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CONDUCTED BY

A. H. HALIDAY, A. M., M. R. I. A., F. L. S., ETC.,

MEMBER OF THE ENTOMOLOGICAL SOCIETIES OF LONDON, FRANCE, AND STETTIN.

W. H. HARVEY, M. D., M. R. I. A., F. L. S.,

PROFESSOR OF BOTANY, UNIVERSITY OF DUBLIN.

REV. S. HAUGHTON, A. M., F. T. C. D., M. R. I. A.,

PROFESSOR OF GEOLOGY, UNIVERSITY OF DUBLIN.

AND OTHERS.

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THE DUBLIN NATURAL HISTORY SOCIETY;

THE DUBLIN UNIVERSITY ZOOLOGICAL & BOTANICAL ASSOCIATION;

AND SOME OF

THE PAPERS READ BEFORE SECTIONS C & D OF THE BRITISH
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DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION.

FRIDAY EVENING, NOVEMBER 21, 1856.

R. BALL, LL.D., President, in the Chair.

THIS being the first meeting of the Session, the PRESIDENT read his

ANNUAL ADDRESS.

WHEN on Saturday last your Council told me it was my duty to address you, it came on me quite by surprise: it seemed but as yesterday that I had done so; time passes so quickly to those who are fully employed. Yet it is certainly a fact that a year has glided away—I trust not without advantage to many of us—and that we shall have in this Association proof that good work has been done in the period, and that not a few of you have been active in the pursuit of practical zoology, in some of the departments to which I ventured to call your attention last year.

In noticing the occurrences of the past year, I have not to mourn the loss of so many of our members and friends as on the former occasion; yet there is one loss which I deeply feel, that of my old and excellent friend Yarrell, one of our Corresponding Members, whose kindness and hospitality I often enjoyed. Eager to obtain information himself, he was equally willing to give it. I may mention, as an instance, that he placed at my disposal, during two days which I spent in his house, all the materials in his possession which he thought could aid me in a work on Fisheries, in which I had made considerable progress, but which pressure of business and illness forced me to lay aside—I hope not for ever.

Since our Association was established (now but a brief period), we have had a great loss of most valued members, men who loved natural science for its own sake, and to whose exertions it mainly owes its present rising position; by being frequently associated with them, their loss occasions in me a sense of loneliness which our junior members cannot yet and probably will never know,—for this loss is likely to be replaced by additions, from the numbers of persons now enlisting in the pursuit of natural science. We must hope that the great majority of these

- Pinnularia radiosa* (fragment), (fresh water); Ballyleg Quarry.
Surirella minuta (fresh water); Ballyleg Quarry and Glenarm.
 „ *subsalsa* (fresh or brackish water); Ballyleg Quarry.
Synedra capitata (fresh water); Glenarm.
 „ *radians* (fresh water); Ballyleg Quarry and Portrush.
Tabellaria flocculosa, (fresh water); Ballyleg Quarry.
 „ *fenestrata* (fresh water); Ballyleg Quarry.
Tryblionella marginata (fresh and brackish water); Ballyleg Quarry.

In all, 42 different species, which may be distributed in the three following classes:—

Species found in fresh or brackish water,	4
Marine species,	7
Fresh-water species,	31
	—
Total,	42

From this summary it appears that, as regards the number of species found in these four specimens of chalk, there was a great preponderance of fresh-water forms; and the same observation applies to the number of specimens belonging to each species.

These facts I thought might possibly possess some interest, and, therefore, I have not hesitated to submit them to the consideration of the Section. I purpose following up this subject, and will publish any further results in the “Transactions of the Dublin University Zoological and Botanical Association.”

ANALYSIS OF CERTAIN ALLIED GENERA OF TERRESTRIAL ISOPODA; WITH DESCRIPTION OF A NEW GENUS, AND A DETAILED LIST OF THE BRITISH SPECIES OF *LIGIA*, *PHILOUGRIA*, *PHILOSCIA*, *PORCELLIO*, *ONISCUS*, AND *ARMADILLIUM*. BY PROFESSOR JOHN ROBERT KINAHAN, DEPARTMENT OF SCIENCE AND ART, M.B.T.C.D., M.R.I.A., HON. SEC. DUBLIN NATURAL HISTORY SOCIETY, ETC. ETC.*

HAVING been during the past summer engaged in researches among the Irish Isopoda, I am induced to lay before your Association the results to which I have been led by an examination of the above genera,—the rather, as from authors this interesting family has received but little attention, and in consequence but little is known with certainty concerning the habits, species, and distribution of the group. This is the more remarkable, as of the fourteen species now to be noticed, all, with the exception of two, are of extremely common occurrence, and their study, owing to their size, comparatively easy. In proof of this state-

* Read before Section D at the Meeting of the British Association, Dublin, August 26, 1857.

ment I may mention that all except two (one a marine species) have occurred to me in a garden not sixty yards square, and nearly all in abundance.

It would appear to have been the fashion with carcinologists (probably on account of the terrestrial habits of most of the genera), to nearly ignore their existence, and hence the mistakes with which the authorities abound. This renders a brief sketch of the bibliography of the group necessary.

Historical Bibliography.

Although a host of writers have from the earliest days of science noticed these animals, yet the true nature of their generic, specific, and familiar relations have been so totally misunderstood, and the characters drawn on for diagnosis are of so little real value, that we may pass over the labours of the majority of authors, and come at once to the works published within the last twenty years, the rather as this part of the subject has been so ably treated of by Professor A. Lereboullet in the "Transactions of the Strasbourg Society," just now to be referred to.

Passing, therefore, over the writings of Linnæus, Geoffroy, Fabricius, De Geer, Cuvier, Leach, Dumeril, Latreille, Risso, Savigny, and a host of others, whose characters, drawn from colour chiefly, render their descriptions worse than useless, we will come to Brandt, who appears to have caught at the true distinctive characters of form, and may be said to have laid the first foundation of a perfectly natural system, in his "Conspectus Monographiæ Crustaceorum Oniscodorum," published in Moscow in 1833; and although in some instances he has stopped short in his analysis, and has even mistaken the true import of some of the characters, yet it must be a matter of regret that this naturalist has not yet fulfilled his promise by giving to the world a full history of the group.

Milne-Edwards, who comes next in order of time, has scarcely in this sustained his well-deserved reputation in other groups, as this part of his work is replete with errors of a serious nature, and the descriptions, many of them copied verbatim from the earlier writers, and mere accounts of colours, are useless. Witness the description of *Philoscia muscorum*, a genus which he can scarcely have examined, or he would not have proposed that it should be reunited to *Oniscus*, a genus from which, as we shall see, it differs widely.

In the fourth volume of the "Memoirs of the Natural History Society of Strasbourg," published in 1853, appears a paper from the pen of Professor A. Lereboullet, M. D., Director of the Museum at Strasbourg, entitled, "Sur les Crustacés de la Famille des Cloportides qui habitent les Environs de Strasbourg," of which it is impossible to speak in too high terms, whether we regard the minuteness of details, or the author's patient investigations into the labours of others, and although in one or two points he has evidently fallen into error, yet, as a whole, this little work must be long looked on as a standard on the subject.

I must here also notice an excellent, but scarce little work, which

has but recently come into my hands, and for the perusal of which I have to thank the kindness of A. H. Haliday, Esq., entitled, "Prodromus Synopseos Crustaceorum Prussicorum," published at Königsburg, 1834, from the pen of E. G. Zaddach, Ph. D., which contains much useful matter; among other things, M. Edwards's error concerning *Philoscia* is noticed.

Dana in his splendid work on the Crustacea, has proposed in some respects a new arrangement of the group, but has, as I think, mistaken in some cases the bearings of the characters, as will be shown further on.

Valuable notices of separate genera and species have appeared as detached papers in some of the journals, chiefly German (as, for instance, the description of the curious genus, *Titanethes albus* of Schiödte (*Phærusa alba*, Koch), in Schiödte's interesting account of the subterranean Fauna of Carniola), which have thrown much light on the true affinities of these animals, and render a revision of our classification necessary.

It will be necessary to glance at the systems of classifications adopted by the several authors mentioned; but first I must notice a most elaborate, as far as illustrations go at least, work by Henrich Schæffer, intended as a supplement to Koch's "Fauna Germanica." In this work we have spurious species multiplied to a most inconvenient extent, and his genera are most of them too large: thus, under *Ligia* he includes *Philoscia muscorum* (figured as *Ligia melanocephala*, a more natural alliance, by the way, than M. Edwards, of *Oniscus*). *Itea* includes *Itea* proper and *Platyarthus* (*Br.*), and probably a third form. He has changed Brandt's name, *Ligidium*, for *Zia*, and his *Armadillo* into *Pentheus*, whilst *Armadillium* (*Br.*) figures here as *Armadillo*, Latr. The other genera described by him are *Phærusa*, *Oniscus*, and *Porcellio*, the two latter including as species many which can scarcely be looked on as even varieties.

On Classification.

Brandt, taking as familiar characters the number of joints in the terminal appendages of the antennæ and the number of pairs of caudal appendages (i. e. the last pair of false feet), has divided the genera known to him into two sections, viz., *Ligiea* (*Ligia* and *Ligidium*) and *Oniscinea*, subdivided according to the length, form, and insertion of the exterior caudal appendages, into (1) *Porcellionea* (*Trichoniscus*, *Platyarthus*, *Porcellio*, *Philoscia*); and (2) *Armadillinea* (*Armadillidium*, *Cubaris*, *Armadillo*, and *Diploexochus*).

Although these generic groups are natural enough, he appears to have mistaken the true nature of the caudal appendages, which in all the genera belonging to this group consists truly of two pairs, as we hope to show when we come to treat more in detail of them, although in all the groups except *Ligiea* their true nature is somewhat obscured by the truncation of the margin of the peduncle. In *Ligidium*, included by him among the *Ligiea*, but which, as will be seen, we propose to place in a separate division, the appendages are really two pairs.

His lesser divisions and species are many of them faulty, being

governed nearly entirely by considerations of number and colour, characters of a very minor importance in classification, though oftentimes convenient when conjoined with the more permanent characters, of form, position, and structure. Some of his genera probably must fall, at least in their present shape, their descriptions being so imperfect as to render them unrecognisable, owing to his imperfect means of observation: thus, *Trichoniscus* may possibly turn out to be *Itea*, *Zia*, or some of their allied genera, more fully described by later writers.

Milne-Edwards has for the most part copied Brandt, but has proposed new primary divisions, in the naming of which he has been singularly infelicitous. He has drawn his familiar characters from the comparative length or brevity of the last false feet, as compared with the terminal segment of the abdomen, and thus makes two primary groups, *Cloportides maritimes* (*Ligia* and *Ligidium*): and *Cloportides terrestres*, subdivided, according to the form and length of the last pairs of false feet and their appendages, into Porcellioniens (*Oniscus*, *Philoscia*, *Deto*, *Porcellio*, *Trichoniscus*, *Platyarthus*), Armadilliens (*Armadillidium*, *Armadillo* (includes *Cubaris*), *Diploexochus*), and Tylosiens (*Tylus*).

The names of his primary divisions show us the danger of naming groups from habits. *Ligidium*, although included among the Maritime woodlice, is as truly a terrestrial species, and found at as great a distance from sea, as *Porcellio* itself. Most of his descriptions of genera are avowedly mere transcripts from previous authors, even those which one would suppose ought to have come under his own notice, being indigenous, as in the case of *Philoscia*, which he allies to *Oniscus*, whereas in truth it is much more closely allied to *Ligia* in all its characters. His specific descriptions are almost all mere details of colour, without one truly distinctive character.

Dana has much extended the group, uniting, however, to the genera already mentioned others, whose claim to the alliance appears but slight, viz., the *Limnoriæ* and *Asellidæ*, on account of the characters of the posterior pair of abdominal appendages. He has thus made one large group, *Oniscoidea*, and in his definitions has largely entered into characters which may be generic.

He divides the *Oniscoidea* into three groups, according to the mode of articulation of the body; the number of articulations of the abdomen; the size of the last abdominal segment; the length of the caudal appendages (i. e. the last false feet); the absence or presence of a palp to the mandibles; and the number of articulations and size of the internal antennæ. (Of these, the characters of the number of articulations in the abdomen and internal antennæ, the size of last abdominal segment, presence of a palp to the mandibles, have reference solely to his last family (*Asellidæ*), a group which had been probably better omitted.) 1. *Armadillidæ*, according to arrangement of caudal appendages, divided into *Tylinæ* (*Tylus*), and *Armadillinæ* (*Armadillo*, *Sphærillo*, *Armadillidium*, *Diploexochus*). 2. *Oniscidæ*, according to number and form of articulations of maxilliped, form of articulation of fifth joint of external an-

tennæ, and form of peduncle and styles of caudal appendages, divided into Oniscinæ, Oniscus (including as sub-genera Trichoniscus, Porcellio, Oniscus). Philoscia; Platyarthus; Deto. Scyphacinæ (Scyphax, Styloniscus). Liginæ (Ligia, Ligidium). 3. Asellidæ, including Limnorinæ (Limnoria). Asellinæ (Jæra, Jæridina, Asellus, Janira, Henopomus, Munna). As I believe these last do not really belong to this group, I omit their characters.

Although this classification contains some new characters, many genera are omitted, which naturally belong to the group, and many of the characters are too artificial to be taken into account. The innovation of considering Porcellio, Oniscus, and Trichoniscus as sub-genera is highly objectionable (indeed it will be well when the term sub-genus is banished altogether from our nomenclature), as these divisions do not depend, as he seems to assert, on the mere number of joints in the terminal filament of the antennæ, but, as I hope to prove, on a number of other characters sufficient to constitute them, as real genera as Ligia and Ligidium. Mere number plays too great a part in his system also to allow of natural groupings. His classification, however, is valuable as restoring to their proper place the Armadillidæ, which, on account of their resemblance to certain Myriapodæ, have been hitherto, as it seems, unjustly degraded to the bottom of the list of Cloportides.

From a revision of these various systems, it appears, that putting out of sight such arbitrary characters as mere colour and number, divisional characters of most importance are: the comparative development of the external antennæ or rather of its filament; the mode of insertion and development of the last pair of abdominal feet, and perhaps we may add the form of the maxilliped; this last, however, is a character so difficult of application that it were, perhaps, as well to leave it out. 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*, as they are generally called. These characters, being permanent in their structure, presenting differences easily caught at, and running also in parallel arrangement throughout the groups, I would propose as the basis of the classification, which, till a better shall arise, I would suggest as that which appears most natural and most in accordance with homological affinities.

The characters, then, which must be considered in detail are:—

1st. The amount of development of the so-called “epimerals” or *coxæ* of the posterior cephalo-thoracic and abdominal appendages.

2nd. The form of the head as regards the absence or presence of what are called the frontal or median, and lateral lobes.

3rd. The relative structure and development of the antennæ, and especially of the terminal filament, or, as we will call it, “*the tige*” of the external or superior antennæ.

4th. The structure and position of the last pair of abdominal false feet, their relations to each other and the last abdominal ring.

Before entering on these, the following nomenclature of parts must be stated:—*Head*: all the parts anterior to and including the first ring, or, in other words, the homologue of the carapace of the Brachyura. The term *cephalo-thoracic* refers to the portion of the body included between this point and the posterior border of the eighth ring, counting the head the first: this homologizes, we believe, with the pereion of Spence Bate; while the remaining six rings are referred to as the *abdomen*, homologizing with the abdomen of the Brachyura, and the pleon and telson of Spence Bate. The appendages attached to the last abdominal ring are cited as the last pair of abdominal feet, for such is evidently their nature; the so-called epimerals stand as *coxæ*, and the filament of the antennæ as *tige*.

I.—*Amount of Development of the "Epimerals."*

The "epimerals" first claim our attention. For the determination of the true homological relations of these we are indebted to the researches of C. Spence Bate, F.L.S., among the Amphipoda, who, in the first Part of his Report on the British Edriophthalmia, published in the Report of the British Association for 1855, has proved most conclusively that these so-called epimerals are truly and homologically the first joint, or, as he calls them, the *coxæ* of the ambulatory and swimming organs; and although, in the case of the posterior pairs of appendages in the Isopods under consideration, their true nature, when present, is oftentimes obscured, yet, by a little care in the examination, it may be at once seen, though somewhat disguised.

Their presence in the cephalo-thoracic rings seems to be constant in all the genera I have examined, or of which detailed accounts are extant; though sometimes, as in *Ligidium*, the suture which divides them from the edge of the true epimerals is so faintly marked as not to be appreciable; hence I suspect that Lereboullet laboured under an error in supposing them absent in *Ligidium Persooni*, for an examination of his own figures of the articulation of the ambulatory legs shows that they must be present, from the position of the articulation of the first joint, which arises from beneath a ledge which evidently is the *coxæ* of the limb: it is hazardous to speak positively on this point without an examination of specimens, but in *Armadillium*, *Ligia*, *Philoscia*, *Philougria*, *Porcellio*, and *Oniscus*, I find them well marked, and they are figured or recorded in *Itea*, *Titanethes*, *Tylus*, and several other genera. In the abdominal segments there may be some question of their presence, but what are usually called the posterior angles of the rings a very little examination shows really to be these *coxæ*. This is remarkably well seen in *Ligia*, and, judging from Dana's figures in *Tylus* above all, where they appear to be regularly articulated to the rings in the eight, i. e. the first abdominal segment. Dana appears to have overlooked this character altogether; there is some great confusion in his figures: many of the species certainly are not belonging to the genera to which he has referred them,—I may instance *Oniscus nigrescens*, *O. maculatus*, and *O. pubescens*, which are most certainly not *Oniscus*, but most probably *Philoscia* judging from the figures of the false feet.

An additional evidence of the true nature of these posterior angles is afforded by the mode of articulation of the posterior false feet, which is, in some of the genera, by means of a regular ball and socket joint.

Regarding their development in the abdominal segment (i. e. the *pleon* and *telson* of Spence Bate), we find the following types:—

1. Coxæ present in both cephalo-thoracic and abdominal segments, and of nearly equal proportional development. This includes *Ligia*, *Tylus*.

2. Coxæ present in first five abdominal rings only, two types.

(a) Narrow, so that abdomen is much narrower than last cephalo-thoracic ring. The coxæ of first and second abdominal segments concealed beneath last cephalo-thoracic segments. The third ring of the abdomen much wider than the second —; this reaches its limits in *Titanethes*. This type includes *Ligidium*, *Titanethes*, *Philoscia*, and perhaps Dana's new genus, *Scyphax*.

(b) Coxæ present as before, but extremely narrow, and not concealed beneath cephalo-thoracic rings. This includes *Itea* (?), *Philougria*, and probably *Trichoniscus*, and *Deto*.

3. Coxæ present in third, fourth, and fifth segments. In the first and second segments the coxæ, if developed, are so linear as not to be recognisable. This includes *Porcellio*, *Oniscus*, and probably *Platyarthrus*. *Scyphax* also, judging from the figures, belongs to here; it may, however, form a distinct type, as the coxæ of the second appears to be developed. The animal figured by Dana as the young of this genus can scarcely be so, unless it be an exception to all the rules which regulate the form of the young in this family. He has himself proposed to call it *Actæcia*.

4. Coxæ present in second, third, fourth, and fifth rings, the sixth reduced to its minimum: *Armadillo*, *Sphærillo*.

II.—*The Form of the Head.*

We shall next examine the arrangement of the various parts of the cephalic segment, or, as I have called it, the *head*; these are of minor importance, but still assist much in classification. It will be necessary to examine the native genera in detail.

Ligia, Plate XX., Figs. 7 to 10.

When the head is looked down on from the front, we remark anteriorly just beneath but not attaining to the frontal line of the head, a broad plate extending over the *entire* forehead, and divided transversely by a raised ridge; its superior margin also marked by a raised ridge. This superior ridge passes off on each side beneath the eyes, forming at least a third of the inferior border of the orbit. The external angle of the orbit, however, is formed, not by this, but by the cephalic ring continued forwards from behind, and terminating as a rounded knob just above the external antennæ; these arise in the angle between the inferior border of the frontal plate and the projecting lobes. The inferior border of the frontal plate is formed of two curves, convex upwards, one over the origin of each external antennæ; the angle of their junction is

truncate, separated by a short transverse suture from a small, narrow, somewhat quadrilateral plate, which bears the internal antennæ, and is probably the remains of the second or internal antennary ring, the frontal plate itself representing the external antennary or third ring of the typical crustacean; beneath this is a broad, well-marked plate, the epistome.

Philoscia. Plate XX., Figs. 1 to 6.

The inferior border of the frontal ring is nearly straight across, the transverse suture well marked, nearly on a level with the superior margin of the external antennæ, its superior margin curved, raised, and passing slightly beyond the frontal line of the cephalic segment, shutting out the orbit from the insertion of the external antennæ, and a deep sulcus separating it from the external angle of the orbit, the third ring being thus transverse and narrow. The second ring is nearly as deep as the third, and well marked; the epistomal plate narrow, and formed of two triangles placed apex to apex. The orbits are open below and behind.

Philougria. Plate XXI., Figs. 1 to 4.

Nearly a similiary arrangement prevails, but the lateral ridges around the insertion of the external antennæ are somewhat more strongly marked.

Oniscus. Plate XXI., Figs. 5 to 7.

The external angles of the superior margin of the third ring are produced into a broad lobe, which covers over the origin of the external antennæ, it is then continued across, projecting slightly over the frontal line of the cephalic segment; the transverse suture is well marked. The second ring very narrow, almost obsolete. The lateral lobes are continued backwards, and are separated by a suture from the external inferior border of the cephalic segment, which completes the orbits.

Porcellio. Plate XIX., Figs. 1 to 10.

External angles of third antennary segment still more developed, the superior margin raised into a lobe which projects above the frontal line of the cephalic segment, and gives the head a trilobed appearance. This lobe, though sometimes badly marked, *Porcellio pruinosus* (Br.), *P. frontalis* (Lereb., not Edw.), for example, is present in all the species I have had an opportunity of examining.

Armadillium. Plate XXI., Fig. 3.

The eyes are supported on the cephalic segment alone, the margin of this is raised, forming an angular projection in the middle of the forehead, passing back from whence, as before stated, it forms the orbital margin, to the entire exclusion of the third segment, the lateral lobes here being remarkably small, and derived entirely from the cephalic segment.

The superior margin of the third ring commences beneath the lateral lobes of the cephalic segment, a suture marking its origin, and the margin of cephalic border concealing it, thence it gradually emerges, passing inwards, and rises above the frontal border as a prominent arched plate, which projects over the frontal line, and is visible from behind.

Its surface presents the following markings, beginning below:—In the centre, arising from the transversal suture which divides the second and third segments, two divergent ridges passing out on each side, terminate at the extremities of the arched superior margin; external to each of these is a deep sulcus; bounding the outer edge of this sulcus a curved raised ridge surrounds the insertion of each external antennæ, and terminates as a large lobe on the outer side of the head; these are the lobes which are described by authors as the lateral lobes in the *Armadillinæ*, and which differ from the lateral lobes of the *Oniscinæ* in the place of their origin being from the inferior, not superior, margin of third ring.

The second ring is well marked, transversal, and prolonged on each side into a trigonal point beneath the external antennæ, the lobes bearing the internal antennæ on their summits. When at rest the external antennæ lie buried within this sulcus, curled over between the lateral lobes of the third and fourth, or cephalic, segments.

We have then the following rings represented: the first antennary (i. e. second normal ring); the second antennary (third normal). As to the first (or ophthalmic) ring, it scarcely seems to exist; what I have called the lobes of the superior ridge may represent it, but I think rather they are the epimerals of the third ring.

Of these parts the most important to be attended to are the median lobe, formed, as we see in *Porcellio*, by the *superior* margin of the third or external antennary ring; and the lateral lobes, formed in *Oniscus* and *Porcellio* by the superior margin of the same ring, and in *Armadillium* by the inferior margin; for while undoubtedly generic in their characters, they also assist us materially, in conjunction with other characters, in the formation of families.

On analysis, then, we get the following types of cephalic characters in the groups:—

1. Head furnished with lateral lobes arising from *inferior* margin of third ring; median lobe arched, prominent, forming a triangular plate, vertical to frontal line. Genera—*Armadillium*, *Armadillo*, *Spherillo* (?), *Cubaris*, *Scyphax* (?).

2. (a) Head furnished with lateral lobes arising from *superior* margin of third ring; median lobe prominent, in the same plane as the frontal line—*Porcellio*.

(b) Head furnished with lateral lobes, arising from the *superior* margin of the third ring, which is emarginate in the centre—*Oniscus*.

3. The superior margin of third ring nearly straight, neither lateral nor median lobes, terminating externally at the external angle of orbits—*Philoscia*, *Philougria*, *Itea* (?).

Itea is described as having small lateral lobes.

4. The superior margin as in No. 3, but not rising above inferior border of orbits—*Ligia*, *Ligidium* (?).

There may be, and probably are, two other types at least, viz., that of *Scyphax*, and *Titanethes*, but I have only seen figures of these, the latter is described as having large lateral, but no median lobes.

These naturally lead us to consider the characters of the antennæ; and here we are dealing with organs whose importance has been to a certain extent recognised, though apparently neither has their full nor true bearing on classification been hitherto considered. The number of joints without any reference to the more important character of form, has been too much relied on, and hence some most incongruous groupings, as of *Philoscia* and *Oniscus*, have been made; but of this more anon: first, to consider their general structure:—

III. *The Characters of the Antennæ.*

First, of the *Internal antennæ*.—These are merely rudimentary through the entire group, generally consisting of but three short articulations (*Porcellio* has four), and seldom passing beyond the front. They are inserted internal to, and at the base of, the external antennæ; they afford but little assistance in classification, for although they have been made use of to distinguish genera, in the higher divisions they are useless as diagnostic characters. We pass then to the next or—

External antennæ.—These are invariably simple, being made up of a peduncle, which is pretty constant in its characters, and a filament or tige, which varies much, and therefore affords good classificatory characters. The peduncle invariably, as far as we know, consists of five joints: in some, as *Ligia*, a sixth appears to exist, but a little examination will show this to be a part of the third ring. The only joint which affords any useful character is the second, which, in some genera, as *Armadillium*, *Porcellio*, and *Oniscus*, is narrow at its articulation with the first ring, and then suddenly swells out into a broad expanse, contracting again slightly towards its articulation with the third joint; while in others, as *Philoscia*, *Ligia*, *Philougria*, *Itea*, and *Ligidium*, the second joint is globular: another argument for the separation of *Philoscia* and *Oniscus*. The carvings and sulcations on the joints of the peduncle, however, occasionally afford useful specific characters.

From the extremity of the peduncle arises the filament, and of this, trusting to form alone, the seven following types have been described. This organ has attracted much attention; but unfortunately, as I said before, too much attention has been paid to mere number, and too little to form.

Regarding form only, we find the filament constructed on three types:—

1st. The articulations are short, globular, cupped at their upper extremities, which are fringed with hairs, and receive the inferior portion of the articulation next succeeding. These filaments are all, as far as I

can learn, multi-articulate. Examples—*Ligia*, *Ligidium*, *Titanethes*, *Styloniscus*.

2nd. The articulations elongated, somewhat flattened, and generally covered with hair, few in number, gradually tapering, but not subulate, the terminal one terminating in a narrow articulated hair. Examples—*Oniscus*, *Porcellio*, *Philoscia* (?), *Armadillium*, *Armadillo*, *Spherillo*, *Tylus*, *Scyphax*, *Platyarthus* (?), *Deto* (?).

The characters of the second articulation of the peduncle, as hinted above, divide these into two groups.

3rd. The articulations few in number, the whole filament gradually tapering, subulate, and perfectly naked, terminating in a tapering filament. Examples—*Philougria*, *Itea*, *Trichoniscus* (?).

In all these genera the number of joints in the antennæ has been used as a generic character by Brandt, &c., except *Ligia*, *Ligidium*, and *Platyarthus*; but in grouping the genera no regard has been, as far as I know, paid to the far more important character—that of the form of the tige.

Dana states that number of articulations of the tige is of no value as a character, and instances as a proof it the genus *Scyphax*, in which he states that in the young the tige has its apex with the rings half marked. From the character of the figure it is apparent the drawing was made from a dead specimen, probably a dried one, in which, owing to the contraction of the tissues, circular cracks had taken place, a fact which any microscopist who examines the antennæ of many of the Cloportides under the glass must be fully aware of. The specimen also which he figures as the young of *Scyphax*, judging from its tail appendage, can scarcely belong to that genus at all; at least, though I have carefully examined the young of all our native genera, most of them recently hatched, yet I never met an instance in which the tail appendages differed much from that of the full-grown animal: but we will speak of this anon in our enumeration of genera.

There is one objection which has been started to using the characters of the tige as generic, which must be noticed, i. e. that in the young the number of joints are less than in the adult. This statement is only partially true. For instance, in most of the genera in which the antennæ are multi-articulate, the antennæ of the young and adult differ much; but in those of the second and third types, given above, in some species there is no difference at all, the articulations being all present, though the terminal ones are much shorter than normal. This is the case, for instance, in very young *P. pruinosis* and *P. scaber*, even when the coxæ of the seventh cephalo-thoracic segments and the legs of the same pair are absent: and even where it holds good there can be no mistake, for other characters, such, for instance, as that noted above, the absence of the seventh coxæ, at once marks the animal as immature; hence I think Dana is wrong in making sub-genera of *Trichoniscus*, *Porcellio*, and *Oniscus*, merely because the number of joints in their antennæ have been too much dwelt on.

IV.—*Form and relations of the last abdominal ring and its appendages.*

Although the characters of these latter have been long employed in diagnosis, yet it would appear that their true homological value has neither been appreciated nor understood: for, although in all the genera of this group their presence has been recognised under the names of “*abdominal false feet*,” “*caudal appendages*,” and “*appendages of the last segment*,” yet, as far as I am aware, the true relations subsisting between them and the so-called “*thoracic*” feet have been either overlooked or only hinted at.

Their structure in all the genera is pretty much the same: a broad basal joint, articulated somewhere at the termination of the last abdominal ring, and furnished (except, perhaps, in *Tylos*, which I have never seen) with a pair of dissimilar appendages, the external generally broad, the internal pointed and linear, and inserted above the external; or, to speak more correctly, an appendage of two or more articulated joints, the basal joint furnished at its inner side with an accessory appendage; that is, a foot, in which the second (the first being the posterior angle of the ring), third, and fourth, &c., articulations are present, the second, or ischium, being furnished with an appendage.

That this is the true nature of the organ appears from the following:—

1st. The mode and point of articulation of the peduncle (basis) with the last abdominal segment.

2nd. The mode of articulation of the so-called external appendage (ischium) and peduncle (basis).

3rd. The difference in form and relation between the internal (accessory filament) and external (ischium) appendages.

1st. The mode of articulation of the peduncle.

By reference to the observations on the so-called “*epimerals* and posterior angles of the abdominal rings,” it will be seen that, taking into consideration the ultimate segment only, two principal types exist, viz., those in which “*epimerals*” or *coxæ* exist, as *Ligia*, and those in which these organs are absent, as *Oniscus*, *Porcellio*, and, perhaps, *Philoscia*, &c.

Now, if we examine these, we will find that the point of articulation between what we have called the peduncle, and the last abdominal segment, is different in these two types.

In the first (*Ligia*, for instance), it takes place at the posterior margin of the ring, in a notch formed between what I have considered as the *coxæ* and the posterior margin of the ring, by the whole superior border of the peduncle, which is broad and flat, the exterior angle of which forms a regular ball-and-socket joint, which is received into a regular notch in the posterior angle of the ring, exactly similar to the notch on the under side of the “*epimeral*” of the cephalo-thoracic ring.

In the other (*Oniscus*, to wit), the inferior portion of the peduncle is narrowed, so that it appears to be articulated by the exterior angle only,

the interior border being produced into a lobe, and attached to the extreme exterior edge of the last ring, or rather to a process of this ring, visible only below, and which may be looked on as the coxa reduced to a minimum and fixed to the ring; the form of articulation is the same as in *Ligia*.

This view of relations receives further confirmation on examination of the last abdominal ring in *Philoscia* and kindred forms, where the articulation is completed externally by a small triangular lobe, differing from the angle in *Ligia* only in size; indeed, it is a question whether I am strictly correct in describing *Philoscia* as wanting the "coxa" in the sixth abdominal ring, and not as having the coxæ fused to the ring.

The mode of articulation dependent on the development of coxæ in the last ring causes the peduncle to be more or less uncovered by the preceding coxæ, and has given rise to the erroneous description of Brandt, already referred to, viz., "*Ligiæ*—Caudal appendages, one pair" (*Conspect.*, page 9); *Oniscinæ*—"Caudal appendages, two pairs" (*ib.*, page 12); the absence, or rather complete fusion, of the coxa with the last ring causing the peduncle in *Oniscus*, &c., to be completely covered by the coxæ of the fifth rings, led Brandt to overlook its existence altogether, and to mistake the terminal appendages for separate organs.

2nd. The mode of articulation of the so-called external appendage (ischium), and the peduncle (basis).

This is always at the *extremity* of the peduncle, and generally on a plane inferior to that of the so-called internal appendage, the peduncle being hollowed out into a regular joint for its reception, and the external border of the peduncle terminating inferiorly in a tooth outside the articulation; the internal, on the other hand, arising from a lateral process, more or less distinctly marked, and generally on a plane much superior to the articulation of the external appendage. This is evident, even in such forms as *Ligia*, where the apex of the peduncle being truncated, the appendages arise from nearly the same point, the lateral process being slightly larger than the real apex, or as *Ligidium*, in which the lateral process is still further elongated, so that the ischium appears to arise above the internal appendage.

From this extreme we trace the lateral process till we arrive at such forms as *Oniscus*, where, without careful examination, we might doubt its existence at all, and where, to a superficial examination, the internal appendage appears to have no connexion with the peduncle at all, but rather to spring directly from the last ring: but more of this genus anon.

3. The difference in form and relations between the external (ischium) and internal (accessory filament) appendages.

Besides the difference between these two, displayed in the fact of the one (ischium) being articulated to *the extremity*, the other (accessory filament) to the *lateral* process of the peduncle, the differences of the two are remarkable.

The external (ischium) is generally more or less compressed, often abrupt at its termination, and generally ending in a tuft of hairs.

The internal (accessory filament), on the other hand, is rounded, spine-like, generally made up of more than one articulation, and terminates in a hollow hair, or rather becomes filamentous, presenting, in short, all the characters of a true accessory appendage; it is from this character I have named it the accessory filament.

Having established these relations, next for a detailed description of the entire organs, i. e. first, the peduncle or basis; second, ischium; third, accessory filament.

1. *The Peduncle or Basis*.—This is attached to last abdominal ring, and is either somewhat quadrilateral, without distinct lateral process, its inner margin dilated into a lobe (Ligia).

Or else somewhat triangular; its internal margin produced into a rounded process, which bears the accessory filament (Philoscia, Oniscus).

The lateral process (obsolete in Tylos) is either distinct, produced beyond, and arising from inner angle of the apex of the peduncle (Ligidium), arising from near the base of the peduncle (Oniscus, Porcellio); or else indistinct, and almost on the same level as the apex (Ligia); between these, every gradation of development exists. The peduncle may, in fine, be described in general terms as a flattened articulation, generally furnished internally with an accessory appendage, bearing the ischium on its summit, and more or less covered by the last abdominal ring, from whence it arises.

2. *The Ischium or External Appendage*.—This articulates to the apex of the basis or peduncle, and is either—

Rounded, its base dilated and flattened, hairy and scabrous; its apex abrupt and tufted with hairs (Ligia, Philoscia, Scyphax, Ligidium (?), Tylos (?), Sphærillo).

Rounded, somewhat subulate, its base slightly dilated and compressed, smooth (Philougria, Itea (?), Titanethes (?), Styloniscus (?).

Flattened, acuminate, dilated, hairy, scabrous (Oniscus, Porcellio, Scyphax (?)).

Flattened, dilated, squared, apex truncate or rounded, broader below than above, hairy (Armadillium, Actecia (?), Armadillo).

Accessory filament or internal appendage, either—

Tapering, rounded, terminating in a jointed filamentous hair (Ligia, Philoscia, Philougria), or—

Flattened, apex truncate, wider than base, club-shaped, fringed with hairs (Armadillium); or—

Obsolete (Tylos).

The published details of foreign genera are so inaccurate that I must confine myself mainly to our native species in my description of types, merely glancing at one or two of the former, of which sufficient details have been published. Those which have no British representatives are marked with an asterisk.

1. **Peduncle* operculiform, triangular, broader above than below, articulated beneath last abdominal ring. *Lateral process* obsolete; ischium short, subulate (?), articulated to apex of peduncle. *Accessory appendage*, none (Tylos).

2. *Peduncle* irregularly quadrilateral, much broader than long, outer side produced, articulated by lower margin beneath exterior angle of posterior border of the last ring; entire peduncle almost covered by the ring. *Accessory lobe* triangular, springing from base of peduncle, scarcely half length of peduncle. *Ischium* irregularly quadrilateral, base much narrower than apex, which is transverse; inner side produced at apex, borders hairy. *Accessory appendage* nearly twice length of ischium; base rounded, narrow; apex flattened, club-shaped, hairy and scabrous (*Armadillium*, *Armadillo* (?). To this neighbours, probably, *Sphærillo* and *Diploexochus*). Plate XXI., Figs. 12, 13.

3. *Peduncle* triangular, much longer than broad, articulating border notched at outer angle, outer margin produced into lobe at base, apical angle well marked, apex half breadth of base, articulated to exterior angle of last ring beneath. *Accessory lobe* distinct, quadrilateral, about third length of peduncle, arising from articulating margin, completely covered by last abdominal ring. *Ischium* compressed, acuminate, trigonal, lobed on inner side, hairy. *Accessory appendage* curved, trigonal at apex, lobed at base, terminating in filament, two-thirds concealed beneath terminal ring, two-thirds length of ischium (*Porcellio*, *Oniscus* (which has accessory lobe nearly obsolete), *Platyarthus*, probably). Plate XX., Fig. 11.

4. *Peduncle* quadrilateral, transverse, twice as broad as long, superior articulating border produced into an angle, articulated to lateral border of last abdominal ring. *Accessory lobe* distinct, nearly attaining apex of peduncle, unconcealed by last ring. *Ischium*—base flattened, apex acuminate, bi-articulate, hairy, and spined along edges. *Accessory appendage* falciform, hairy, apex blunt, three-fourths of length of ischium (*Philoscia*).

5. *Peduncle* somewhat triangular, as long as broad, superior border terminating internally in an angle, articulated in a notch of the posterior linear border of the last ring, which passes back below coxa of fifth ring. Exterior margin produced into a triangular lobe. *Accessory lobe* triangular, distinct, nearly attaining apex of peduncle, unconcealed. *Ischium* subulate, somewhat trigonal at base, terminating in a long filament, smooth. *Accessory appendage* curved, needle-shaped, smooth, nearly equal in length to ischium (*Philougria*, *Itea* (?), and probably also *Trichoniscus*).

6. *Peduncle* quinquangular, oblong, superior border narrow, articulated in a distinct notch at the posterior margin of ring; apex truncate; exterior angle acute; lateral lobe obsolete. *Ischium* elongated, trigonal, rough, hairy. *Accessory appendage* rounded, subulate, slightly larger than ischium, terminating in a filament (*Ligia*).

Besides these there are several intermediate forms, as *Ligidium*, in which the accessory lobe far exceeds apex of the peduncle—*Actæcia* (*Dana*), in which the external angle of apex is produced into a lobe, so that the ischium appears to be lateral; but sufficient has been said on the subject.

The whole of these appendages are capable of reproduction, and it

is common to find *Ligia* with them in a rudimentary state. They preserve their comparative characters, even in the young state of the animals, the only difference being, that the accessory lobe is somewhat more strongly marked, and afford the most valuable of all the characters which I have mentioned, for fixity of a type.

The order of value of these characters is:—

- Generic. 1st. Appendages of, and last ring of abdomen.
 2nd. Arrangement and form of external antennæ.
 3rd. Proportional development of coxæ of abdominal rings.
 4th. Development of antennal rings.
- Familiar. 1st. Appendages of last ring of abdomen.
 2nd. Proportional development of coxæ.
 3rd. Arrangement and form of external antennæ.

The characters of the internal antennæ and of the parts of the masticatory apparatus are chiefly of familiar import: they are so difficult to establish that I have omitted them in this rough sketch, which is put forward merely as an attempt at a more natural arrangement of these genera than those published. It will be found that I have also omitted all mention of the internal anatomy for the present.

Many of the foreign genera are so scantily described, that it would be foolish to attempt anything like generalities here, and this whole paper, as I said before, is merely provisional, the rather as I hope before long to examine into, not merely genera, but species, as at present far too many false ones incumber our systems.

Provisional Arrangement of Families.

The genera described are British.

Family.—TYLIDÆ.

Genus 1.—TYLOS (*Latreille*).

Family.—ARMADILLIDÆ.

Genus 1.—ARMADILLO (*Brandt*).

Genus 2.—CUBARIS (*Brandt*).

Genus 3.—SPHÆRILLO (*Dana*).

Genus 4.—ARMADILLIUM (*Brandt*).

Body semi-globose; head rounded, median lobe minute, arcuated, as a triangular shield. External antennæ: second joint of peduncle lobed. Tige three-jointed, hairy, rounded. Coxæ of first and sixth abdominal rings obsolete. False feet of last pair: peduncle flattened, lamellar, truncate. Ischium flattened, truncate; external angle produced. Accessory lobes arising from base. Accessory filament flattened, club-shaped, concealed.

Genus 5.—DIPLOEXOCHUS (*Brandt*).

Genus 6.—(?) ACTÆCIA (*Dana*).

(Which probably should stand as a representative of a separate family.)

Family.—PORCELLIONIDÆ.

Genus 1.—ONISCUS (*Latreille*).

Body flattened. Head transverse, lateral lobes well developed from superior margin of third ring, which is emarginate in the median line, not attaining to front, *passing out beneath the orbits*. Internal antennæ inconspicuous. External antennæ: peduncle, second joint lobed at base. Tige three-jointed, articulations rounded, cupped. Coxæ of first, second, and sixth abdominal rings obsolete; third to fifth, broad, curved. Abdominal false feet articulated beneath external angle of last ring. Peduncle triangular, lamellar. Accessory lobe obsolete. Ischium compressed, trigonal, lamellose, along with three-fourths of peduncle unconcealed. Accessory appendage curved, trigono-subulate, almost concealed, arising from basal angle of peduncle, which is truncate.

Genus 2.—PORCELLIO (*Latreille*).

Body flattened or semi-globose (*armadilloides*). Head transverse: lateral and median lobes well marked, *arising from superior margin of third ring, which surpasses frontal line, and is not continuous beneath orbits*. Internal antennæ inconspicuous. External antennæ: second joint broadly lobed internally. Tige two-jointed; articulations semi-flattened, hairy. Coxæ of first, second and sixth abdominal rings obsolete. Abdominal false feet of last pair articulated *beneath* basal angles of last ring. Peduncle triangular, lamellar, three-fourths uncovered. Accessory lobe well-marked, arising from base of peduncle, covered by last ring. Ischium compressed, trigonal, lamellose, acuminate, uncovered. Accessory filaments curved, trigonal, terminating in a filament nearly completely covered by last abdominal ring.

Genus 3.—(?) PLATYARTHUS (*Brandt*).

Genus 4.—(?) DETO (*Guerin*).

Family.—LIGIDÆ.

Genus 1.—LIGIA (*Brandt*).

Body flattened. Head transverse. Internal antennæ inconspicuous. External antennæ: second joint, peduncle without lobe. Tige multi-articulate; segments globose, cupped, hairy. Coxæ of abdominal rings: first and second small; third to sixth, well developed. Abdominal false feet articulated in notch at end of last ring, unconcealed. Peduncle quadrilateral. Accessory lobe inconspicuous from truncate apex. Ischium somewhat trigonal, scabrous. Accessory appendage as long as ischium, terminating in a filamentous hair.

Family.—PHILOSCIDÆ.

Genus 1.—LIGIDIUM (*Brandt*).Genus 2 (?).—STYLONISCUS (*Dana*).Genus 3 (?).—TITANETHES (*Schiödte*).Genus 4.—PHILOSCIA (*Latreille*).

Body flattened. Head rounded. Antennal ring arcuate, attaining to, but not surpassing, frontal line. Internal antennæ inconspicuous. External antennæ, second articulation, rounded without lobe. Tige, three-jointed articulations rounded, hairy, terminating in a filament. Coxæ of sixth abdominal ring obsolete, first to fifth narrow, linear. Abdominal false feet, last pair: peduncle quadrilateral, transverse, articulated to exterior margin of last ring, uncovered. Accessory lobe distinct, attaining apex of peduncle. Ischium: base flattened, acuminate, almost trigonal, bi-articulate, hairy; accessory filament falciform, hairy, apex blunt.

This genus has been misdescribed by all authors except Zadach, who gives a very fair description of it in his monograph, already quoted.

5.—(?) SCYPHAX (*Dana*).

(Scyphax and Philoscia may form the type of a separate family.)

Family.—ITEADÆ.

Genus 1.—(?) TRICHONISCUS (*Brandt*).Genus 2.—(?) ITEA (*Koch*, in part).Genus 3.—(?) PHILOUGRIA (*mihi*).

Body flattened. Head round; no median or lateral lobes. Internal antennæ inconspicuous, three-jointed. External antennæ: second joint round, not lobed. Tige subulate, five-jointed; smooth. Coxæ of first abdominal ring small and inconspicuous; second to fifth, narrow, linear, well marked; sixth, nearly obsolete. Abdominal false feet: last pair completely uncovered. Peduncle somewhat triangular, articulated in notch at posterior margin of last joint. Ischium trigonal, subulate, smooth, terminating in a filament. Accessory lobe well marked, springing from side of, and nearly attaining, extremity of apex of peduncle. Accessory filament long, subulate, filamentous, smooth.

This genus is very closely allied to Itea, which is described by Zadach as having the *exterior margin* of the peduncle of the abdominal false feet *free* lateral processes of the front; present beneath the superior frontal margin above the base of the antennæ; the internal antennæ one-jointed. Characters, if correctly given, sufficient to constitute the above a genus.

Some, perhaps, will be inclined to substitute the term genus for family in the above Table, making sub-genera of most of the genera.

Against this custom, too prevalent now-a-days, I must enter my protest: every distinct set of forms possessing one or two important parallel characters in common, should rather constitute a genus, than by, as is too often done, grouping a number of these in one genus, necessitate the formation of sub-groups, which are always most puzzling to the student, and of no use unless to the systematist addicted to *mere number* of families in some preconceived order of numeral arrangement.

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List of British Species of Oniscoidea.

Family.—ARMADILLIDÆ.

Genus.—ARMADILLIUM (*Brandt*).

(Armadillidium of Brandt shortened in conformity to modern usage.)

Armadillium vulgare (*Latr. sp.*)

Synonyms: *Oniscus armadillo* (*Linn.*), *O. cinereus* (*Zenk.*), *Armadillo vulgaris* (*Latr.*), *A. variegatus* (*ib.*), *Armadillidium Zenckeri* (*Br.*), *Armadillo opacus, variegatus, Willii* (*Schæffer*).

Body smooth, elliptical; median plate arched above, scarcely surpassing frontal line. Terminal ring of abdomen narrow (coxæ obsolete), triangular: apex truncate. False feet of last pair: basis nearly completely concealed, bilobed; internal lobe much shorter than external; a raised transverse ridge on inferior face. Ischium flattened, somewhat triangular, wider below than above. Secondary appendage trigonal, broader below than above, compressed, hairy at the end. Second joint of external antennæ lobed.

Colour: dark steel-gray, almost black; steel-gray blotched with patches and spots of whitish-yellow and red browns.

Habit: rolls itself into a ball.

Habitat: dry places under stones, decaying timber, and amidst herbage.

Distribution: Ireland generally. England—London, Kent.

Family.—ONISCIDÆ.

Genus.—ONISCUS (*Linn.*).

1.—*Oniscus murarius* (*Cuvier*).

Synonyms: *O. asellus* (*Linnæus*, and *Auct.*).

Body oval, shining, covered with smooth granules; lateral lobes of head large, inclined backwards; frontal line somewhat emarginate; terminal ring of abdomen elongate, triangular, convex above; coxæ terminating as acute angle; coxæ of fifth concealing origin of accessory appendage. Accessory appendage nearly equalling ischium in length. Second joint of external antennæ lobed internally.

Colour: general ground light-gray or bluish, with blotches and patches of yellow, generally lineally arranged; a salmon-coloured variety with dark patches occasionally met near sea.

Habits: semi-rolls, and feigns death.

Habitat: under decayed vegetable and animal matter, as well in the driest as wettest localities. Common near sea.

Localities: Ireland—east coast generally. England—Kent, London, &c. Appears to be common everywhere, but the species have not been distinguished.

2.—*Oniscus fossor* (*H. Schæffer*, *D. Crus.*, Cah. 22, n. 22).

Synonyms: *Oniscus muscorum* (*Lereboullet*, p. 29). I cannot speak of the other synonyms given by the author, as he has confounded it with *Philoscia muscorum*. *P. tæniola* (*Koch*), given by him as a synonym, is figured as a true *Porcellio* by *Schæffer*. The figure of *O. fossor* is very characteristic.

Body oval, covered with numerous rough granulations, which give it a powdered appearance; head convex; lateral lobes moderate, rounded; frontal line produced into a triangular lobe which belongs to head, not to antennal ring; terminal ring and other characters as *O. murarius*, than which the whole animal is much smaller.

Colour similar to *O. murarius*, but paler.

Habits: semi-rolls, and feigns death; much more active than *O. murarius*.

Habitat: dryish places, as under stones, dry leaves.

Localities: Ireland—Dublin (*Wexford*, *E. Percival Wright*, Esq.). England—Epping Forest, Kent. Very common among the chalk-pits at Chisselhurst; now first recorded as British. (Three specimens in British Museum Collection undistinguished from *O. murarius*.)

Genus.—PORCELLIO (*Latreille*).

1.—*P. scaber* (*Latreille*).

Synonyms: *Oniscus asellus* (*Linn*), *O. granulatus* (*Lam.*). *Porcellio dubius*, *affinis et mult. al.* (*H. Schæff.*), *P. Brandtii* (*M.-Edwards*).

Body elongate, oval, rugous. Lateral processes very salient; external angle rounded; median process triangular; terminal ring ending in a triangular point, acuminate, deeply sulcate in the median line.

Colour: uniform grayish-black, yellow blotches on dark ground; a nearly uniform salmon-coloured variety also met with; there may be two species confounded.

Habit: runs with agility; semi-rolls itself; attacks living caterpillars.

Habitat: moist places, everywhere there is decaying matter; among sea-weed on sea-shore along with *Ligia*, &c. The paler varieties are found in the dryer localities.

Distribution: apparently everywhere, and very common; carries the young all through the summer.

2.—*P. dilatatus* (Brandt).

Synonyms: *P. scaber* (Auct. and M.-Edw.).

Body very broad, depressed, rough, and granular; lateral frontal processes very prominent, rounded at apex, and hollowed; median lobe obtusely triangular, moderate; last ring rounded at apex, plane above. Ischium very flat and broad. Much larger than *P. scaber*.

Colour: a uniform slate-gray.

Habit: crawls very slowly, semi-rolls; extremely brittle in its structure, a touch causing the limbs to fall off.

Habitat: amongst decaying grass and straw, extremely rare.

Localities: Ireland—Dublin. Now first added to British lists.

3.—*P. pictus* (Auct.).

Synonyms: *P. conspersus* (?), *P. serialis*, *P. crassicornis* (H. Schæffer).

Body as *P. scaber*, slightly elongated; lateral lobes very salient, curved outwards; median lobe curvilinear, small; body granulous, last ring triangular, acute at apex, superior surface sulcated.

Colour similar to *P. scaber*, but patches more regularly arranged; may be easily mistaken for *Oniscus fossor* at first glance, but is more shining.

Habit: runs with great agility, does not roll.

Habitat: very local; dry places, as old ruins, under dry leaves.

Localities: Ireland—Dublin (local), Belfast (A. H. Halliday, Esq.) England—Chisselhurst, Kent, among chalk-pits; now first added to British lists.

4.—*P. lævis* (Lam.).

Body very convex, polished; lateral frontal lobes slightly salient, small, rounded; median lobe triangular, very short; last ring, apex rounded, deeply sulcate above. The largest of our species.

Colour: lead-gray, occasionally blotched with yellow on sides.

Habits: semi-rolls, sluggish.

Habitat: common everywhere in moist places, especially in stables and litter, among grass at bottom of walls.

Localities: Ireland—Dublin. England—Kent (one specimen in British Museum Collection, from neighbourhood of London).

5.—*P. pruinus* (Brandt, Conspect. 19.)

Synonyms: *Porcellio frontalis* (Lereboullet), preoccupied by Edwards. *P. maculicornis* (?) (H. Schæffer).

Body sub-ovate, oblong, slightly rugged, downy. Lateral lobes small, rounded. Median lobe rounded, minute, almost linear; last ring triangular, acute at apex; surface plane. Feet very long. Abdomen much narrower than cephalo-thoracic rings.

Colour: uniform mouse-colour, marbled under the lens with white.

Habit: runs with great agility, concealing itself rapidly from the

light; preferring moderately humid, warm situations; one of the commonest of our species. It buries itself to a considerable depth in clay.

Locality: Ireland—Dublin; everywhere. England—Kent, Chislehurst, very common. (Three specimens (unnamed) in British Museum Collection, from neighbourhood of London, belong, I believe, to this species. They are stuck on cards, rendering examination impossible.) Now first added to British lists.

6.—*P. armadilloides* (Lereboullet).

Synonyms: *O. convexus* (Degeer), *O. saxatilis* (Hartmann).

Body elongated, elliptical; segments very convex, smooth. Lateral lobes minute, truncated in front. Median lobe very short, angular, acute. Last ring of abdomen acute, plane, or slightly convex above.

Colour: iron-gray, with clear borders to segments; a band of white blotches along either side of the median line. Never having seen it alive, cannot speak of its habits. Rolls itself into a perfect ball.

Added to British lists on authority of six specimens in British Museum Collection (unnamed), which A. White, Esq., informs me were captured near London (Highgate) (?) by Mr. Walker.

7.—*P. cingendus* (n. s.) (*mihi*). Plate XIX., Fig. 1.

Body elongate, ovate, smooth, or slightly scabrous. Lateral lobes minute, rounded, directed downwards. Median lobe nearly obsolete, arcuate. Terminal ring broadly triangular; apex acute, plane above; a raised continuous line along upper margin of each ring. Whole animal shining, smooth, or covered with minute shining granulations only. Closely allied to *P. pruinus*, from which it differs chiefly in the smooth, shining body, and the coxæ of cephalo-thoracic rings having their posterior angles rounded off.

Colour: bright red and yellow blotches on a dark steel-gray ground.

Habits: runs with extreme rapidity; inhabits dry stations exclusively, as under leaves; never rolls itself into a ball.

Localities: Dublin, very rare.

The characters given above are constant, easily distinguishing it from *P. pruinus*, which, when young, resemble the parents. I can find no description in authors approaching this species, and am, therefore, compelled to give it a name. I find it both in company with *P. pruinus*, and also alone.

Family.—LIGIDÆ.

Genus.—LIGIA.

1.—*Ligia oceanica* (Lin. sp.)

Synonyms: *Oniscus oceanicus* (Linn.), *P. aquaticus* (Baxter), *Cymothoa oceanica* (Fabric.), *Ligia oceanica* (ib.).

Body flattened, oval. Head transverse, covered with smooth granulations. External antennæ shorter than body. Tige multi-articulate,

sub-glabrous. Terminal ring of abdomen: posterior border regularly arcuated in the middle. Coxæ as acute angles. Abdominal false feet: peduncle oblong, slightly shorter than last abdominal ring. Ischium and accessory appendage twice the length of peduncle.

Colour: yellowish-brown, the young prettily diced with white.

Habits: runs with agility, or rolls up extremities of body, and feigns death; very common among vegetable debris, along tide-marks, and on rocks; seldom takes water; may be seen running over sand in full sunshine.

Common around Ireland.

Family.—PHILOSCIADÆ.

Genus.—PHILOSCIA (*Latreille*).

1.—*Philoscia muscorum* (*Latreille*). Plate XX., Fig. 1.

Synonyms: *Ligia melanocephala* (*H. Schæffer*), *Oniscus sylvestris* (?) (*Fabric.*), *Oniscus muscorum* (?) (*Cuv.*). I have not been able to verify the reference queried. *Philoscia muscorum* (*Zaddack*, Syn. Crust. Prussic., p. 14).

Body flattened, elliptical, perfectly smooth and glistening. Head transversely elliptical, arched in front; neither lateral nor median lobes. Internal antennæ three-jointed. External antennæ: second joint of peduncle not swollen at base. Tige three-jointed; articulations rounded, tumid, the last terminating in a hair, a long spine at apex of fourth and fifth articulations, all the articulations both of peduncle and tige densely hairy. Coxæ of abdominal rings somewhat linear; abdomen abruptly narrower than seventh cephalothoracic ring. Last ring broadly triangular; apex acute. Abdominal false feet, last pair, attached to exterior margin of ultimate ring, uncovered. Peduncle somewhat quadrilateral. Ischium trigonal, spinous along edges, fine hairs between spines, with a slender filament at its apex. Accessory appendage not quite half length of ischium rounded, hairy. Accessory lobe triangular, distinct, nearly attaining apex of peduncle.

Colour fulvous, with dark black patches, a dark stripe generally along median line. A pale salmon-coloured variety was brought me by E. Percival Wright, Esq., from Wexford, which I have found since rather common on Bray Head, county of Wicklow, and occasionally about Donnybrook, county of Dublin.

Habitat: dry places among leaves, also among sand hills, along sea-shore, under stones; common near sea.

Habits: runs rapidly, feigns death, but does not roll into a ball.

Localities: Ireland—Dublin, extremely common; Wicklow, Meath, (Wexford and Cork, E. Percival Wright, Esq.), Belfast (A. H. Haliday, Esq.) England—Middlesex, Essex, Kent, common.

A species which has been much misunderstood, although an extremely common species.

Family.—ITEADÆ.

Genus.—PHILOUGRIA (*φίλος ὑγρός*) (*mihî*).1.—*Philougria celer* (*mihî*). Plate XXII., Fig. 1.

Body semi-flattened, elliptical, perfectly smooth and shining. Head oval, twice as broad as long; neither lateral nor median lobes extant; antennal plate attaining to frontal line. Eyes small, oval, situated at posterior angle of head. Internal antennæ small, inconspicuous, three (two?) jointed. External antennæ moderate in length, generally curved, folded in form of (∞). Peduncle five-jointed, attached to detached segment (epimeral?) of ring, hence apparently six-jointed. First articulation very short, transverse; second, obtusely triangular, longer than first; third, globular equal to second; fourth, elongated, slender, sides parallel, equal to second and third conjoined, its exterior superior angle truncate, inner angle ending in a long hollow spine; fifth, slenderest, and slightly longer than fourth, sides nearly parallel, internal margin produced into four angular eminences, each of which bears a short spine, external angle terminating in a filament, external border hairy. Tige five-jointed, filamentous; articulations cylindrical, gradually tapering; first, short; second, third, and fourth, equal; fifth equaling second, third and fourth conjoined; terminating in a filament; perfectly free from hairs or spines. Coxæ of cephalothoracic segments well marked. Segments of cephalothorax: first, much broader than head, second and third gradually broader; third and fourth equal; fifth, sixth, and seventh gradually decreasing in breadth; seventh as broad as first. Posterior margin of first three rings convex downwards; fourth and fifth, median portion convex downwards, coxæ concave upwards; sixth and seventh rings concave downwards, their coxæ quadrilateral, strongly angular, suture well marked; coxæ of the seventh extending half-way down fourth abdominal ring; raised transverse border along margin of each ring; a border of small spines along lateral edges of coxæ (visible under $\frac{1}{4}$ inch power). Abdominal segments: first, semilunar, very linear, coxæ nearly obsolete, covered by those of seventh cephalothoracic segment: second, linear, coxæ rounded, uncovered by seventh cephalothoracic ring; third, fourth, and fifth, each equal in breadth to first and second conjoined; coxæ well marked and curved, inferior border of entire segment convex medianly and deeply concave externally, so as to form a projecting angle, gradually decreasing in breadth from third downwards; terminal ring deeply concave over insertion of last false feet, the segment being here linear, coxæ nearly obsolete, medianly produced, truncately triangular, apex deeply emarginate; total length of ring about twice that of fifth; the rings gradually increase in length from one to six. Abdominal false feet: last pair uncovered, articulated in excavated posterior margin of last ring. Peduncle, and ischium, and accessory filament, as in genus, *q. v.*

Colour: uniform red brown, without spots or marbling, though varieties may occur.

Habits: runs with agility, as conveyed in the name; buries itself deep in the ground, and generally congregates in numbers; very impatient of dryness, soon dying on exposure to air.

Habitat: very moist places, amongst all kinds of decaying matter; also amongst moist dead leaves, amongst wet ashes, in moss, at roots of trees: extremely common. I cannot account for this species remaining so long undetected in Britain.

Localities: Ireland—Dublin, very common (Wexford, Cork, and Kerry, E. Percival Wright, Esq.).

England—Epping Forest, near London, Kent, Chisselhurst, where it seems as common as in Ireland.

Now first added to British list.

In many Papers, the references to the Plates not being as definite as we could wish, we have thought it better to append separate, carefully drawn-up Descriptions of Plates. These have been furnished to us by the authors of the papers, except in a few cases, where such assistance was not needed; and we trust that they will add to the importance of the many valuable Original Communications which this volume of the "Natural History Review" contains.—Eds. N. H. R.



PLATE XIX.

ILLUSTRATIVE OF A PAPER BY J. R. KINAHAN, M. B.—ANALYSIS OF
 GENERA OF TERRESTRIAL ISOPODA, RECORDS OF BRITISH SPECIES,
 AND DESCRIPTIONS OF NEW GENUS AND SPECIES.

Fig.

1. *Porcellio cingendus*, much enlarged. Tail appendages as in Fig. 4.
2. Head and first cephalo-thoracic ring of *P. cingendus*.
3. Ditto, ditto, *P. pruinus*.
4. Fifth and sixth abdominal rings of *P. cingendus*.
5. Ditto, ditto, *P. pruinus*.
6. Back view of head of *P. cingendus*.
7. Ditto, *P. pruinus*.
8. Abdominal false feet of *P. cingendus*. *a*, Peduncle. *b*, Accessory lobe. *c*, Ischium. *f*, Accessory filament.
9. Tige of external antenna of *P. cingendus*.
10. Front view of head, and side view of orbit of *Oniscus murarius*.
a, Line of front. *b*, Lateral lobes. *c*, External antennæ.
d, Transverse suture.
11. Peduncle of external antennæ of *O. murarius*.
12. Abdominal false feet of *O. murarius*. (References as in Fig. 8.)

Vide page 258.

PLATE XX.

ALSO ILLUSTRATIVE OF DR. KINAHAN'S PAPER.

Fig.

1. *Philoscia muscorum*, much enlarged. The antennæ disproportionately large.
2. Abdominal false feet (♂), last pair. *a*, Peduncle. *b*, Accessory lobe. *c*, Ischium. *f*, Accessory appendage.
3. Fifth and sixth abdominal rings. *a*, Abdominal false feet.
4. Back view of head.
5. Front view of head. *a*, External antennæ. *b*, Internal antennæ. *c*, Superior margin, third segment.
6. Internal antennæ.
7. *Ligia oceanica*, false feet. References as in *Philoscia muscorum*.
8. Ultimate abdominal ring of ditto.
9. Side view of orbit of ditto.
10. Front view of orbit of head. *a*, External antennæ. *b*, Eyes. *c*, Superior margin of third ring. *d*, Internal antennæ.
11. Back view of head of *Oniscus murarius*. *e*, Frontal line of head. *c*, lateral lobes.

Vide page 258.

PLATE XXI.

ALSO ILLUSTRATIVE OF DR. KINAHAN'S PAPER.

Fig.

1. External antennæ of *Porcellio pruinosus* (immature). *a*, Tige.
2. External antennæ of *P. scaber* (immature).
3. Antennæ of *Armadillium vulgare*. (A) Internal. (B) External.
b, Tige.
4. Peduncle and tige of external antennæ of *Philoscia muscorum*.
5. External antennæ of *Oniscus fossor*.
- 5A. Tige of *O. murarius* (immature).
6. Abdominal false feet of *O. fossor*.
7. Terminal rings of *O. fossor*.
8. Ditto, *Porcellio scaber*.
9. False feet of *Armadillium vulgare*. The numerals are omitted from this figure.
10. Last rings of abdomen of ditto.
- 11 and 12. Back views of heads of ditto.
13. Front views of ditto. Incorrectly numbered as 12.
14. External and internal antennæ of *Ligia Porsoni* (after Lereboullet).

Vide page 258.

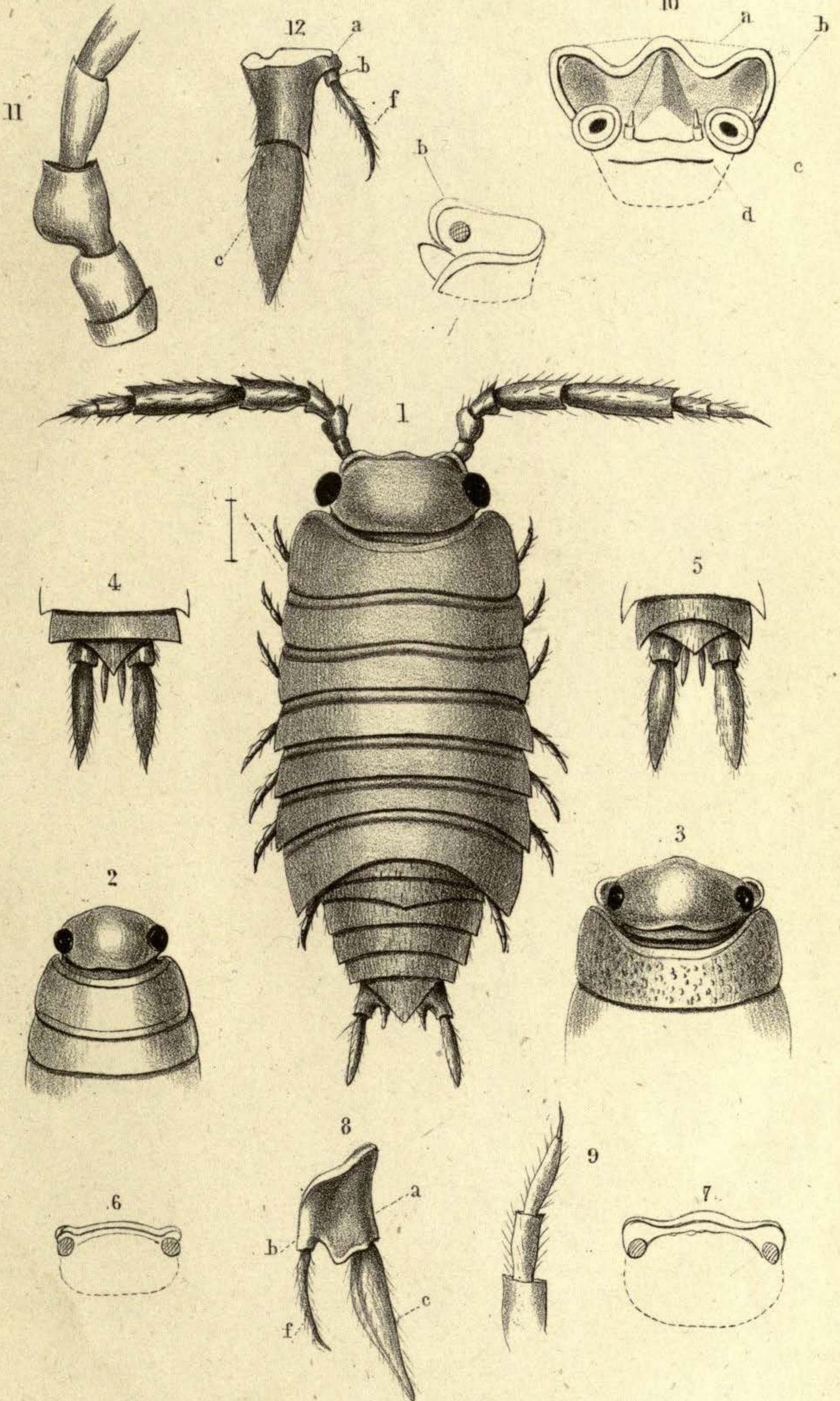
PLATE XXII.

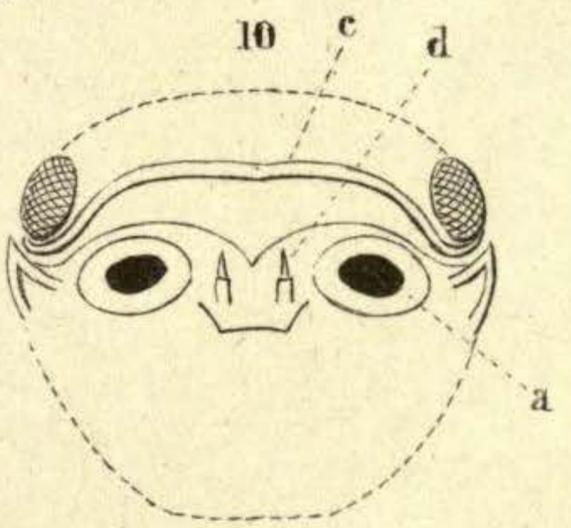
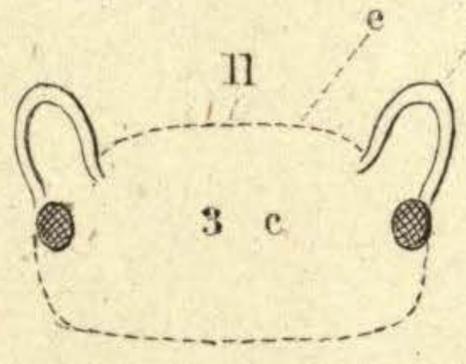
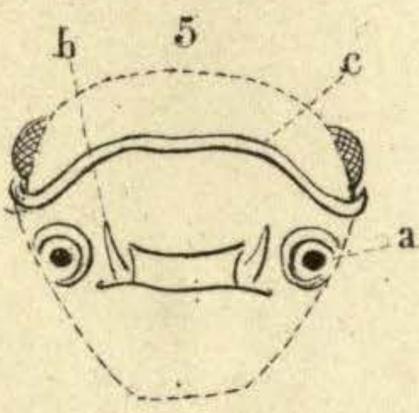
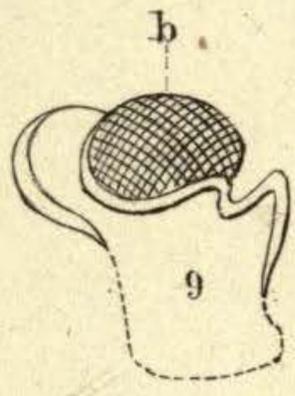
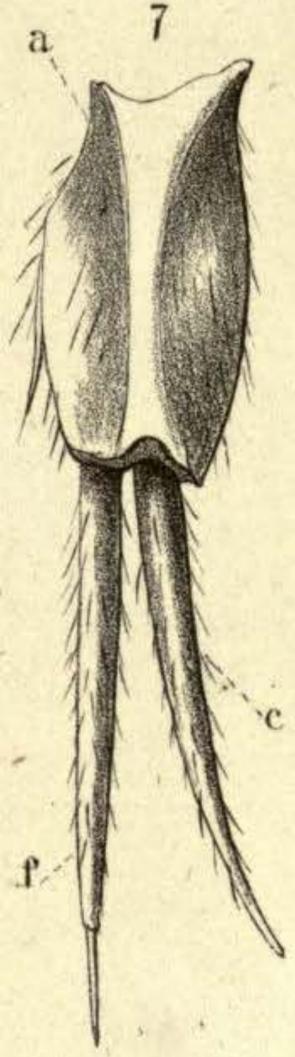
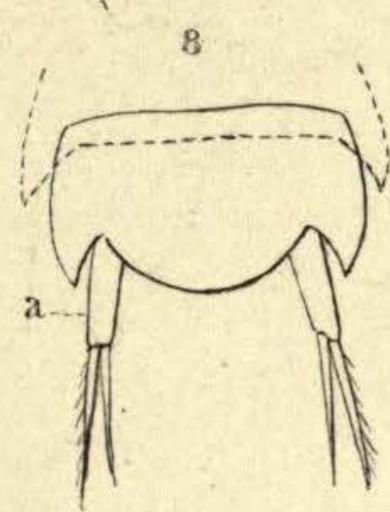
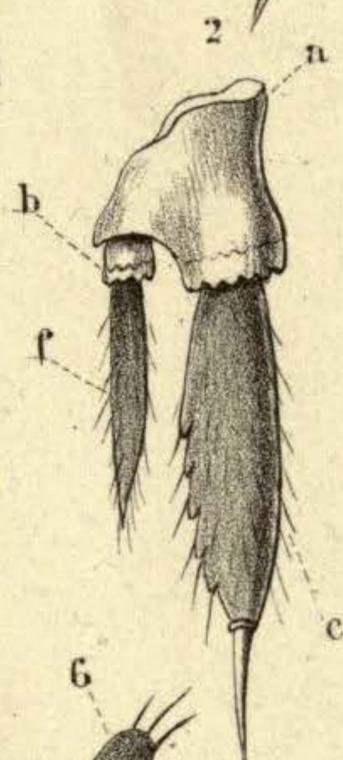
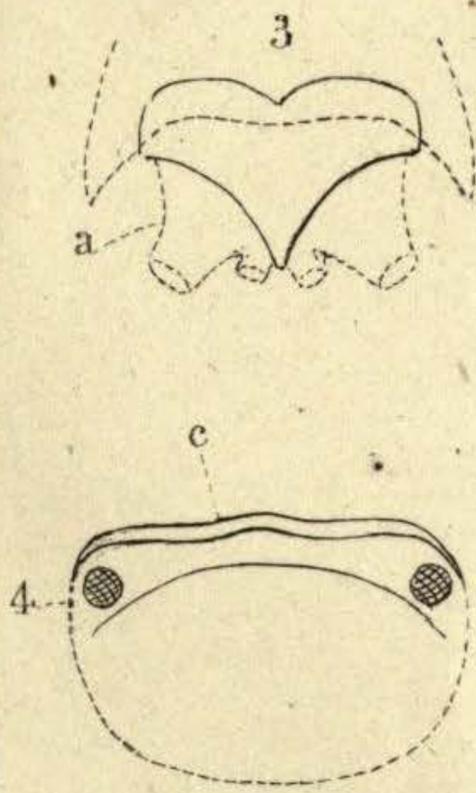
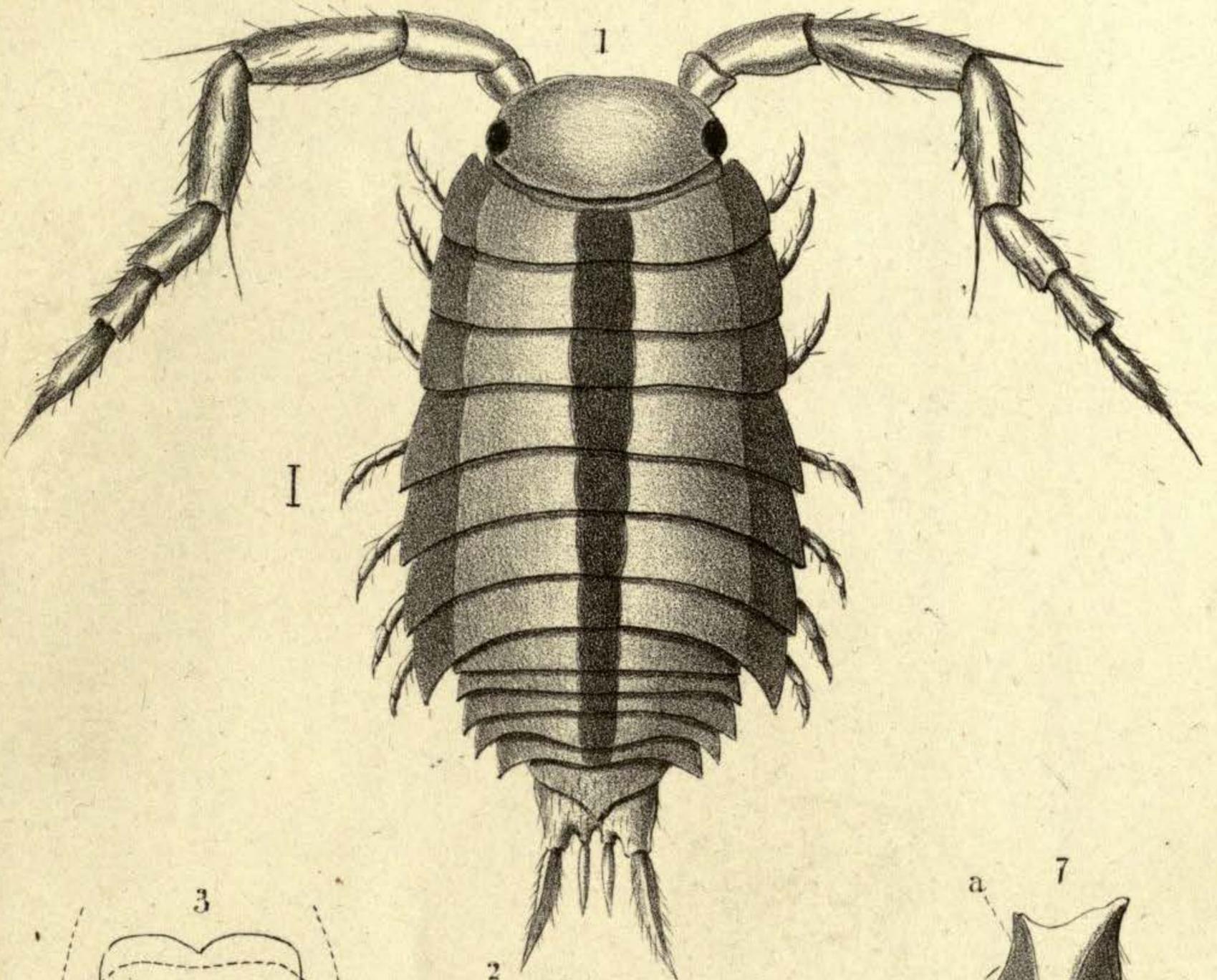
ALSO ILLUSTRATIVE OF DR. KINAHAN'S PAPER.

Fig.

1. *Philougria celer* (*n. s.*), much magnified.
2. Last pair abdominal false feet, front and back view of ditto. *a*, Peduncle. *b*, Accessory lobe. *c*, Ischium. *f*, Accessory appendage.
3. Terminal abdominal rings.
4. Tige of external antennæ.
5. Abdominal false feet of Tylos, after Dana.
6. Ditto, Actæcia, ditto.
7. Ditto, Scyphax, ditto.
8. Ditto, Sphærillo, ditto.
9. Ditto, *Ligidium Porsoni* (after Lereboullet).

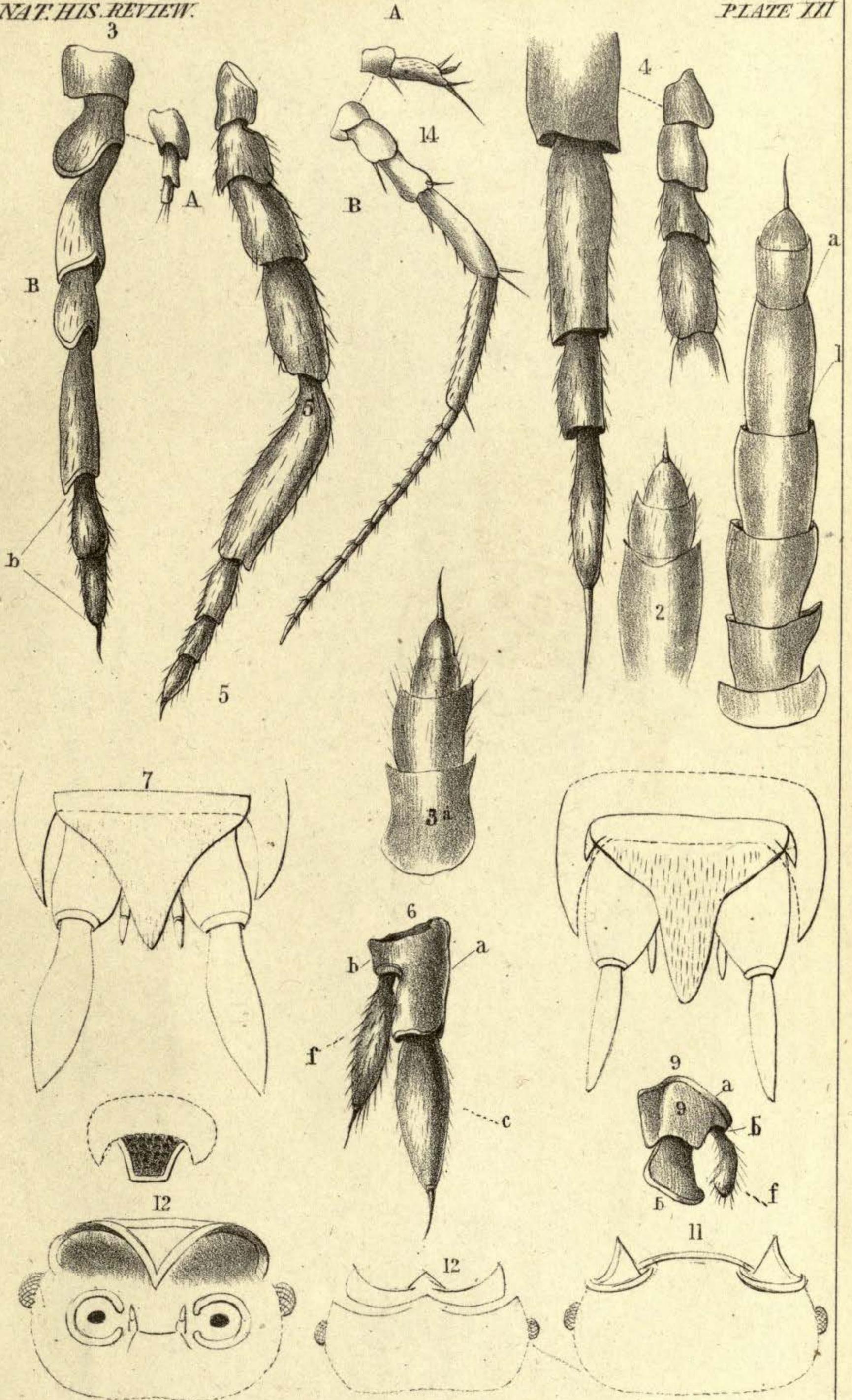
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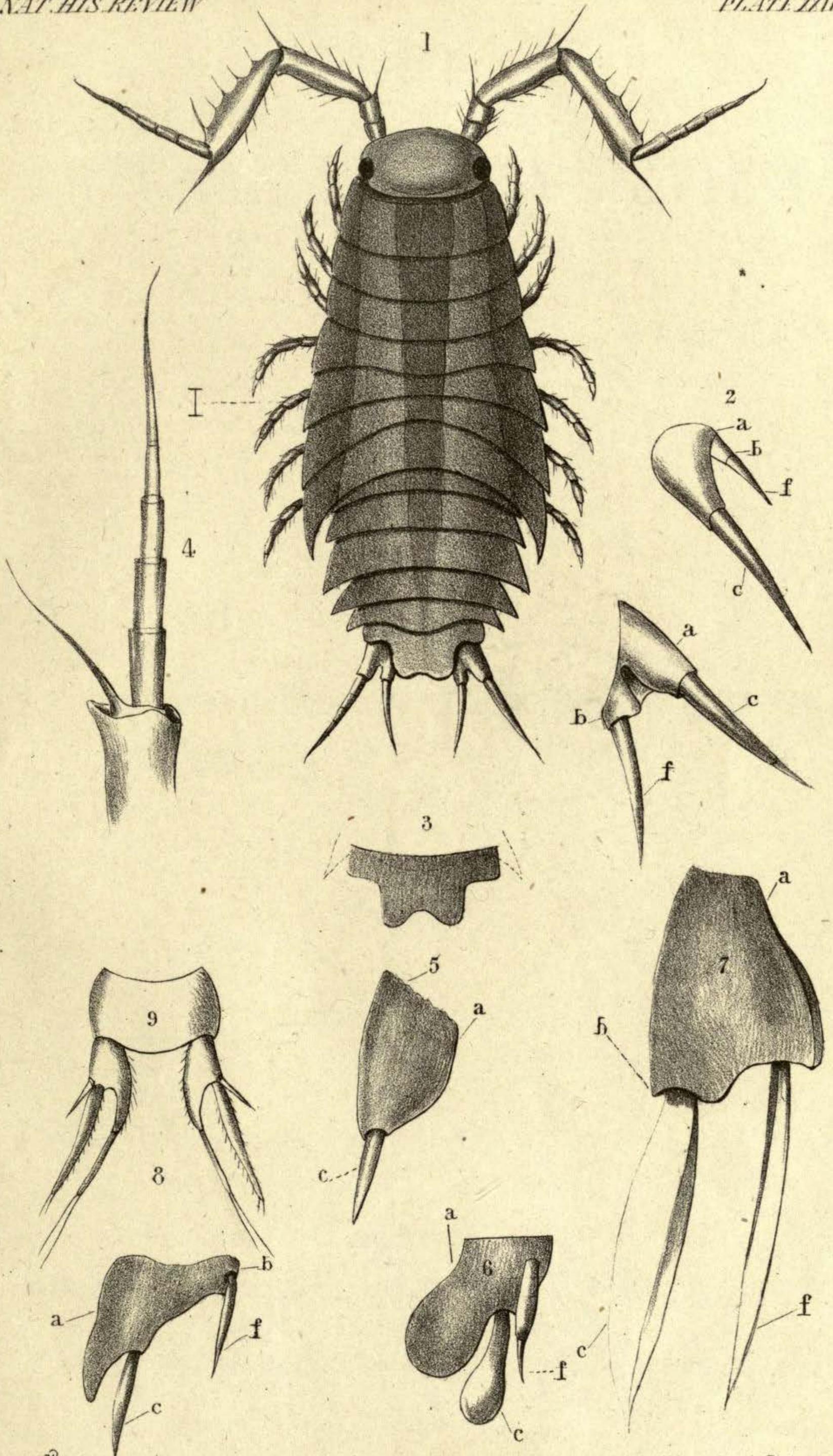




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