the exterior margin and apex, and with a short plumose setæ on the inner margin. The inner branches are provided with a number of plumose setæ, especially on the inner edge, but those on the inner branches of the female are more elongated. There is also a stout sigmoid spine on the inner aspect of the second basal joint in the female first pair, which appears to be wanting in that of the male. (See figs. 12 and 13.)

The second pair in both sexes have the inner and outer branches three-jointed. In that of the female the inner branch is rather shorter than the outer; the first joint bears one setæ, the second two, and the third two on the inner margin; the third joint has also three apical setæ and another on the middle of the outer margin. All these setæ are elongated and plumose. The outer branch has the proximal joint moderately stout and as long as the next two joints taken together: it bears a single seta on the inner edge and a short spine on the outer distal angle; the second joint, which is smaller than the first or third, also bears a short marginal spine, while the third joint has two spines on the outer margin and two at the apex.

In the male the length of the outer and inner branches of the second pair is about the same; the armature of the inner margin of the inner branch is similar to that of the second pair in the female, but the end joint bears two terminal spines instead of setæ, with another spine on its outer margin; the armature of the outer branch in the male does not differ much from that of the same branch in the female, except that the marginal spines are rather longer. (See figs. 14 and 15.)

The third pair, as in the second just described, have in the two sexes both branches three-jointed. In the male the third pair scarcely differs from the second either in structure or armature. In the female the third pair is rather smaller than the second, but the inner branch carries the same number of plumose setæ, while the outer branch, though armed with the same number of marginal spines as that of the second, wants the seta on the inner margin of the first joint (fig. 16).

The fourth pair in the female is almost the same in structure and armature as the third pair; but in the male the fourth pair is very small, and though the outer branch consists of three joints, the inner is only two-jointed and distinctly shorter than the outer; both branches are provided with moderately stout spines (fig. 17).

The fifth pair consists of a narrow, elongated, one-jointed branch, which is articulated to a rudimentary basal joint and furnished with two slender apical spines (fig. 18). The female represented by the drawing (fig. 1) is about 4·5 millimetres in length.

Remarks.—The *Notopterophorus* described in the preceding notes, though it does not conform altogether to Hesse's description of *Notopterophorus papilio*, agrees with it in several important particulars, and I am therefore inclined to ascribe it to that species. Moreover, the mouth appendages described and figured here are apparently identical with those of the form recognised as belonging to Hesse's species in Dr. Brady's "Monograph of the Free and Semi-parasitic Copepoda of the British Islands," vol. 1., p. 142, plate xxxi., figs. 3–12.

The two habitus figures given in M. Hesse's original work and reproduced in the Monograph referred to are, in respect of the slender form of the cephalo-thorax, unlike any of the specimens I have examined. On the other hand, Hesse's description of the cephalo-thorax and abdomen agrees tolerably well with Scottish specimens of the adult female.*

Another point of interest which is noticed by Dr. Brady is the great similarity between this species and the members of another genus, and in referring to this he says that "except for the peculiar wing-like dorsal appendages there seems to be little to separate this genus from *Doropygus*," and this corresponds with the opinions of other observers, and is also supported by the *Doropygus*-like form of the young female, and still more by the general character of the male. Still, the presence in the adult female of these remarkable appendages is in itself, I think, a sufficient reason for separating this and similar forms under the distinctive name established by Costa and utilised by M. Hesse.

The purpose which these curious and wing-like expansions serve in the life-history of the creature may be, as M. Hesse suggests, to assist its movements "or to aid in removing obstacles from its path." I am inclined, however, to agree with Dr. Brady, who says—"For my own part I find it difficult to believe that these excessively delicate organs can be of much use for such purposes, or to understand why, if they are so used, they should be entirely wanting in so many other species which live under the same conditions. We must, I think, admit that their use is at present quite unknown."†

I have obtained this Copepod in large Ascidians from various Scottish localities, but nowhere so common as in Ascidians dredged in Scapa Flow, Orkney. The branchial chamber of the large Ascidians dredged there was sometimes crowded with these Copepods.

Though many specimens have been examined by me from Scottish waters, they were apparently all of the one species, but examples were obtained in different stages of development, from the young females without dorsal appendages, or with a mere indication of them, to those that were adult and whose dorsum was ornamented with the appendages fully expanded.

In full-grown specimens the ovigerous sac was usually so distended, and the integument so thin and transparent, that through it the eggs or larvæ could be seen crowded together. Occasionally examples were observed with the ovigerous sac empty and collapsed, its contents having been set free.

Herr R. Buchholz has described what appears to be a different species from that of M. Hesse under the name of *Notopterophorus elongatus*,‡ which is also referred to by Dr. Giesbrecht in his remarks on the

* Referring to this part of the animal, Hesse says:—"Le thorax est gros et court; il se divise en cinq articles à peu près de la même grandeur, sauf pourtant le dernier que est le double des autres, et que acquiert encore un volume plus considérable à mesure qu'il se remplit d'œufs, et que ceux-ci se développement par l'incubation."

† Brady, *op. cit.*, p. 144.

‡ "Beiträge zur Kenntniss der innerhalb der Ascidien lebenden parasitischen Crustaceen des Mittelmeeres." *Zeitschr. Wiss. Zool.*, Band 19, p. 127, taf. viii., fig. 6, and taf. ix., fig. 6 (1869).

Notodelphyidæ* ; while Dr. Canu, referring to the distribution of this species, speaks of it as occurring in the Mediterranean, the English Channel (Manche), and the North Sea.† Dr. G. S. Brady records the occurrence of one or two specimens of *Notopterophorus elongatus* amongst some things sent to him by the Rev. A. M. Norman, but which were lost during examination and before they were described and figured.‡ Possibly the form described here should be referred to the same species, and ultimately this may be necessary. Meantime, however, I am inclined to identify it with the form described by M. Hesse.

In the figure of *Notopterophorus elongatus* given by Dr. Bucholz (fig. 6A, pl. viii.) in the work referred to in the footnote, the dorsal appendages are without whip-like filaments; and the excellent drawings of the same form in plate xxiii. of Dr. Giesbrecht's *Beiträge* represent these appendages as bearing minute hairs instead of the long filaments seen in *N. papilio*.

Tribe Caligoida.

Fam. Caligidæ.

Genus *Nogagus*, Leach (1819).

Nogagus latus, sp. n. Pl. xv., figs. 1–9 (♂).

This species and the one to be immediately described are both males, and are for the present referred to the genus *Nogagus*, Leach; they were observed on dog-fishes captured in the North Sea.

The genus *Nogagus* is not a satisfactory one, and though meantime allowed to stand, is not considered valid. The various forms that have been included in this genus are all of them males, and are supposed to belong to other genera, of which the females only are known, *i.e.*, *Pandarus*, Leach, *Dinemoura*. Baird, *Echthrogaleus*, Stp. and Lüthk, etc., and a few of them have already turned out to be the males of such genera.

The males and females of those species that have already been satisfactorily identified—as, for example, *Pandarus carchariæ*, Leach (the female), and *Nogagus Cranchi*, Van Beneden (the male)—are so unlike each other, not only in general appearance, but also to some extent in structure, that it is difficult to believe, without having sufficient proof of their identity, that they can belong to the same species. Yet it seems to be the case, in these examples at least, that the difference between them, though so pronounced, is only sexual, and due probably to a difference in the habits of the animals, the male perhaps living a more free life than the female.

Steenstrup and Lütken divided the *Nagagi* into two groups, the chief differences between them being that in the first the urosome (abdomen) and both branches of the first four pairs of thoracic feet consist of two articulations, while in the second the urosome and both branches of the fourth pair of feet are uni-articulate.

One of the forms now to be described—the one named above—appears to be referrable to the first group, but the other differs slightly from both.

* "Beiträge zur Kenntniss einiger Notodelphyiden." *Mitth. Zool., Stat. Neapel*, 3 Band, pp. 327, 328, taf. xxii.-xxiv. (1882).

† "Les Copépodes du Boulonnais." *Trav. du Laborat. de Zool. Mar. des Wimereux-Ambleteuse (Pas-de-Calais)*, Tome vi., p. 191 (1892).

‡ "British Copepoda," vol. i., p. 144.

This form—*Nogagus latus*—has a close general resemblance to *Caligus*, except that the frontal plates are without *lunulæ*. The cephalic shield is sub-rotundate, being nearly as broad as it is long, and it is also nearly equal to two-thirds of the entire length of the animal. The fourth and fifth thoracic segments are short but of moderate width ; the last is about twice the length of the preceding segment and is sub-quadrate in outline. The urosome is small and appears to be composed of two segments. The furcal joints are also short and broad, while the apical setæ have the appearance of small lamelliform plates fringed with delicate hairs (fig. 1).

The antennules are moderately stout, and the first joint is furnished with a number of short and stout plumose bristles round the distal end, but the second joint is smaller and bears a few apical spines (fig. 2).

The second antennules are also stout, and they are each armed with a strong terminal claw (fig. 3).

The first pair of maxillipeds are considerably elongated and resemble nearly the same appendages in *Nogagus borealis*, Stp. and Ltk. (fig. 4).

The second maxillipeds are short and very robust, their distal end is moderately truncate, and they are each armed with a short but strong terminal claw (fig. 5).

The first pair of thoracic feet have both branches short, sub-equal, and two-jointed ; each branch is provided with three stout and moderately elongated terminal setæ, the outer branch having also a few short spines on the exterior margin, as shown in the drawing (fig. 6).

The second pair is rather more robust than the first, both branches being two-jointed and of nearly equal length. The first joint of the inner branch has one plumose seta on the inner margin, while the second bears seven or eight similar setæ round its distal end. The first joint of the outer branch is also furnished with a seta on the inner margin and a small spine on the outer distal angle, but the end joint carries five setæ round the inner margin and apex and four spines on the exterior edge (fig. 7).

The third pair, which, like the first and second, has both branches bi-articulated, is also moderately stout, but the branches, though armed nearly as in the second pair, are rather shorter (fig. 8).

The structure of the fourth pair is similar to that of the other three, but this pair is rather smaller, and both branches are very short. One seta springs from the inner distal angle of the first joint of the inner branch, while the second joint carries three or four round the distal end. The first joint of the outer branch is provided with a small spine exteriorly, while the end joint has five setæ round the inner margin and apex, and three or four small spines on the outer margin (fig. 9).

Habitat.—On piked dog-fish (*Squalus acanthius*) captured in the North Sea in 1902.

Nogagus ambiguus, sp. n. Pl. xv., figs. 10–17 (♂)

In this species the cephalic shield is of an oval outline, and the lateral margins where they meet anteriorly form a more or less distinctly angular instead of a broadly rounded front, as in the form just described. The last two thoracic segments are of nearly equal size, and their width is about one-third of that of the cephalic shield at its widest part. The urosome (abdomen) consists of one small segment, and the furcal joints, which are also very short, are each furnished with moderately long plumose setæ (fig. 10).

The antennules, which are of average size, are also adorned with long plumose setæ (fig. 11).

The first maxillipeds are elongated, and each is armed with a long and powerful terminal claw having a stout seta at its base nearly as in *Nogagus lunatus*, Stp. and Ltk.—a species which this form resembles in some other particulars (fig. 12).

The second maxillipeds are short and very stout, and armed with strong terminal claws as shown in the drawing (fig. 13).

The first four pairs of thoracic feet are composed of two sub-equal branches, and both branches in each of the first three pairs are distinctly two-jointed. In the first pair the end joints carry three long plumose setæ, the end joints of the outer branches being also provided with four spines on the exterior margin (fig. 14).

The second pair are nearly similar in structure and armature to the second pair in *Nogagus latus* (fig. 15).

The third pair also resembles the same pair in that species, but the spines on the exterior edge of the outer branch are rather stronger, and the second joints of both branches are provided with only four elongated though stout terminal setæ (fig. 16).

The fourth pair are rather small, and the inner branch is bi-articulate; a seta springs from the inner distal angle of the first joint, and the second carries three terminal setæ. The outer branch, which appears to consist of two coalescent joints, with the articulation between them obsolete or nearly so, bears three setæ round the inner distal margin, and four spines—three small and one moderately large—on the exterior edge; the setæ are all elongated and plumose (fig. 17).

Habitat.—Taken from a piked dog-fish (*Squalus acanthius*) captured in the North Sea in 1902.

Genus *Dinemoura*, Latreille (1829).

Dinemoura producta (O. F. Müller). Pl. xv., figs. 18–20 (♀).

This species was recorded in Part III. of the *Eighteenth Annual Report of the Fishery Board of Scotland*, and I now supplement the previous description by the following additional note:—The antennules, as shown by the drawing (fig. 18), resemble in their armature those of *Nogagus latus* just described. The first pair of thoracic feet are of a peculiar structure; the inner branch is small, and it and the second basal joint bear a few small rounded wart-like processes. The outer branch has the first joint expanded and gibbous at the proximal end exteriorly, while the distal end is produced so as to extend partly over the small rounded second joint. Both branches are furnished with three marginal or sub-terminal arcuate setæ fig. (19).

The second pair, which is also slightly distorted, has both branches three-jointed and of about equal length. The drawing (fig. 20) shows the structure and armature of this pair.

This species has been obtained occasionally on Porbeagle sharks landed at the Aberdeen Fish-market.

Another species usually found on the Porbeagle shark, viz., *Echthrogaleus coleoptratus*, has also been obtained adhering to the dorsal fin of a piked dog-fish that was captured in the Moray Firth in October, 1900. I do not know of any previous record of *Echthrogaleus* from this fish.

EXPLANATION OF THE PLATES.

PLATE XIII.

Harrietella simulans, T. Scott.

		Diam.
Fig. 1.	Male, dorsal view,	× 260
Fig. 2.	Antennule of male,	× 546
Fig. 3.	Foot of second pair, male,	× 546
Fig. 4.	Foot of fourth pair, female,	× 820
Fig. 5.	Foot of fourth pair, male,	× 820

Laophontodes typicus, T. Scott.

Fig. 6.	Female, dorsal view,	× 260
Fig. 7.	Antennule of male,	× 520
Fig. 8.	Mandible and palp,	× 780
Fig. 9.	Maxilla,	× 780
Fig. 10.	First maxilliped,	× 780
Fig. 11.	Foot of first pair, male and female,	× 820
Fig. 12.	Foot of third pair, male,	× 546
Fig. 13.	Foot of fourth pair, male and female,	× 546
Fig. 14.	Foot of fifth pair, female,	× 542
Fig. 15.	Foot of fifth pair, male,	× 546

PLATE XIV.

Notopterophorus (c) *papilio*, M. Hesse.

Fig. 1.	Female, side view,	× 20
Fig. 2.	The same, dorsal view,	× 20
Fig. 3.	Young female with a male adhering to it,	× 47
Fig. 4.	Antennule of female,	× 410
Fig. 5.	Antennule of male,	× 410
Fig. 6.	Antenna of female,	× 205
Fig. 7.	Antenna of male,	× 410
Fig. 8.	Mandible and palp,	× 123
Fig. 9.	Maxilla,	× 205
Fig. 10.	First maxilliped,	× 205
Fig. 11.	Second maxilliped,	× 137
Fig. 12.	Foot of first pair, female,	× 71
Fig. 13.	Foot of first pair, male,	× 270
Fig. 14.	Foot of second pair, female,	× 72
Fig. 15.	Foot of second pair, male,	× 270
Fig. 16.	Foot of third pair, female,	× 72
Fig. 17.	Foot of fourth pair, male,	× 456
Fig. 18.	Foot of fifth pair, female,	× 340
Fig. 19.	One of the furcal joints,	× 270

PLATE XV.

Nogagus latus, sp. n.

Fig. 1.	Male, dorsal view,	× 20
Fig. 2.	Antennule of the same,	× 120
Fig. 3.	Antenna,	× 90
Fig. 4.	First maxilliped,	× 90
Fig. 5.	Second maxilliped,	× 60
Fig. 6.	Foot of first pair,	× 90
Fig. 7.	Foot of second pair,	× 60
Fig. 8.	Foot of third pair,	× 45
Fig. 9.	Foot of fourth pair,	× 20

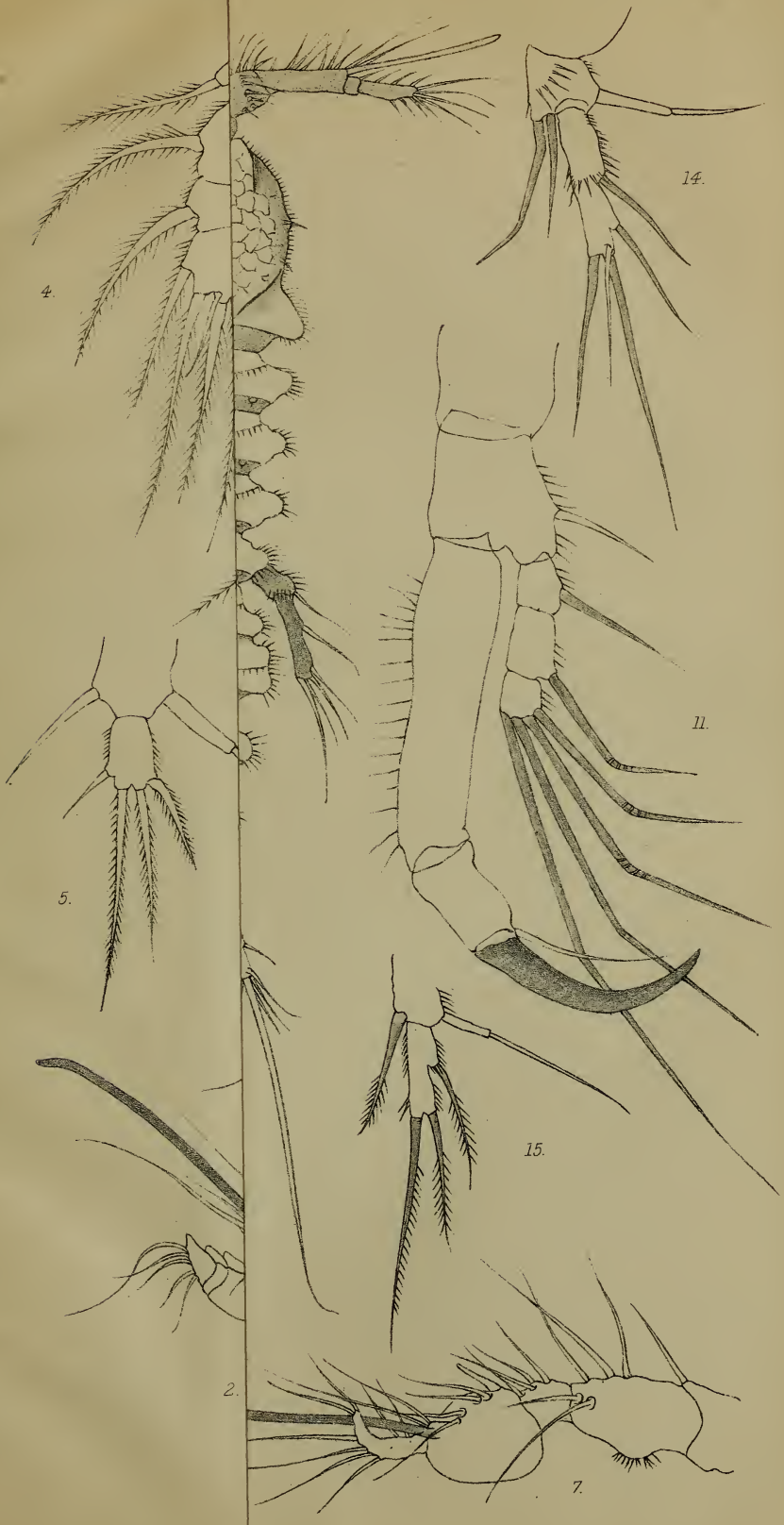
Nogagus ambiguus, sp. n.

		Diam.
Fig. 10.	Male, dorsal view,	× 20
Fig. 11.	Antennule of the same,	× 90
Fig. 12.	First maxilliped,	× 90
Fig. 13.	Second maxilliped,	× 60
Fig. 14.	Foot of first pair,	× 45
Fig. 15.	Foot of second pair,	× 30
Fig. 16.	Foot of third pair,	× 45
Fig. 17.	Foot of fourth pair,	× 45

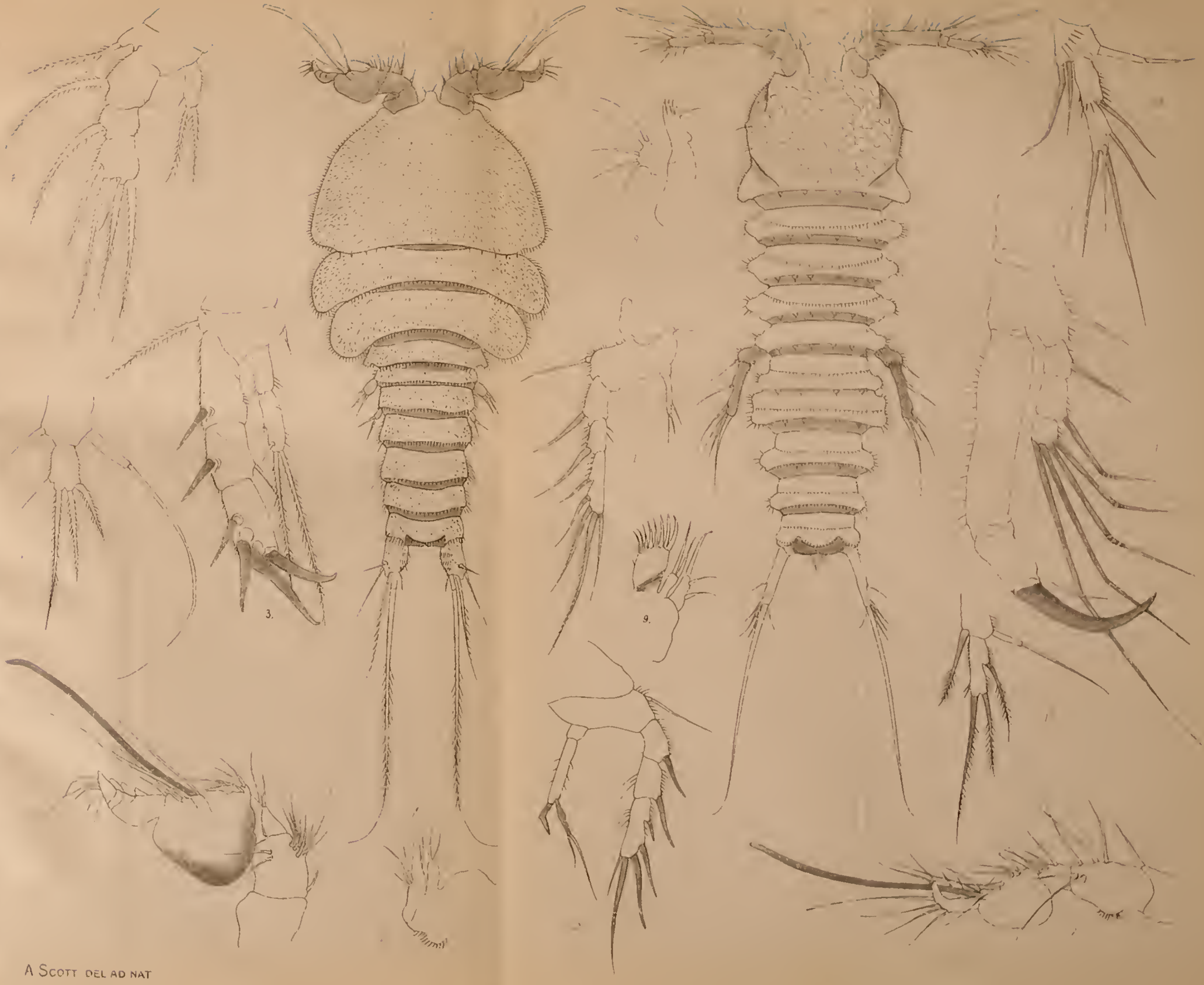
Dinemoura producta (O. F. Müller).

Fig. 18.	Antennule of female,	× 40
Fig. 19.	Foot of first pair of same,	× 26
Fig. 20.	Foot of second pair,	× 13

PLATE XIII

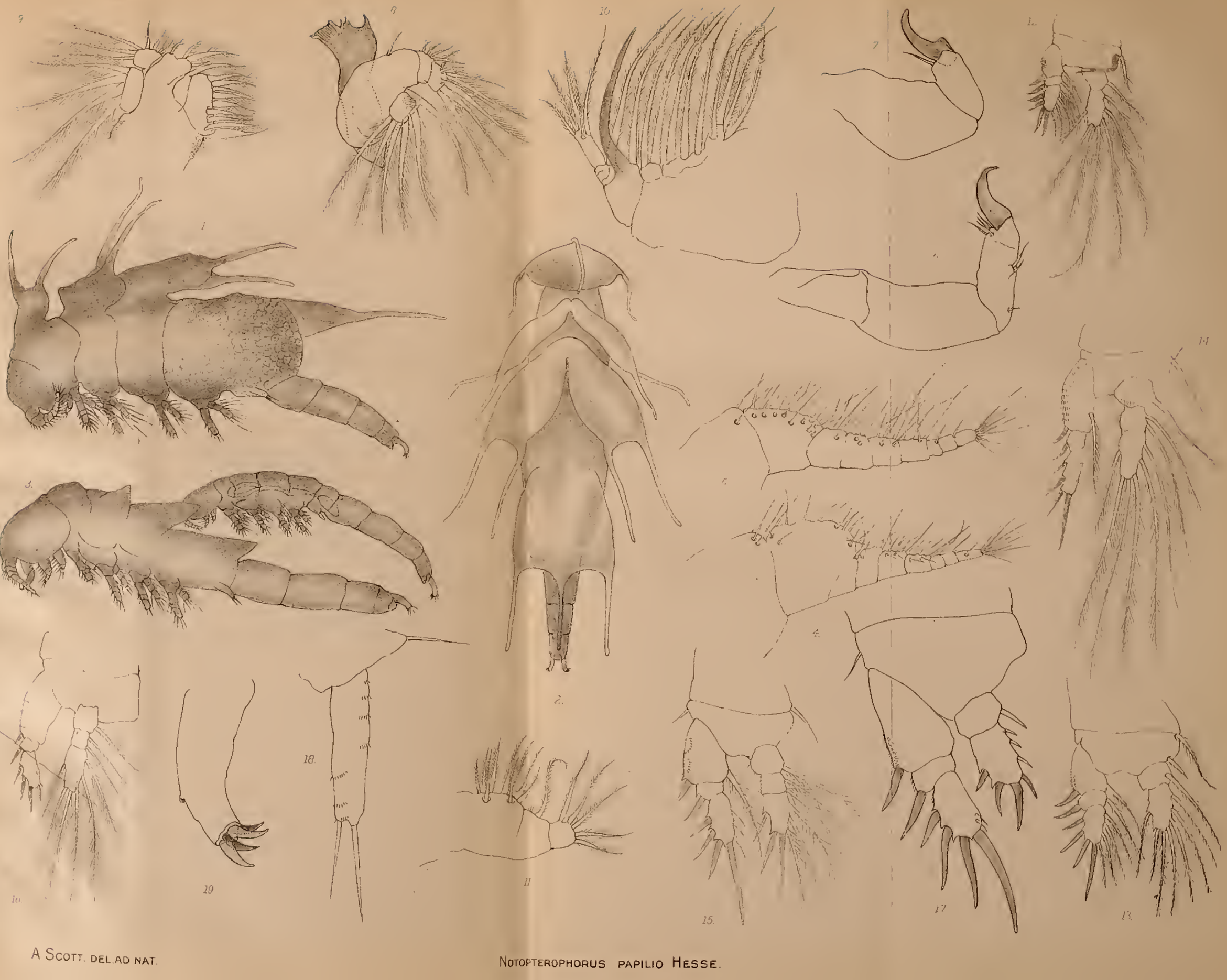


A. SCOTT, DEL. AD. N.



A SCOTT DEL AD NAT

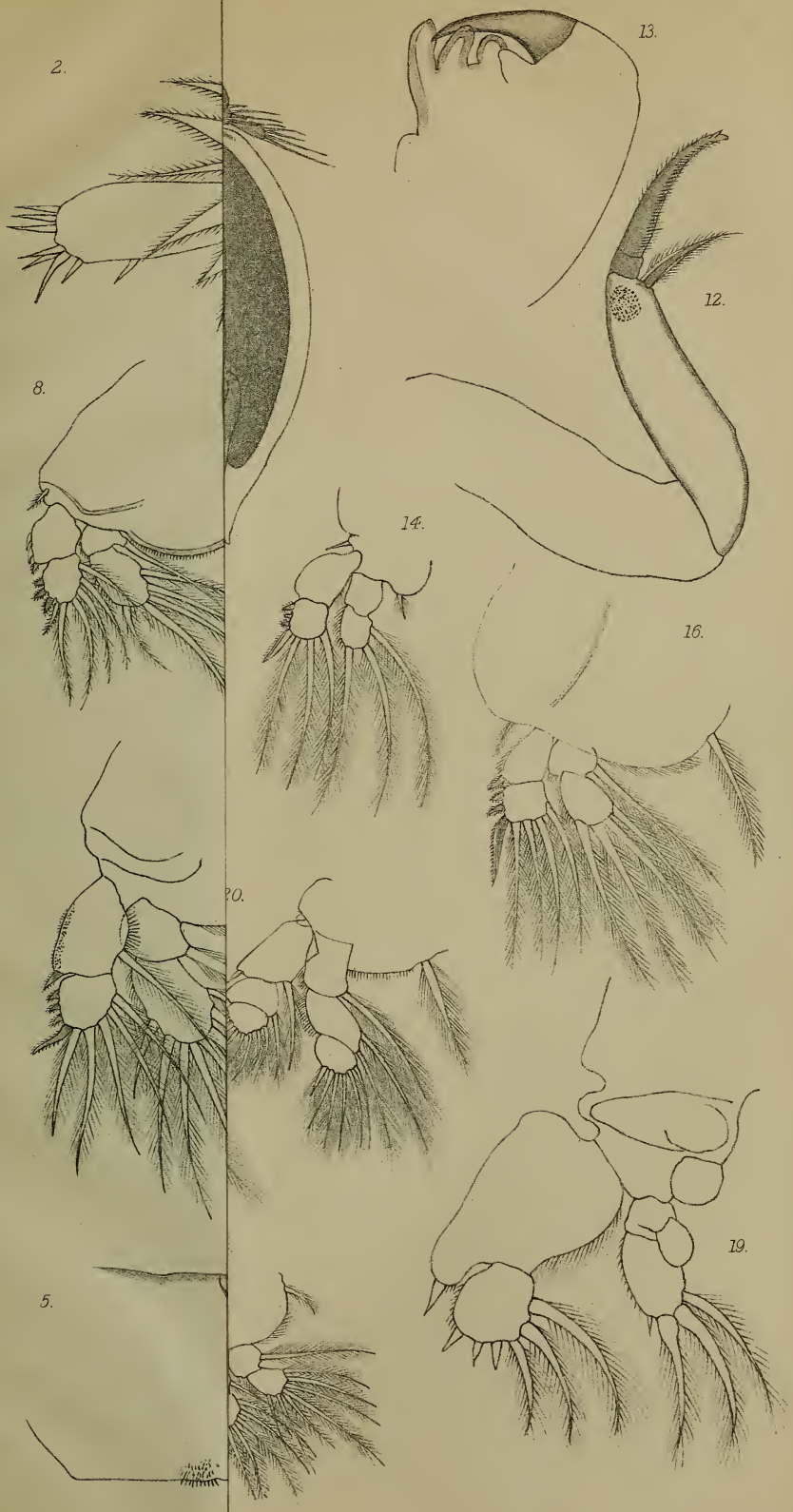
A. SCOTT. DEL. AD NAT.



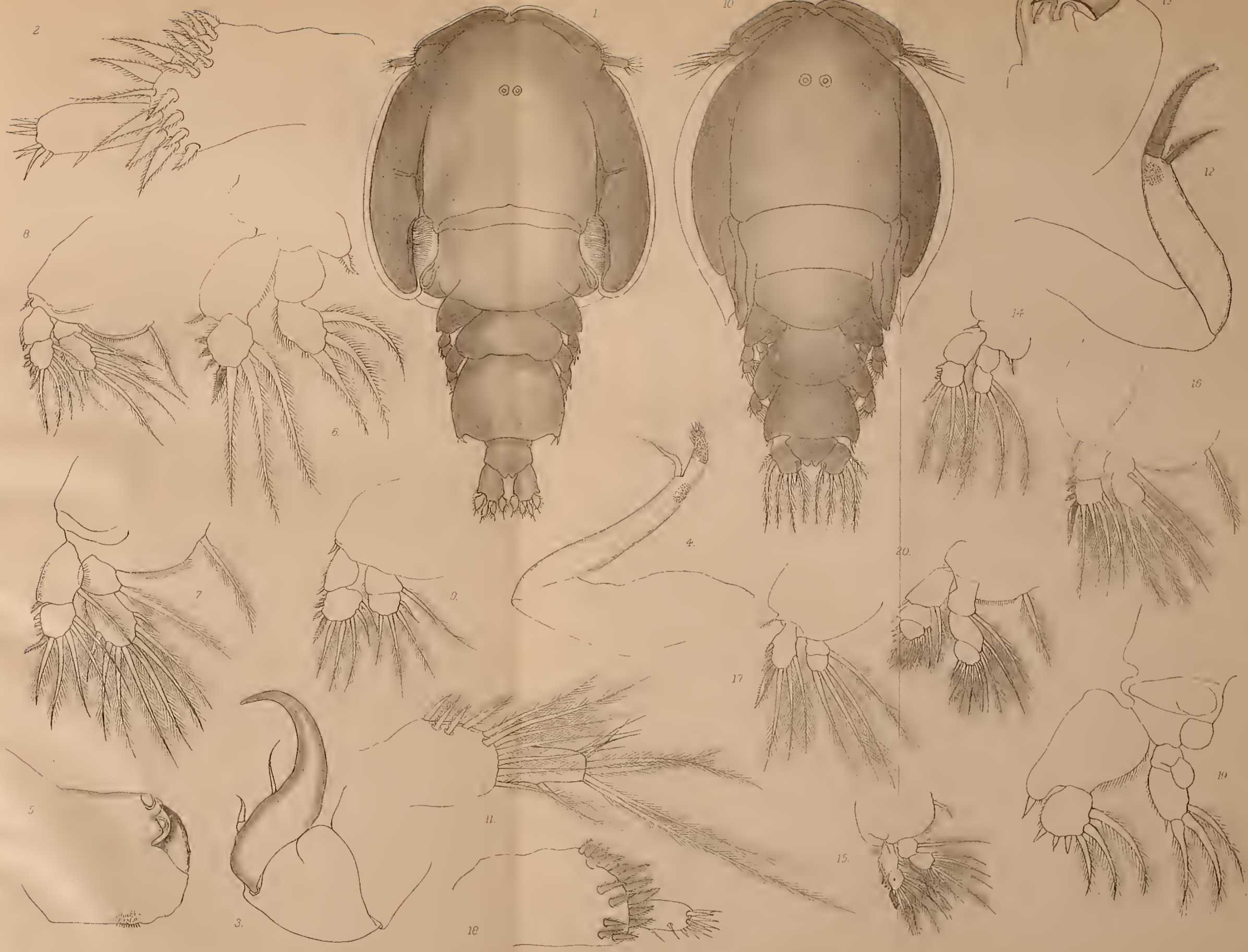
A SCOTT. DEL. AD NAT.

NOTOPTEROPHORUS PAPILIO HESSE.

PLATE XV



A. SCOTT, DEL. ALTA. O.F. MÜLLER.



A. SCOTT. DEL. AD NAT.

FIGS. 1-9. NOGAGUS LATUS, SP. N. FIGS. 10-17. NOGAGUS AMBIGUUS, SP. N. FIGS. 18-20, DINEMOURA PRODUCTA. O. F. MÜLLER.