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VOLUME LI, PART I.—SESSION 1914–15.

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MDCCCCXVI.

Price Twenty-five Shillings.

XXIII.—A Revision of the British Idoteidæ, a Family of Marine Isopoda. By Walter E. Collinge, D.Sc., F.L.S., etc., Research Fellow of the University of St Andrews. *Communicated by* Professor M'Intosh. (With Eleven Plates.*)

(MS. received December 11, 1915. Read January 10, 1916. Issued separately January 17, 1917.)

CONTENTS.

I. Introduction.

Many of the earlier accounts of the group of Crustacea, known as Isopoda, suffer from want of more detailed diagnoses and figures. To some extent this has been remedied during recent years by the authors of different monographs, but there are still many families which remain somewhat obscure, or only partially understood, owing to the above-mentioned cause. Such a family is the Idoteidæ.

In the present communication I propose to revise the diagnoses of the British genera and species, to set forth in greater detail than has hitherto been done their structure, illustrating the same, and to discuss the classification and affinities of the family as a whole.

This investigation has been carried out at the Gatty Marine Laboratory of St Andrews University, during my tenure of a Research Fellowship of the University, and of a Walker Trust Research Scholarship.

* The author desires to thank the Carnegie Trust for the Universities of Scotland for their grant to meet the cost of reproduction of the plates.

My best thanks are here tendered to Professor W. C. M'INTOSH for the facilities he has so kindly given me for carrying out the work, and for material from the University Natural History Museum and his private collection.

I also wish to record my thanks to the Rev. T. R. R. STEBBING for specimens of *Zenobiana prismatica* (Risso) and *Stenosoma lanciferum* (Leach); to Professor G. O. SARS for examples of the Norwegian species of *Idotea*; to Professor D'ARCY W. THOMPSON for the facilities he has at all times so kindly given me for examining the collections in the Museum of University College, Dundee; to Dr RAFFAELE ISSEL for specimens of *Zenobiana prismatica* (Risso) and other species; to Dr K. STEPHENSEN for specimens of *Idotea metallica*, Bosc, and various species of *Zenobiana* and *Stenosoma*; to Professor L. A. L. KING and Dr THOMAS SCOTT for other species; and to Dr W. T. CALMAN for his kind advice on certain matters of terminology. Finally, I have to thank Miss H. G. KIRK for the great pains she has taken with the figures, many made from my rough drawings, and others direct from the specimens themselves.

METHODS AND TECHNIQUE.

Whilst examples of both sexes of all the species here enumerated have been examined, many of them alive, dissections of all have been made and the different parts treated in various ways to bring out the minute structure. A brief account of the methods employed may prove useful.

Killing.—Where living specimens have been obtainable these have been killed by placing them in small glass jars and slowly adding equal parts of fresh water and 90 per cent. alcohol. When dead the specimens were transferred to 75 per cent. alcohol, and finally to 85 per cent. Some species are apt to become very soft in the 75 per cent. alcohol, so that it is well to change them to the stronger alcohol after an hour or two.

Staining.—Various fluids have been tried, but only those possessing great penetrative powers were found to be of any value. The best results were obtained with Mayer's alcoholic carmine. When the parts were not required as permanent mounts, very good results were obtained by leaving them for four or five hours in an aqueous solution of methyl-green.

Mounting.—All permanent preparations were treated with alcohol, xylol, and mounted in Canada balsam (xylol). Temporary mounts were examined in xylol.

For the removal of soft parts in the appendages, temporary preparations were held, after mounting in Canada balsam, over a spirit lamp for about the third of a minute. Where permanent preparations were desired, the different parts were boiled in a weak caustic soda solution, then washed in alcohol, stained, cleared in xylol, and mounted in Canada balsam.

II. Historical.

This family of Isopoda has received considerable attention from carcinologists in all parts of the world. Miers (44) in his well-known "Revision" of 1881 has reviewed the work of most of the earlier authors, and as I shall have occasion to mention some when discussing the classification and affinities, no useful purpose would be served in repeating these here.

The genus *Idotea* was constituted by J. C. Fabricius in 1798, the first description appearing at page 302 in his *Supplementum Entomologia Systematica.* Two years previously he had indicated that he intended describing the genus as new in the Supplement (cf. *Index Alphabeticus*, 1796, p. 86). In this latter publication he used the "*nomen nudum*" *Idothea*, but in 1798 at the head of his description he uses the name *Idotea*, and I agree with Canon Norman (47) that the latter spelling of the name should be retained. Firstly, as he points out, because this is the spelling which is used, and intentionally used, with the description ; and secondly, because it is the spelling which has been almost universally employed for a hundred years.

Miss Richardson (57) prefers to use the spelling *Idothea*, pointing out that that of *Idotea* is preoccupied by Weber, 1795.

The earlier references to the family by Linné, Pallas, Pennant, De Geer, Risso, Bosc, Latreille, Desmarest, Brandt, Kröyer, Milne-Edwards, Leach, Rathke, White, and others need not be considered here, beyond the remark that frequently the definitions of these authors were insufficient, and that they were not always clear as to the species they were describing.

Dana (16) in 1853, in his great work on the *Crustacea of the U.S. Exploring Expedition*, described six new species of *Idotea*, and diagnosed the new genera *Epelys*, *Cleantis*, and *Erichsonia*.

Bate and Westwood (3) gave a good account of the British species, as then known ; and Harger (32) also gave a very full account of those genera and species found on the eastern coast of the Northern United States.

Miers' (44) work of 1881 was a great advance upon any previously published, and included a discussion of no less than forty-seven species, included in four genera.

Chilton (11a) in 1885 described the interesting *Idotea festiva* from New Zealand.

In 1894 (46) Norman drew attention to several distinct varieties of *Idotea baltica*, which have since been elevated by Sars to specific rank. Dollfus (20) in 1894–95 gave a brief account of the species found upon the coast of France. Stebbing (69) in 1895 proposed the name *Zenobiana* for the genus *Zenobia*, Risso ; and Sars (64) two years later showed, in connection with the Norwegian species, that what had generally been considered by recent authors as only varieties of one and the same species, were in reality referable to no less than six different species, all easily recognisable in both sexes. Benedict (4) in 1897 published a useful revision of the genus *Synidotea*. Chilton (11) in 1899, in a paper which seems to have been overlooked by later authors, gave an account of the New Zealand species. STEBBING (70) in 1900 described the genus *Paridotea* with the *Oniscus ungulata* of PALLAS as the type; and in 1904 (68) the genus *Glyptidotea* for the *I. lichtensteinii* of KRAUSS. NORMAN (47) in the same year catalogued eleven species as occurring in the British Isles. Miss RICHARDSON (55) in 1904 described a new genus, *Symmius*, for a Japanese species, in which the uropoda each consist of a single piece, the metasome has three segments, the flagellum of the antennæ a single joint, and the maxillipede a three-jointed palp. In the same year (56) she described another Japanese genus, *Pentias*, which is characterised by the five-jointed palp of the maxillipedes and a uniarticulate metasome. In 1905 the same writer (58) redescribed the then known species of North America, amplifying the earlier diagnoses and adding the two new genera *Mesidotea* and *Pentidotea*.

In 1910 RACOVITZA and SEVASTOS (52) gave an interesting account of a new fossil species for which they erected the genus *Proidotea*.

In 1912 Miss RICHARDSON (60) pointed out that the *Cleantis isopus* of MIERS could not be retained in the genus *Zenobiana*, and suggested the new genus *Cleantiella* for its reception.

ISSEL (35) in 1913 redescribed and figured *Zenobiana prismatica* (Risso), pointing out various errors in BATE and WESTWOOD'S figures and description, and further showed that DANA'S genus *Cleantis* was synonymous with this.

BARNARD (*Ann. Sth. Afr. Mus.*, vol. x) in 1914 described the new genus *Engidotea*, a new species of *Synidotea* (*setifer*), and three new species of *Paridotea*, Stebbing.

In 1915 the writer published a diagnosis of *Idotea hectica* (Pallas) with figures (14), and also gave a brief account of the species of the family occurring in St Andrews Bay (15).

III. CLASSIFICATION AND AFFINITIES.

In the various attempts that have been made at a classification of the Isopoda, almost every part of the exoskeleton has at some time or other been employed. Many authors have put forth different systems, but few of them have proved successful or serviceable.

Of the earlier systems very little need be said, for, as has been frequently pointed out, many of the errors and much of the synonymy arose owing to the imperfect descriptions and absence of figures, so that an author often confused one species with another; such conditions are, of course, common to all branches of zoology.

BRANDT (7) was perhaps the first to realise that certain parts of the exoskeleton were more constant than others, amongst which he specially emphasised the importance of the antennæ, the telson, and the uropoda.

MILNE-EDWARDS (45) very largely copied BRANDT, but, accepting imperfect descriptions by earlier authors, his work, in this particular respect, has not proved of any great value.

DANA (16) in 1853 to a large extent followed the main lines of MILNE-EDWARDS' classification.

KINAHAN (37) in 1857 very thoroughly and critically examined the different systems up to that date, and at once recognised the importance of the antennæ and the uropoda, and, he adds, perhaps the form of the maxillipedes, but he states : "Two very important sets of characters have been omitted or overlooked, which must be taken into account in any classification which seeks to form natural groups ; these are : the characters drawn from the form of the head and from the epimerals" (coxal plates).

It is upon the whole of the above-mentioned characters that the classification in the present paper is based.

The leading structural characters of systematic value are undoubtedly shown in the form of the cephalon and its appendages, the coalescence of the abdominal segments, and the operculiform inferior uropoda. In all of these characters the Idoteidæ exhibit a close relationship with the Arcturidæ. Both families are probably of ancient origin, and many of their genera afford evidence of more recent modifications and adaptations. Unfortunately many of the earlier species are incompletely described and still more incompletely figured, as already pointed out. OHLIN (48) very pertinently remarks, the classification of the different genera is as yet very uncertain, and is very much in want of a renewed critical revision. Such a revision the writer hopes to complete at no very distant date.

LATREILLE (39) in 1829 included in his fourth section of the family (the Idoteides of LEACH) the genera *Idotea*, Fabricius ; *Stenosoma*, Leach ; and *Arcturus*, Latreille. MILNE-EDWARDS (45) in 1840 employed the same section for the genera *Arcturus*, *Idotea*, and *Anthura*, Leach, but this last-mentioned genus has little in common with either of the preceding ones, apart from the elongated form of the body.

In 1853 DANA (16) removed the Arcturidæ to a new group, which he termed Anisopoda, and placed the Idoteidæ with the Chætiliidæ, a proceeding which few subsequent authors have thought was warranted. Of the three genera he described, *Epelys*, *Cleantis*, and *Erichsonia*, the first is now regarded as synonymous with *Edotia*, Guérin-Mén., the second with *Zenobiana*, Stebbing, and for the third name, which was preoccupied, BENEDICT substituted *Erichsonella*.

BATE and WESTWOOD (3) in 1867 associated together the families Arcturidæ and Idoteidæ. CLAUS (12) in 1871 placed both *Chætilia*, Dana, and *Arcturus* in his group Idoteides.

Both HARGER (32) in 1880, and MIERS (44) in 1881, recognised the close affinity of the Idoteidæ with the Arcturidæ, as have practically all subsequent authors. BONNIER (5) in 1887, following CLAUS, placed both *Arcturus* and *Idotea* in the family Idotheidæ. HANSEN (30) in the same year gave an account of *Glyptonotus entomon* (Linn.), and figured and described some of the oral appendages. Dr HANSEN informs me (*in litt.* 7th Dec. 1915) that he now considers the specimens he examined to be referable to the *G. sibiricus* of BIRULA.

In 1901 OHLIN (48) described from Patagonia a new genus and species (*Pseudidothea bonnieri*) as the type of a new family—Pseudidotheidæ,—which he regarded "as an intermediate link between Idotheidæ and Arcturidæ." It is characterised by the transformation of the first pair of metasomatic appendages into a copulatory organ in the male, in addition to the usual style on the endopodite of the second pair, the coalescence of the metasomatic segments, the small antennulæ, the two-jointed flagellum of the antennæ, and a five-jointed palp on the maxillipedes.

The specimens very much resemble the *Idotea miersi* of STUDER (74), and whilst the characters given may serve to constitute a new genus, or even subfamily, I feel very doubtful whether they are sufficiently important to rank above this.

THOMSON (77A) in 1904 described the new family Holognathidæ and genus *Holognathus* for the reception of the *Idotea stewarti*, Filhol, which differs from the true Idoteidæ in possessing a three-jointed mandibular palp.

RACOVITZA and SEVASTOS (52) in 1910 constituted a new sub-family, Mesidoteini, with the genus *Mesidotea*, Richardson, as the type, and including also *Chiridotea*, Harger, and *Proidotea*, Racovitza and Sevastos. In this interesting and thoughtful paper the authors point out that the family Idoteidæ is an ancient one, and especially the genera of the new sub-family, which are completely isolated from the remaining genera. They summarise as follows :—

"(*a*) La famille des Idothéides est formée par plusieurs lignées qui actuellement ne sont réunies par aucune forme intermédiaire.

"(*b*) Au cours de leur évolution ces lignées ont subi un certain nombre de transformations orthogénétiques souvent identiques, ce qui a produit un grand nombre d'adaptations convergentes ou parallèles.

"(*c*) Les Mesidoteini littoraux septentrionaux sont d'une autre lignée que *Glyptonotus* littoral austral avec lequel ils ont été réunis à tort.

"(*d*) C'est également à tort que OHLIN rapproche son genre subantarctique littoral *Macrochiridothea* de *Chiridotea* littoral subarctique."

So far as I am aware, they are the only authors who have expressed an opinion upon the peculiarly modified uropoda, stating : "La transformation des uropodes en appareil protecteur des pléopodes, qui caractérise les Valvifera, doit être fort ancienne puisque *Proidotea* est pourvue de 'valves' typiques. Il n'est pas possible de savoir actuellement si cette disposition a été acquise d'une façon indépendante par les différents valvifères ou si elle est l'héritage d'un commun ancêtre. Quoi qu'il en soit elle a dû s'effectuer de la façon suivante en partant d'une (ou plusieurs formes) à uropodes droits pourvus de protopodites plus petits que les uropodites : Habitude de replier les uropodes en dedans—augmentation progressive des protopodites avec réduction consécutive des uropodites—allongement du pléotelson et de l'uropode—réduction et disparition de l'exopodite inutile précédent la réduction puis la disparition de l'endopodite qui seul joue d'abord un rôle protecteur."

ISSEL (35) in 1913 showed that DANA'S genus *Cleantis* was synonymous with

Zenobiana, Stebbing. BATE and WESTWOOD were evidently of this opinion, for writing in 1867 (3) they stated: "This species [*Idotea parallela* = *Zenobiana prismatica* (Risso)] appears to us to be very closely allied to, if not identical with, the genus *Cleantis* of DANA."

MIERS (44) in his "Revision" states that LEACH's diagnosis of *Stenosoma* "does not permit of its being used for a sectional designation. . . . *Leptosoma*, on the other hand, will include all Idoteæ with a uniarticulate postabdomen." This author, however, overlooked the fact that RISSO's name *Leptosoma* was preoccupied.

LEACH's original diagnosis of *Stenosoma* (41, p. 365) is as follows:—"Antennæ exteriores corporis longitudine, articulo tertio quarto longiore. Corpus lineare."

He included in this genus two such dissimilar species as his *hectica* (= *Idotea linearis* (Pennant)) and *acuminata* (= the *Stenosoma acuminatum*, Leach).

The fact that SAY (65), when describing his *filiformis* (= *Erichsonella filiformis*), included it in this genus, GOULD (26) his *Idotea irrorata*, and DANA (17) his *Idotea gracillima*, sufficiently illustrates how imperfect the diagnosis is. The name has been used with so many varied conceptions that, with MIERS, I agree that it cannot be employed for any section or division of the family.

Seeing that neither of the above names can be employed, I am proposing that of *Synisoma*, and give an emended diagnosis of the genus.

Synisoma, it may be remarked, differs from the genus *Erichsonella* of BENEDICT in the following characters:—

1. The flagellum of the antennæ does not consist of only a single clavate joint.
2. The coxal plates are distinctly separated and visible dorsally on all excepting the first segment.

As pointed out above, RACOVITZA and SEVASTOS have already separated the genera *Mesidotea*, Richardson, *Chiridotea*, Harger, and *Proidotea*, Rac. and Sev., and placed them in the sub-family Mesidoteinæ. The remaining genera fall into at least three or four further subfamilies, of which the Idoteinæ of MIERS would contain the genus *Idotea*, Fabr., and allied genera.

BARNARD (*Ann. Sth. Afr. Mus.*, 1914, p. 203) has recently described the new genus *Engidotea*, with the *I. lobata* of MIERS as the type, which species is characterised by the inner lobes of the first maxillæ having only two setose spines, the second maxillæ having only two lobes, and no setose styles on the uropoda. The palps of the maxillipedes are five-jointed.

IV. GEOGRAPHICAL DISTRIBUTION.

Whilst members of the Idoteidæ are found in all parts of the world, they would seem to be more numerous in the temperate and colder seas than elsewhere. Many species are found on the shore and in shallow water, whilst others frequent moderate depths, and a few have been taken at considerable depths. HARGER (30) records

Edotia nodulosa, Kröyer, at a depth of 190 fathoms, off Halifax, U.S.A., and *Mesidotea entomon* (Linn.) has been recorded from 60 fathoms.

Some species, like *I. baltica* (Pallas), are cosmopolitan, whilst others have a very restricted distribution. The whole question of the distribution of the different genera would well repay further investigation.

Zenobiana, Stebbing, and *Synisoma*, Cllge. (= *Stenosoma*, Auctt.), would seem to be rare in northern waters around the British Isles, although BATE and WESTWOOD (3) mention having received examples of *S. acuminata* (Leach) from Cumbrae. The latter genus has probably a southern distribution. It is recorded from numerous localities on the shores of the Mediterranean, Adriatic, and Black Seas, and also from the southern coast of England.

Of our British species of this family, the majority of the species of *Idotea* are common round the coasts of the British Islands. *I. metallica*, Bosc, and *I. viridis* (Slabber) are perhaps rarer than the remainder. *I. sarsi* has, so far, only been received from St Andrews Bay.

I have elsewhere (15) pointed out that of the eight previously recorded British species of *Idotea*, seven have been found in St Andrews Bay, viz. :—

I. baltica (Pallas) ; *I. pelagica*, Leach ; *I. neglecta*, G. O. Sars ; *I. emarginata*, Fabr. ; *I. granulosa*, Rathke ; *I. viridis* (Slabber) ; *I. linearis* (Pennant).

V. VARIATION.

Apart from the colour markings, which are endless, and slight variations in the mandibles and first and second maxillæ, very few variations have been met with in the large number of specimens I have examined. In *I. baltica* (Pallas) BATE and WESTWOOD (3, p. 381) give figures of variations in the form of the terminal segment of the body. Some of these are undoubtedly of young examples, or possibly were not referable to this species. In the form of the antennæ, apart from the number of joints in the flagellum, and in the shape of the terminal segment, I have found very few variations indeed, and SARS (64, p. 81) states that he has found the form of the terminal segment of the metasome pretty constant, even in young specimens. According to CHILTON (11), the segmentation of the metasome is liable to vary in a species. As an instance he cites the difference in *Idotea peronii*, M.-Edw., and *I. stricta*, Dana, and unites the two species.

MIERS (44) was of opinion that there were several distinct geographical sub-species or varieties of *I. baltica*, and I fully concur with this view. Thus in St Andrews Bay the ordinary large form occurs in great abundance, exhibiting innumerable colour variations ; but there is also a very much rarer and smaller form, which is found only, so far as my observations go, on the algæ in the rock pools on the east shore. It is by no means common, for diligent search has so far only resulted in obtaining eight specimens.

From the Mediterranean I have the same species, but in all the specimens the tridentate terminal segment of the metasome is less pronounced, and the mesosome in both sexes is comparatively wider.

In examples of *I. linearis* (Pennant) received from Plymouth, eight specimens all show a depressed area on the ventral side of the fifth peduncular joint of the antennæ, and in one example of the same species, received from the Bay of Nigg, Aberdeen, the left antenna has six peduncular joints.

There appears to be a considerable amount of variation in the size of the different species according to locality. Of the species treated of in this paper I give below a list, and the measurements given by different authors. The first line of figures refers to the length of the male, and the second to that of the female, where two are quoted.

Species.	Authority.									
	Bate and Westwood.	Miers.	Harger.	Sars.	Richardson.	Scott.	Tattersall.	Stephensen.	Issel.	Collinge.
	in.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
1. *I. baltica* (Pallas)	$1\frac{1}{3}$	30	30–38 20	35	20	...	35	...	...	35 20
2. *I. pelagica*, Leach	$\frac{1}{2}$	...	...	13 9	...	...	13 9	...	...	13–14 9–10
3. *I. neglecta*, G. O. Sars	...	...	...	25 16	...	25–33	25 16	...	...	27·5 16–17
4. *I. emarginata* (Fabr.)	$1\frac{1}{6}$	35	...	30 18	...	...	30 18	...	...	30 20
5. *I. granulosa*, Rathke	...	...	25	15 11	...	...	15 11	...	...	19–21 16
6. *I. viridis* (Slabber)	...	...	...	12 10	...	...	12 10	...	...	12 10
7. *I. metallica*, Bosc	...	17	28 22	...	18	...	18	18–31 18–24	...	23 18
8. *I. linearis* (Pennant)	$1\frac{1}{2}$	38	...	...	...	...	35	...	...	28–38 25
9. *Zenobiana prismatica* (Risso)	...	15	...	...	...	...	12	...	10–13	13·5
10. *Synisoma lancifer* (Leach)	...	...	...	...	...	...	20	...	...	22·5
11. *Synisoma acuminata* (Leach)	...	25	...	...	...	...	15	...	...	...

VI. External Structure.

The form and structure of the exoskeleton of this family have only been very imperfectly described and figured. The differences in a given species in the descriptions and figures of different authors are difficult to account for. Thus in such a cosmopolitan form as *Idotea baltica* (Pallas), Sars (64) states that there are sixteen to twenty articulations in the flagellum of the antennæ and figures eighteen. BATE and WESTWOOD (3) state about twenty. Miss RICHARDSON (58) gives fourteen as the number, whilst HARGER (30) states twelve to sixteen, and shows seventeen in his figure (pl. v, fig. 25*b*).

Both Miss RICHARDSON and HARGER in their figures of the maxillipedes show the basal segment, to which the four-jointed palp is attached, as one piece. BATE and WESTWOOD show it with a short lateral process on the inner side, but only figure three joints in the palp. SARS shows the joint and process, but the terminal portion is scarcely correct. I have elsewhere shown (13) that the oral appendages in the Isopoda are liable to considerable variation, but not to the extent of the fusion or total absence of the different parts.

Numerous other instances might be quoted, for similar variations are to be found in the figures of the first and second maxillæ, the shape of the cephalon, the coxal plates, and the uropoda, but these are sufficient to indicate how imperfectly described and figured the various species are.

No author, so far as I am aware, either describes or figures the groove on the third joint of the palp of the maxillipede. A certain amount of difference may be due to figuring and describing immature specimens (see p. 739), in other cases the differences are possibly due to differences in the sexes, many authors not stating whether the examples were male or female; be this as it may, the need of more accurate figures must have been felt by everyone who has studied the family.

(*a*) *General Form.*

The body is more or less broad and flattened, the various genera and species ranging from an oblong oval to an elongated linear shape. There is considerable range in the size of the different genera and species. The largest member of the family is *Glyptonotus antarcticus*, Eights, which attains a length of 90 mm., and the smallest is *Idotea danai*, Miers, which is only 2 mm. long. The males in practically all cases are larger and more robust than the females.

(*b*) *The Cephalon.*

Excepting in *Chiridotea*, Harger, the cephalon is quadrate in outline. In *Idotea baltica* (Pallas), *I. neglecta*, G. O. Sars, and *I. pelagica*, Leach, it is cleft on the posterior lateral margins, and in many species there is a more or less distinct sinuous line towards the posterior margin.

1. *The Eyes.*—Paired compound eyes are present in all the genera of the family. In most species they are large, and situated dorsally or dorso-laterally. In a few species they are quite small. In no genera or species of the family are they known to be absent.

2. *Antennulæ.*—These are composed of a three-jointed peduncle with the flagellum

consisting of a single clavate joint. On the dorsal surface of this joint are a varying number of groups of sensory setæ, probably of an olfactory nature.

3. *Antennæ.*—There are five peduncular joints in these appendages, and usually a multiarticulate flagellum. In *Erichsonella*, Benedict, *Eusymmerus*, Richardson, *Zenobiana*, Stebbing, and *Symmius*, Richardson, the joints are united to form a single piece. In *Edotia*, Guérin-Ménéville, the antennæ are rudimentary, and the flagellum consists of a single joint. Terminally there is a more or less conical style with a number of long fine setæ at the apex.

4. *Oral Appendages.*—These include the upper and lower lips, the mandibles, the first and second maxillæ, and the maxillipedes. The lips have been regarded by most authors as integumentary modifications rather than true appendages, although Miss ARMS "maintains that the leaves of the lower lip 'are independent outgrowths or buds from the integument, as much as any other pair of appendages; and the fact that the parts of the segment to which they must have belonged have disappeared, or cannot be readily found is,' in her opinion, 'an argument of doubtful weight'" (66). The upper lip is plate-like, and projects from the dorsal border of the mouth over the mandibles; a second and inner plate is present in some Isopoda. The lower lip is bilobed, and consists of a small inner pair of lobes and an outer larger pair.

The mandibles are without palps; each consists of a stout robust body with a bidenticulated apical portion, below which is a broad truncated molar tubercle. There is considerable variation in the form of the teeth, according to age, etc.

The first maxillæ each consist of a short robust outer lobe terminating in a variable number of stout curved spines, and an inner series of more slender ones, which may be simple or toothed. The inner lobe is a thin, flat, narrow chitinous band with a series of, usually setose, spines terminally. In *Idotea*, Fabricius, *Mesidotea*, Richardson, *Glyptidotea*, Stebbing, *Zenobiana*, Stebbing, *Paridotea*, Stebbing, *Pentias*, Richardson, and *Synisoma*, Collinge, there are three of these spines; in *Synidotea*, Harger, and *Engidotea*, Barnard, only two.*

The second maxillæ each arise from the protopodite as two flat laminar lobes, the innermost of which is bilobed; all of them are fringed with long setæ.

The maxillipedes each consist of a coxopodite which is divided into two, a basal segment or basiopodite composed of a single joint; articulating with this distally is the palp or endopodite, on the outer side is an epipodite, whilst on the inner side is a short joint articulating with the basal segment, which joint is provided with one or more peculiar handle-shaped appendages known as the coupling processes.

In *Chiridotea*, Harger, *Synidotea*, Harger, *Edotia*, Guérin-Mén., *Chiriscus*, Richardson, *Symmius*, Richardson, and *Macrochiridothea*, Ohlin, the palp is three-jointed; in *Idotea*, Fabricius, *Colidotea*, Richardson, *Eusymmerus*, Richardson, and *Erichsonella*, Benedict, four-jointed; in *Mesidotea*, Richardson, *Pentidotea*,

* In an Australian form (genera and species as yet undetermined) there are four spines present. *Paridotea ungulata* also has four.

Richardson, *Paridotea*, Stebbing, *Zenobiana*, Stebbing, *Glyptidotea*, Stebbing, *Cleantiella*, Richardson, *Engidotea*, Barnard, and *Pentias*, Richardson, five-jointed; and in *Glyptonotus*, Eights, the number varies from three to five joints.

(*c*) *The Mesosome.*

The mesosome or thorax consists of seven free segments articulating with each other. An exception to this is found in *Crabyzos longicaudatus*, S. Bates (2), where the cephalon is partially coalescent with the first mesomatic segment.

The first segment is usually narrower than the rest, and partly surrounds the cephalon. The pleural plates may be well developed, as in *I. baltica*, *I. neglecta*, and *I. emarginata*, or very small, as in *I. linearis*.

1. *Coxal Plates.*—In most members of this family the coxopodites of the appendages are developed to such an extent as to protrude beyond the pleural plates or overlap or replace them on the dorsal surface. Many authors have used the term "epimera" for these, but, as CALMAN (10) points out, that term has been used in so many different senses, that it seems better to abandon it altogether. In our British species the greatest development of these plates is seen in *I. baltica*, *I. neglecta*, and *I. emarginata*, and they are smallest in *I. linearis* and *Zenobiana prismatica*, and occupy an intermediate position in the members of the genus *Synisoma*. In *I. hectica* (Pallas), an Atlantic and Mediterranean species, they do not protrude beyond the ventral surface of the pleural plates.

2. *Appendages.*—Each segment carries a pair of appendages, and each appendage is composed of seven joints. The coxopodite and basiopodite may be very small, whilst in the first and second appendages the distal joints are usually shorter than in the remaining ones. In many species the anterior appendages are smaller than the posterior ones; on the other hand, in *Crabyzos longicaudata* (S. Bate) the first pair are said to be the largest. The dactylopodite is chelate and unguiform. All the appendages are provided with setæ, sometimes of three or four kinds, and all are ambulatory in character.

In the females the third and the three following appendages each have at their base a large membranous plate folded beneath the body to form an ovigerous sac or marsupial chamber.

(*d*) *The Metasome.*

The metasome in the Idoteidæ has undergone considerable modification by a consolidation of the terminal segments to form a strong dorsal shield.

The number of segments varies in the different genera: thus in *Glyptonotus*, Eights, there are four or five segments; in *Mesidotea*, Richardson, *Chiridotea*, Harger, four; in *Idotea*, Fabricius, *Chiriscus*, Richardson, and *Pentidotea*, Richardson, three are present; in *Cleantiella*, Richardson, there are two segments; in *Zenobiana*, Stebbing, three to five may persist; whilst in *Synidotea*, Harger, *Colidotea*, Richardson, *Edotia*, Guérin-Mén., *Crabyzos*, S. Bate, *Eusymmerus*, Richardson, *Erichsonella*, Benedict, *Pentias*, Richardson, *Paridotea*, Stebbing, and *Synisoma*, Collinge, the fusion is complete, the segments being represented by a single piece. In nearly all cases there are evidences of one or more suture lines indicating a further segment or segments.

1. *Appendages.*—There are five pairs of appendages, each of which consists of a basal segment carrying two elongate-oval lamellæ fringed with long setæ. The inner lamellæ of the second pair, and of the first pair also, in *Pseudidothea*, Ohlin, in the male bears a fine stylet.

2. *Uropoda.*—This pair of appendages differs in this family, in common with other members of the suborder Valvifera, from the condition obtaining in any other Isopoda. Here they consist of a pair of somewhat flattened, opercular-like plates (the protopodites) closing within the metasomatic appendages, by meeting in the mid-ventral line or overlapping one another. Each is attached to the metasome laterally. Posteriorly there is in most genera a hinge dividing off a posterior plate (the endopodite). In some genera, *e.g. Mesidotea*, Richardson, *Chiridotea*, Harger, *Glyptonotus*, Eights, and *Macrochiridothea*, Ohlin, there is an inner plate to each uropod (the exopodite). Articulating laterally on the outer side, or dorso-laterally, there is usually a plumose style. STEBBING (70) states that this is absent in *Paridotea*; and in *Symmius*, Richardson, the endopodite is not present, each uropod consisting of a single piece.

VII. BIONOMICS AND ECONOMICS.

Very little is known as to the life-history and habits of the family of Isopods here treated of. ROUX (63) has given some interesting details of their habits, and ISSEL (34) has studied the tube-dwelling species of the genus *Zenobiana*.

Whilst the family contains some of the largest known Isopods, some are quite small.

Many species are exceedingly plentiful. Most of them seem to prefer decaying masses of algæ in rock pools or still water, where they feed upon dead fishes, molluscs, crustaceans, annelids, etc.

Although the majority of species are marine, LOVEN has recorded *Mesidotea entomon* from deep Scandinavian lakes, and THOMSON (77) has described a species of *Idotea* (*lacustris*) from a fresh-water lagoon in New Zealand.

ROUX remarks that when the sea is rough they seek deep water, and are often thrown back by the action of the waves. This is so in St Andrews Bay, where, after a rough sea, large numbers of the commoner species are to be found clinging to the algæ in the rock pools.

Idotea baltica progresses by a series of short, jerky jumps, whereas *I. linearis* moves less rapidly, often apparently floating with the uropoda open and hanging perpendicular to the body. Most of the species are nocturnal, hiding under algæ during the day. *Idotea linearis* is fairly active during the daytime, gliding gracefully through the water even when strong sunlight was shining on the vessel in which it was contained. In the rock pools also I have noticed this species active during the daytime.

ROUX records that in the Mediterranean the fishermen collect these Isopods and use them as bait. The method of collecting is by tying together bundles of fucus, which are sunk below the water; on these the Idoteæ assemble, and from time to time the masses of algæ are drawn up and the specimens collected.

Fishes would seem to be the chief enemies of these crustacea. Mr W. RAMSAY SMITH, in his papers on the food of fishes,* has given many records of their occurrence in the stomachs of various species, as has also Dr THOMAS SCOTT in his "Observations on the Food of Fishes." † I have records of the occurrence of all the British species of *Idotea*, excepting *viridis* and *metallica*, from the stomachs of the cod, haddock, and plaice.

MATZDORFF (43) has given a most interesting account of the colour variation in *I. baltica*. The remarkable variability of this species has been frequently commented upon. He enumerates and figures a number of colour varieties, and shows that they are common to both sexes. The same individual changes colour by the expansion or contraction of dark brown chromatophorous cells, adapting itself to its surroundings. Thus specimens found near the surface, on the top of algæ, were light-coloured, while those on the bottom, in the same locality, were dark-coloured. After the extirpation of the eyes the animals cease to undergo these colour changes.

VIII. SYSTEMATIC.

Many genera of doubtful value have been made by different authors, often upon very trivial differences.

DANA (16), 1852, divided the family into the following five genera:—*Idotea*, Fabr.; *Edotia*, Guérin-Mén.; *Erichsonia*, Dana; *Cleantis*, Dana; and *Epelys*, Dana. BATE and WESTWOOD (3), 1867, included all the British species in the genus *Idotea*, Fabr. MIERS (44), 1881, gives the following divisions:—

Fam. IDOTEIDÆ, Dana.
Sub-fam. i. GLYPTONOTINÆ.
Genus *Glyptonotus*, Eights.
Sub-fam. ii. IDOTEINÆ.
Genera *Idotea*, Fabr.; *Edotia*, Guérin-Mén.; and *Cleantis*, Dana.

HARGER (30) included the five genera:—*Chiridotea*, Harger; *Idotea*, Fabr.; *Synidotea*, Harger; *Erichsonia*, Dana; and *Epelys*, Dana. STEBBING (68) recognised

* 7th, 8th, 9th, and 10th Reports of the Fishery Board of Scotland.
† *Ibid.*, 20th Report, 1902, pp. 486–538.

the following genera:—*Glyptonotus*, Eights; *Chætilia*, Dana; *Arcturides*, Studer; *Idotea*, Fabr.; *Edotia*, Guérin-Mén.; and *Cleantis*, Dana. NORMAN (47), 1904, mentions only the three British genera, whilst RICHARDSON (58) in 1905 arranged the genera as follows:—*Mesidotea*, Richardson; *Chiridotea*, Harger; *Idothea*, Fabr.; *Pentidotea*, Richardson; *Synidotea*, Harger; *Colidotea*, Richardson; *Edotia*, Guérin-Mén.; *Eusymmerus*, Richardson; *Erichsonella*, Benedict; and *Cleantis*, Dana.

In the present communication I propose to divide the family as follows:—

Fam. IDOTEIDÆ, Leach, 1813.*

Sub-fam. i. IDOTEINÆ, Miers, 1881.

Genus 1. *Idotea*, Fabr., 1798.

(1) *Idotea baltica* (Pallas).
(2) ,, *pelagica*, Leach.
(3) ,, *neglecta*, G. O. Sars.
(4) ,, *emarginata* (Fabricius).
(5) ,, *granulosa*, Rathke.
(6) ,, *sarsi*, n. sp.
(7) ,, *viridis* (Slabber).
(8) ,, *metallica*, Bosc.
(9) ,, *linearis* (Pennant).

Sub-fam. ii.

Genus 2. *Zenobiana*, Stebbing, 1895.

(1) *Zenobiana prismatica* (Risso).

Sub-fam. iii.

Genus 3. *Synisoma*, nov. nom.

(1) *Synisoma lancifer* (Leach, MSS.).
(2) ,, *acuminata* (Leach).

Fam. IDOTEIDÆ, Leach, 1813.

Body ovate, oblong or elongate, and more or less depressed. Cephalon and mesosomatic segments distinct; coxal plates separate from or confluent with the segments; metasome with some or all of the segments consolidated into a terminal scutiform piece. Eyes usually dorso-lateral, occasionally dorsal, multifaceted. Antennules with three-jointed peduncle, flagellum uniarticulate. Antennæ with five-jointed peduncle, flagellum usually multiarticulate, but may consist of a single joint or may be short or rudimentary. Mandibles without palps. First maxillæ

* Given on the authority of AGASSIZ, *Nomenclator Zoologicus*.

with outer lobe terminating in a series of stout, curved spines, inner lobe terminating in two to four setose spines. Second maxillæ each consist of three lobes fringed with setæ. Maxillipedes operculiform, palp with three to five joints. Mesosomatic segments, excepting the first, usually about equal in length, coxal plates distinct or coalesced with the segments. Thoracic appendages uniform in structure, ambulatory, varying in size from before backwards, usually stronger in male than in female, occasionally approaching a subcheliform character; dactylus strong, unguiform, unequally bi-dentate. Metasome with some or all of the segments fused to form a large terminal scute-like segment. Metasomatic appendages laminate. Uropoda inferior, arching over the ventral side of the metasome and enclosing the appendages.

Key to the Genera of British Idoteidæ.

1. Body ovate, oblong, or elongate, more or less depressed.
   Antennæ with multiarticulate flagellum.
   Maxillipedes with four-jointed palp.
   Coxal plates of the mesosomatic segments, excepting the first, distinctly separated.
   Metasome composed of three segments.
   Idotea, Fabricius.

2. Body somewhat slender, long and narrow, with parallel sides.
   Antennæ short, with single-jointed flagellum, or with restricted number of joints.
   Maxillipedes with five-jointed palp.
   Coxal plates of the mesosomatic segments distinct, but small and narrow.
   Metasome composed of three to five segments.
   Zenobiana, Stebbing.

3. Body oblong, moderately convex, usually with indications of a keel.
   Antennæ with multiarticulate flagellum.
   Maxillipedes with four-jointed palp.
   Coxal plates small, but distinct.
   Metasome composed of a single segment.
   Synisoma, Collinge.

1. Genus *Idotea*, Fabricius.

Idotea, Fabricius, J. C., *Suppl. Entom. Syst.*, 1798, p. 302.

Body ovate, oblong or elongate, more or less depressed. Cephalon subquadrate, not expanded laterally, sometimes with lateral clefts or posterior sinuous furrow. Coxal plates of mesosome usually well defined on the second to seventh segments. Eyes dorso-lateral. Antennulæ with short, clavate flagellum. Antennæ with elongated multiarticulate flagellum. Maxillipedes operculiform, palps (endopodites) with four joints, basipodite expanded. Metasome composed of three distinct segments and lateral suture lines in front of the long terminal segment. Uropoda laminar, with basal joint and setose spine. Male usually larger than female.

KEY TO THE BRITISH SPECIES OF THE GENUS IDOTEA.

I. Body oblong ovate.
- 1. Coxal plates wide.
  - *a.* Metasome terminally produced in the middle and extending beyond the lateral angles.
    - *I. baltica* (Pallas).
  - *b.* Metasome terminally broad and rounded.
    - *I. pelagica*, Leach.
    - *I. neglecta*, G. O. Sars.
  - *c.* Metasome terminally marginate.
    - *I. emarginata* (Fabr.).
- 2. Coxal plates rather narrow.
  - *d.* Metasome terminally drawn out and pointed.
    - *I. granulosa*, Rathke.
    - *I. sarsi*, Collinge.
    - *I. viridis* (Slabber).
  - *e.* Metasome terminally more or less truncate.
    - *I. metallica*, Bosc.

II. Body elongated, filiform.
- 1. Coxal plates very small.
  - *a.* Metasome terminally emarginate.
    - *I. linearis* (Pennant).

(1) *Idotea baltica* (Pallas). (Pl. I, figs. 1–14.)

Oniscus balticus, Pallas, *Spic. Zool.*, 1772, vol. ix, p. 67, pl. iv, fig. 6.
Idotea entomon, Pennant, *Brit. Zool.*, 1777, vol. iv, p. 38, pl. xviii, fig. 5.
Stenosoma irrorata, Say, *Journ. Acad. Nat. Sci. Phila.*, 1818, vol. i, p. 423.
Idotea tridentata, Rathke, *Fauna Norw.*, 1843, t. xx, p. 21.
Idotea tricuspidata, Desmarest, *Dict. des Sci. Nat.*, 1823, t. xxviii, p. 373, pl. xlvi; Roux, *Crust. de la Medit.*, 1828, pl. xxix, figs. 11, 12; Milne-Edwards, *Hist. Nat. Crust.*, 1840, vol. iii, p. 129; Sars, *Forh. Vidensk. Selsk. Christ.*, 1859, p. 151; Norman, *Rep. Brit. Assoc.*, 1866, p. 197; Bate and Westwood, *Brit. Sessile-eyed Crust.*, 1868, vol. ii, p. 379.
Idotea irrorata, Harger and Verrill, *Rep. U.S. Fish Comm.*, 1873, pt. i, p. 569, pl. v, fig. 23; Verrill, *Am. Journ. Sci. Arts*, 1874, vol. vii, pp. 131, 134; Harger, *Proc. U.S. Nat. Mus.*, 1879, vol. ii, p. 160.
Idotea tricuspidata, Stebbing, *Journ. Linn. Soc. Lond.* (*Zool.*), 1876, vol. xii, p. 148; Dollfus, *Feuille des jeunes Nat.*, 1895, p. 55.

Idotea marina, Miers, *Journ. Linn. Soc. Lond. (Zool.)*, 1881, vol. xvi, p. 25.
Idothea baltica, G. O. Sars, *Crust. Norw.*, 1897, vol. ii, p. 80, pl. xxxii; Richardson, *Bull. 54, U.S. Nat. Mus.*, 1905, p. 364; Tattersall, *Nord. Plank.*, 1911, p. 219, figs. 83–87.
Idotea balthica, Norman, *Ann. and Mag. Nat. Hist.*, 1904 (s. 7), vol. xiv, p. 441.

Body oblong oval, moderately convex, dorsal surface perfectly smooth. Cephalon (fig. 1) wider than long, slightly emarginate anteriorly, posterior margin almost straight, posteriorly with lateral clefts continuing inwardly as dorsal ridges. Eyes large, round, situated dorso-laterally, slightly anterior to the median transverse line. Antennulæ (fig. 2) extending to the end of the third peduncular joint of the antennæ, first joint expanded, irregularly angular, second joint broad but rather smaller, third joint elongated; flagellum single-jointed, clavate, with nine or ten groups of spatulate setæ. Antennæ (figs. 3 and 4) elongated, first peduncular joint very short, second longer and deeply incised ventrally, third and fourth increasing in length, but decreasing in diameter; flagellum normally with twenty joints, of which the first ten or eleven are somewhat cuboid, remainder elongated and slightly clavate, with terminal style and long setæ (fig. 3). First maxillæ (fig. 5), outer lobe terminates in ten short curved spines and a single fine-pointed one, inner lobe narrow, terminating in three setose spines. Second maxillæ consisting of three laminar setose lobes. The segments of the mesosome, excepting the first, which is shorter, are about equal in length. Coxal plates large, occupying the whole of the lateral margins of second to seventh segments, gradually increasing in width (fig. 12). Maxillipedes (fig. 6) with four-jointed palp, the third joint grooved for the reception of the postero-lateral border of the first (fig. 7), basal segment large, with inner lobe distally, epipodite oblong oval, extending as far as the third joint of the palp. Thoracic appendages (figs. 8–11) more or less alike in structure, with few stout setæ, first appendage short and stout, remainder gradually becoming larger from the second to the seventh. Metasome (fig. 13) has two short segments and indications of a coalesced third, terminal segment long, slightly convex, with the posterior margin tridentate, median tooth produced as an acute point, extending beyond the lateral ones. Uropoda (fig. 14) flattened, elongated, rounded anteriorly, sides nearly parallel, inner margins sloping obliquely towards the median line; articulating with the basal plate on its dorsal side is a short setose style; endopodite flat, posterior margin narrowed and slightly emarginate.

Length of ♂ 35 mm., of ♀ 20 mm.

Colour exceedingly variable.

Geographical Distribution.—Common all round our coasts. Amongst many others I have the following records:—Shetland, Moray Firth, St Andrews, Firth of Forth, Yorkshire, Norfolk, Suffolk, and Essex coasts, Isle of Wight and South coast, Devon coast (west and south), Llandudno, Blacksod Bay (Co. Mayo), Irish Sea, St Kilda, Firth of Clyde, and Sutherland coast. It is also recorded as occurring on the Scandinavian and European coasts from Holland to the Mediterranean and Black

Seas, on the Atlantic coast of North America (HARGER), West Indies (RICHARDSON), Brazil, Java, and Red Sea (MIERS), and from New Zealand (CHILTON).

Remarks.—This species is easily distinguished from all other members of the genus by the characters exhibited in the antennules, antennæ, cephalon, the mesosomatic segments, in the tridentate character of the posterior margin of the last metasomatic segment, and the form of the uropoda.

Minor characters are to be found in the form of the first maxillæ, the maxillipedes, and the thoracic appendages.

Young examples, measuring 2·5 mm. in length, found on the metasomatic appendages beneath the uropoda, strongly resemble the parents, excepting in the form of the antennules, antennæ, and the terminal segment.

The maxillipedes of this species are larger and better developed than in any other British member of the genus. On the anterior border of the third joint of the palp there is a deep groove (Pl. I, fig. 7) in which the thickened posterior border of the fourth joint moves.

In examining the antennæ of this and the other species here enumerated, I have found the shape of the terminal style exceedingly constant, and have therefore given figures of it in all the species.

The actual number of joints in the flagellum varies according to age. I have endeavoured to figure those in what I consider to be fully adult specimens. In a young specimen of *I. baltica*, measuring 2·5 mm. in length, the flagellum was composed of only three joints and a style.

(2) *Idotea pelagica*, Leach. (Pl. II, figs. 15–25.)

Idotea pelagica, Leach, *Trans. Linn. Soc. Lond.*, 1815, vol. xi, p. 365; Bate and Westwood, *Brit. Sessile-eyed Crust.*, 1868, vol. ii, p. 384, figs.; Dollfus, *Feuille des jeunes Nat.*, 1895, p. 8, fig. 23.

Idothea pelagica, G. O. Sars, *Crust. Norw.*, 1897, vol. ii, p. 81, pl. xxxiii.

Idotea pelagica, Norman, *Ann. and Mag. Nat. Hist.*, 1904 (s. 7), vol. xiv, p. 442; Tattersall, *Nord. Plank.*, 1911, vol. vi, p. 220, figs. 88–93.

Body comparatively short and stout. Cephalon (fig. 15) wider than long, anterior margin slightly concave, posterior margin straight, with sinuous line in front. Eyes comparatively large, rounded, situated anterior to the median transverse line. Antennulæ (fig. 16) small, first joint widely expanded, second less so, and third expanded distally. Antennæ (figs. 17 and 18) short and stout, extending just beyond the first segment of the mesosome, first three joints almost subequal, as also fourth and fifth; flagellum short, composed of eight joints, terminal style short, with three or four stout setæ. First maxillæ (fig. 19), outer lobe terminating in seven stout curved spines, a single fine-pointed one, and two toothed ones, inner lobe with three setose spines. The segments of the mesosome (fig. 23) are about equal in length, anterior angles of the pleural plates of the first segment bluntly pointed. Coxal plates occupy the whole of the lateral margins of the second to seventh segments, widening from before backwards. Maxillipedes (fig. 20) with elongated basal plate and epipodite, distal inner lobe fairly large, no groove on the third joint of the palp. Thoracic appendages (figs. 21 and 22) short and strongly built.* Metasome (fig. 24) with two short segments and well-marked lateral sutures indicating a further coalesced one, terminal segment with slight median ridge, lateral margins converging slightly to an obtuse point. Uropoda (fig. 25) rather broad, posterior margin obliquely transverse, outer margin slightly curved inwards, endopodite terminally obliquely truncate, outer margin converging a little towards the distal end, setose style short.

Length of ♂ 13–14 mm., of ♀ 9–10 mm.

Colour dark brownish.

Geographical Distribution.—Not a plentiful species in St Andrews Bay. I have examples from Lowestoft, Boscombe, and Plymouth. Recorded from the Firth of Forth; Bell Rock (BATE and WESTWOOD); Aberdeen (SCOTT); Firth of Clyde; Port Erin Bay (HEWITT) and South-West Ireland (NORMAN): also coasts of Norway (G. O. SARS) and France (BONNIER).

Remarks.—Although for long confused with *I. baltica* (Pallas), this is a very distinct species, and there is no difficulty in at once separating both sexes from the former species.

(3) *Idotea neglecta*, G. O. Sars. (Pl. III, figs. 26–36.)

Idotea marina, Dollfus, *Feuille des jeunes Nat.*, 1895, p. 7, fig. 22.
Idothea neglecta, G. O. Sars, *Crust. Norw.*, 1897, vol. ii, p. 84, pl. xxxv, fig. 1.
Idotea neglecta, Norman, *Ann. and Mag. Nat. Hist.*, 1904 (s. 7), vol. xiv, p. 442; Tattersall, *Nord. Plank.*, 1911, p. 225, figs. 106–110.

Body oblong oval, wider anteriorly than posteriorly. Cephalon (fig. 26) wider than long, slightly emarginate anteriorly, posterior margin almost straight, posteriorly with slight lateral clefts and dorsal ridges. Eyes rather large, situated dorso-laterally, anterior to the median transverse line. Antennulæ (fig. 27) extending to the end of the third peduncular joint of the antennæ, first and second joints expanded, third elongated; flagellum single, rather long, clavate joint. Antenna (figs. 28 and 29) of moderate length, peduncular joints gradually increasing in length from the first to the fifth; flagellum composed of eighteen to twenty joints and short setose style. First maxillæ (fig. 30), outer lobe terminating in eight stout curved spines and three toothed ones; inner lobe narrow, terminating in three setose spines and a short spine on the outer side distally. The segments of the mesosome (fig. 34) almost subequal, anterior angle of the first pleural plates directed forwards, obtusely pointed. Coxal plates of male occupy the whole of the lateral

* In the male there is usually a dense fringe of fine setæ bordering the inside of the outer joints; in some cases, however, these were not present, and no difference was observable from the condition obtaining in the female.

margins of the second to seventh segments, gradually increasing in width, smaller in female. Maxillipedes (fig. 31) with four-jointed palp, groove on the third joint very slight, basal plate elongated, with inner lobe fairly broad, epipodite extending to the middle of the third joint of the palp. Thoracic appendages (figs. 32 and 33) moderately strong. Metasome (fig. 35) with two short segments and sutural indications of a third coalesced segment, terminal segment long, raised in the mid-dorsal line, slightly narrowing distally, terminating in an obtuse point, lateral angles rounded. Uropoda (fig. 36) broad, bluntly rounded anteriorly, with raised inner margin, posterior margin obliquely excavate, endopodite terminally transversely truncated.

Length of ♂ 27·5 mm., of ♀ 16–17 mm.

Colour dark brown or greenish-black, sometimes variegated with irregular lighter-coloured patches.

Geographical Distribution.—St Andrews Bay, Firth of Forth, Lowestoft, and Plymouth; Clyde Area (PATIENCE); Moray Firth (SCOTT); Shetland and Falmouth (NORMAN); west coast of Ireland (TATTERSALL): also Norwegian coast (NORMAN and SARS).

(4) *Idotea emarginata* (Fabr.). (Pl. VI, figs. 37–47.)

Cymothoa emarginata, Fabricius, *Entom. Syst.*, 1793, vol. ii, p. 508.

Idotea emarginata, Fabricius, *Entom. Syst. Suppl.*, 1798, p. 303; Latreille, *Hist. Nat. Crust. et Ins.*, 1803, vol. vi, p. 370; Milne-Edwards, *Hist. Nat. Crust.*, 1840, vol. iii, p. 130; Bate and Westwood, *Brit. Sessile-eyed Crust.*, 1868, vol. ii, p. 386, figs.; Miers, *Journ. Linn. Soc. Lond.*, 1881, vol. xvi, p. 43.

Idotea œstrum, Leach, *Trans. Linn. Soc. Lond.*, 1815, vol. xi, p. 365; Desmarest, *Consid. Crust.*, 1825, p. 289.

Idothea emarginata, G. O. Sars, *Crust. Norw.*, 1897, vol. ii, p. 85, pl. xxxv, fig. 2.

Idotea emarginata, Dollfus, *Feuille des jeunes Nat.*, 1895, p. 6, figs. 17, 18; Norman, *Ann. and Mag. Nat. Hist.*, 1904 (s. 7), vol. xiv, p. 443; Tattersall, *Nord. Plank.*, 1911, p. 226, figs. 111–115.

Body oblong oval, slightly convex, surface smooth. Cephalon (fig. 37) wider than long, anterior margin slightly emarginate, posteriorly with sinuous line. Eyes large and round, situated dorso-laterally. Antennulæ (fig. 38) extending to the end of the third peduncular joint of the antennæ; first joint much expanded and produced on the inner side, second smaller, third elongated. Antennæ (figs. 39 and 40) long, first three joints excavated on their outer side, fourth and fifth elongated; flagellum composed of from fourteen to sixteen joints, with elongate setose style. First maxillæ (fig. 41) with outer lobe terminating in eight stout curved spines and two toothed ones, inner lobe with three elongated setose spines, rather wide at their bases, and with small setule distally at the outer border. The segments of the mesosome (fig. 45) almost subequal, anterior angle of the pleural plates of first segment sharply pointed. Coxal plates wide and occupying the whole of the lateral margins of the second to seventh segments, posterior angle of the seventh produced backwardly as sharp spine. Maxillipedes (fig. 42) elongated and somewhat narrow, basal plate and epipodite long, groove on the third joint of the palp only small. Thoracic appendages (figs. 43 and 44) stout. Metasome (fig. 46) with two short segments and lateral indications of a further coalesced one, terminal segment broad, slightly convex, lateral margins curved, posterior margin slightly emarginate, with truncate median portion, lateral angles projecting. Uropoda (fig. 47) with almost parallel sides, posterior margin slightly emarginate, endopodite with straight internal lateral margin, externally sloping, posterior margin emarginate.

Length of ♂ 30 mm., of ♀ 20 mm.

Colour variable.

Geographical Distribution.—Common all round our coasts. I have records from numerous localities, amongst which may be mentioned the following :—Wick, Caithness, Moray Firth, Aberdeen, St Andrews Bay, Firth of Forth, Northumberland and whole of the eastern coast, Sussex, Dorset, and Devon coasts, Welsh coast, Firth of Clyde, Firth of Lorn, Skye and Sutherland coast. Also recorded from Kattegat (MEINERT) and coasts of France and Spain. I have what I believe to be young examples of this species from the Mediterranean.

Remarks.—This species stands out as distinct from any other member of the genus, its large size and robust form contrasting strongly with any other species, excepting *I. baltica*, from which it differs, however, in quite a number of structural details.

Some small, dark-coloured male forms which have been examined, at first sight bear a superficial resemblance to *I. metallica*, but in nearly all cases they have a slight median stripe running down the middle of the mesosomatic segments, which at once serves to distinguish them, as also the more convex mesosome, and in being wider anteriorly than posteriorly.

Like *I. baltica* (Pallas) this species is subject to great variation in its colour markings.

(5) *Idotea granulosa*, Rathke. (Pl. V, figs. 48–58.)

Idotea granulosa, Rathke, *Beiträge zur Fauna Norwegens*, 1843, p. 23.

Idotea phosphorea, Harger, *Rep. U.S. Comms. Fish and Fisheries*, 1874, part i, p. 569; *Proc. U.S. Nat. Mus.*, 1879, vol. ii, p. 160; *Rep. U.S. Comms. Fish and Fisheries*, 1880, part vi, p. 347, pl. v, figs. 27–29.

Idotea marina, var. *phosphorea*, Miers, *Journ. Linn. Soc. Lond.*, 1881, vol. xvi, p. 31.

Idothea granulosa, G. O. Sars, *Crust. Norw.*, 1897, vol. ii. p. 82, pl. xxxiv, fig. 1.

Idotea granulosa, Norman, *Ann. and Mag. Nat. Hist.*, 1904 (s. 7), vol. xiv, p. 441; Tattersall, *Nord. Plank.*, 1911, p. 223, figs. 94–99.

Idothea phosphorea, Richardson, *Bull. No. 54, U.S. Nat. Mus.*, 1905, p. 367, 3 figs.

Body oblong oval, moderately convex, dorsal surface finely granular or almost smooth. Cephalon (fig. 48) broader than long, with the anterior margin almost straight, posteriorly with transverse sinuous line. Eyes moderately large, situated just in front of the median transverse line on the lateral margin. Antennulæ (fig. 49) with first joint expanded, second less so, third elongated and somewhat expanded distally; flagellum clavate. Antennæ (figs. 50 and 51) stout, first three joints almost subequal, fourth longer, fifth longest; flagellum with sixteen joints. First maxillæ (fig. 52), outer lobe terminating in eleven curved spines, inner lobe with three setose spines. The segments of the mesosome (fig. 56) are almost subequal, except the first, the coxal plates occupy the anterior two-thirds of the lateral margin of the second segment, the third rather more, and the remainder the whole of the lateral margins, increasing in breadth from the fourth to the seventh segments. Maxillipedes (fig. 53) with four-jointed palp, groove on the third joint small, basal plate elongated, with narrow epipodite extending to the third joint of the palp; inner lobe also narrow. Thoracic appendages (figs. 54 and 55), first short and stout, gradually becoming larger from the second to the seventh. Metasome (fig. 57) composed of two narrow segments and lateral sutures indicating a coalesced third, the terminal segment tapering to a pointed extremity with the lateral angles rounded. Uropoda (fig. 58) flattened, elongated, rounded anteriorly, sides nearly parallel, inner margin posteriorly extended, exopodite bluntly pointed posteriorly, anterior margin convex, short setose style.

Length of ♂ 19 to 21 mm., of ♀ 16 mm.

Colour (in alcohol) light reddish, or yellowish-brown with minute black dots.

Geographical Distribution.—St Andrews Bay, Firth of Forth, Isle of Wight; Bay of Nigg (SCOTT); Port Erin Bay (HEWITT); Northumberland, and Berehaven, Ireland (NORMAN); South and West Ireland (TATTERSALL): also Norwegian coast (G. O. SARS).

Remarks.—The narrow lanceolate form of the terminal segment at once serves to distinguish this species from any other member of the genus. SARS (64) states that the coxal plates are "comparatively small," but in all the British specimens I have examined they are as figured (Pl. V, fig. 56). Examples received from Professor SARS are rather smaller than ours, the largest being 18 mm. in length, but the coxal plates are, comparatively, only very slightly smaller on segments 2 and 3. That there is considerable variation in size in different localities is evident. SARS gives the length of the male and female as 15 and 11 mm. respectively, whereas those I have examined from this country average 19 and 16 mm. HARGER (32) states that the length of his *I. marina*, var. *phosphorea*, was 25 mm.

Although the dorsal surface is usually finely granulated, specimens with a perfectly smooth surface are by no means rare.

(6) *Idotea sarsi*, n. sp. (Pl. VI, figs. 59–69.)

Body oblong oval, moderately convex, dorsal surface rough. Cephalon (fig. 59) wider than long, anterior margin emarginate, posterior margin narrower than the anterior one. Eyes fairly large, situated dorso-laterally. Antennulæ (fig. 60) with first joint expanded, second joint small, third joint elongated; flagellum single clavate joint, slender. Antennæ (figs. 61 and 62) short, first joint small, fifth joint with tooth-like spine on the anterior inner border; flagellum with thirteen to fourteen joints. First maxillæ (fig. 63) with outer lobe terminating in eleven curved and a single straight spines, inner lobe with three setose spines, and a small curved spine on the outer side distally. The segments of the mesosome (fig. 67), excepting the first, are almost subequal; the pleural plates of the first are laterally truncate, with the anterior angle pointed. Coxal plates large, occupying the whole of the lateral margins of the second to seventh segments, gradually increasing in width; posterior angle of the seventh produced backwardly. Maxillipedes (fig. 64) with four-jointed palp, no groove on the third joint, basal plate, epipodite, and inner lobe elongated. Thoracic appendages of normal type (figs. 65 and 66). Metasome (fig. 68) has two short segments and sutures indicating a coalesced third, terminal segment long, slightly convex and raised in the mid-dorsal line, sides straight and gradually tapering, lateral angles obtuse, posterior margin medially produced in a blunt rounded process extending beyond the lateral angles. Uropoda (fig. 69) somewhat narrow, endopodite with posterior margin bluntly rounded, anterior margin slightly produced.

Length of ♂ 19 mm., of ♀ 15 mm.

Colour (in alcohol) light brown.

Geographical Distribution.—At present known only from St Andrews Bay.

Remarks.—Externally, small examples of this species are not unlike *I. viridis* (Slabber); indeed, I had referred such to that species until meeting with the larger specimens. Later, on examining the minute structure numerous important differences were found. Fortunately, whilst engaged upon this species, Professor G. O. Sars very kindly sent me examples of *I. viridis* from Norway, and it was at once evident that I had something very different. Large adult males might easily be mistaken at first sight for *I. granulosa*, Rathke.

From *I. granulosa* this species differs in the shape of the cephalon, which is more deeply excavated on the anterior margin, and the posterior lateral portions slope inwards. The antennulæ are more slender, as also the antennæ, the style of the latter being longer. There are minor differences in the form of the first maxillæ and maxillipedes. The coxal plates form the complete lateral margin of the mesosomatic segments 2–7, whereas in *I. granulosa* those on the second segment occupy the anterior two-thirds and not the whole of the third segment. The segments of the metasome differ in form, especially the terminal one, which has the sides gradually sloping, with the posterior margin truncate laterally and a prominent median tooth. The endopodites of the uropoda are more triangular in shape, being cut away laterally.

From *I. viridis* (Slabber) the differences, apart from its greater size, are more striking; thus it differs in the shape of the cephalon, the antennulæ, and the antennæ. The style of the antennæ is much shorter than in *I. viridis*. In the form of the first maxillæ and in the maxillipedes the differences are more pronounced, especially the shortened basal segment and the elongated outer lobe of the latter appendages. In *I. viridis* these two parts are about equal in length, and the coxal plates do not form the complete lateral margin of the second to fourth mesosomatic segments, as in this species. The posterior margin of the terminal segment of the metasome in *I. viridis* is not laterally truncate, whilst the endopodites of the uropoda are broader and more truncate in that species than in this.

It gives me great pleasure to associate with this species the name of Professor G. O. SARS, to whom I am indebted for many interesting species of this family.

(7) *Idotea viridis* (Slabber). (Pl. VII, figs. 70–80.)

Oniscus viridis, Slabber, *Naturk. verlustigingen*, 1778, p. 104, pl. xii, figs. 4, 5.
Idotea phosphorea, Hoek (*nec* Harger), *Crust. Neerlandica*, 1889, ii, p. 7, pl. vii, fig. 2, 2*r*.
Idotea salinarum, Dollfus, *Feuille des jeunes Nat.*, 1895, p. 7, fig. 21.
Idothea viridis, G. O. Sars, *Crust. Norw.*, 1897, ii, p. 83, pl. xxxiv, fig. 2.
Idothea angusta, G. O. Sars, *ibid.*, p. 84.
Idotea viridis, Norman, *Ann. and Mag. Nat. Hist.*, 1904 (s. 7), xiv, p. 442.

Body oblong linear, somewhat depressed. Cephalon (fig. 70) wider than long, anterior and posterior margins slightly emarginate. Eyes moderate in size, situated dorso-laterally. Antennulæ (fig. 71), first joint only very slightly expanded, second and third elongated; flagellum with single clavate joint. Antennæ (figs. 72 and 73) slender, fourth and fifth joints subequal; flagellum with twelve joints, mostly elongated, style conical with long setæ. First maxillæ (fig. 74), outer lobe narrowed distally, with six stout curved spines and three toothed ones. The segments of the mesosome (fig. 78) are somewhat unequal in length, pleural plates of the first with rounded anterior and posterior angles. Coxal plates of the second to fourth segments narrow and not occupying the whole of the lateral margin, those of the fifth and seventh segments much wider and occupying the whole of the lateral margins. Maxillipedes (fig. 75) elongated, palp four-jointed, basal plate narrowed on the inner side, epipodite oblong oval, distal inner lobe fairly large. Thoracic appendages (figs. 76 and 77) much more slender than in most other species, and elongated. Metasome (fig. 79) with two short segments and well-marked lateral sutures indicating a further coalesced one, terminal segment slightly convex, lateral margins almost parallel, narrowing a little towards the posterior end, posterior margin terminating as a drawn-out point, with obtuse lateral corners. Uropoda (fig. 80) narrow, endopodite obtusely truncated terminally, outer margin cut away, setose style normal.

Length of ♂ 12 mm., of ♀ 10 mm.

Colour greenish or greenish-yellow.

Geographical Distribution.—St Andrews Bay and Isle of Wight; St Kilda (HEWITT); Clyde Area (PATIENCE); Suffolk coast, Weymouth, and Guernsey (NORMAN); South and West Ireland (TATTERSALL): also Norwegian coast (G. O. SARS); coasts of Holland and France (HOEK).

Remarks.—This species must be considered rare in St Andrews Bay. Thanks to the kindness of Professor G. O. SARS, I have been able to examine examples from Norway. Apart from being slightly smaller, they do not differ at all from the specimens taken in St Andrews Bay, and they are practically identical with specimens from Freshwater Bay, Isle of Wight, kindly sent to me by Mr W. OMER-COOPER.

(8) *Idotea metallica*, Bosc. (Pl. VIII, figs. 81–91.)

Idotea metallica, Bosc, *Hist. Nat. des Crust.*, 1802, t. ii, p. 179, pl. xv, fig. 6; Latreille, *Hist. Nat. Crust.*, 1803, t. vi, p. 373.
Idotea peloponesiaca, Roux, *Crust. de la Médit.*, 1828, pl. xxx, figs. 10–12.
Idotea atrata, Costa, *Fauna del R. Napoli (Crust.)*, 1838, pl. xi, fig. 3.
Idotea rugosa, Milne-Edwards, *Hist. Nat. Crust.*, 1840, vol. iii, p. 131.
Idothea robusta, Kröyer, *Naturhist. Tidssk.*, 1846 (s. 2), vol. ii, p. 108, pl. xxvi, fig. 3.
Idothea compacta, White, *List Crust. Brit. Mus.*, 1847, p. 95.
Idothea algirica, Lucas, *Anim. artic. Expl. Sci. Algérie*, 1849, vol. i, *Crust.*, p. 61, pl. vi, fig. 2.
Idotea robusta, Harger, *Rep. U.S. Comms. Fish and Fisheries*, 1880, p. 349, pl. vi, figs. 30–32.
Idotea metallica, Miers, *Journ. Linn. Soc. Lond.*, 1881, vol. xvi, p. 35; Norman, *Ann. and Mag. Nat. Hist.*, 1904 (s. 7), vol. xiv, p. 443; Tattersall, *Fisheries, Ireland, Sci. Invest.*, 1904, No. 2 [1905], p. 50; Stebbing, *Trans. Linn. Soc. Lond. (Zool.)*, 1910, vol. xiv, p. 108; Tattersall, *Nord. Plank.*, 1911, p. 227, fig. 116; *nec* Stephensen, *Rep. Danish Oceanog. Exp.*, 1908–1910, No. 3, 1915, p. 12, fig. 4.
Idothea metallica, Richardson, *Bull. No. 54, U.S. Nat. Mus.*, 1905, p. 362, 3 figs.

Body oblong ovate, moderately convex, surface more or less rugose. Cephalon (fig. 81) wider than long, anterior margin slightly emarginate, posteriorly with deeply impressed furrow. Eyes large and round, situated dorso-laterally. Antennulæ (fig. 82) extending to the end of the second peduncular joint of the antennæ. Antennæ (figs. 83 and 84) short and robust, joints 1 to 4 of the peduncle short, fifth joint longer; flagellum short, with eight to ten joints. First maxillæ (fig. 85) with outer lobe terminating in nine plain spines and three toothed ones, inner lobe with three elongated setose spines. The segments of the mesosome (fig. 89) almost subequal, anterior angle of pleural plates of first segment bluntly rounded. Coxal plates occupy the whole of the lateral margins of the second to seventh segments, posterior angles of those of the fifth to seventh produced backwardly as sharp spines. Maxillipedes (fig. 86) broad, joints of the palp and basal plate short and broad, as also the epipodite; inner distal lobe large. Thoracic appendages (figs. 87 and 88) robust. Metasome (fig. 90) with two short segments and strongly marked lateral sutures, indicating a further coalesced one, terminal segment with a strong median ridge, lateral margins converging to a truncate extremity. Uropoda (fig. 91) oblong, with almost parallel sides, endopodite with slightly sloping lateral margins, posterior margin truncate, setose style short.

Length of ♂ 23 mm., of ♀ 18 mm.

Colour (in alcohol) bluish-green.

Geographical Distribution.—As previously pointed out, this species has not as yet been found in St Andrews Bay. Dr SCOTT informs me that he took it off the N.E. coast of Scotland in 1909. I have examples from South-West Ireland (whence it is recorded by NORMAN and TATTERSALL), also from the Adriatic and Mediterranean Seas, Japan, and the Atlantic coast of North America. Recorded also from Greenland, Iceland, and Patagonia (RICHARDSON); New South Wales and Borneo (MIERS).

Remarks.—This species is widely separated from any other British species. It approaches *I. emarginata* (Fabr.) in the form of the cephalon and uropoda, and less so in the form of the coxal plates of the mesosome. In the form of the antennules and antennæ, the first maxillæ, the maxillipedes, and in the shape of the metasome, there are marked differences. The maxillipedes are short and broad, whilst in *I. emarginata* they are narrow and elongated. Miss RICHARDSON (58, p. 363, fig. 393) wrongly figures the coxopodite as a single piece, and STEPHENSEN'S figure (73, p. 13, fig. 4) of *I. metallica* is really of a new and allied species which I am describing elsewhere. The lateral margins of the metasome in *I. metallica* are straight, whereas in *I. emarginata* they are slightly curved.

On the posterior region of the cephalon there is in this species a deeply impressed transverse furrow. Referring to this, TATTERSALL (75) remarks that this species "may be distinguished from *I. emarginata* very readily by the presence of a small supplementary segment between the cephalon and the first segment of the thorax." The term "supplementary segment" is somewhat unfortunate, as examination shows that this furrow is in no sense a segment or even a suture indicating one, but simply the sinuous line, common to a large series of genera and species of this family, near the posterior margin of the cephalon. In *I. baltica* and other species it is laterally continued as a cleft; in *I. metallica* this is not so, only it is more deeply impressed. In the closely allied species (the *I. metallica* of STEPHENSEN) this is not so pronounced. Somewhat similar lines or furrows are present on the segments of the mesosome in many species of Isopoda, and as a sinuous line it is present on the cephalon of *I. baltica*, *I. neglecta*, *I. pelagica*, *I. emarginata*, *I. linearis*, and many other species.

There is perhaps less difference in the form of the body in the two sexes in this species than in any other British species of the genus.

(9) *Idotea linearis* (Pennant). (Pl. IX, figs. 92–102.)

Oniscus linearis, Pennant, *Brit. Zool.*, 1777, vol. iv, pl. xviii, fig. 2.
Idotea tridentata, Latreille, *Gen. Crust. et Ins.*, 1806, vol. i, p. 611.
Idotea hectica, Leach, *Edinb. Encycl.*, 1833, vol. vii, p. 404 (*nec* Pallas).
Stenosoma lineare, Leach, *Trans. Linn. Soc. Lond.*, 1815, vol. xi, p. 366.
Idotea linearis, Milne-Edwards, *Hist. Nat. Crust.*, 1840, vol. iii, p. 132.
Idothea sexlineata, Kröyer, *Naturhist. Tidssk.*, 1846 (s. 2), vol. ii, p. 88; *Voyage en Scand., etc.*, pl. xxvi, fig. 1.
Idotea linearis, Bate and Westwood, *Brit. Sessile-eyed Crust.*, 1868, vol. ii, figures on p. 388; Miers, *Journ. Linn. Soc. Lond.*, 1881, vol. xvi, p. 47; Norman, *Ann. and Mag. Nat. Hist.*, 1904 (s. 7), vol. xiv, p. 443; Tattersall, *Nord. Plank.*, 1911, p. 229, fig. 117.

Body narrow, elongated, somewhat depressed dorsally, surface uneven. Cephalon (fig. 92) wider than long, with anterior margin deeply emarginate, lateral lobe broadly rounded, posterior margin almost straight, with slight impressed line anterior to the margin. Eyes large, situated dorso-laterally immediately behind the lateral lobes. Antennulæ (fig. 93) extending beyond the third peduncular joint of the antennæ, first joint comparatively small, second joint very small. Antennæ (figs. 94 and 95) large, with last two joints of peduncle nearly subequal, and each nearly twice as long as the two preceding ones; flagellum normally with twenty joints, terminal style long, distally with dense brush of setæ. First maxillæ (fig. 96) with outer lobe terminating obliquely truncate, with nine curved spines, inner lobe terminating in three fine setose spines. The segments of the mesosome (fig. 100), excepting the first, almost subequal, pleural plates small, coxal plates small, occupying the anterior portion of the lateral margin of segments 2 to 4, the middle portion of the fifth segment, and the posterior portion of the sixth and seventh. Maxillipedes (fig. 97) with four-jointed palp, groove on the third joint scarcely visible, basal segment short and broad, inner distal lobe large, epipodite roughly oval. Thoracic appendages (figs. 98 and 99) only moderately stout, protopodite of the seventh deeply grooved. Metasome (fig. 101) has two short segments and indications of a coalesced third, terminal segment long, lateral margins slightly incurved anteriorly, widening a little beyond the middle and contracting towards the posterior margin, which is excavate with median obtuse point, and longer and more acutely produced laterally. Uropoda (fig. 102) flattened, elongated, rounded and narrower anteriorly, widening towards the joint, endopodite narrower than the terminal margin of the basal plate, longer than the breadth, and slightly cut away on the outer postero-lateral border.

Length of ♂ 28–30 mm., of ♀ 25 mm.

Colour (in alcohol) pale brownish-green, with darker-coloured longitudinal stripes.

Geographical Distribution.—Fairly common all round our coasts. I have records from a large number of localities, amongst which the following may be mentioned:— Moray Firth, Aberdeen, St Andrews, Northumberland coast, Norfolk and Suffolk coasts (very small examples), Weymouth, Plymouth, Bristol Channel, Blacksod Bay (Co. Mayo), Irish Sea, and Firth of Clyde. I have examined very fine specimens in the Cambridge University Museum of Zoology, measuring 38 mm. in length, from Lowestoft. Also recorded from Netherlands, Denmark, Mediterranean, and Java (Miers); Channel Isles and coasts of France and Spain (Norman).

Remarks.—*I. linearis* stands out distinct from any other species of the family occurring in the British Isles. Its long filiform body, graceful antennæ, and small coxal plates at once serve to identify it.

2. Genus *Zenobiana*, Stebbing.

Zenobia, Risso, *Hist. Nat. de l'Europe Mérid.*, 1826, v, p. 110; Miers, *Journ. Linn. Soc. Lond.*, 1881, xvi, p. 19; Dollfus, *Feuille d. jeunes Nat.*, 1895, p. 9.
Cleantis, Dana, *Amer. Journ. Sci. and Arts*, 1849 (s. 2), viii, p. 427; *ibid.*, 1852, p. 300; *U.S. Explor. Exped.*, 1853, pp. 697, 707.
Zenobiana, Stebbing, *Ann. and Mag. Nat. Hist.*, 1895 (s. 6), xv, p. 24; Norman, *ibid.*, 1904 (s. 7), xiv, p. 443; Tattersall, *Nord. Plank.*, 1911, p. 231; Issel, *Ann. Mus. Zool. Napoli*, 1913, iv, p. 2.

Body somewhat slender, long and narrow, with parallel sides. Cephalon wider than long. Eyes small, situated dorso-laterally. Antennæ short; flagellum short, with single joint, or restricted number of joints. Maxillipede with five-jointed palp. Coxal plates distinct, usually small and narrow. Metasome with three to five segments, lateral margins of the terminal segment partly folded over the dorsal side towards the depressed area at the posterior extremity.

As already pointed out, ISSEL (35) regards the genus *Cleantis*, Dana, as synonymous with *Zenobiana*. TATTERSALL (76) in 1911 had previously pointed this out, but was in favour of retaining DANA'S name. He states, p. 231: "Es scheint mir dass die Genus *Cleantis*, Dana, sich als Synonym mit *Zenobiana* erweisen wied, und dass daher, da der Name *Zenobia* sich nach STEBBING als schon vergeben erweisen hat und daher für das in Rede stehende Genus nicht wahlbar ist, das letztere den Namen *Cleantis* tragen muss der ursprünglich von DANA für dasselbe vorgesehen ist."

As it stands at present the genus is an unsatisfactory one, including as it does species widely separated from one another. Miss RICHARDSON (60) has very rightly placed the *Cleantis isopus* of MIERS in a new genus, *Cleantiella*, "owing to the differences in the shape of the body, which is broader and more flattened, and in the character of the legs, and to the fact that the abdomen is composed of but two segments."

(1) *Zenobiana prismatica* (Risso). (Pl. X, figs. 103–114.)

Zenobia prismatica, Risso, *Hist. Nat. de l'Europe Mérid.*, 1826, v, p. 110, pl. v, fig. 24.
Zenobia mediterranea, Risso, *ibid.*, p. 111.
Idotea chelipes, O. G. Costa, *Fauna del regno di Napoli*, 1838, p. 2, pl. xi, fig. 2*a*, *b*, *c*.
Idotea prismatica, Heller, *Verh. zool.-bot. Ges. Wien*, 1866, xvi, p. 729.
Idotea parallela, Bate and Westwood, *Brit. Sessile-eyed Crust.*, 1867, ii, p. 391, fig.
Idotea (subg. *Zenobia*) *prismatica*, Miers, *Journ. Linn. Soc. Lond.*, 1881, xvi, p. 21.
Zenobiana prismatica, Stebbing, *Ann. and Mag. Nat. Hist.*, 1895 (s. 6), xv, p. 24; Norman, *ibid.*, 1904 (s. 7), xiv, p. 444; Tattersall, *Nord. Plank.*, 1911, p. 231, fig. 120; Issel, *Ann. Mus. Zool. Napoli*, 1913, iv, p. 1, figs. 1–9.

Body elongated, narrow, with the sides of the metasome parallel. Cephalon (fig. 103) wider than long, and wider anteriorly than posteriorly, anterior margin curving very slightly inwards towards the median line; dorsal surface convex, sloping towards the anterior margin. Eyes small, dorso-lateral. Antennulæ with first and second joints slightly expanded, third joint small; flagellum club-shaped, with terminal setæ. Antennæ (figs. 104–108) short, first joint small, second widely expanded, third short and wide, third and fourth subequal and deeply indented distally on the ventral side ; flagellum with three or four joints in the male, female usually unjointed. First maxillæ (fig. 109) with outer lobe terminating in four stout curved spines and three toothed and one small one, inner lobe with three long setose spines. The segments of the mesosome (fig. 112) are slightly depressed, the pleural plates of the first extending forwards and partly flanking the cephalon. Coxal plates of the second to fourth segments very narrow and not extending over the whole of the lateral margin, fifth and seventh much wider, forming the entire lateral margin with the posterior angles produced into an elongated point. Maxillipedes (fig. 110) elongated, palp five-jointed, with well-marked groove on the third joint, epipodite wide and long, distal inner lobe pointed distally. Thoracic appendages (fig. 111) fairly robust. Metasome (fig. 113) with three short segments and lateral indications of a further coalesced one, terminal segment with lateral margins straight and posteriorly elevated, folding over on to the dorsal side, posterior margin rounded. Uropoda (fig. 114) wider anteriorly than posteriorly, setose on the inner and outer lateral margins, endopodite narrower than the basal plate.

Length 13·5 mm.

Colour (in alcohol) variable.

Geographical Distribution.—Firth of Clyde, south and south-west coast of England (STEBBING) ; Jersey (SINEL) ; west coast of France (DOLLFUS) ; Adriatic Sea (CLAUS) ; Mediterranean (ISSEL).

Remarks.—This species has been very fully described by ISSEL (35), who has given outline figures of the animal and various appendages. In addition to correcting BATE and WESTWOOD'S description and figures, he has pointed out that there is considerable variation in the flagellum of the antennæ of the female. Three of his figures are here reproduced illustrating this (figs. 106–108).

3. Genus *Synisoma*, nov. nom.=*Stenosoma*, Auctt.

Body oblong, widening slightly towards the middle of the length of the mesosome, usually keeled, surface smooth, tuberculated or sculptured. Cephalon with well-developed lateral lobes. Antennulæ with first joint expanded, flagellum composed of a single joint. Antennæ with large second joint, flagellum multiarticulate, style short. Palp of maxillipede four-jointed, distal inner lobe usually wide. Segments of the mesosome keeled or raised, pleural plates of the first segment produced laterally or forwards. Coxal plates small, but visible dorsally on all segments excepting the first. Appendages somewhat slender. Metasome composed of a single segment, with lateral sutures indicating coalesced segments ; terminally the segment is usually pointed. Uropoda flattened, endopodite more or less triangular in shape.

DOLLFUS (20) wrongly confounded the genus *Synidotea*, Harger, with this genus.

(1) *Synisoma lancifer* (Leach, MSS.).* (Pl. XI, figs. 115–128.)

Leptosoma lancifer, Leach, MSS. in Brit. Mus.
Idotea appendiculata, Bate and Westwood (*nec* Risso), *Brit. Sessile-eyed Crust.*, 1867, ii, p. 396, figs.
Stenosoma lancifer, Dollfus, *Feuille des jeunes Nat.*, 1895, p. 5, fig. 13.
Stenosoma lanciferum, Norman, *Ann. and Mag. Nat. Hist.*, 1904 (s. 7), xiv, p. 444; Tattersall, *Nord. Plank.*, 1911, p. 230, fig. 118.

Body oblong, widest at the third mesosomatic segment, with well-marked dorsal keel. Cephalon (fig. 115) wider than long, and wider anteriorly than posteriorly, anterior margin produced in the median line as a depressed sharp point, lateral lobes well developed, sinuous in front of the posterior margin. Eyes moderate in size, situated dorso-laterally. Antennulæ (fig. 116) with first joint expanded. Antennæ (figs. 117 and 118) fairly stout, first joint short, second the largest, third and fourth subequal, fourth about the length of the first; flagellum with sixteen joints, 1 to 6 cubical, remainder elongated, terminal style short and conical. First maxillæ (fig. 119), outer lobe terminating in five stout curved spines and six inner ones, of which two are toothed; inner lobe terminally rounded, with three long setose spines and a small spine on the outer anterior border of the lobe. The segments of the mesosome (fig. 126) slope from a strong dorsal keel, third segment the widest and longest, gradually becoming smaller anteriorly and posteriorly; pleural plates small, that of the first segment truncate anteriorly. Coxal plates occupying the anterior half of segments 2 and 3, slightly more of 4, 5, and 6, and nearly the whole of the seventh. Maxillipedes (fig. 120) broad and stout, basal plate medium size, epipodite elongated, narrowing anteriorly, distal inner lobe very wide, with marginal stout spines and setose spines distally (fig. 121). Thoracic appendages (figs. 122–125) somewhat slender, sparsely setose. Metasome (fig. 127) composed of a single segment, with lateral sutures anteriorly indicating three coalesced segments, lateral margins almost straight anteriorly, expanding towards the posterior end and rounded, terminating in a drawn-out rounded process. Uropoda (fig. 128) flattened, endopodite triangular in shape, short setose style.

Length of ♂ 22·5 mm.

Colour (in alcohol) yellowish-brown.

Geographical Distribution.—South and south-west coast of England (NORMAN and STEBBING); Channel Isles (KOEHLER); also west coast of France (DOLLFUS); Mediterranean (STEPHENSEN).

I have to thank Dr E. J. ALLEN, F.R.S., for kindly sending me for examination very fine examples from Wembury Bay and Looe Island.

Remarks.—This handsome species is easily separated from any of its allies by the prominent keel in adult specimens, and the form of the terminal segment.

STEPHENSEN'S (73) *S. appendiculatum* (Risso), 1826, is the *S. acuminata* of

* As the International Rules of Zoological Nomenclature (1905) prohibit the use of an "unpublished" name, it might be advisable to adopt DOLLFUS as the authority.

LEACH, 1815, whilst his *S. acuminatum* (Leach)—represented by two examples from different localities—is in one case referable to *S. capito* (Rathke), the other approaching *S. lancifer* (Leach), but I am inclined to regard it as a distinct species.

Judging from the material I have examined, I am of opinion that there is a further British species, allied to *S. lancifer*, in which, however, the metasome has the lateral margins of the terminal segment almost straight, and the posterior margin gradually converging to a blunt point. STEPHENSEN'S figure of his *S. acuminata* (73, p. 15, fig. 5) approaches this very closely.

2. *Synisoma acuminata* (Leach).

Stenosoma acuminatum, Leach, *Trans. Linn. Soc. Lond.*, 1815, xi, p. 366; *Edinb. Ency.*, 1833, vii, p. 433.
Idotea acuminata, White, *List Crust. Brit. Mus.*, 1847, p. 95; Bate and Westwood, *Brit. Sessile-eyed Crust.*, 1867, ii, figures on p. 394; Miers, *Journ. Linn. Soc. Lond.*, 1881, xvi, p. 59.
Stenosoma acuminatum, Dollfus, *Feuille des jeunes Nat.*, 1895, p. 5, fig. 14; Norman, *Ann. and Mag. Nat. Hist.*, 1904 (s. 7), xiv, p. 444; Tattersall, *Nord. Plank.*, 1911, p. 231, fig. 119.
Stenosoma appendiculatum, Stephensen, *Rep. Danish Oceanog. Exp.*, 1915, p. 17, fig. 7.

I regret that I have not been able to obtain any British examples of this species. The following description is taken from MIERS (44), with some slight alterations in the terminology:—

"Body narrow, elongated, moderately convex, with indications of a longitudinal median dorsal carina. Cephalon with its anterior margin somewhat excavated, and its antero-lateral angles rather prominent. First four segments of the mesosome each widest in the middle, and with their lateral margins (in a dorsal view) more or less angulated; the posterior segments of the mesosome are widest at or near their postero-lateral angles. Metasome ovate-lanceolate, with the lateral margins at first straight and then curving regularly to the distal extremity, which is subacute or acute, or even acuminated, and with more or less distinct traces of lateral sutures near its base, indicative of two coalescent segments. Eyes small, placed in the middle of the lateral margins. Antennules do not reach the extremity of the antepenultimate joint of the peduncle of the antennæ, with their basal joints moderately dilated. Antennæ reaching sometimes to the posterior margin of the sixth mesosomatic segment; the last two joints of the peduncle slender, subequal, and each longer than the preceding; flagellum about nineteen-jointed, and longer than the peduncle. Legs very slender, subequal. The coxal plates (in a dorsal view) are very small, and in the second to fourth segments occupy the middle of the lateral margins; in the fifth and sixth segments they are placed near to, and in the seventh segment quite at, the postero-lateral angle of the segment; in the last two segments they are of nearly triangular form. The terminal plates of the uropoda are considerably longer than broad, and rounded at their distal ends.

"Length of the largest example in the British Museum collection about 1 inch (25 mm.), breadth rather less than $\frac{1}{4}$ inch (5 mm.)."

MIERS further states : "This is a very variable species, and I have been obliged to unite under one name several types that have usually been considered distinct.

"It occurs on the shores of the Mediterranean and Adriatic, in the Black Sea, and on the South British coasts, and northward apparently as far as the island of Cumbrae on the Clyde.

"Dr LEACH'S designation of *I. acuminata* may apply to what may be considered the typical form of this species, in which the body is less distinctly carinated, the epimera [coxal plates] less distinctly angulated, and the terminal segment lanceolate, with the sides rounding off to the distal extremity, which is acute or subacute, but not produced and acuminated.

Besides LEACH'S typical specimen (which is in very bad condition), there is but a single specimen, from Tripoli, in the British Museum collection presenting these characters."

Geographical Distribution.—"On the shores of the Mediterranean and Adriatic, in the Black Sea, on the South British coasts, and northward apparently as far as the island of Cumbrae on the Clyde" (MIERS). Channel Isles (KOEHLER).

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EXPLANATION OF PLATES.

(All the figures are drawn from male specimens, unless otherwise stated.)

Idotea baltica (Pallas).

Fig. 1. Dorsal view of the cephalon. × 7.
Fig. 2. Dorsal side of the left antennule. × 20.
Fig. 3. Terminal style of the antenna. × 110.
Fig. 4. Dorsal side of the left antenna. × 11.
Fig. 5. Ventral side of the terminal portions of the inner and outer lobes of the right first maxilla. × 130.
Fig. 6. Ventral side of the right maxillipede. × 21.
Fig. 7. Portion of the third and fourth joints of the right maxillipede, showing the thickened edge of the latter and the groove on the former.
Fig. 8. Ventral view of the second thoracic appendage. × 14.
Fig. 9. Claw of same enlarged.
Fig. 10. Ventral view of the eighth thoracic appendage. × 10.
Fig. 11. Claw of same enlarged.
Fig. 12. Dorsal view of the lateral portions of the mesosomotic segments, showing the coxal plates. × 3·5.
Fig. 13. Dorsal view of the metasome. × 5.
Fig. 14. Left uropod. × 7.

Idotea pelagica, Leach.

Fig. 15. Dorsal view of the cephalon. × 7.
Fig. 16. Dorsal side of the left antennule. × 30.
Fig. 17. Dorsal side of the left antenna. × 16.
Fig. 18. Terminal style of the antenna. × 110.
Fig. 19. Ventral side of the terminal portions of the inner and outer lobes of the right first maxilla. × 130.
Fig. 20. Ventral side of the right maxillipede. × 21.
Fig. 21. Ventral view of the second thoracic appendage of ♀. × 9.
Fig. 22. Ventral view of the eighth thoracic appendage of ♀. × 6·5.
Fig. 23. Dorsal view of the lateral portions of the mesosomatic segments, showing the coxal plates. × 3·5.
Fig. 24. Dorsal view of the metasome. × 5.
Fig. 25. Left uropod. × 7.

Idotea neglecta, G. O. Sars.

Fig. 26. Dorsal view of the cephalon. × 7.
Fig. 27. Dorsal side of the left antennule. × 30.

Fig. 28. Dorsal side of the left antenna. × 16.
Fig. 29. Terminal style of the antenna. × 110.
Fig. 30. Ventral side of the terminal portions of the inner and outer lobes of the right first maxilla. × 130.
Fig. 31. Ventral side of the right maxillipede. × 21.
Fig. 32. Ventral view of the second thoracic appendage. × 14.
Fig. 33. Ventral view of the eighth thoracic appendage. × 7.
Fig. 34. Dorsal view of the lateral portions of the mesosomatic segments, showing the coxal plates. × 3·5.
Fig. 35. Dorsal view of the metasome. × 5.
Fig. 36. Left uropod. × 7.

Idotea emarginata (Fabr.).

Fig. 37. Dorsal view of the cephalon. × 7.
Fig. 38. Dorsal side of the left antennule. × 30.
Fig. 39. Dorsal side of the left antenna. × 11.
Fig. 40. Terminal style of the antenna. × 110.
Fig. 41. Ventral side of the terminal portions of the inner and outer lobes of the right first maxilla. × 130.
Fig. 42. Ventral side of the right maxillipede. × 21.
Fig. 43. Ventral view of the second thoracic appendage. × 10.
Fig. 44. Ventral view of the eighth thoracic appendage. × 7.
Fig. 45. Dorsal view of the lateral portions of the mesosomatic segments, showing the coxal plates. × 3·5.
Fig. 46. Dorsal view of the metasome. × 3·5.
Fig. 47. Left uropod. × 7.

Idotea granulosa, Rathke.

Fig. 48. Dorsal view of the cephalon. × 7.
Fig. 49. Dorsal side of the left antennule. × 30.
Fig. 50. Dorsal side of the left antenna. × 11.
Fig. 51. Terminal style of the antenna. × 110.
Fig. 52. Ventral side of the terminal portions of the inner and outer lobes of the right first maxilla. × 130.
Fig. 53. Ventral side of the right maxillipede. × 21.
Fig. 54. Ventral view of the second thoracic appendage. × 14.
Fig. 55. Ventral view of the eighth thoracic appendage. × 14.
Fig. 56. Dorsal view of the lateral portions of the mesosomatic segments, showing the coxal plates. × 5·5.
Fig. 57. Dorsal view of the metasome. × 5.
Fig. 58. Left uropod. × 7.

Idotea sarsi, n. sp.

Fig. 59. Dorsal view of the cephalon. × 7.
Fig. 60. Dorsal side of the left antennule. × 30.
Fig. 61. Dorsal side of the left antenna. × 11.
Fig. 62. Terminal style of the antenna. × 110.
Fig. 63. Ventral side of the terminal portions of the inner and outer lobes of the right first maxilla. × 130.
Fig. 64. Ventral side of the right maxillipede. × 37.
Fig. 65. Ventral view of the second thoracic appendage. × 14.
Fig. 66. Ventral view of the eighth thoracic appendage. × 10.

Fig. 67. Dorsal view of the lateral portions of the mesosomatic segments, showing the coxal plates. × 5.
Fig. 68. Dorsal view of the metasome. × 5.
Fig. 69. Left uropod. × 7.

Idotea viridis (Slabber).

Fig. 70. Dorsal view of the cephalon. × 14.
Fig. 71. Dorsal side of the left antennule. × 56.
Fig. 72. Dorsal side of the left antenna. × 11.
Fig. 73. Terminal style of the antenna. × 110.
Fig. 74. Ventral side of the terminal portions of the inner and outer lobes of the right first maxilla. × 130.
Fig. 75. Ventral side of the right maxillipede. × 37.
Fig. 76. Ventral view of the second thoracic appendage. × 27.
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Idotea metallica, Bosc.

Fig. 81. Dorsal view of the cephalon. × 7.
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Idotea linearis (Pennant).

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Fig. 95. Terminal style of the antenna. × 110.
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Fig. 105. Ventral side of the same. × 20.
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Synisoma lancifer (Leach).

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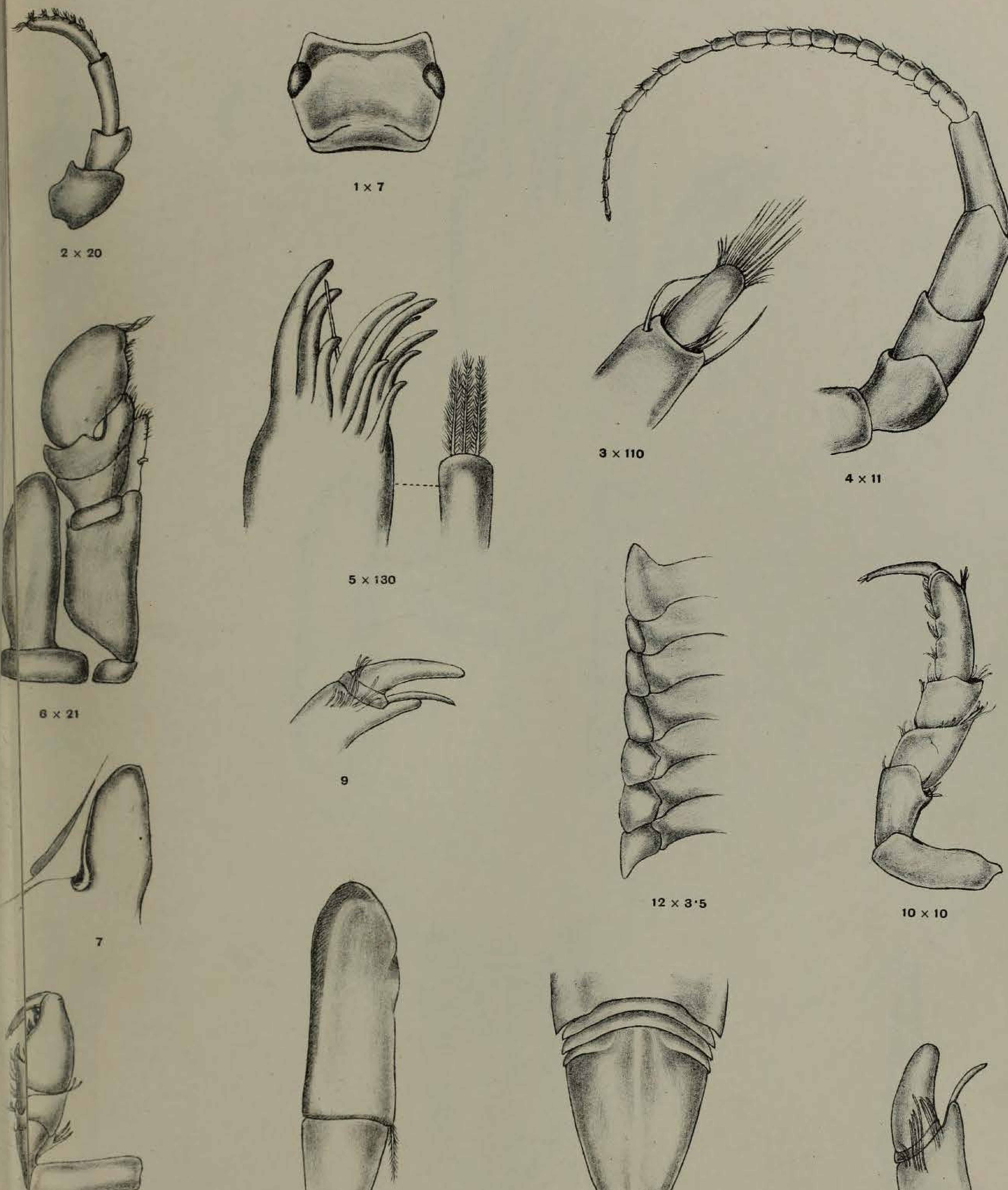
W. E. COLLINGE: BRITISH IDOTEIDAE.—PLATE I.

IDOTEA BALTICA (PALLAS).



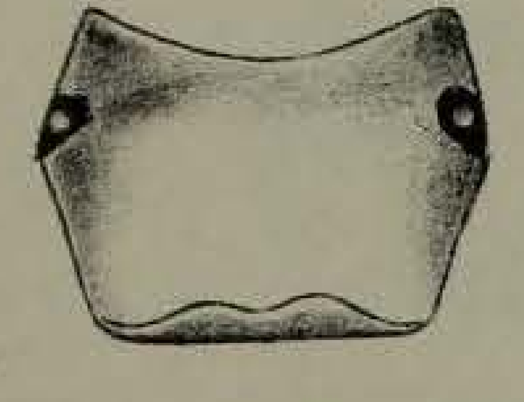
DEL. & NAT.

A. RITCHIE & SON, EDIN^R

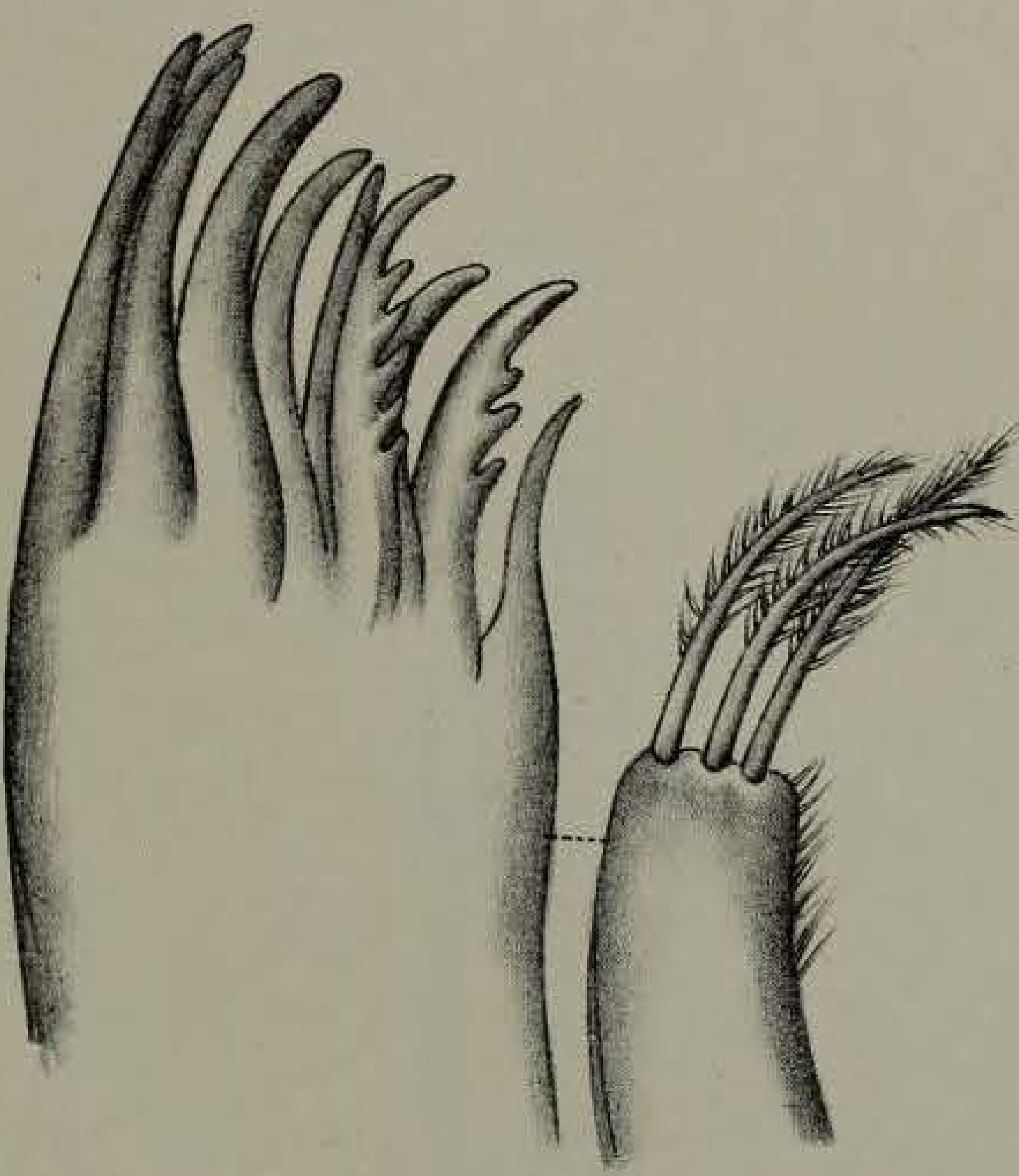
W. E. COLLINGE: BRITISH IDOTEIDAE.—PLATE II.

IDOTEA PELAGICA, LEACH.

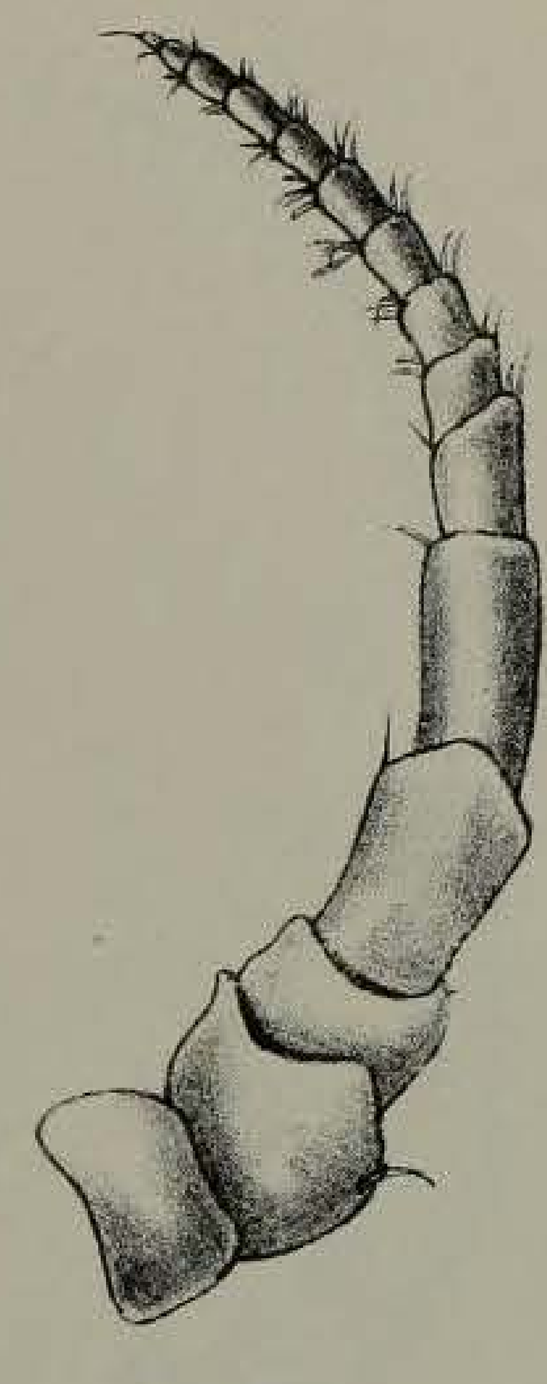
16 × 30



15 × 7



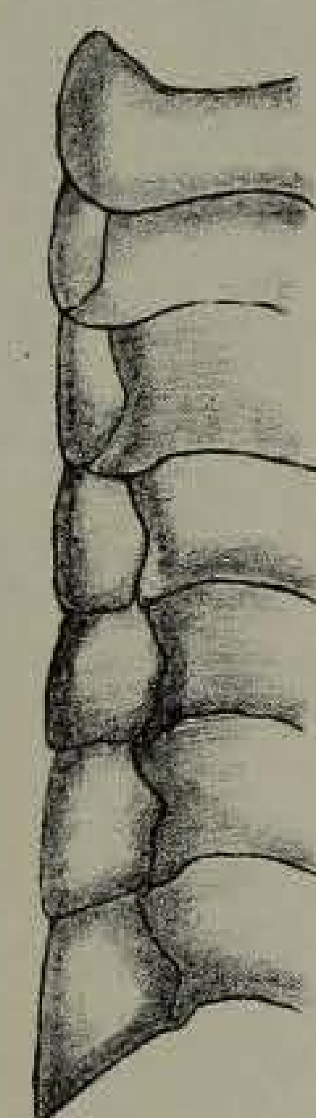
19 × 130



17 × 16

18 × 110

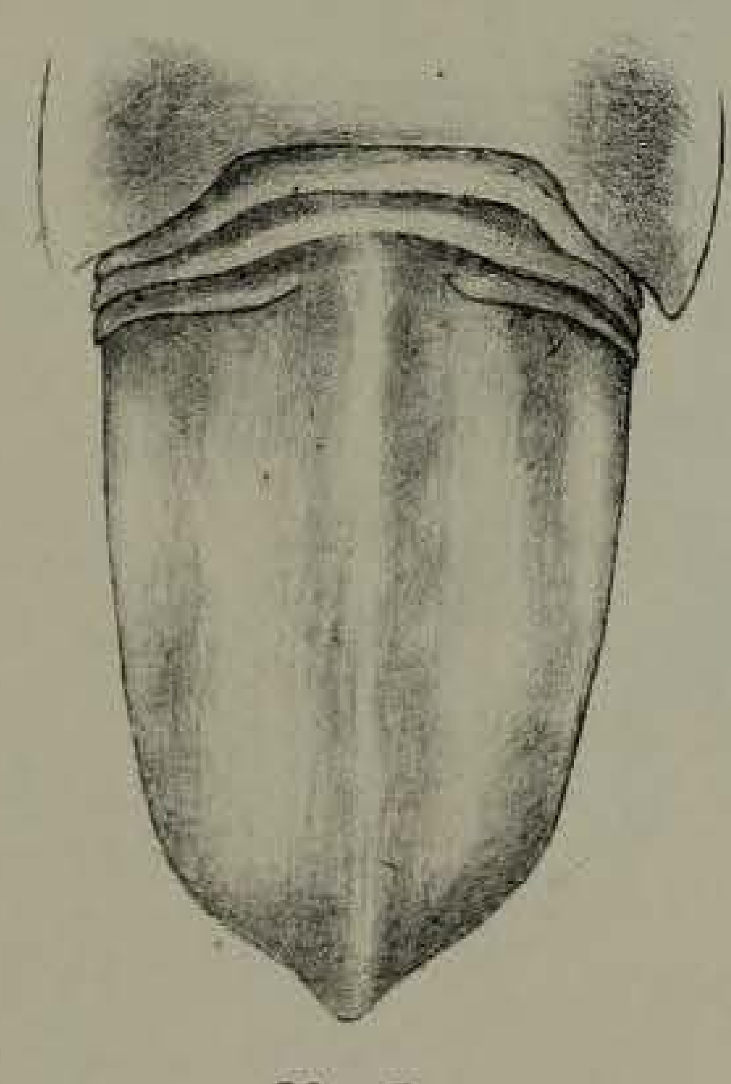
25 × 7



23 × 3·5

21 × 9

0 × 21



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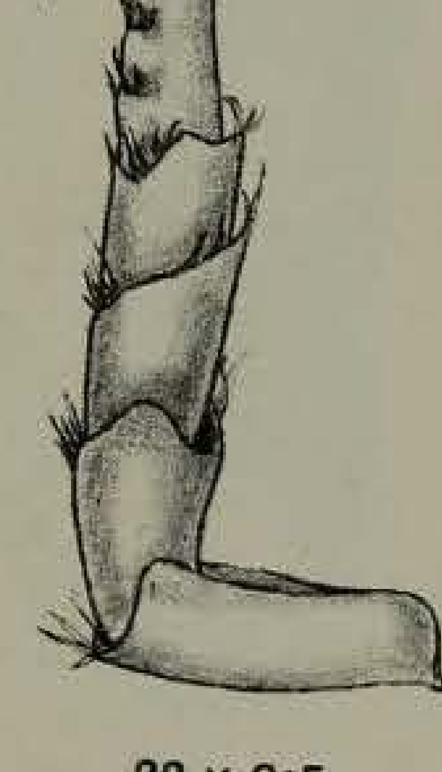


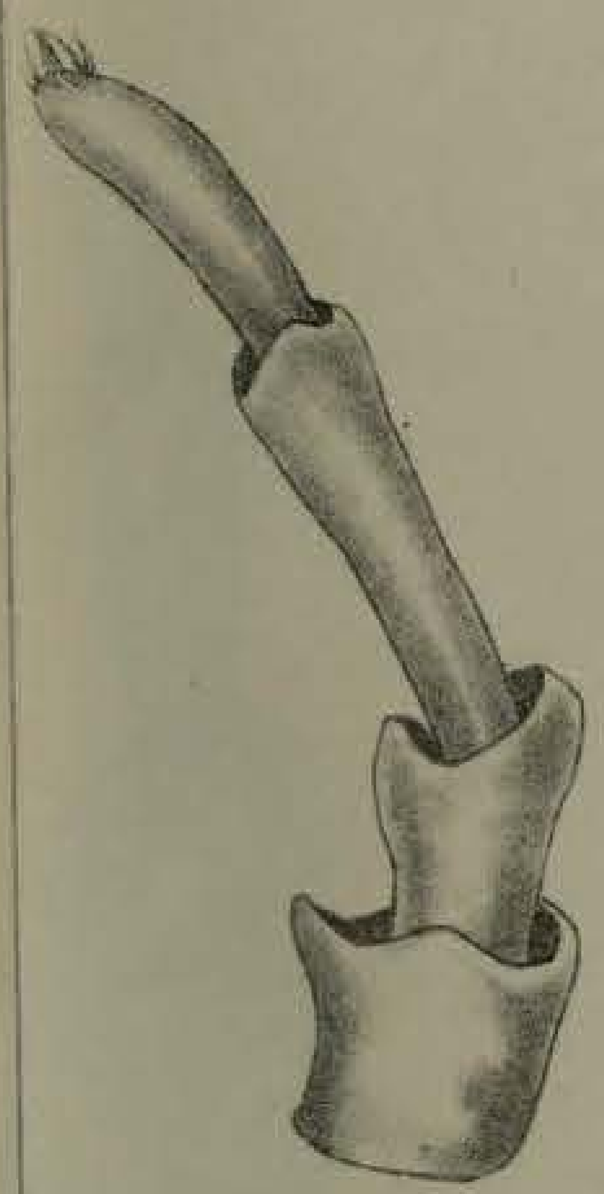
22 × 6·5

DEL AD NAT.

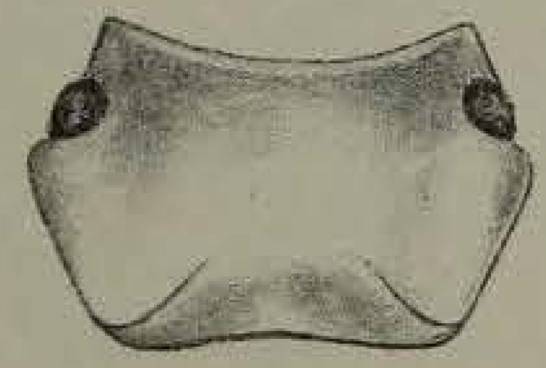
A. RITCHIE & SON, EDIN[R].

W. E. COLLINGE: BRITISH IDOTEIDAE.—PLATE III.

IDOTEA NEGLECTA, G. O. SARS.



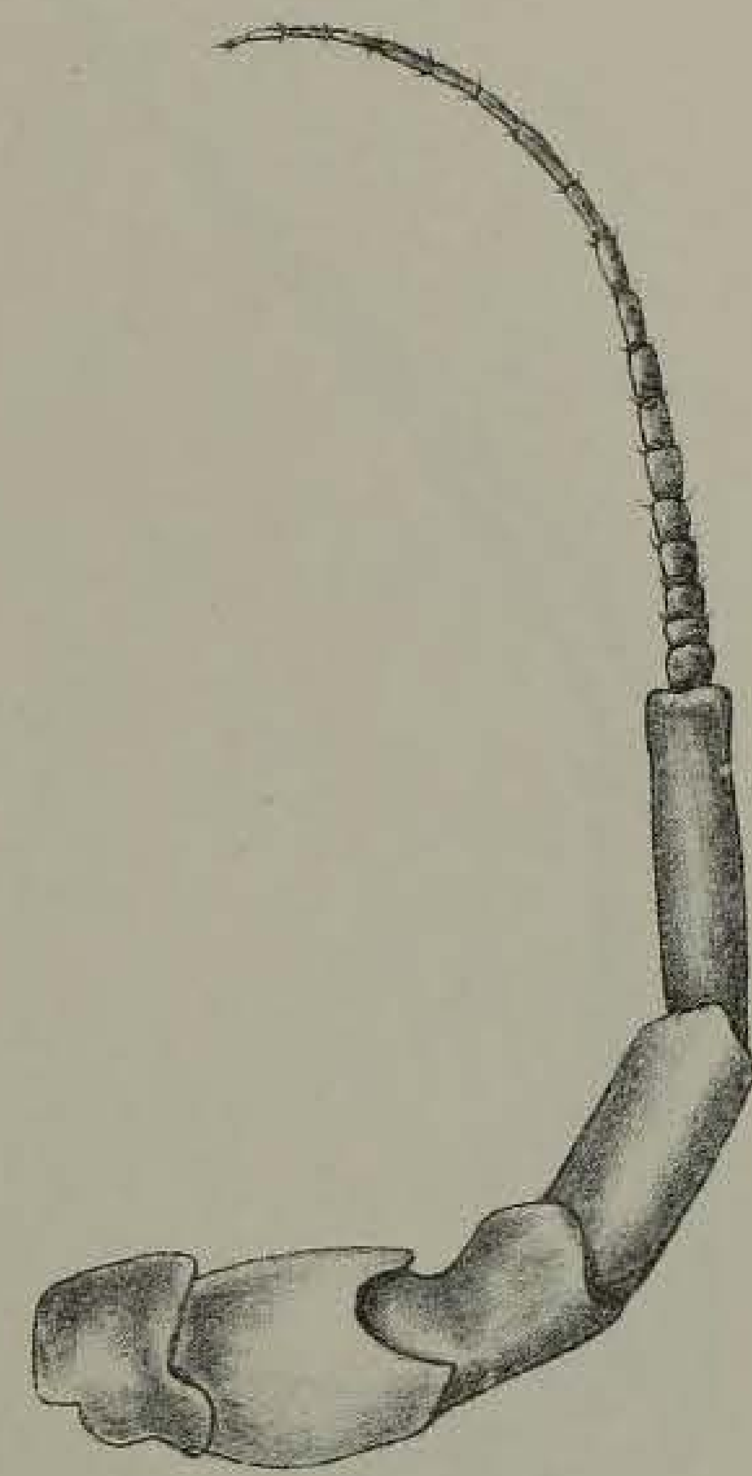
27 × 30



26 × 7

32 × 14

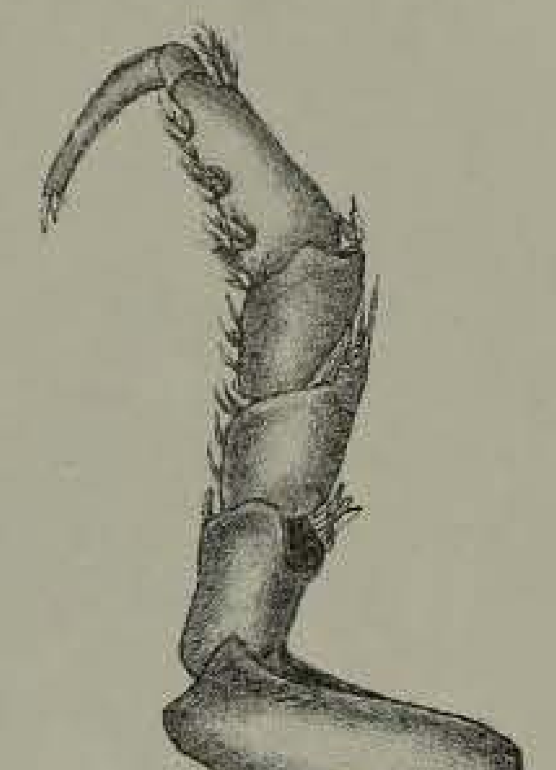
29 × 110



28 × 16

31 × 21

35 × 5



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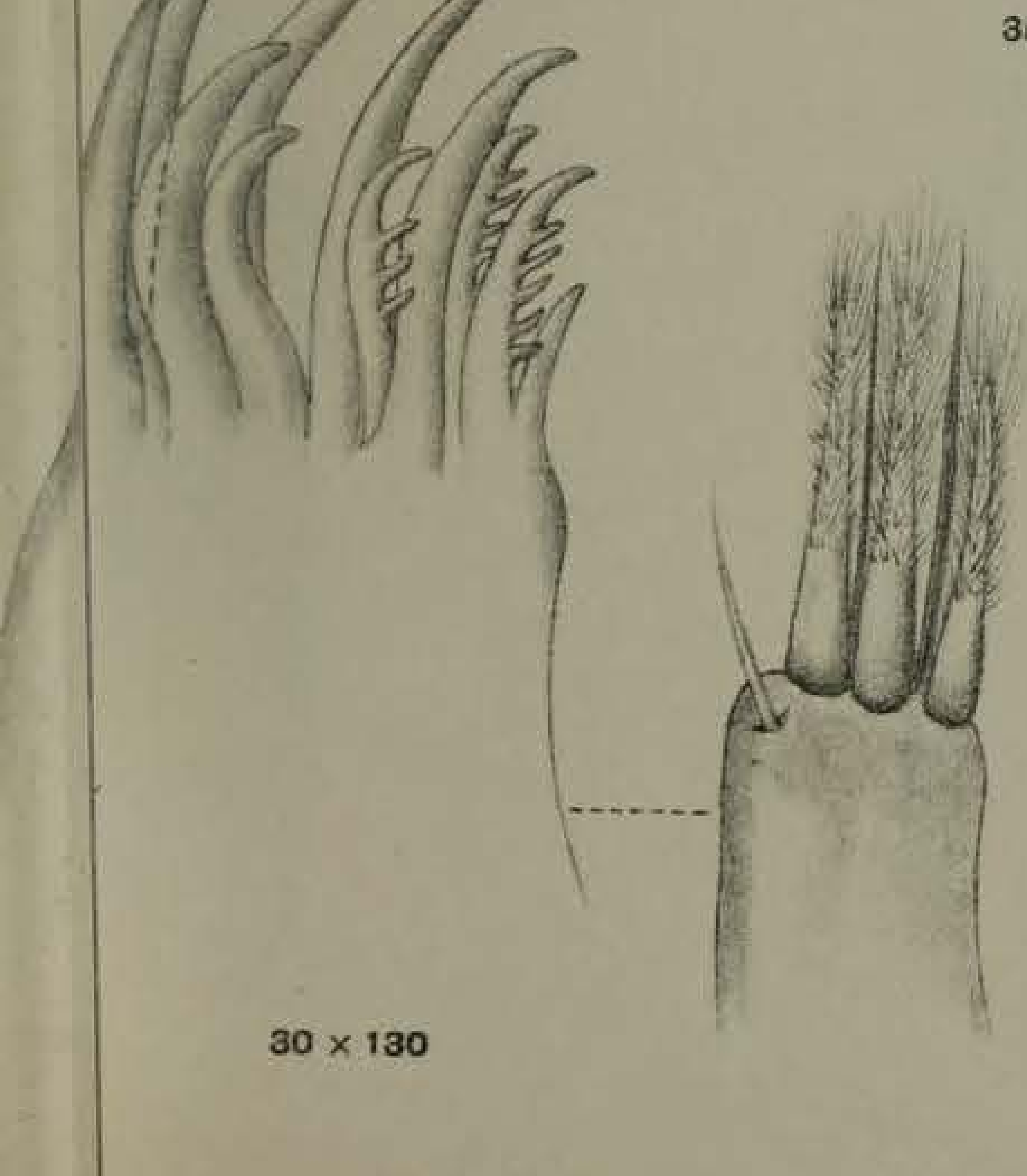

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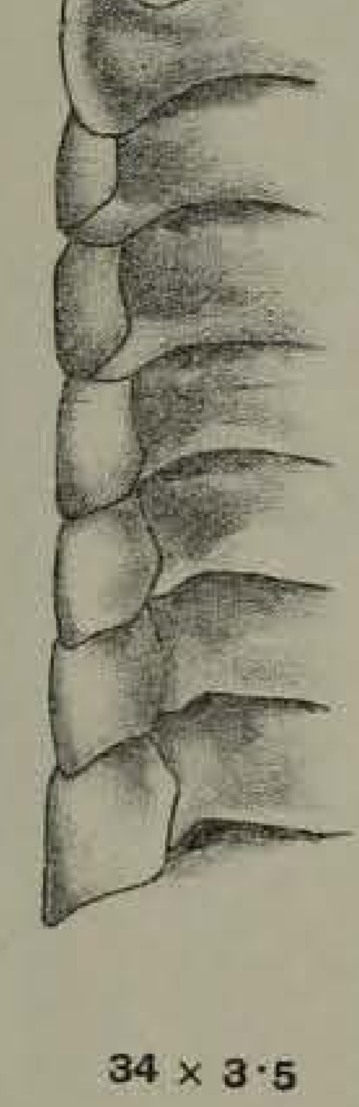


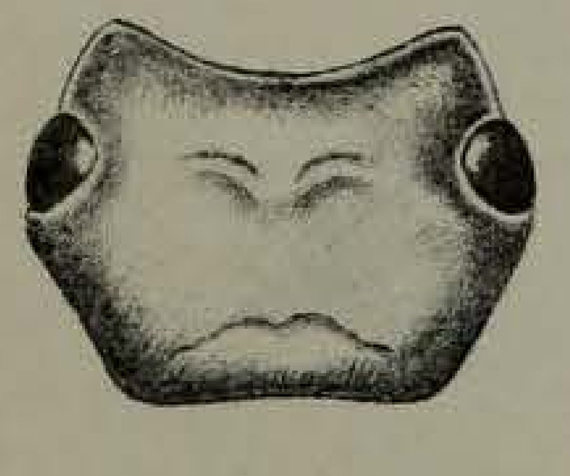
34 × 3·5

36 × 7

W. E. COLLINGE: BRITISH IDOTEIDAE.—PLATE IV.

IDOTEA EMARGINATA (FABR.).

38 × 30



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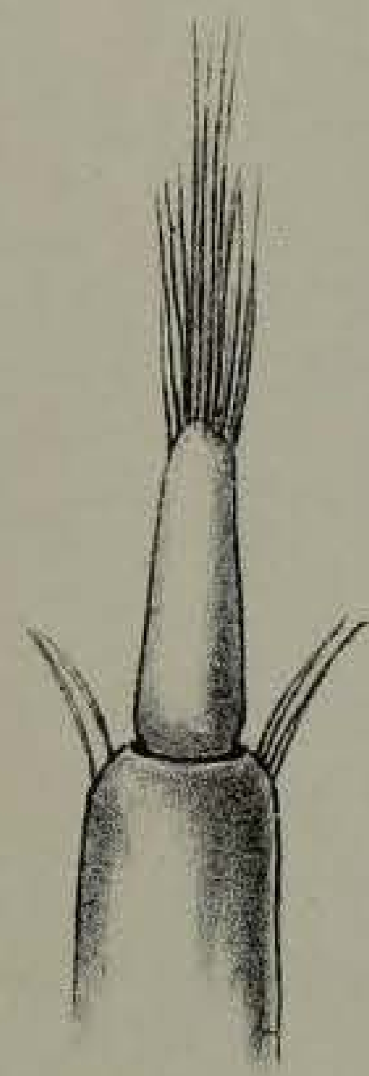

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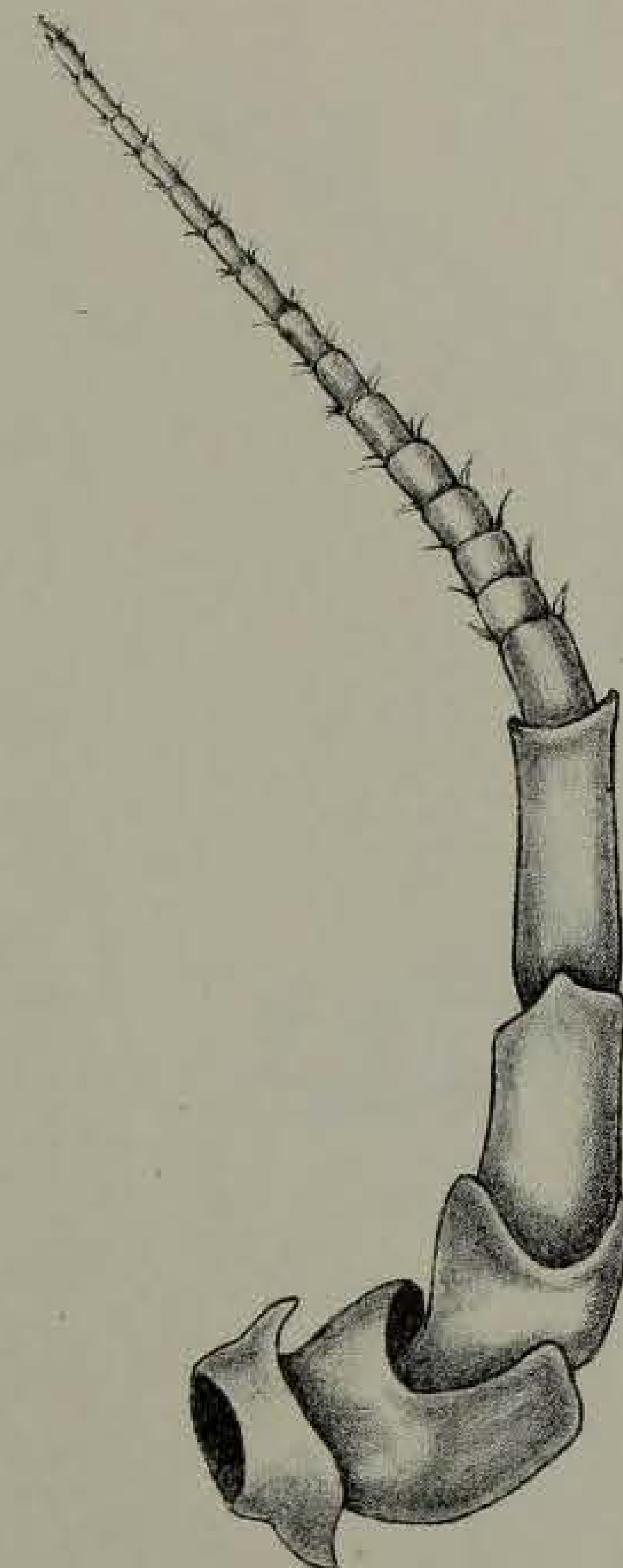

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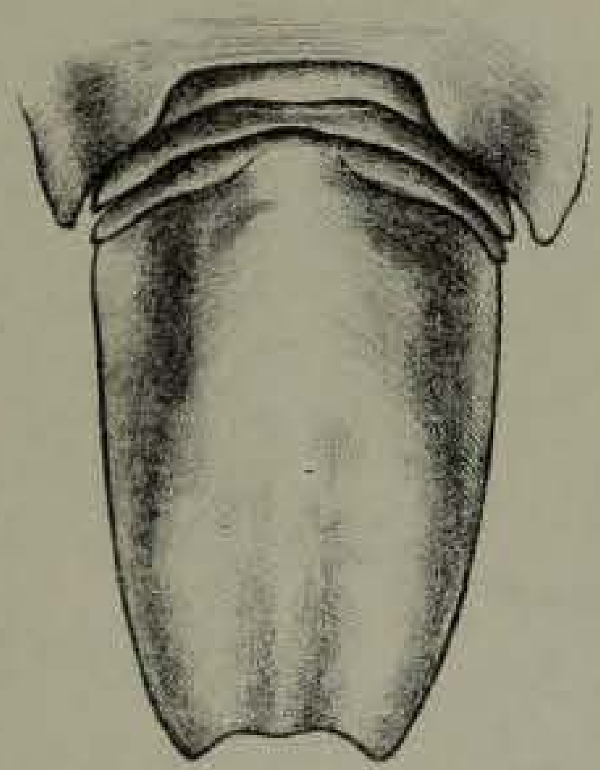
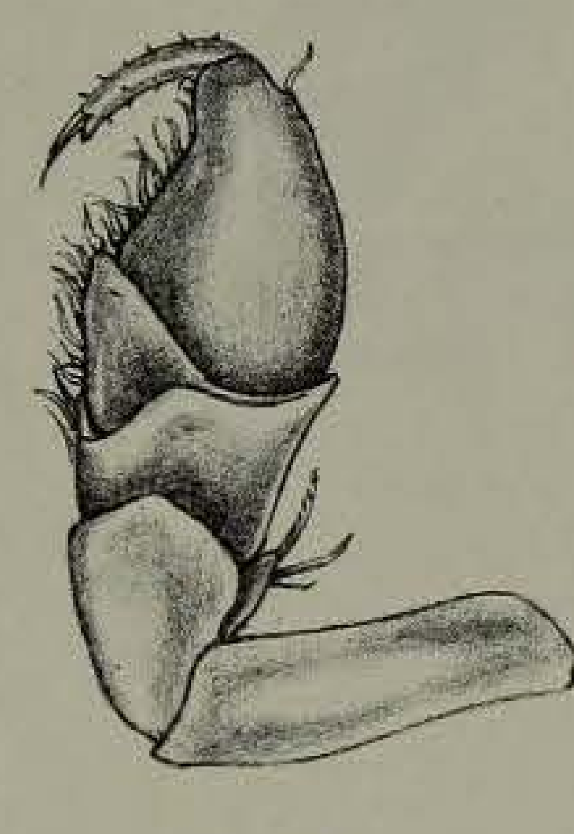


46 × 3·5

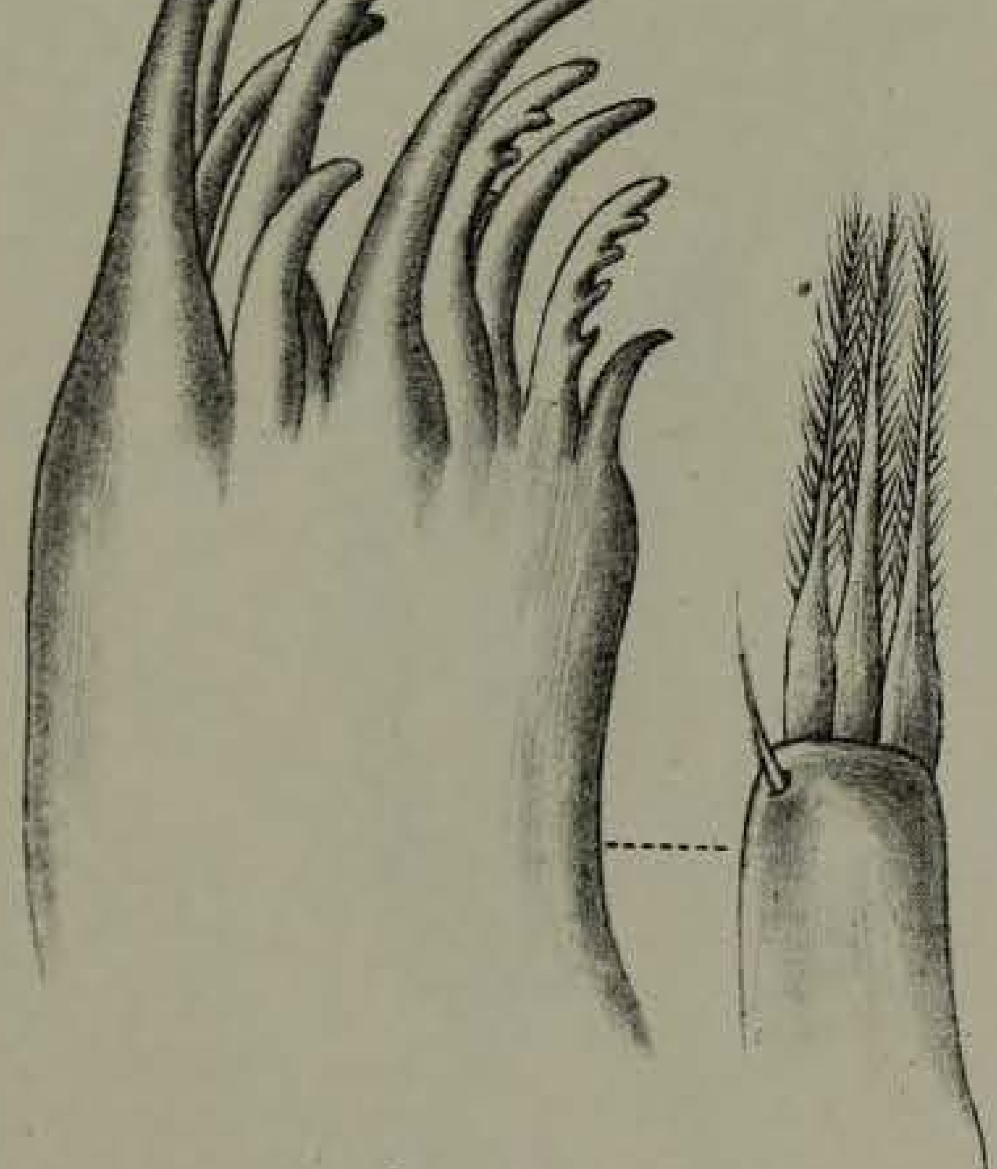
45 × 3·5

42 × 21



43 × 10

47 × 7



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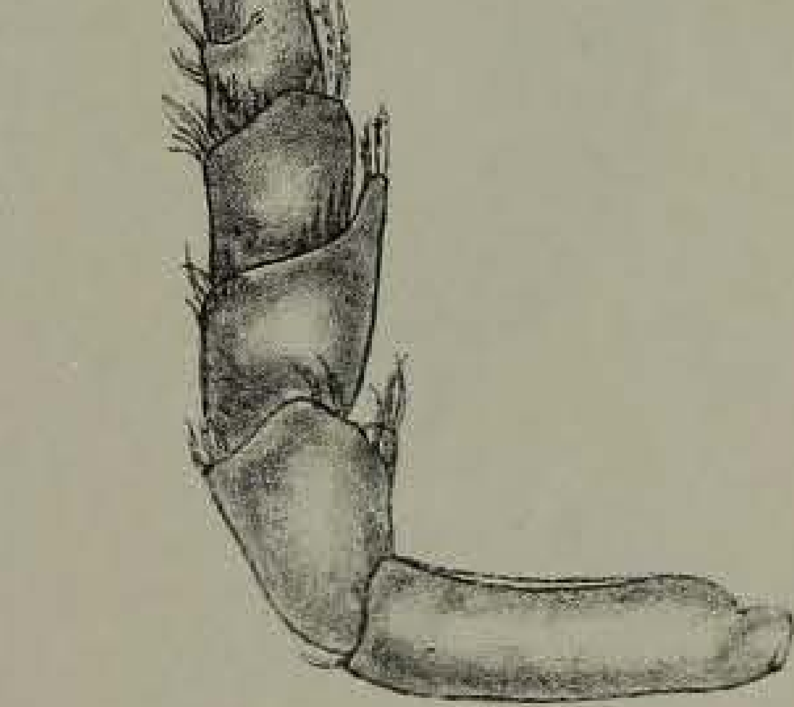

44 × 7

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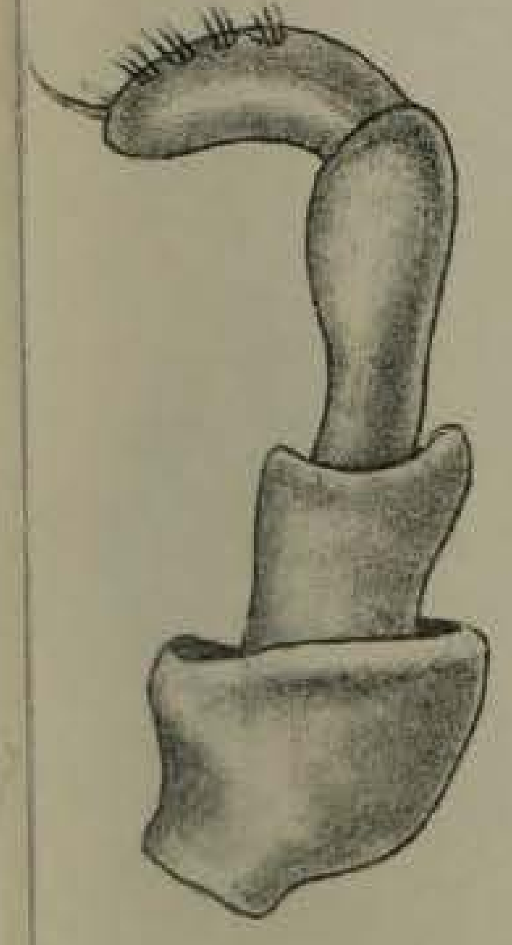
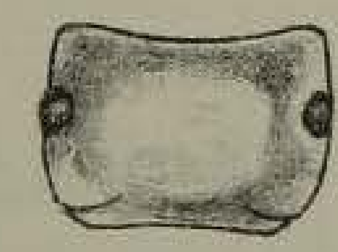
A. RITCHIE & SON, EDINR.

W. E. Collinge: British Idoteidae.—Plate V.

Idotea granulosa, Rathke.



49 × 30



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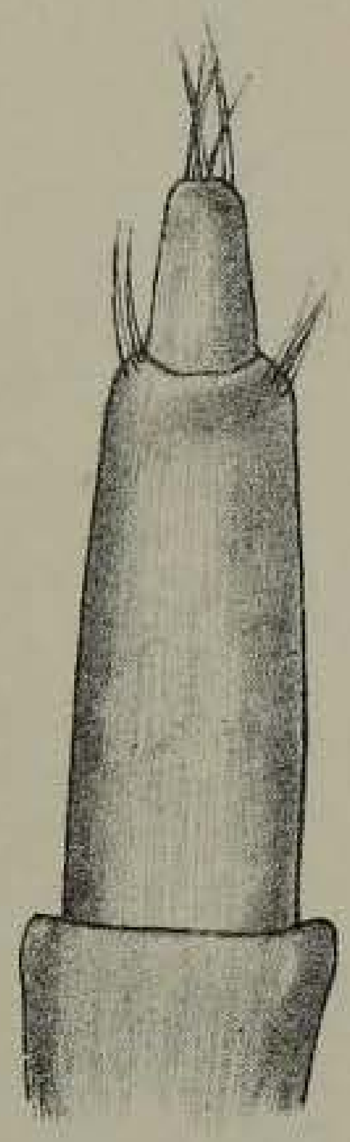
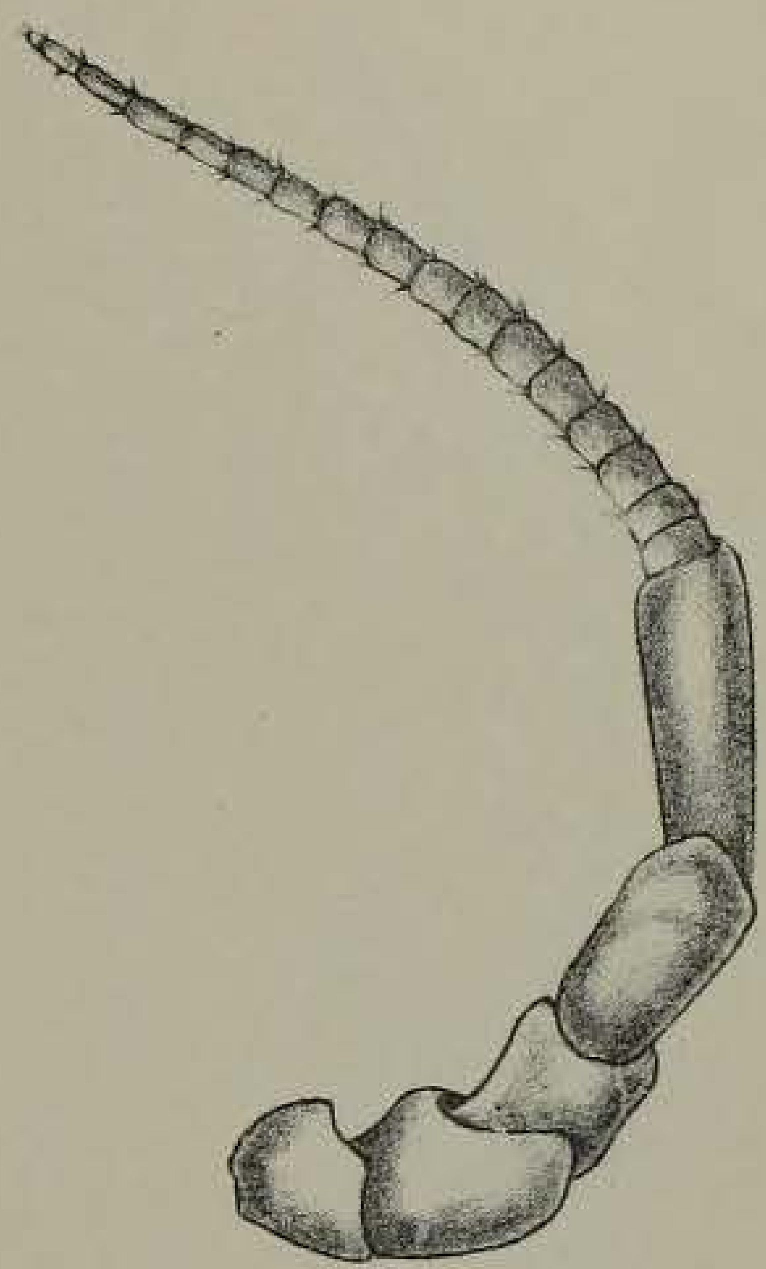


51 × 110



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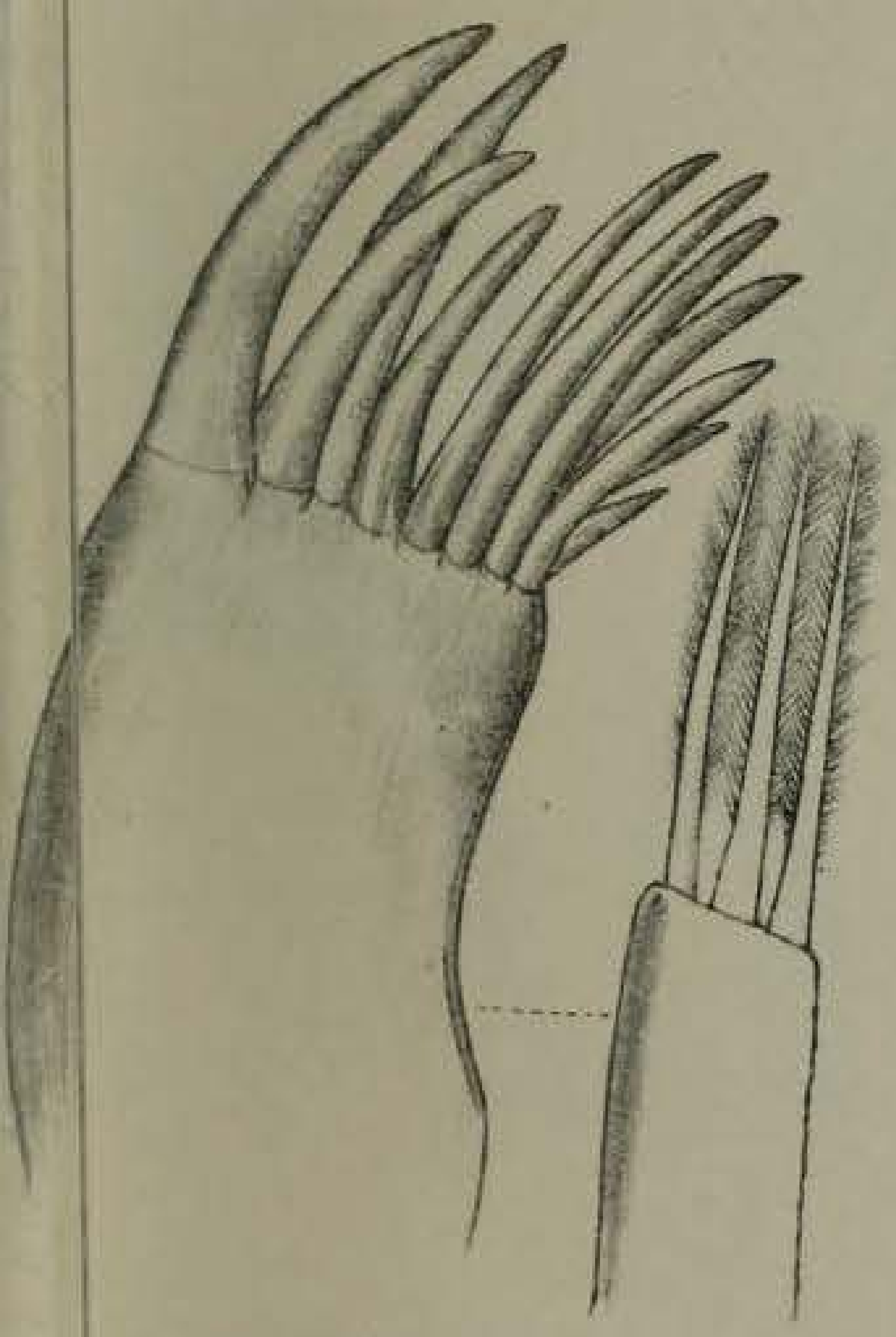
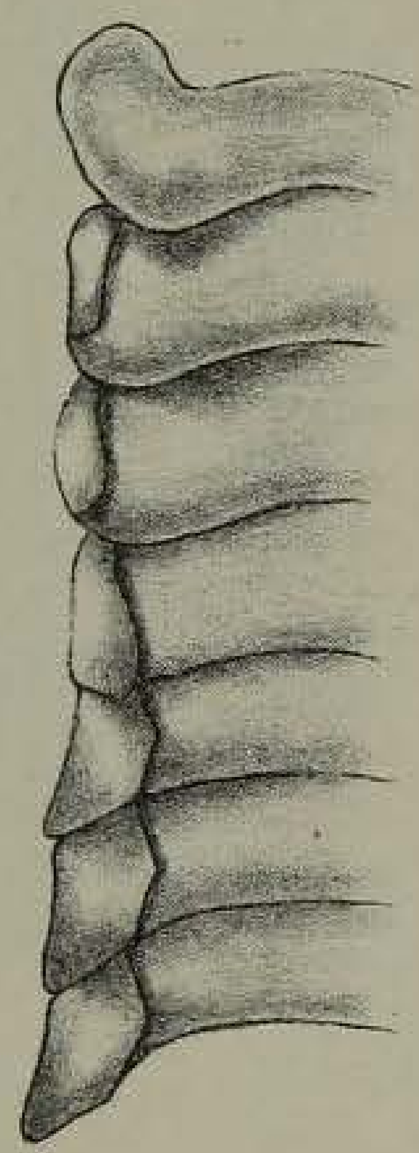
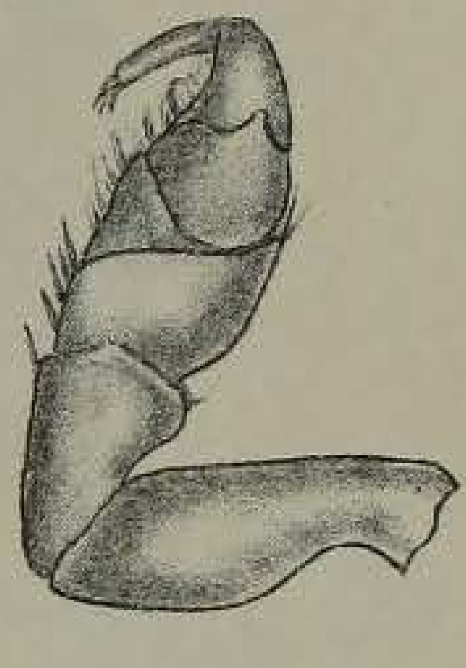


52 × 130

53 × 21

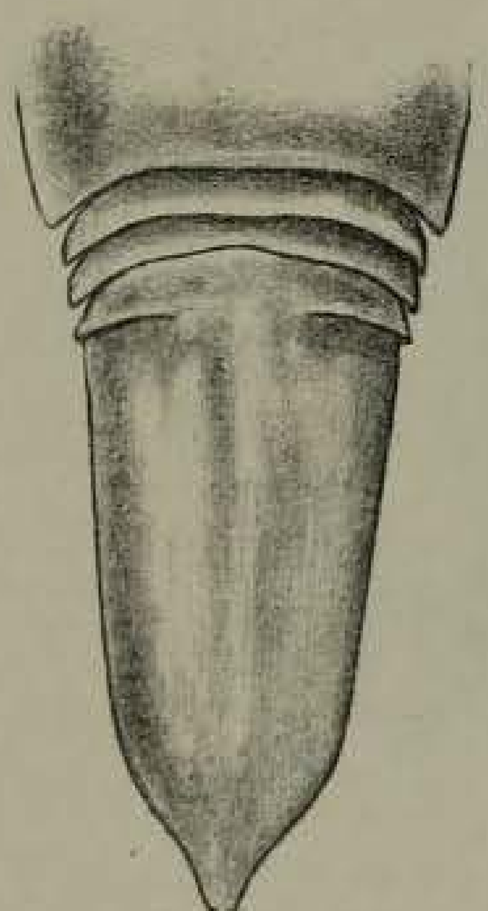


56 × 5·5



54 × 14

58 × 7



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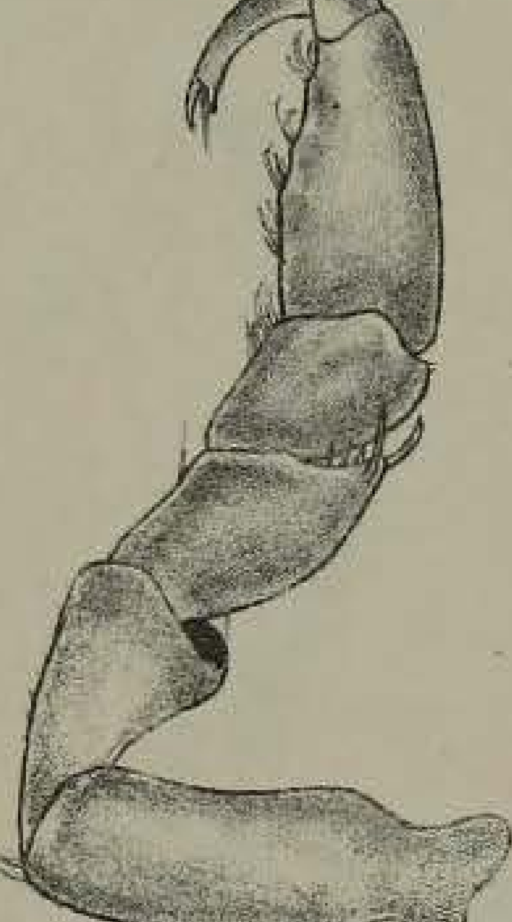


55 × 14

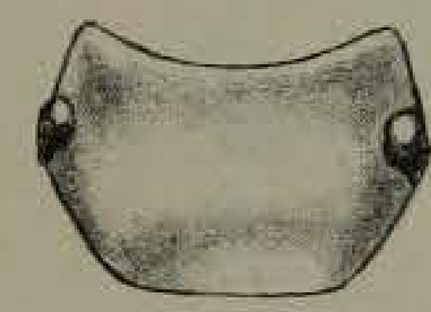
Del. ɔ Nat.

A. Ritchie & Son, Edin^r.

W. E. COLLINGE: BRITISH IDOTEIDAE.—PLATE VI.

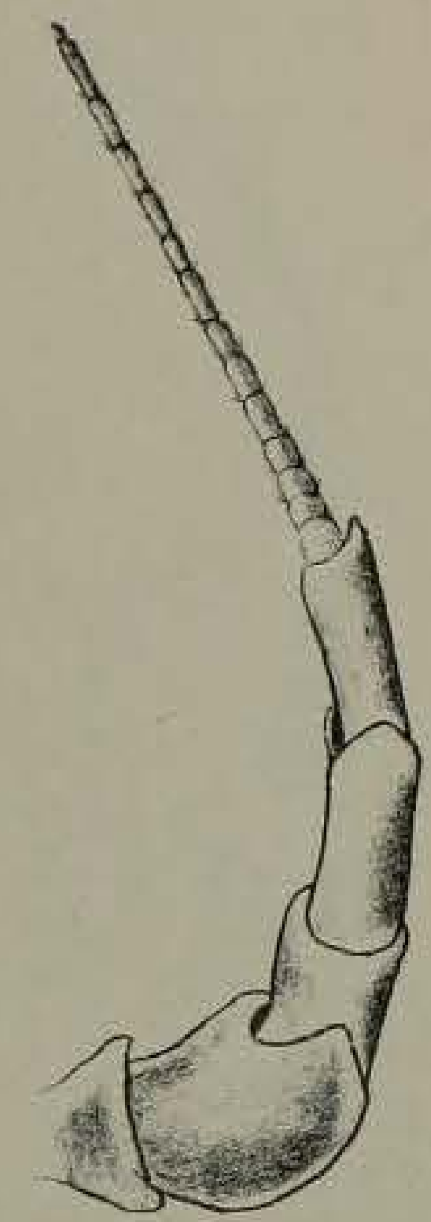
IDOTEA SARSI, N. SP.

60 × 30

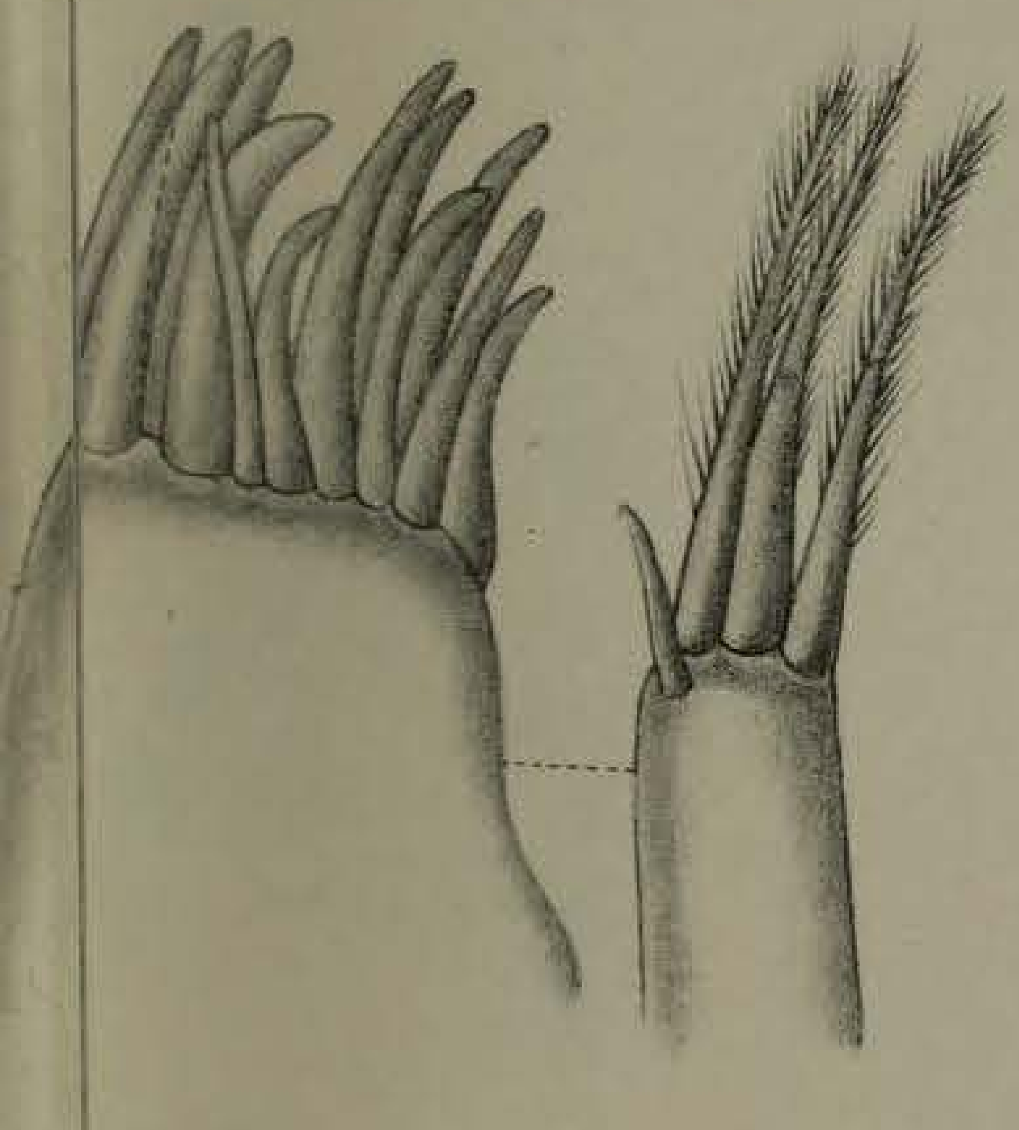


59 × 7

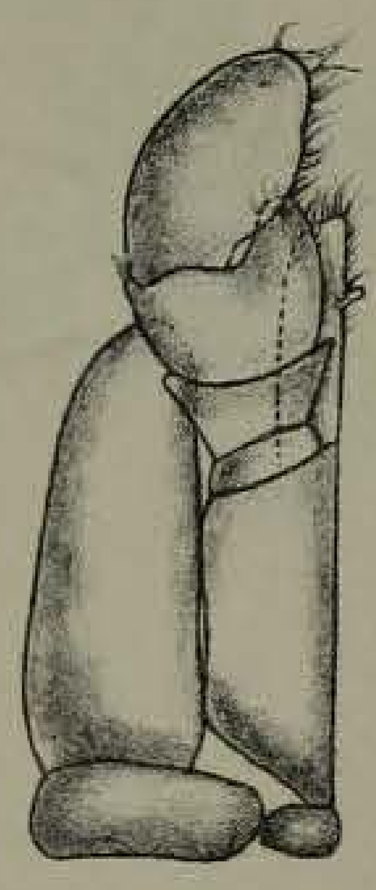
62 × 110



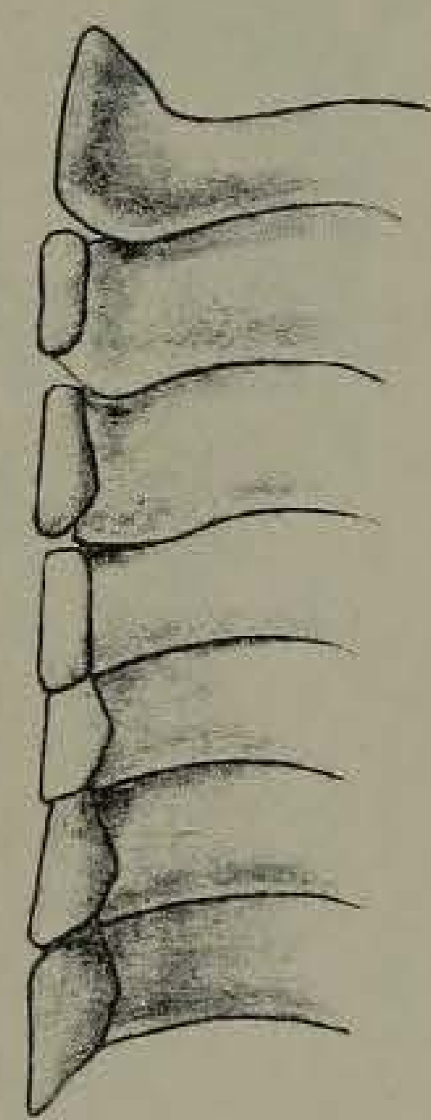
61 × 11



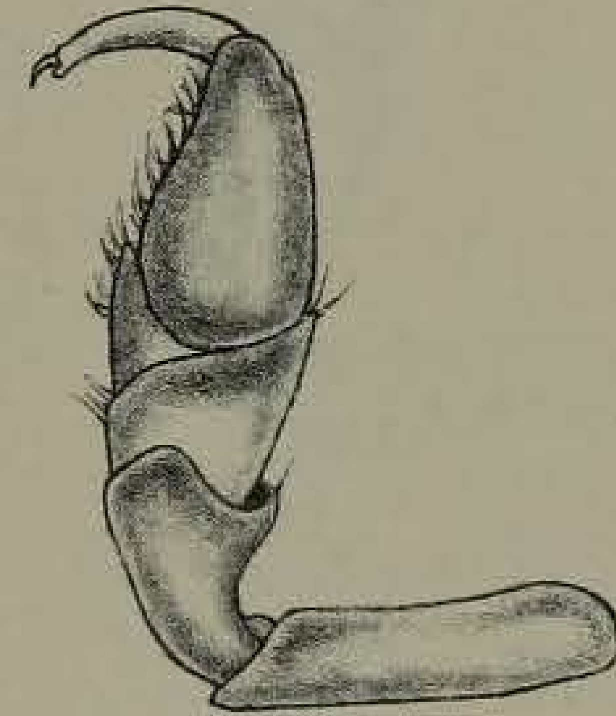
63 × 130



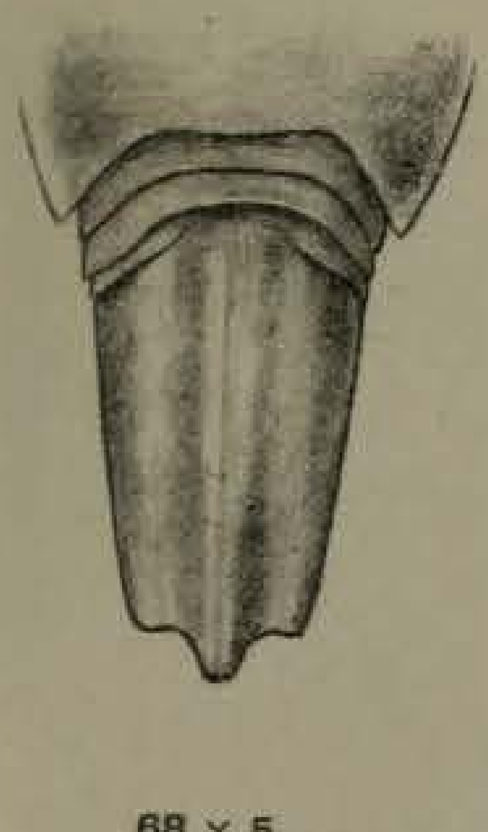
64 × 37



67 × 5

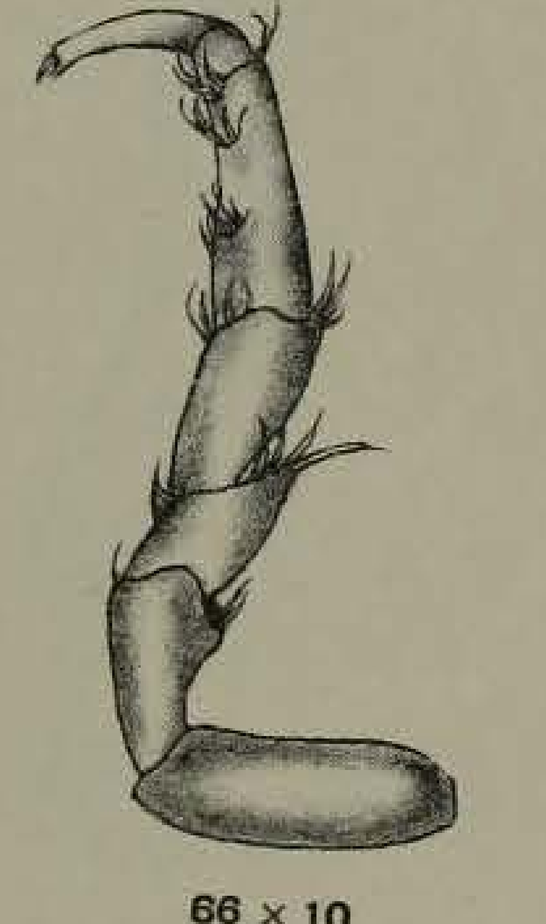


65 × 14



68 × 5

69 × 7



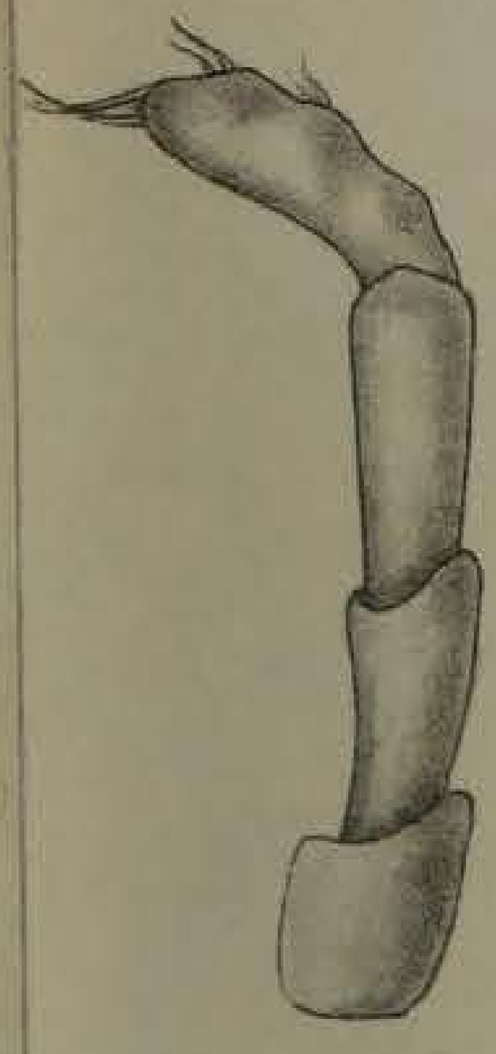
66 × 10

DEL. NAT.

A. RITCHIE & SON, EDIN^R.

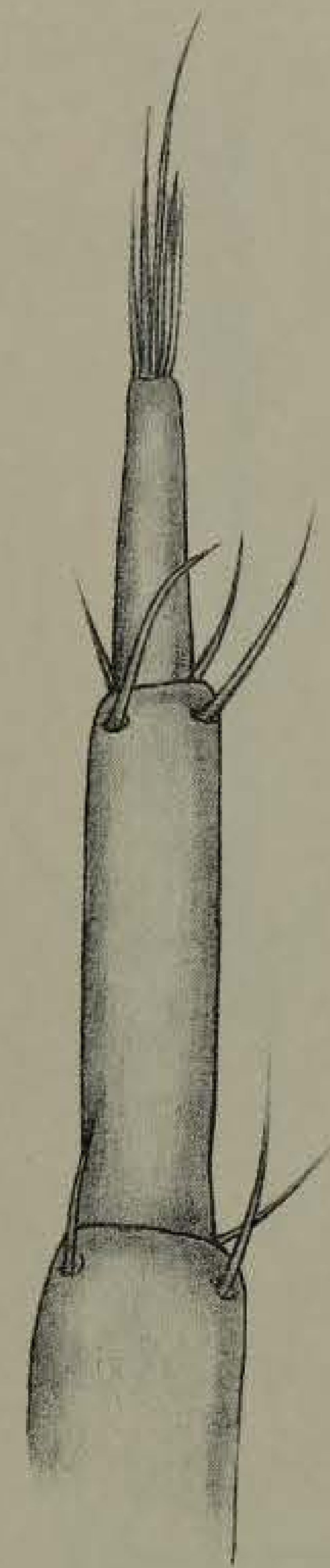
W. E. COLLINGE: BRITISH IDOTEIDAE.—PLATE VII.

IDOTEA VIRIDIS (SLABBER).

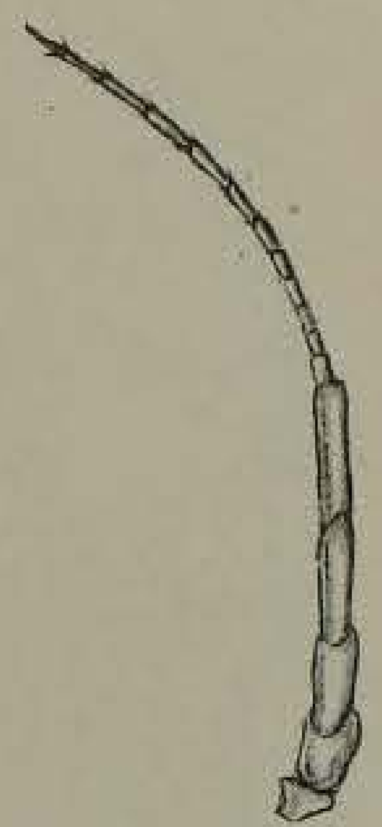


71 × 56

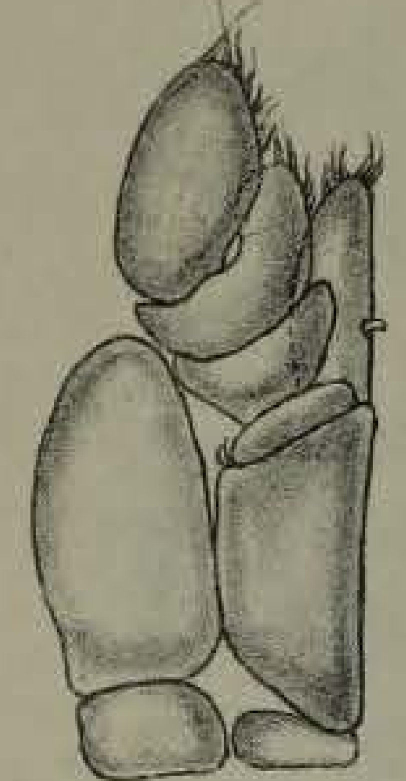
70 × 14



73 × 110

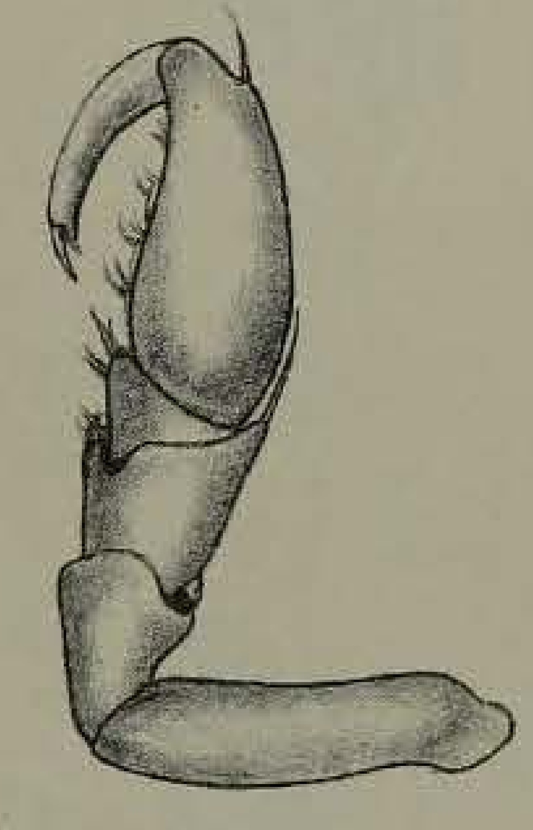


72 × 11



75 × 37

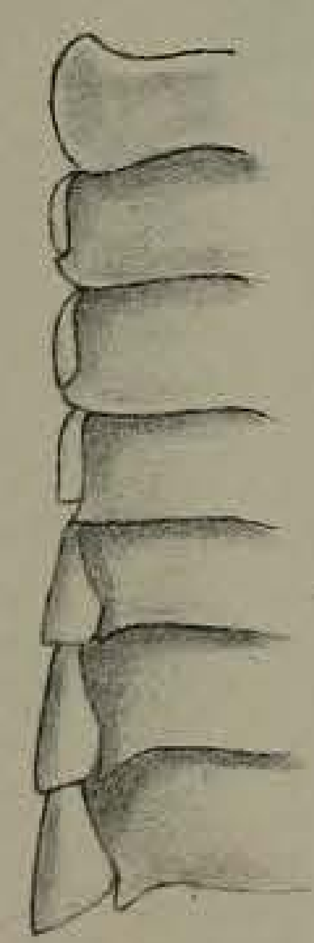
74 × 130



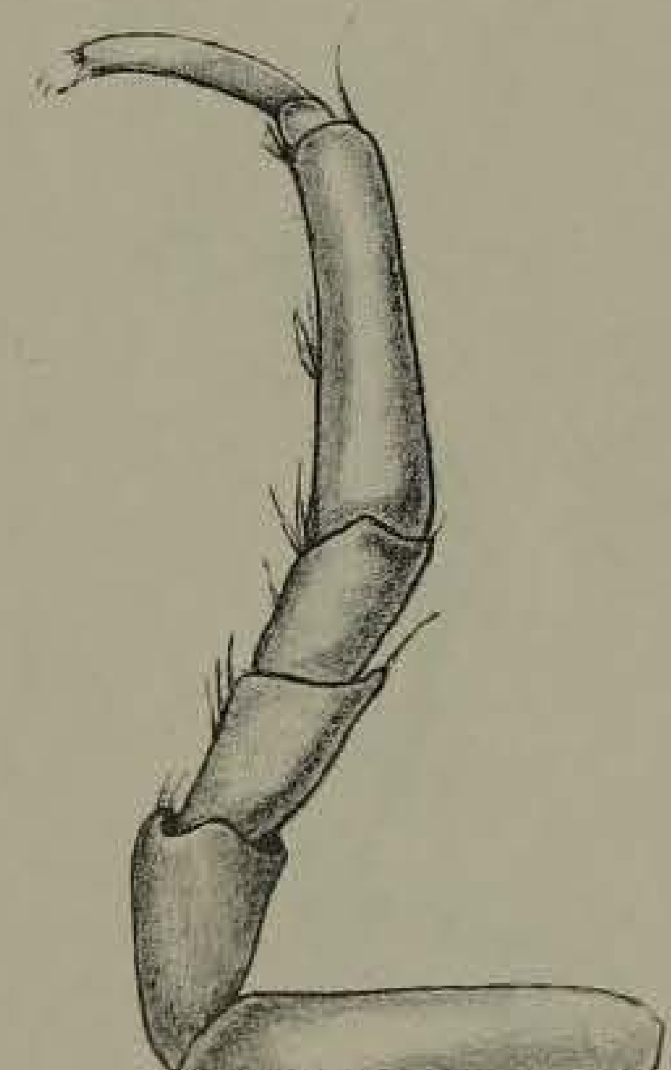
76 × 27

80 × 14

79 × 10



78 × 8·5



77 × 27

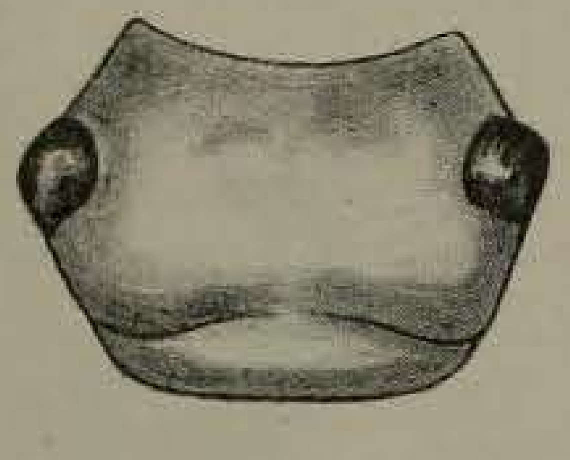
DEL D NAT.

A. RITCHIE & SON, EDINR

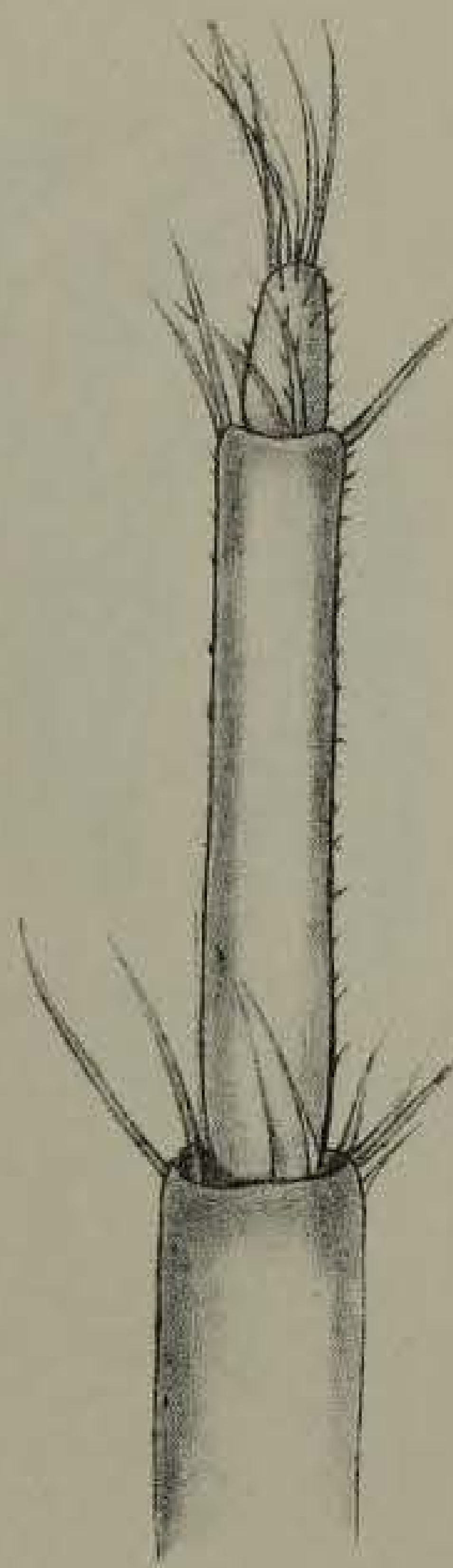
W. E. Collinge: British Idoteidae.—Plate VIII.

Idotea métallica, Bosc.

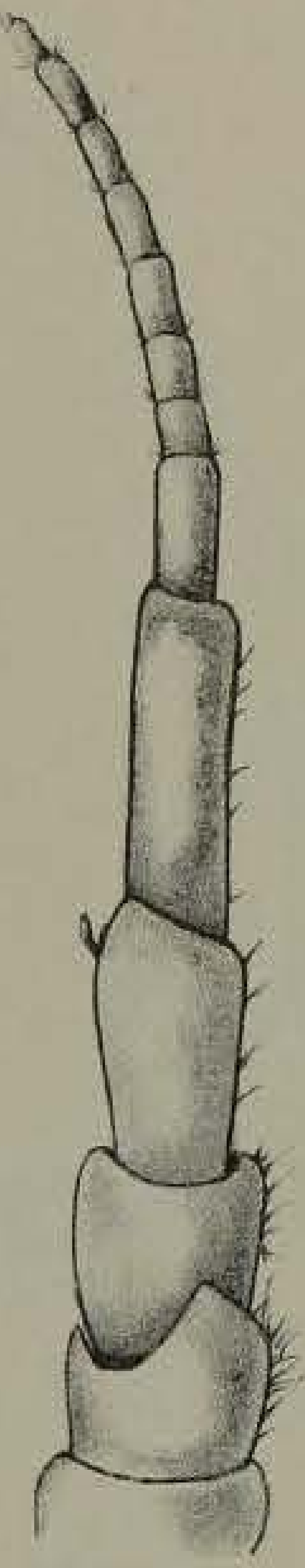
82 × 30



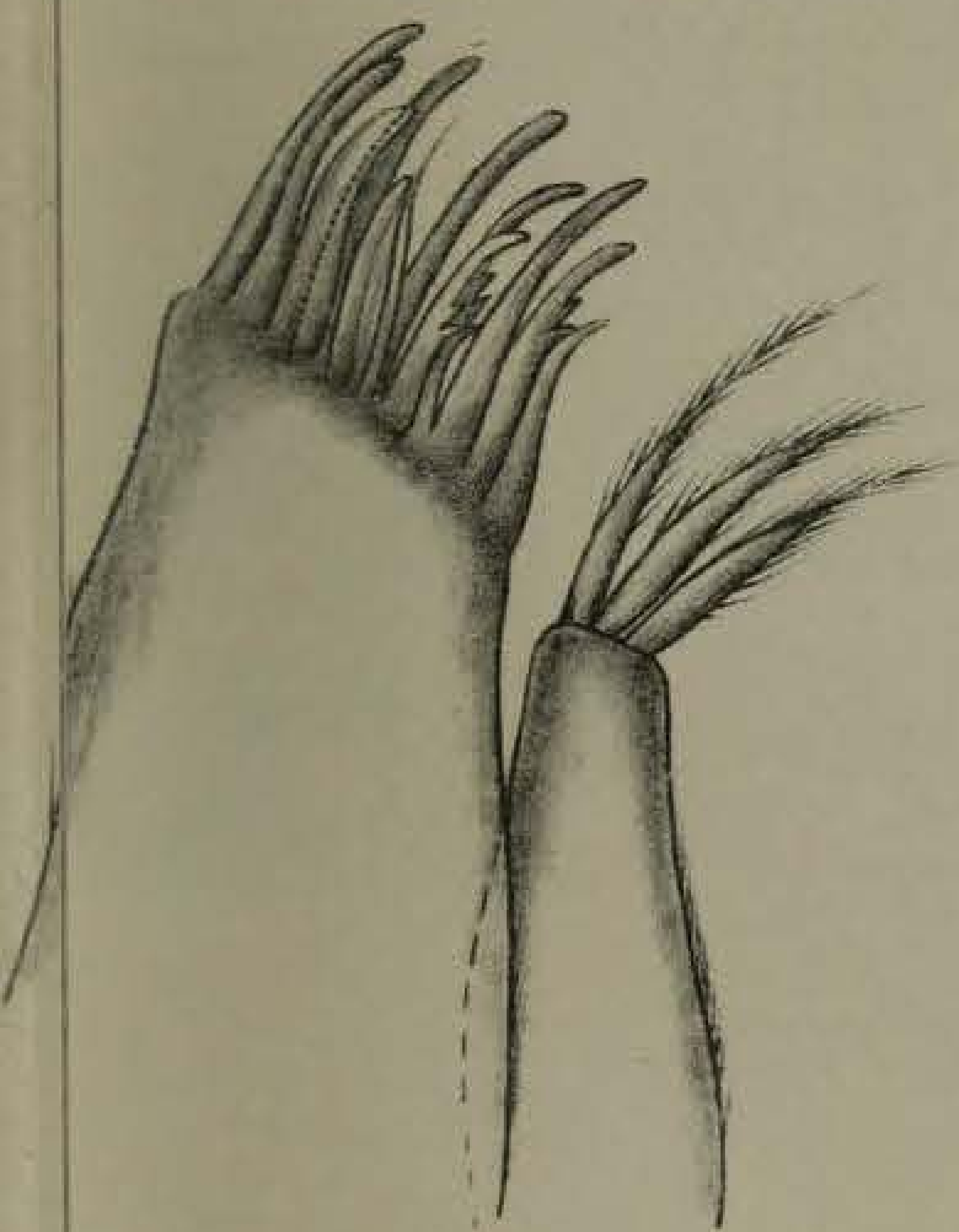
81 × 7



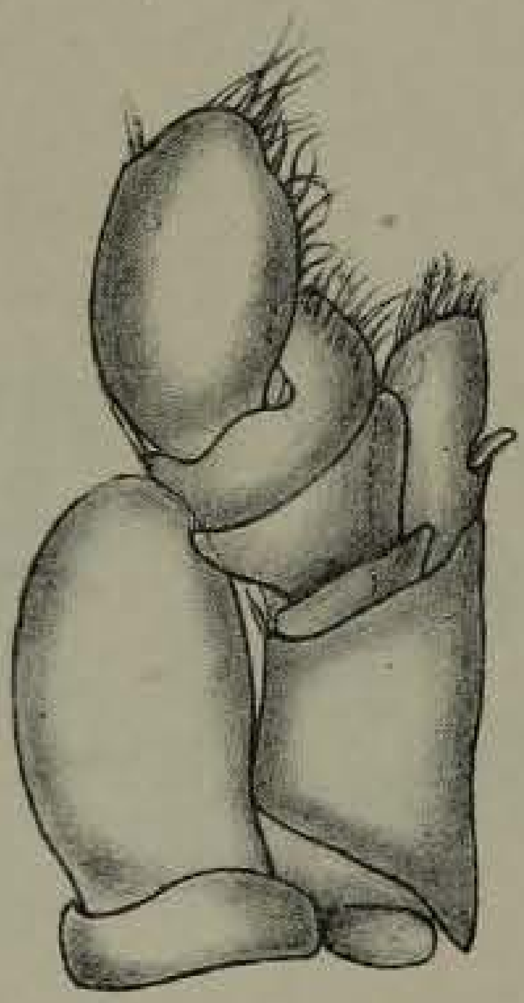
84 × 110



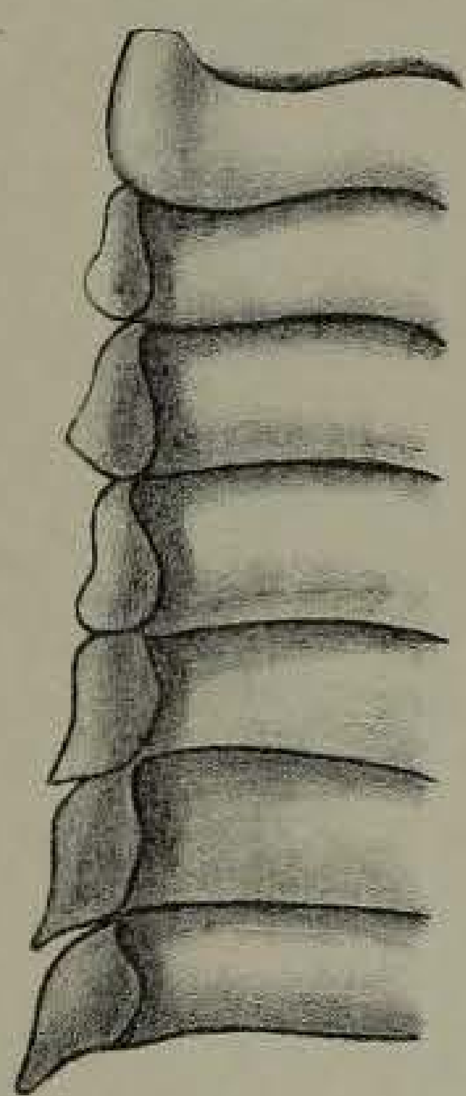
83 × 11



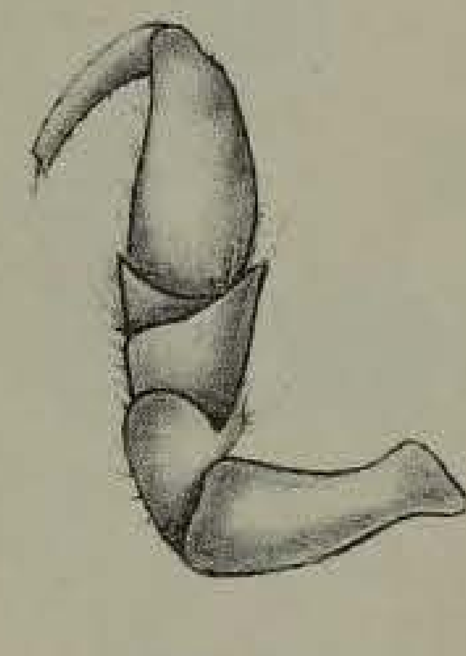
85 × 130



86 × 18

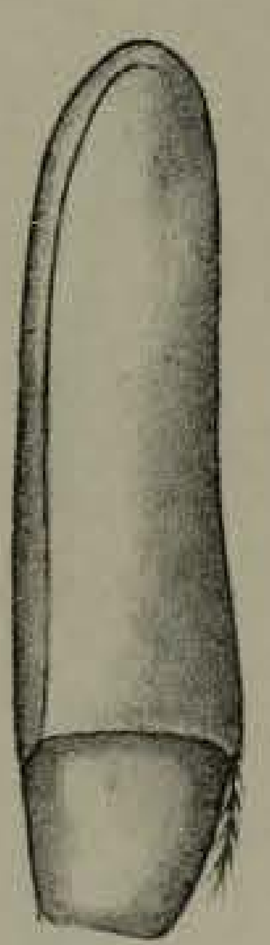


89 × 5

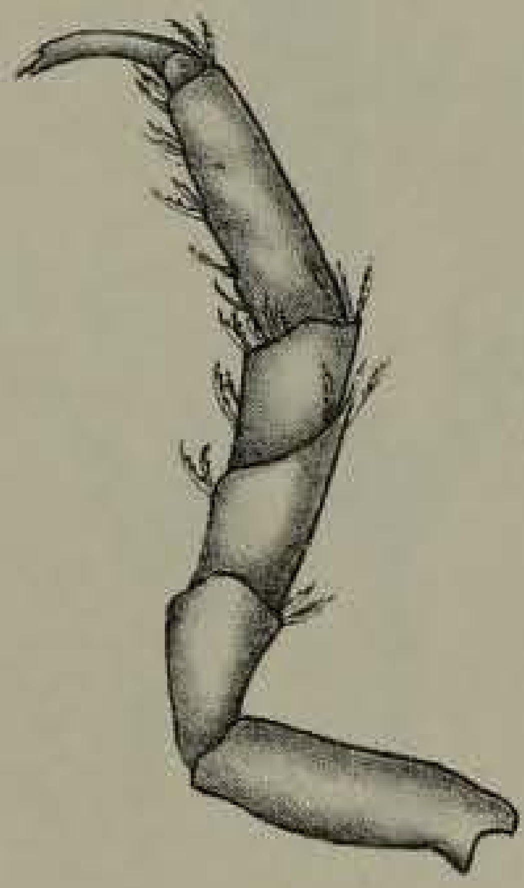


87 × 10

90 × 2·5



91 × 7



88 × 6

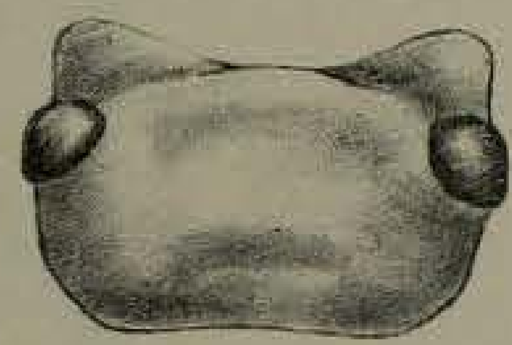
DEL. AD NAT.

A. RITCHIE & SON, EDIN^R.

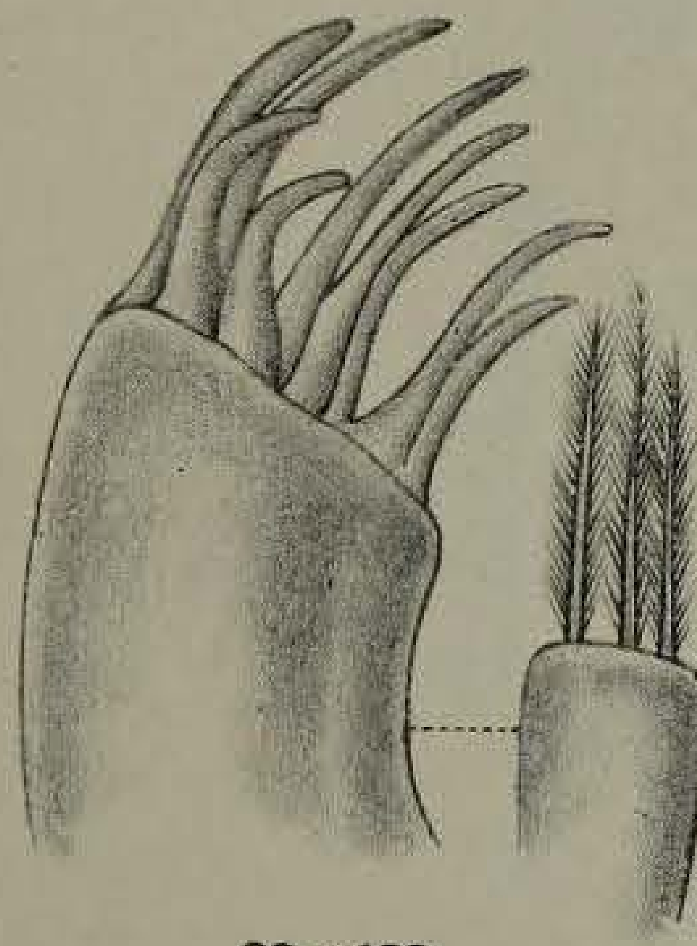
W. E. COLLINGE: BRITISH IDOTEIDAE.—PLATE IX.

IDOTEA LINEARIS (PENNANT).

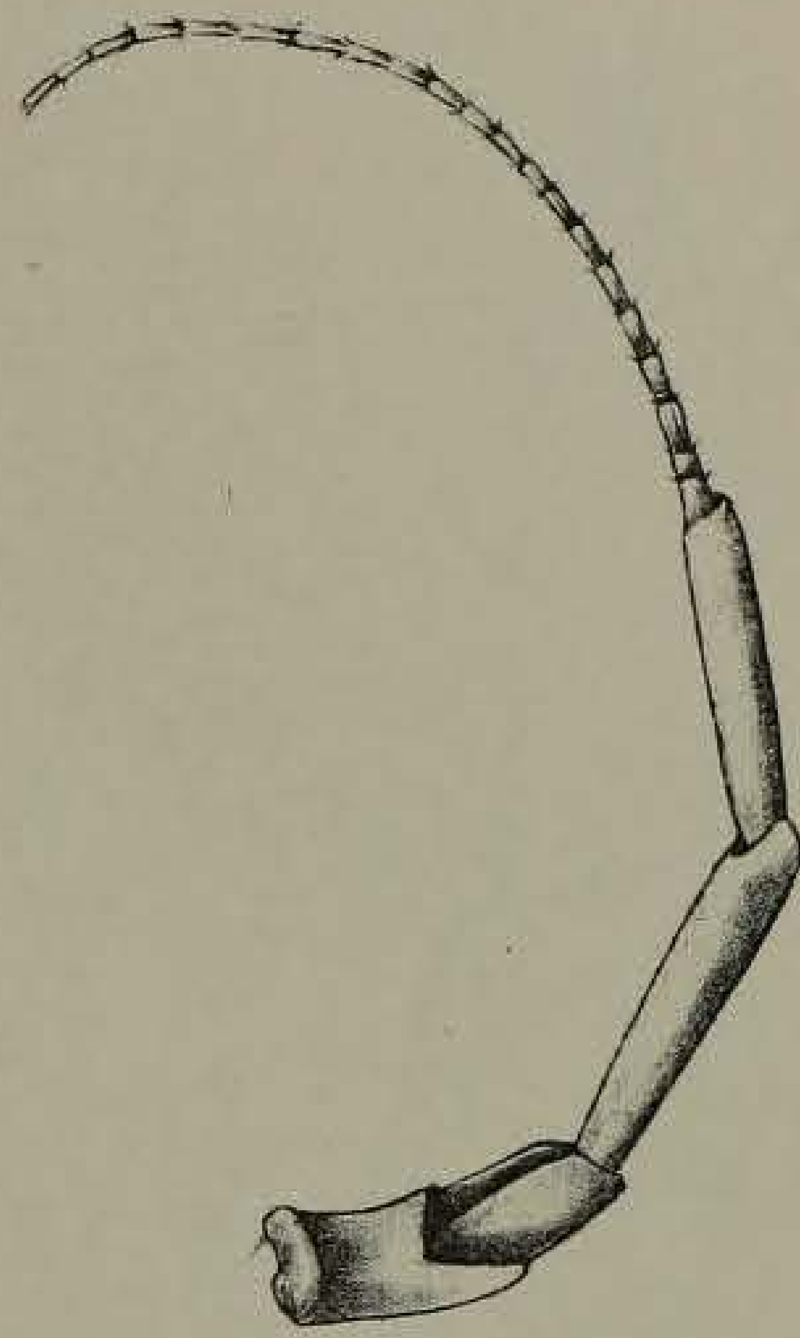
93 × 30



92 × 7



96 × 130

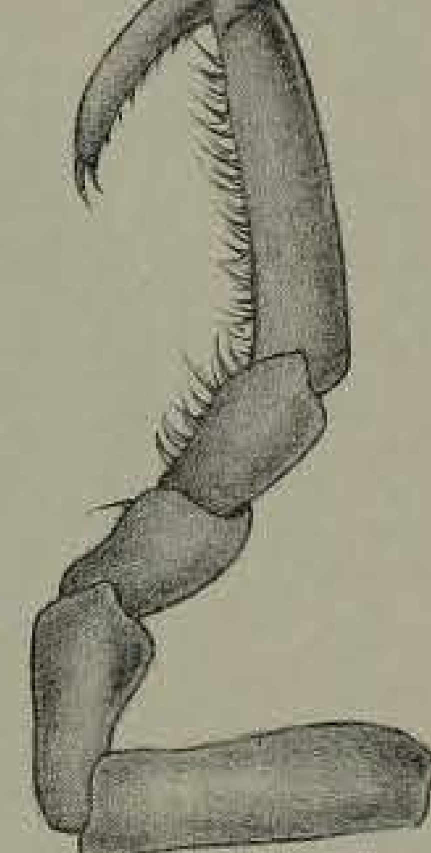


94 × 5

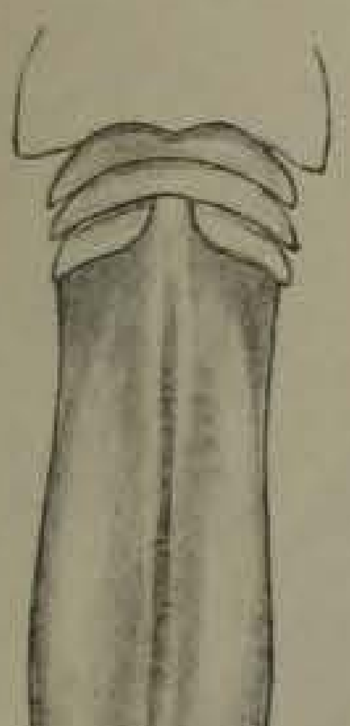
97 × 21

98 × 14

100 × 5

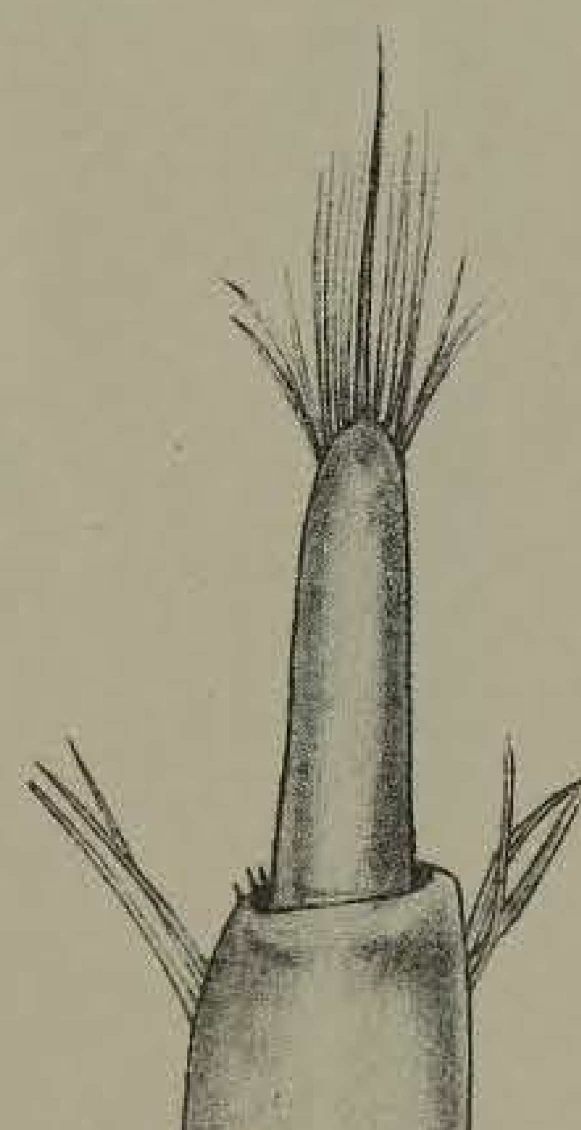


99 × 10



101 × 5

102 × 7



95 × 110

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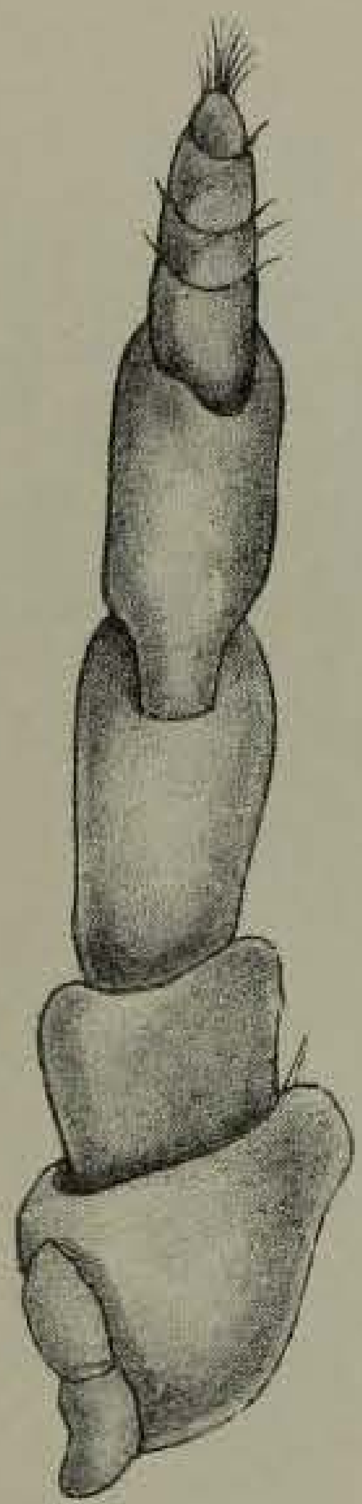
A. RITCHIE & SON, EDINR

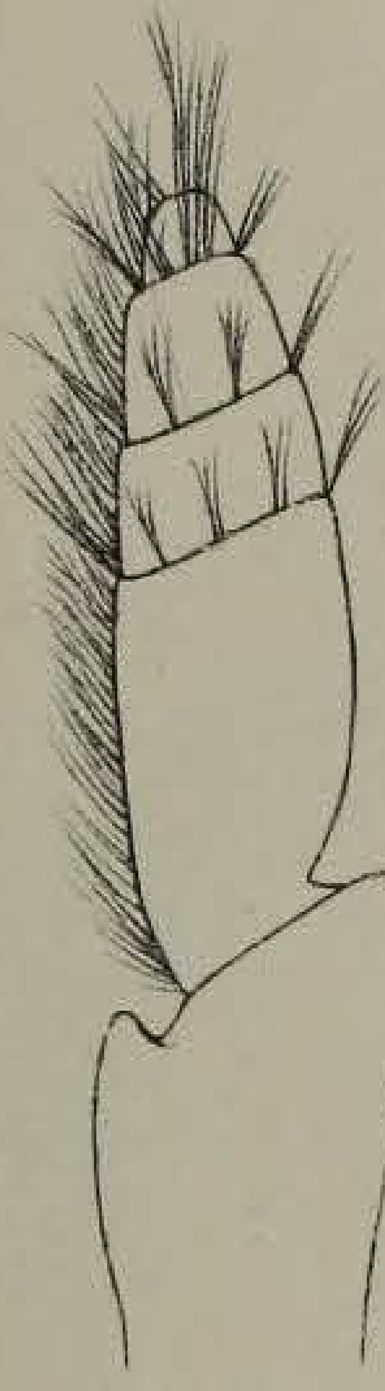
W. E. COLLINGE: BRITISH IDOTEIDAE.—PLATE X.

ZENOBIANA PRISMATICA (RISSO).

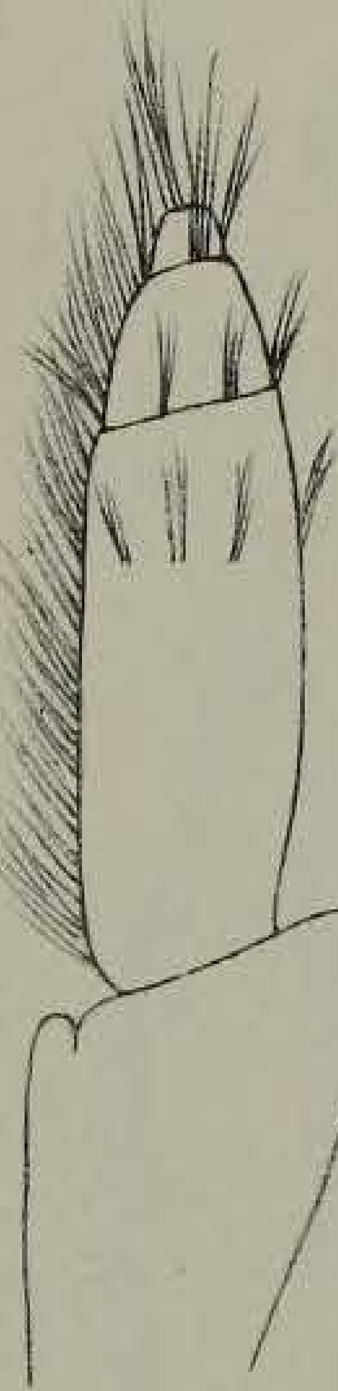
104 × 20



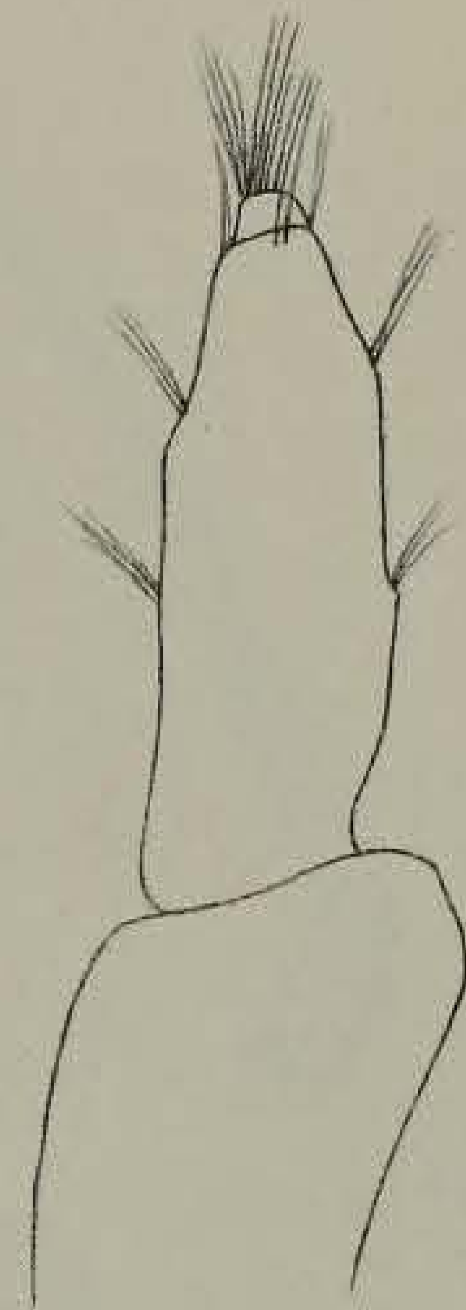
105 × 20



106

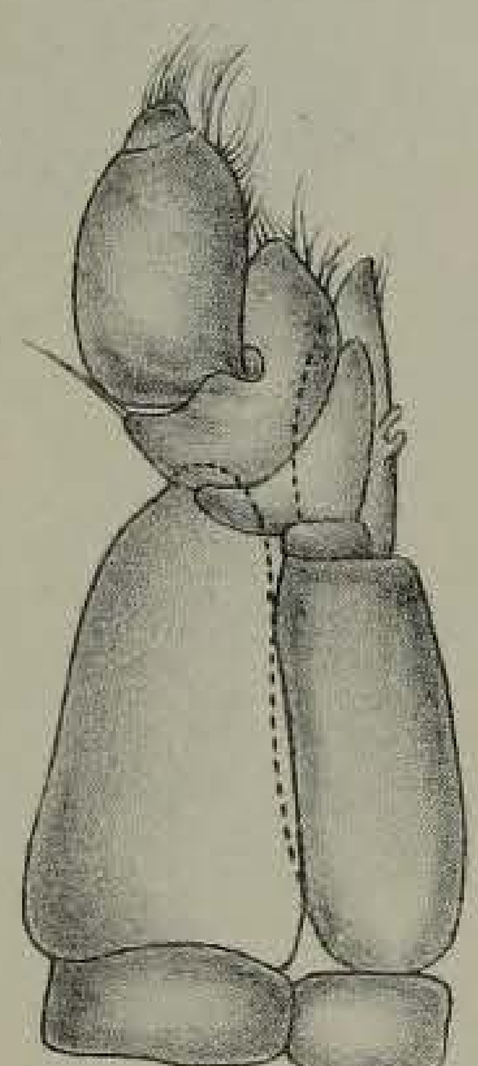


107

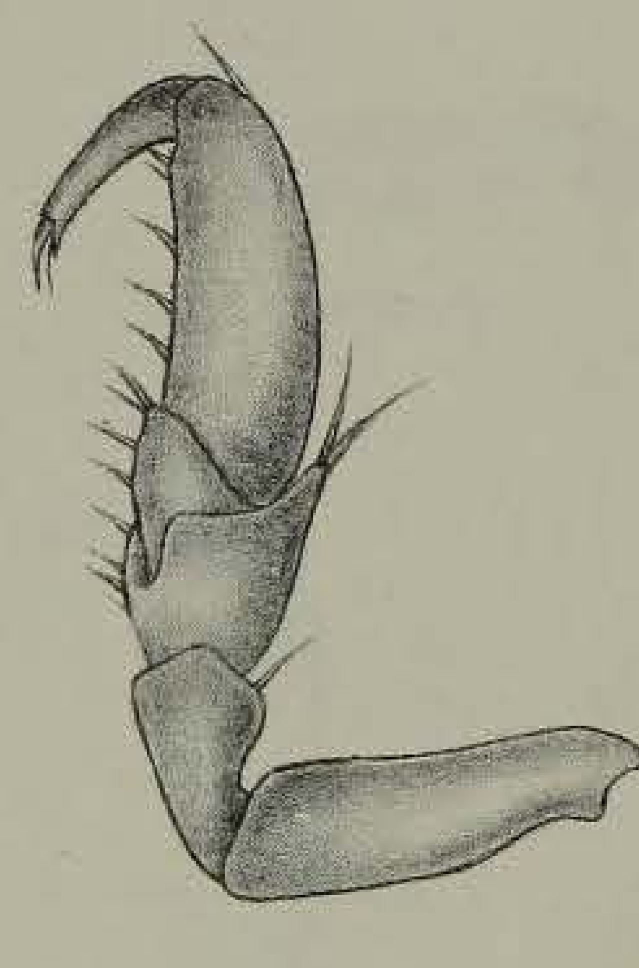


108

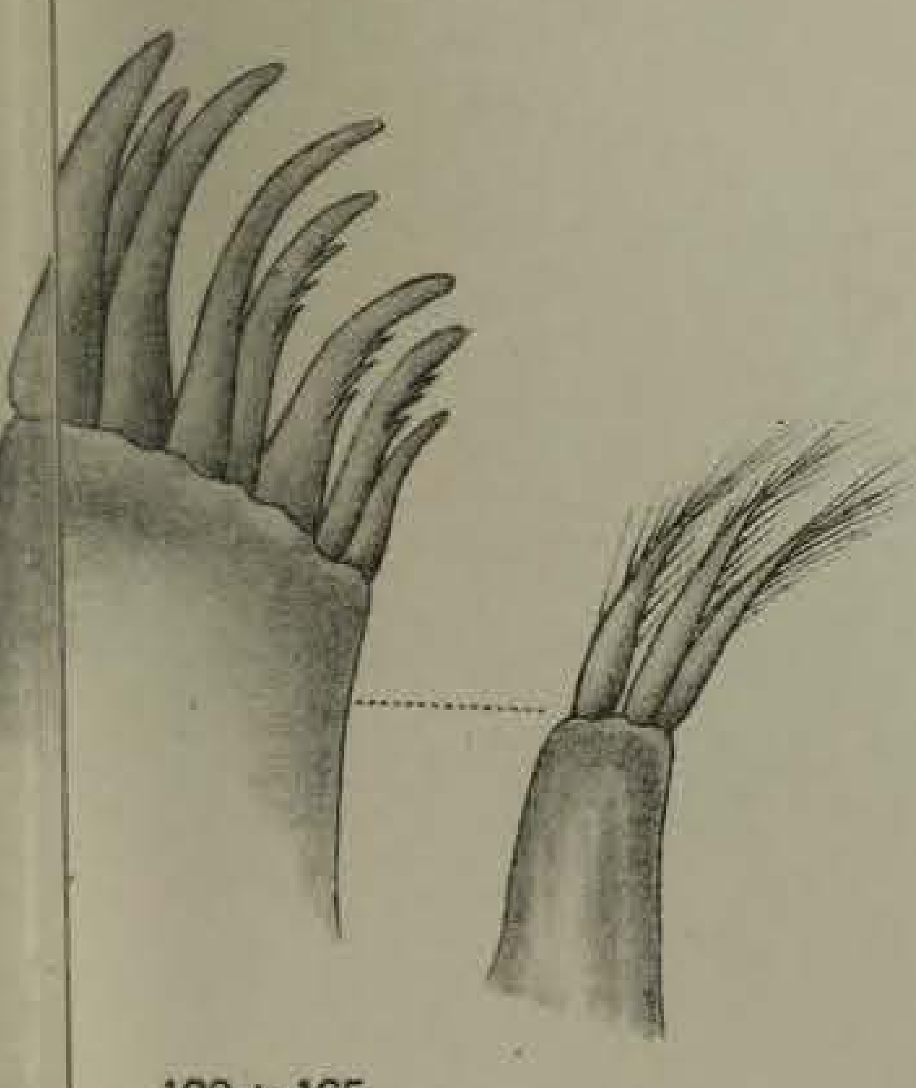
103 × 8



110 × 43

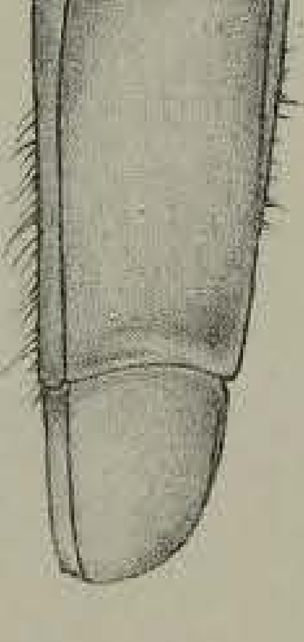


111 × 33



109 × 165

113 × 8



114 × 24

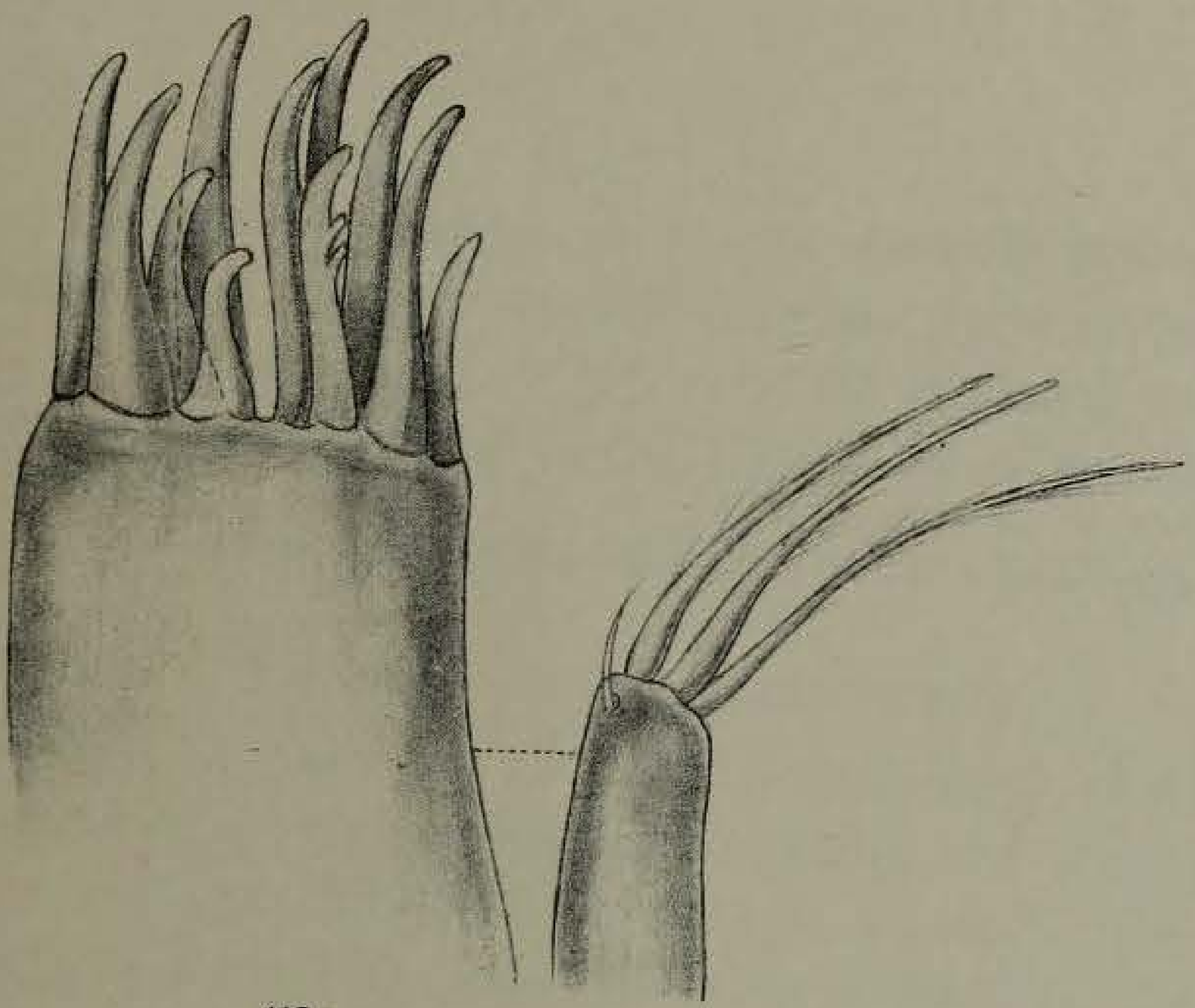
112 × 8

A. RITCHIE & SON, EDIN^R

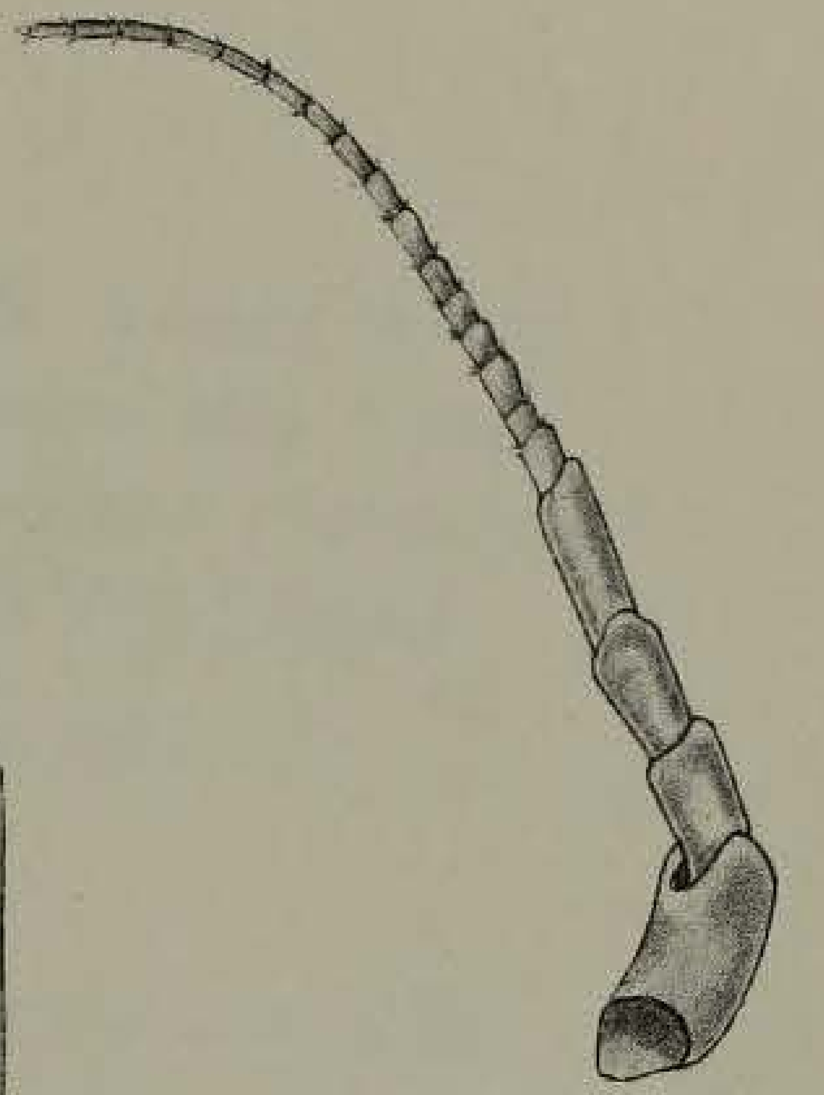
W. E. Collinge: British Idoteidae.—Plate XI.

Synisoma lancifer (Leach).

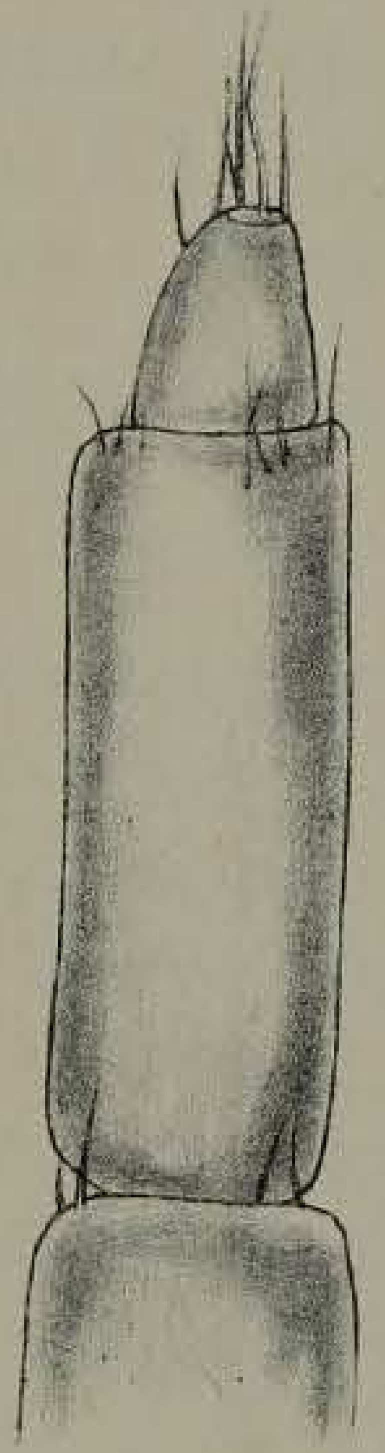
116 × 28



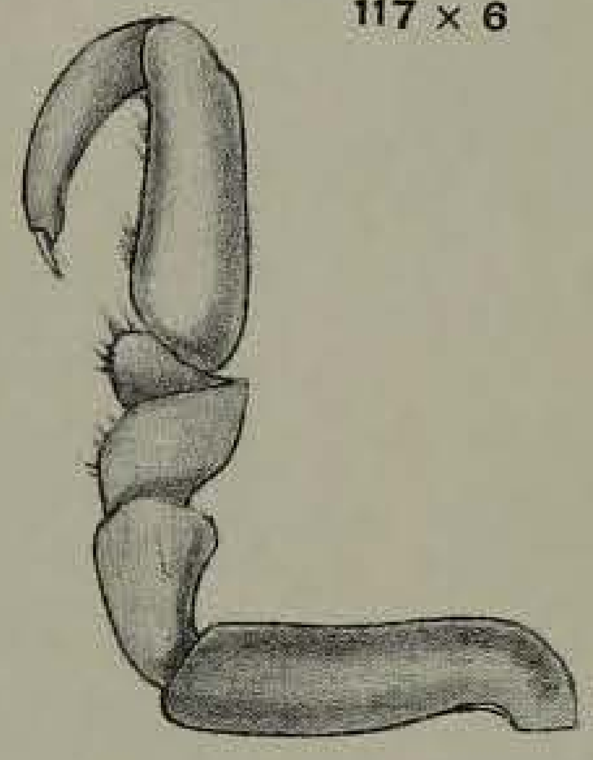
119



117 × 6

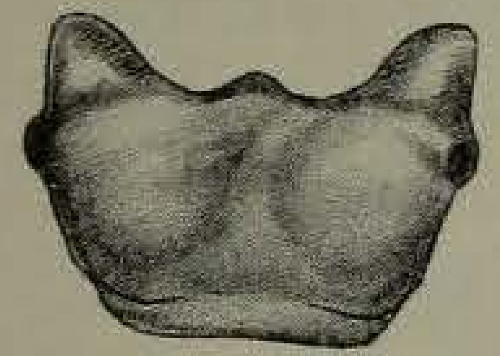


118 × 110

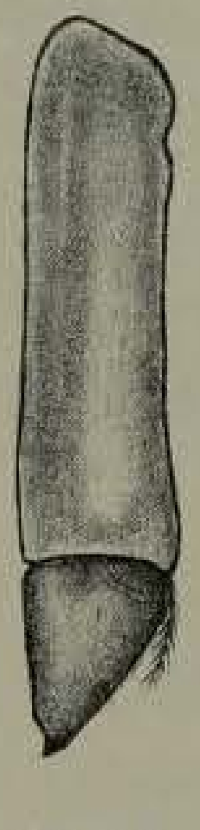


122 × 15

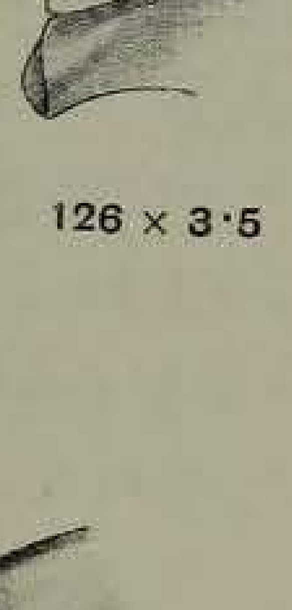
120 × 24



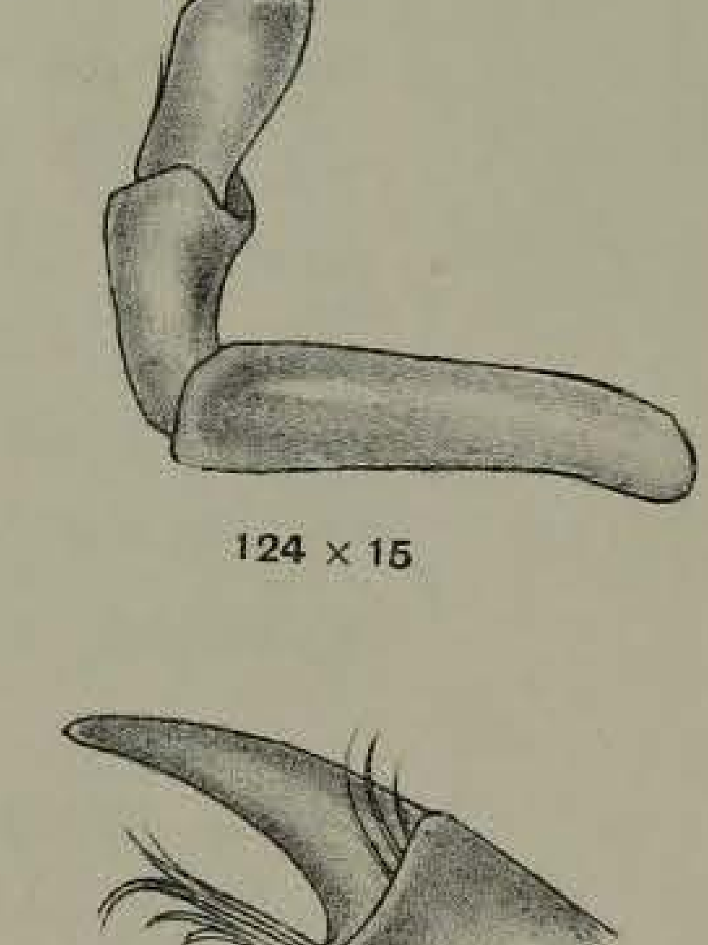
115 × 7



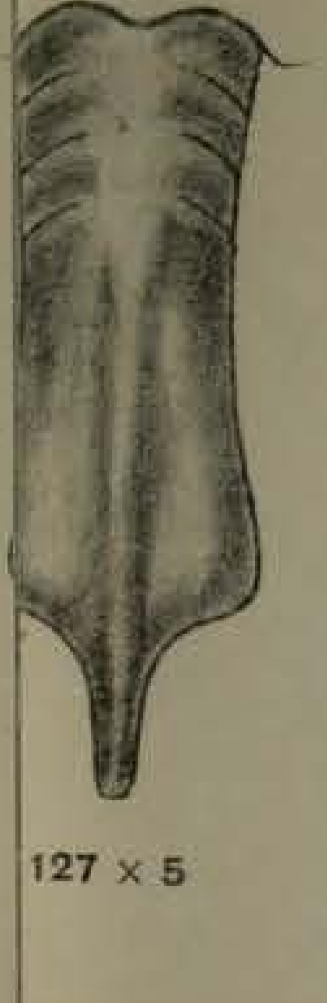
128 × 7



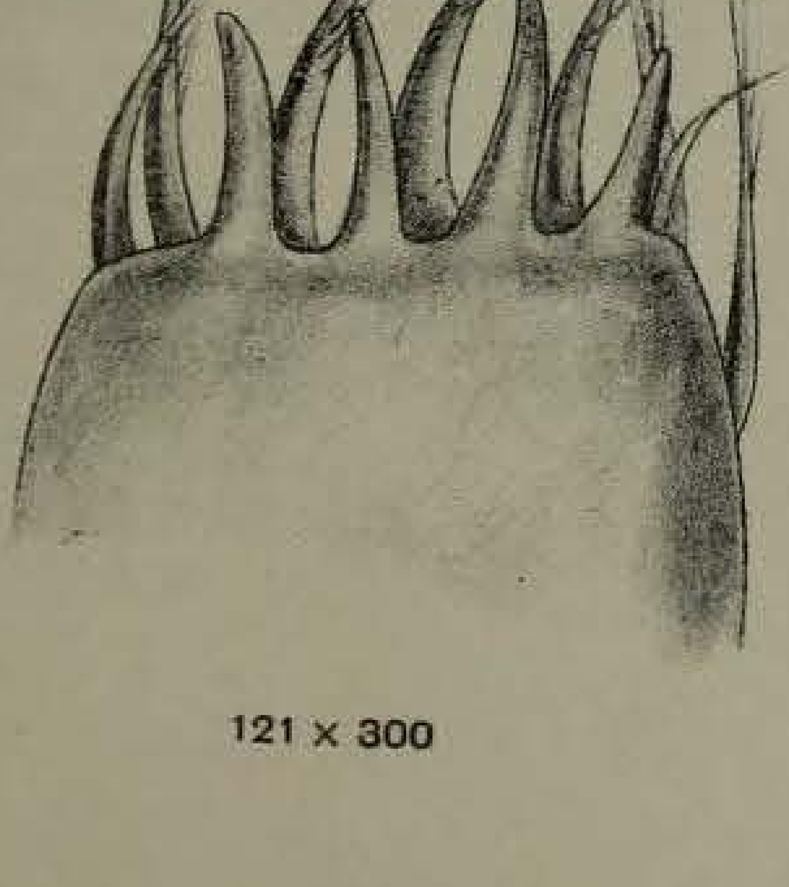
126 × 3·5



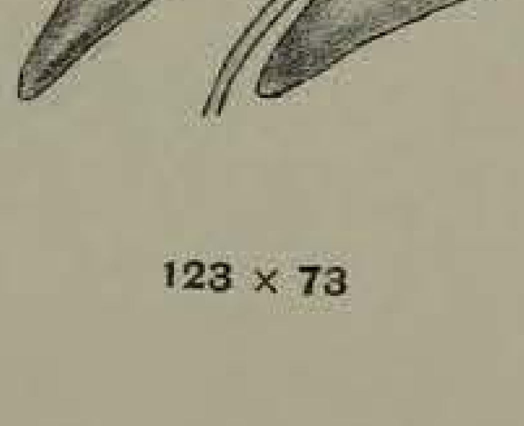
124 × 15



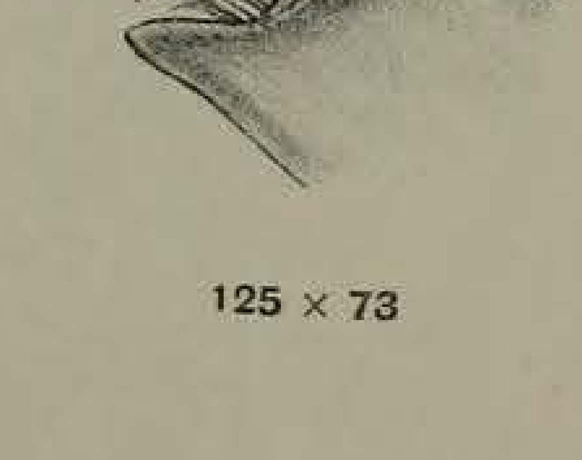
127 × 5



121 × 300



123 × 73



125 × 73

Del. ad nat.