

THE AMERICAN LAND AND
FRESH-WATER
ISOPOD CRUSTACEA

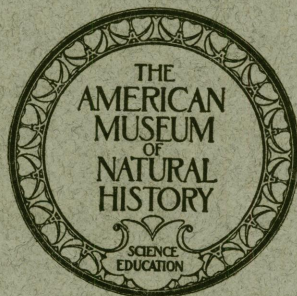
BY WILLARD G. VAN NAME

BULLETIN

OF

THE AMERICAN MUSEUM OF
NATURAL HISTORY

VOLUME LXXI, 1936



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INTRODUCTION

In the present work I have attempted to give brief descriptions and illustrations of the land and fresh-water Isopoda known from North and South America and the neighboring islands, and to describe the new species contained in the collection of the American Museum of Natural History in New York, as well as a few others that have come to my attention.

The preparation of this work has been undertaken in the belief that it will fill an actual deficiency in zoölogical literature, as considerable experience in trying to identify and label the undetermined material in the collection of Crustacea of that Museum has convinced me of the scattered and incomplete character of the literature dealing with the Isopoda of tropical and South America, especially the land and fresh-water species, and of the need for bringing the information together in accessible form. Many new species have been described since the publication of Richardson's very useful and convenient 'Monograph on the Isopods of North America' (1905, Bulletin No. 54, United States National Museum) and, moreover, that work covers only the region from Panama northward and, because of the lack of material from tropical America available to its writer, is very incomplete as regards the terrestrial species of the warmer parts of the area with which it deals.

Although in European countries the land isopods, chiefly those of the Old World, have been the subject of minute study by a number of able specialists, in America there have been thus far but two, Dr. Oscar Harger, who died in 1887, and Mrs. Harriet Richardson Searle, whose work was mainly published prior to 1913, who have devoted themselves to the Isopoda as an exclusive specialty, and they concerned themselves more with marine than with land forms. In spite of many excellent minor contributions by other zoölogists, some European, some American (among the latter we may mention Prof. A. S. Pearse, Prof. B. E.

Stafford, Miss Lee Boone, and, lately especially, Dr. C. H. Blake of the Massachusetts Institute of Technology), our knowledge of the American land and fresh-water isopods is in a backward state, so much so that much of the information essential for the preparation of a satisfactory monograph is lacking at the present time, and its acquisition will take many years of work and study.

The subject is such a large one, our knowledge of it is so incomplete, and the labor of studying and illustrating animals of the character of the isopods is so time-consuming, that I have found it necessary to keep the work within the scope and dimensions of a handbook or manual which I might reasonably hope to bring to completion, rather than to attempt an exhaustive monograph, since otherwise I would be likely never to finish more than a small part, covering only a few of the genera or families.

In the present state of our knowledge of the American forms it is not possible to carry out so minute a subdivision of the genera into new genera of narrower scope, subgenera and sections, as the European specialists have been able to do with the Old World forms. Our American species in many cases do not fit into the narrow diagnoses by which the older and more familiar genera are now limited by European students, or into the new groups of generic and subgeneric rank that they have established. Often we are not yet able to judge whether this implies that the modern limitations of the genera are too narrow, or that new groups should be formed for the American species. Though the latter course will doubtless be necessary in many instances, I have avoided it in the present work, using some of the generic names with greater inclusiveness than is the practice of the modern European writers who are dealing with this group. This is not due to an underestimation of the need of more minute classification, but because of the insufficiency of the available descriptions and illustrations of such a large proportion of our species. Even in the case of many species which I have examined or described myself, the specimens have been too few or too poorly preserved, or too much mutilated and lacking important parts and appendages, to be suitable for minute study, and in the case of unique or borrowed specimens, I have often not felt at liberty to subject them to an amount of handling that would inevitably result in great damage to them or in their going entirely to pieces. I hope that the publication of the present work, providing a summary of our present information, will serve to point out where more investigation is most needed, and in that way be a step to a more satisfactory classification of the American

members of the group, and perhaps do more toward attaining it than would a premature attempt, based on insufficient data.

Necessarily such a work as this one must be, to a very large extent, a compilation, as many of the species included are rare and known from but few specimens; many of them as yet have not been found a second time. I have been able to examine or study personally only a small minority of the species, and have had to depend for the others on the original descriptions and figures of other authors. Though their species may clearly be valid, their descriptions, especially in the case of the older writers, are often far too brief and incomplete, and the figures, if any, are often very insufficient, yet they furnish all the information we have.

These descriptions have usually been quoted, wholly or in part, in their original wording without any attempt to reduce them to a uniform system of terminology of parts. Yet there can rarely be any doubt as to the structures referred to, especially as the authors' figures have also been reproduced. Descriptions written in foreign languages other than French or Latin have been translated.

I have not had the services of an artist in preparing or copying illustrations and, unfortunately, I am very far from being one myself, so that I must take the blame for the crudity of some of the figures, though in many cases the originals are not all that might be desired. In most figures I have attempted to give only the essential outlines, though sometimes the original authors give beautifully shaded figures.

The illustrations, where no credit is given, may be understood to be original. It might seem an easy matter to secure accuracy in drawing outlines of parts and appendages of definite shape, as those of Crustacea are supposed to be, but in the smaller isopods the minute size and great delicacy of the parts and their liability to shrinkage and change of form from handling, pressure, or partial desiccation, as well as the different outline of some parts when seen from even slightly different angles, introduce difficulties that are greater than might be expected. They often occasion apparent discrepancies between illustrations given by different authors, which may be misleading if the possibility of explaining them by the above causes is not kept in mind.

To state its scope more exactly, this book attempts to cover the land and fresh-water Isopoda of North and South America, including Greenland, Bermuda, the West Indies, and the Galapagos, Juan Fernandez, and Falkland Islands. A total of 254 terrestrial species, includ-

ing several determined only generically by the authors recording them, and 49 fresh-water species are dealt with as inhabitants of this area.

As already stated, I have described the new species contained in the collection of the American Museum of Natural History and a number of others that have come to my notice (see pages 32 and 33), but my main aim has been to give a convenient résumé of the knowledge and literature of the subject as it stands up to the present time, and I have not felt justified in delaying its publication for lengthy research of my own, or for the purpose of studying the large amount of undescribed material that exists in the various other museums, interesting and important as the results of such a study might be. Certainly the addition of a number of new and interesting forms to the fauna would have resulted from such a study, but it would have postponed and jeopardized too much the completion of a task which has already consumed more years than I like to contemplate.

A few additional points need to be explained or mentioned. In covering so extensive a field, non-essentials had to be reduced to a minimum. The bibliography therefore lists, with very few exceptions, only works and articles referring to American species or referring to the more widely distributed forms as inhabitants of America. The latter limitation has (except in the case of original descriptions) usually been adopted in the lists of synonyms and references also. In the case of tropical and South American species I have sought out all the references I could find, even the briefest mention of the most common and most widely distributed species; in the case of those of the United States, I have tried to exercise similar care for the rarer species, but to carry this out for some of the abundant, almost semi-domesticated ones would have been neither practicable nor worth while.

Economy of space and other considerations have led me to avoid superfluous perfunctory explanations of the figures or plates. The animals here dealt with are remarkably uniform in general structure, and usually no one with even a superficial knowledge of the Isopoda will be in doubt as to just what aspect or what part of the animal is shown, especially with the aid of the self-evident lettering, such as *mxp* for maxilliped, *pl*² for second pleopod, etc. The thoracic segments and appendages are designated with Roman numerals, I to VII (the morphological fact that the true segment I really forms part of the head being ignored, as is the usual practice), and the abdominal segments and parts with Arabic numerals 1 to 6. In special cases, however, additional lettering and explanatory matter has been given if it seemed needed. The iso-

Pods here dealt with differ in size within only comparatively small limits. They attain their adult form and structure while quite small and maintain this as they grow. Therefore the exact degree of enlargement of the figures is not of significance and, following the practice of many other works, has not been given, but it can be deduced approximately from the dimensions stated in the descriptions.

ACKNOWLEDGMENTS

To the authors from whose works extracts, illustrations, or information (often quoted in condensed form) have been taken, credit is given in the proper places. It remains for me to express here my thanks and deepest sense of obligation to all of them, and also to those who have personally and directly aided me, or helped to make it possible to carry out this undertaking; first of all the authorities of the American Museum of Natural History, especially Dr. Roy W. Miner, head of the Department of Living Invertebrates of the Museum. To his continued and unfailing interest and sympathy, and his understanding of the delays and difficulties that invariably arise in the course of so lengthy an undertaking, the completion of the work has largely been due.

I thank also all those, both individuals and institutions, who have given or loaned me specimens for study or made exchanges enabling me to study cotypes and other original material, especially the authorities of the United States National Museum (with special obligations to Drs. Waldo L. Schmitt and Clarence R. Shoemaker); to Dr. Stanley C. Ball of the Yale University Museum; and Prof. Edwin P. Creaser of the University of Michigan. I wish also to express my appreciation of the assistance of Mrs. Walter C. Langsam, of the American Museum of Natural History, for her interest and care in verifying references and quotations and reducing to a minimum the errors that creep into the manuscript of such a work in spite of all efforts. For such mistakes and omissions as have escaped our discovery I hope the readers will be lenient.

THE ISOPODA

THEIR GENERAL CHARACTERS AND RELATIONSHIPS

The Isopoda are a group now usually given the rank of an order of the Malacostraca or highest subclass of the Crustacea, that which contains the crabs, crayfishes, etc. Together with the order Amphipoda, they are often grouped as a super-order called Arthrostraca (from the segmented condition of the thorax) or Edriophthalmata (from the fact that the eyes are sessile instead of being raised on stalks), which forms one of the lower divisions of the Malacostraca.

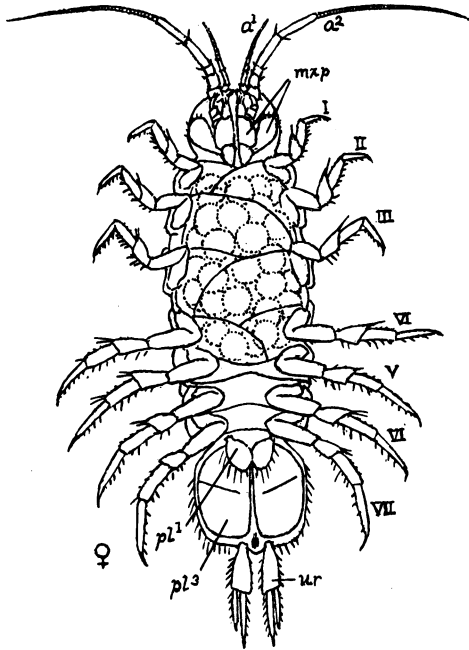


Fig. 1. An aquatic isopod, *Asellus communis* Say, of the suborder Asellota. Lower surface of female. Roman numerals show the seven thoracic segments.

a^1 , a^2 , first and second antennae; mxp , maxilliped; pl^1 , pl^3 , appendages (pleopoda) of first and third abdominal segments; ur , uropod.

From the higher orders of the Malacostraca they differ most conspicuously in that the dorsal plates of the segments of the anterior parts of the body are not extensively fused into an immovable carapace, and in the usually immovably fixed, unstalked eyes, as well as in the generally much smaller size, a length of 20 to 30 mm. being attained by only a

small minority of the species, and larger dimensions by only very few. The body is somewhat elongated, and composed, in addition to the head, of thirteen clearly apparent segments, which generally each bear a pair of jointed limbs or appendages variously modified for walking, prehension, swimming, respiration, etc.

Leaving parasitic and other aberrant forms of both groups out of consideration, the Isopoda are conspicuously distinguished from their near allies, the Amphipoda, by the limbs or appendages, especially by those of the hinder part of the body—the so-called abdomen, comprising the last six segments. These abdominal limbs are usually reduced to flattened plates, modified (except the last, or sixth, pair) for respiratory purposes, while in the Amphipoda the first three abdominal appendages commonly form short swimming feet and the last three are modified into processes for jumping or sudden progression either on land or water, accomplished by suddenly straightening the body. In the Isopoda the body is usually of a somewhat flattened, dorsoventrally compressed form; in the Amphipoda it is compressed from side to side. The heart is in the anterior part of the body in the Amphipoda, in the rear part in the Isopoda; this may be explainable by the fact that in the latter the abdominal limbs are the respiratory organs, while the Amphipoda have gills borne on the legs of the fore part of the body. In both groups the eggs and developing young are carried by the mother in a brood pouch or MARSUPIUM formed by overlapping, plate-like outgrowths (OÖSTEGITES) which extend inward from the bases of some of the legs, forming a cavity between themselves and the ventral surface of her body. Both groups comprise both marine and fresh-water forms; the Isopoda have also one large group of completely terrestrial forms (the ONISCOIDEA), while among the Amphipoda only one family, the Orchestiidae, comprising the well-known beach fleas which live under damp seaweed or burrow in wet sand on sea beaches, has acquired terrestrial habits to some degree.

THE ONISCOIDEA

The most familiar members of the Isopoda are terrestrial ones, the Oniscoidea. They are small, usually rather slow moving, insect-like creatures with a transversely segmented body like a small armadillo, found under logs, stones, pieces of board, etc., which have lain on the ground for some time and afford a more or less dark, damp retreat in which these small creatures can take refuge. They seldom measure over 12 to 18 mm. long and many of them, when frightened, can roll up into

a complete ball, protecting the delicate limbs and under parts, and exposing only the hard chitinous plates of the back. They are popularly known by various names, such as wood-lice, slaters, or sow-bugs, or in the case of those that roll up, as pill-bugs, but are of course crustaceans, not insects, as their larger number of legs (seven pairs) at once shows. The Oniscoidea are for the most part entirely inoffensive creatures; they are not in any case actually predacious, though not averse to such animal food as they can get. They feed chiefly on vegetable matter, often apparently on decaying wood or leaf mould, which they swallow, and digest out what nourishment it contains. In occasional cases, when numerous, they have been reported as doing damage to vegetables, to plants in greenhouses, or to cultivated mushrooms.

STRUCTURE AND TERMINOLOGY

As an example for study, both of the Isopoda in general and of the Oniscoidea especially, we shall take *Porcellio scaber* Latreille, a species which may be found near human habitations in such situations as have been mentioned, throughout a large part of the United States and Europe. This species has the body of rather flattened form, and is unable to roll up into a ball. Its body is composed of thirteen distinct segments besides the head, which is narrow and somewhat set back into the first body segment. The head bears a pair of jointed antennae and a pair of compound eyes; the mouth is on the inferior side. The seven following segments compose the principal part of the body (called the THORAX) and each bears a pair of legs; the remaining six segments are smaller and constitute the so-called ABDOMEN. The terminal (or sixth) of these segments forms a triangular piece, the TELSON, which bears as its appendages a pair of short, stout stylets (the UROPODA), each with two pointed terminal branches. Turning the animal over, we see that the other five abdominal segments bear pairs of overlapping, mostly plate-like appendages (called PLEOPODA) certain of which are narrowed and modified in the males, thus furnishing an easy means of recognizing that sex. Raising the external overlapping plates, we find that the abdominal appendages of which they form a part comprise also soft vascular, inner leaf-like plates which serve for respiration.

Female individuals may be distinguished by the lack of the above-mentioned sexual modification of the pleopoda and by the usual presence of the marsupium or brood pouch already mentioned. In this the eggs, which are not very numerous in Oniscoidea (in small species usually very few), and the young into which they develop, are carried until the

young are able to run around. The development in the land Isopoda (though not in most aquatic forms) is very direct, the larval stages not differing very greatly from the adult, though the seventh thoracic segment, and especially the pair of legs it bears, lag behind the preceding six in development, so that a stage with six pairs of legs is passed through.

As in other Crustacea, the external surface of the body and its appendages is covered with a chitinous integument secreted by the external epithelium of the body and strengthened and hardened in the

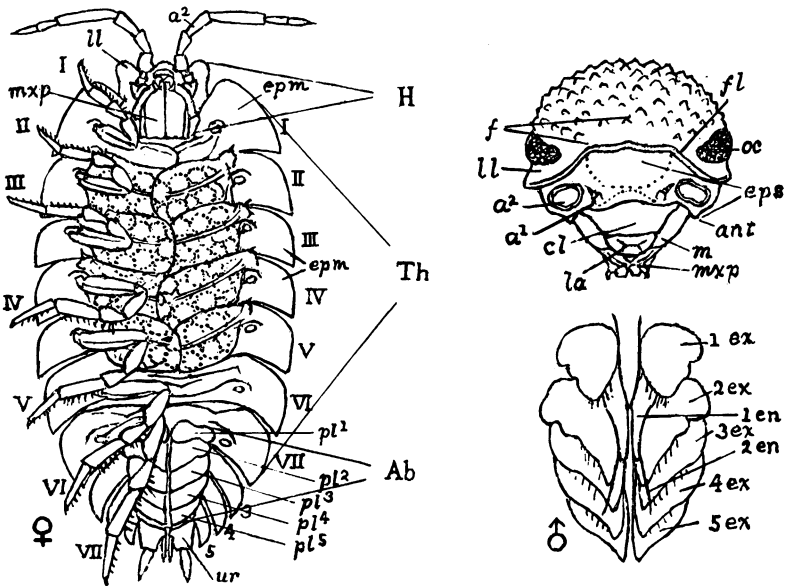


Fig. 2. A typical land isopod, *Porcellio scaber* Latreille. Lower surface of female (left legs removed), front view of head, and pleopoda of male.

a¹, first antenna; a², second antenna or socket for same; ant, antennary tubercle; cl, clypeus; en, endopodite; epm, epimera; eps, epistome; ex, exopodite; f, forehead; fl, frontal line; la, labrum; ll, lateral lobe; m, mandible; mxp, maxilliped; oc, eye; pl, pleopod; ur, uropod. Ab, abdomen; H, head; Th, thorax.

larger species by the deposit of calcareous matter, also secreted by the epithelial cells. This integument is shed or moulted at intervals to permit of growth; a new integument, that is at first soft and flexible having been first secreted beneath the old one.

Beside the coarser elevations and tubercles (in a few cases even actual spines) with which the dorsal surface of the body and head is ornamented in many Oniscoidea, the dorsal surface on higher magnification exhibits a minute granulation or sometimes reticulation, and

frequently a scabrous pubescence of short hairs or setae. In some genera the setae are variously modified into small scale-like or clavate appendages.

The integument is also penetrated by pores, mostly very minute. In the case of the American Oniscoidea the detailed study of these microscopic surface features has hardly been begun, so that we are not yet in a position to discuss them in detail or to employ them as taxonomic characters. So far as the native American species are concerned, they offer a practically untouched field of study for the investigators who may make them the subject of their research.

Though many Isopoda, especially those living in dark situations, are almost without pigment, and are practically wholly of the pale yellowish or whitish color of the chitinous integument, in most of the Oniscoidea the dorsal surface is more or less deeply colored with a brownish, grayish, blackish, or somewhat purplish pigment that contrasts, sometimes quite handsomely, with the lower parts of the body, which are usually pigmented slightly, if at all, and with the borders of the segments and such other parts of the upper surface as may be devoid of the pigment. One feature of the distribution of the pigment occurs so widely in the Oniscoidea and in some other Isopoda as well, that it can not fail to attract notice; this is the presence on each side of the median dorsal region of each thoracic segment of an area of light-colored, unpigmented, oval spots, or short irregular bars, which mark the insertion on the inner surface of the body wall of the strong muscles that move the legs. This part of the back is, moreover, apt to be more or less roughened or rugose, even in the species where the general surface of the integument is very smooth.

The structure of some of the more important parts of the Isopoda, especially as they are developed in the Oniscoidea, will now be taken up in more detail, using, as before, *Porcellio scaber* as the typical example, but dealing also with some of the variations occurring in other members of the group.

Head

The HEAD, though appearing as a single segment, is in reality a fusion of five or (according to the view that the eyes and first antennae represent the appendages of somites, seven segments or somites) as is shown by the number of pairs of appendages arising from it.

The EYES are sessile and immovable and usually composed of a number of ocelli. The eyes, however, are very subject to degeneration

or even practically complete disappearance in species that live in caves or underground, or in other dark places.

The FIRST ANTENNAE or ANTENNULES, though well developed and composed of many joints in most aquatic isopods, are minute and reduced to only two or three joints in the Oniscoidea. They are also peculiar in their situation in this group, arising directly between, instead of anterior to, the SECOND ANTENNAE. The latter are, in the

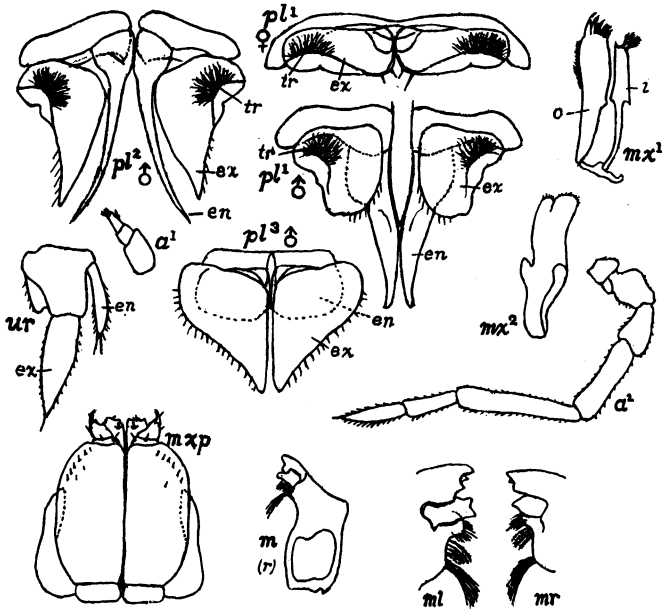


Fig. 3. *Porcellio scaber* Latreille. Adapted from Sars, 1899.

Details: *i*, inner, *o*, outer branch of first maxilla; *ml*, *mr*, tips of left and right mandibles; *mx*, maxilla; *tr*, tracheae; other lettering as in Fig. 2. (Maxillipeds and pleopoda of both sides are shown.)

Oniscoidea, so much larger and more conspicuous that they are commonly referred to simply as the ANTENNAE, ignoring the existence of the minute and inconspicuous first pair. The second antennae arise from sockets having a well-defined, more or less raised border, situated lower down on the face than the eyes and somewhat nearer the median line yet leaving a wide space between them in which, as already stated, the minute first antennae are inserted. Between the latter there may be a median tubercle or elevation. The second antennae usually consist of

a PEDUNCLE of five distinct movable joints, the first two very short, the fifth usually the longest, and a FLAGELLUM or slender terminal part which, in aquatic isopods and in the more primitive land forms (Ligiidae), can be elongate and composed of many small joints called ARTICLES. In the majority of the Oniscoidea, however, its articles are reduced in number to three, or often, as a result of the fusion of the two terminal articles into one larger one, to only two, as is the case in *Porcellio scaber*. On the lower side of the head there is the BUCCAL MASS, an obtusely conical mass of structures protruding downward and forward, composed of certain unpaired structures (in front the FRONTAL LAMINA, second, the CLYPEUS, and below it the LABRUM or upper lip) and four pairs of appendages modified into masticatory or accessory feeding organs. All these, commonly spoken of collectively as the MOUTH PARTS, surround the mouth and fit closely together when not in use, forming collectively the above-mentioned conical, projecting buccal mass.

The unpaired structures named above form the upper and anterior surface of the buccal mass. The paired appendages or mouth parts, naming them from front to rear, are as follows:

First: a pair of strong MANDIBLES, each ending in a curved process or apex bearing a few strong teeth. In the Oniscoidea the mandibles have no jointed appendage or palpus.

Second and third: two pairs of flattened appendages called MAXILLAE. The first maxillae consist mainly of two (outer and inner) elongate branches or divisions arising from a slender, more or less transverse basal segment. The outer and longer branch bears a row of eight or more somewhat curved teeth on its obliquely truncated terminal edge; the inner, or more median branch, which is slenderer and weaker, bears two (or rarely more) brush-like tufts of setae. The second maxillae are shorter, broadly plate-like, without teeth, and with only a partial indication of division into inner (median) and outer lobes.

Fourth: behind the maxillae a pair of somewhat oblong, flattened appendages, the MAXILLIPEDS, whose median borders are straight and fit closely together, so that they serve as a cover or operculum for the other mouth parts and form the posterior or lower surface of the buccal mass. They bear, near the free end, a short, flattened palp of several joints.

It is universally admitted that the parts of the head from which these pairs of appendages (perhaps excepting the eyes and first an-

tennae) arise represent somites which are fused to form the head. More will be said about the maxillipedal somite below.

The head is set back into the concave anterior border of the first thoracic segment and is so articulated as to permit of considerable tilting, or up-and-down motion, but not so much lateral motion.

The completeness of the fusion of many of the elements (somites and parts of somites) composing the head, and the displacement or suppression of some of those elements, especially in those forms that roll up into a ball, render the morphology of the head of the land isopods a very difficult subject to clear up satisfactorily, and authorities are by no means in agreement on many of the questions regarding the homologies of the elements constituting the head and in respect to the terminology and nomenclature of these parts which they employ in their works.

In the present work, however, we are concerned chiefly with those external features of the head that are sufficiently prominent and conspicuous to be employed in the descriptions and diagnoses published by the various authors. Yet in spite of this, uncertainty and confusion are sometimes caused by the obliteration in some species of lines and sutures that are prominent and conspicuous features in other species.

If the face (or anterior, more or less vertical aspect of the head) of *Porcellio scaber* is examined, there will be seen a very prominent sinuous projecting ridge extending across it, passing below the eyes at the sides and arching upward in the middle. Viewed from above, this ridge, which is called the **FRONTAL LINE** (*linea frontalis*), extends forward in the present species into three obtuse lobes, a median one and one under each eye, though in many other Oniscoidea these lobes are absent or greatly reduced. This ridge marks the lower front boundary of the upper surface of the head, the surface above it resembling the general surface of the back of the animal in character, pigmentation and tuberculation, while below it the head is narrower and the sides and front of it are smoother, resembling more in character the under surface of the animal, and sutural lines indicating the building up of the head out of several distinct segments are recognizable. According to widely prevailing usage, including that of Budde-Lund, Dollfus, and others, the upper part of the face above the frontal line is termed the **FOREHEAD** (*frons*). This merges above and behind into the **VERTEX**, or upper surface of the head. The part of the face below the frontal line, down to the beginning of the clypeus, which latter forms the projecting upper surface of the buccal mass, is called the **EPISTOME** (*epistoma*). By some authors the clypeus is also included in the epistome.

Jackson (1926a, 1928a) to whom we are indebted for by far the most thorough and systematically carried out study of the head in the land Isopoda, rejects the term "epistome" entirely, as one that has been loosely and inexactly applied to parts of the head in various Crustacea (Jackson, 1926a, p. 893). He uses the term "frontal" for the regions below the frontal line, instead of applying it according to the general usage to the region above that line.

He distinguishes the area immediately below the frontal line as the PROFRONS, the transverse area next below this and separated from the profrons by the supra-antennal line (see below) as the POSTFRONS, and the next lower area, extending to the superior border of the clypeus and including the sockets of the second antennae, as the FRONTAL LAMINA. All these three areas are, in the usual terminology, parts of the epistome.¹ (See Fig. 4.)

Jackson, as he himself states (1926a, p. 894), has endeavored to adapt his usage of the terms frons, frontal, vertex, etc., to correspond to their use in insects. I believe, however, that entomology is a sufficiently specialized subject to have its own uses for terms without there being any obligation for other branches of zoölogy to conform to them, especially if confusion will be increased rather than diminished thereby, and though the studies on which Jackson's conclusions regarding the structure and homologies of the head in isopods are based must command a general acceptance of his views regarding the homology of the parts, it will not be easy to bring about the abandonment of a term so convenient for use in describing Isopoda as the word "epistome," or to change the usual applications of the terms "frons" and "frontal."

The description of the head of *Porcellio scaber* requires important modifications in order to apply to some of the other Oniscoidea, as well as to various aquatic forms. On account of lack of space, most of these modifications must be left to the systematic part of this book for such consideration as they need. A few of them, however, are of such common occurrence that they require mention here.

The frontal line, though forming a very prominent transverse sinuous ridge in *Porcellio scaber*, is much reduced in many Oniscoidea, and often becomes practically obliterated in forms having the head rounded and the lateral lobes vestigial or wanting, especially when the dorsal body surface is smooth or nearly so. Usually, however,

¹ Dollfus, who described many tropical American land isopods, divided the epistome into three sections: the PROSEPISTOMA, corresponding to the profrons of Jackson; the MESEPISTOMA, lying below it and including the region of the sockets of the antennae; and the METEPISTOMA, consisting of the clypeus.

there are at least indications of it in a sudden change to a more vertical direction in the surface of the face along a curved line arching between the eyes.

In many Oniscoidea, especially in forms such as *Philoscia*, where the frontal line is poorly developed or is not recognizable, there is another distinct and sometimes somewhat raised line crossing the face lower down. This is the SUPRA-ANTENNAL LINE (the linea transversa epistomatis of Budde-Lund). (See Fig. 4.) This arches over the sockets of the second antennae at the sides, passing either close above them or somewhat higher up on the face; in the middle it usually dips downward, forming there a distinct, though wide, V-shaped angle. (The

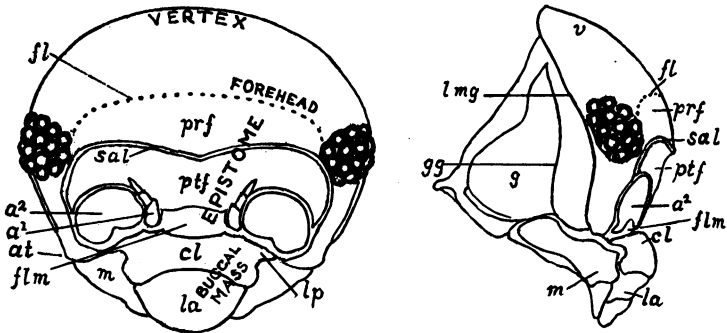


Fig. 4. Head of *Philoscia muscorum* Scopoli, a land isopod in which the frontal line and lateral lobes are not distinct. Adapted from Jackson, 1928a.

a^1 , a^2 , antennae; at , antennary tubercle; cl , clypeus; fl , frontal line; la , labrum; lmg , marginal line; lp , lateral process of clypeus; m , mandible; sal , supra-antennal line; v , vertex. The following letters show terminology used by Jackson (1926a, 1928a); flm , frontal lamina; g , gena; gg , genal groove; prf , profrons; ptf , postfrons. Only the socket for the second antennae is shown.

area between this line and the frontal line above it is the profrons of Jackson. It forms the upper part of the epistome of most authors and the prosepistoma of Dollfus.)

The clypeus, which, as already stated, projects forward to form the upper surface of the buccal mass, is narrower than the areas of the face above it, the outline of the head being here built out on each side by the large basal part of the mandible. The upper lateral angles of the clypeus, however, are extended into a pair of lateral processes which in most species are small and flush with the surface of the head below the antennal sockets, but are larger and more or less prominent in some genera, as *Cubaris* and its allies. Another feature of the head that

should be mentioned is the ANTENNARY TUBERCLE, a prominence on the side of the head in the region of the antennal socket but variously situated in relation to the latter. These tubercles may be more or less confluent with the lateral lobes of the frontal line when the latter are rudimentary and directed downward and appressed to the sides of the head, as they often are.

Thorax

The main division of the body lying next behind the head and comprising seven separate segments is called the THORAX, mesosome, or pereion. These segments bear the seven pairs of LEGS (pereiopods) and are designated in this work, as are also the legs they bear, by the Roman numerals I to VII. However, by comparison with other Crustacea and from studies in the development, it is clear that the maxillipeds, which form part of the buccal mass already mentioned in describing the head, with the somite to which they belong which forms the rear part of the head, really represent thoracic elements, and from a theoretical point of view should be called segment I of the thorax,¹ making the number of thoracic segments eight.

The seven pairs of legs (pereiopods) are usually much alike in their structure (whence the name isopod, = equal-legged), although they usually become longer toward the rear of the body. However, there may be some sexual differences in the form of the joints and in the arrangement and number of the spines borne on them, especially in the three anterior pairs.

They consist of six movable joints or segments, termed, respectively, (beginning at the basal end) the BASIS, ISCHIUM, MERUS, CARPUS, PROPODUS, and DACTYLUS.² This is one less than is found in many Crustacea, the reason being that in the Oniscoidea the true first or proximal joint (the COXA or COXOPODITE) is coalesced completely with and consolidated into the lateral part of its somite, forming an integral part of the latter. The broad lateral extensions of the body segments called the EPIMERA (singular, EPIMERON), which arch outward and greatly increase the apparent width of the body, are actually largely composed of this coxal joint or coxopodite. In some Oniscoidea, especially in female specimens, a slightly impressed line crossing the surface of the segment from

¹ It may not be out of place to compare with this the modification in the Decapoda of not one pair only, but three pairs of thoracic limbs into mouth parts (the first, second, and third maxillipeds), which results in a corresponding reduction in the number of legs to five, the anterior pair of which are often modified into large grasping claws or chelae. In most Decapoda also the dorsal plates of the head and all the thoracic segments, instead of only one, are fused into an immovable carapace, leaving only the abdominal segments movable.

² Of these only the immovable coxa and the basis represent the protopodite of the typical two-branched crustacean limb, the remaining segments the endopodite. An exopodite is wanting.

front to rear some distance from each lateral end marks the junction of the epimeron with the TERGUM or TERGITE, the median part of the segment.

The marsupium or brood pouch of the female has already been mentioned. In *Porcellio* it will be found to be composed of five pairs of plates called OÖSTEGITES (the first pair very small) arising at the bases of legs I to V.

The first thoracic segment is usually the longest and largest. It is often provided with a more or less well-developed outwardly bent or rolled border along the lateral margin and, in forms that roll up, often with a cleft at the rear lateral corner into which the edge of the epimeron of the second segment is received when the animal is rolled. This cleft is very frequently continued forward as a furrow (COXOPODITE SULCUS) on the lower aspect of the border of the first segment; this sulcus separates off a ridge (the COXOPODITE RIDGE) parallel to and within the actual margin of the segment. Similarly, on the second segment there is often a process (COXOPODITE PROCESS) on the inner aspect of the epimeron. The process forms between the latter and itself a small notch or cleft to receive the anterior edge of the third segment when the animal is rolled up. These structures assist in maintaining the segments in position. Their shape and the manner in which they are developed furnish good characters for distinguishing the species in *Cubaris* and certain allied genera. A coxopodite process is not usually developed on the segments following the second.

Abdomen

Behind the thorax are the six smaller segments constituting the ABDOMEN, metasome or pleon. These, and the appendages borne by them, are designated in this book by Arabic numerals (1 to 6) to distinguish them from the Roman numerals used for the thoracic parts.

In the Oniscoidea the first two abdominal segments are overlapped, especially at the sides, by the concave rear border of the seventh thoracic segment. Their epimera are not much developed, but segments 3 to 5, inclusive, usually have well-developed, more or less backwardly curved epimera. The sixth segment or TELSON¹ is narrow, usually somewhat triangular in Oniscoidea that do not roll up, but often widely truncated at the end in those that do so, so that it may fit closely against the anterior margin of the head when in the rolled position.

¹ The telson in Isopoda is a compound segment consisting of a sixth abdominal segment which bears its pair of appendages, the uropoda (see below) and a median terminal piece (the latter the true telson). Hence Dollfus and some other authors term it the PLEOTELSON, a usage doubtless more strictly correct, but not very generally followed.

Abdominal Appendages

Although the abdominal appendages (PLEOPODA and UROPODA¹) and their functions have been briefly alluded to above, the importance of their characters in classification makes it necessary to consider them in more detail.

The pleopoda consist of a short basal segment (PROTOPODITE) and an INNER and OUTER PLATE or division (ENDOPODITE and EXOPODITE, respectively), each composed, with certain exceptions, of only a single segment, usually of flattened leaf-like form. The endopodites, as already stated, are soft and vascular and respiratory in function, except that those of the first and second (in Ligiidae only the second) pairs in the male are produced into elongate stylets for copulatory organs. The exopodites or outer plates are chitinous and serve as protective covers or opercula; in the male one or more pairs are elongated for the protection of the stylets.²

In the less specialized families (Ligiidae and Trichoniscidae) and in some members of other families, the exopodites or outer plates apparently have only a protective and moisture-conserving function, but in most members of the higher families of Oniscoidea they contain TRACHEAE or respiratory air tubes, either in the first two pairs of pleopoda or in all five pairs, so that they assume important respiratory functions. These tracheae exhibit different characters and arrangements in different groups and evidently have arisen independently in some cases. They may exhibit quite different arrangements in genera otherwise very closely allied, as notably in *Porcellio* and *Tracheoniscus*. In *Porcellio* they are present only in the two anterior pairs in the form of an extensively branched system which opens by a single large orifice, while in *Tracheoniscus*, a genus but slightly distinguishable in most characters from *Porcellio* and formerly universally included in it, the tracheae open by minute tubules ending in small pores in the margin of the plate.

In *Armadillidium* the tracheae are, as in *Porcellio*, confined to the exopodites of the first two pleopoda, but there are several openings situated along a furrow instead of a single opening for all the tracheae.

In *Cubaris* and certain allied forms we have the maximum of development of respiration by means of the exopodites of the pleopoda,

¹ The uropoda, which are merely the modified appendages of the sixth abdominal segment should, strictly speaking, be included in the pleopoda. Ordinarily, however, the appendages of segments 1 to 5 only are implied in using the latter term.

² In the males of the higher or more specialized Oniscoidea, as the Oniscidae, Armadillidiidae, etc., the two pleopoda of the first pair together with a median male sexual appendage between them are united into a single structure.

with a somewhat diminished development of the endopodites. All five pairs of exopodites have well-developed tracheae opening by a single aperture in a laterally placed pocket like depression.

In *Oniscus*, on the other hand, and in true members of the genus *Philoscia* and its near allies there are no tracheae in the exopodites. *Oniscus*, however, has a radial fluting of a part of the dorsal surface of all five pairs, which, in the opinion of Verhoeff (1920, p. 415), is a step toward the development of true tubular tracheae.

The *Philoscias* and allied forms are mostly small species with a delicate cuticle, and an especially efficient respiratory apparatus is less essential. Its absence may be due to its never having been developed, or to its having been lost accompanying decrease in size.

The *Tylidae* are representatives of a very small aberrant group which, if it belongs to the same phylogenetic stem as the other Oniscoidea, must have branched off at an early date. They have tracheae in the exopodites of the pleopoda which open in the middle of the inferior lamella of the exopodite. Their tracheae have apparently developed independently of those which occur in any other groups.

For a detailed discussion of this subject the reader is referred to Verhoeff, 1917*a* and 1920. In those articles that author establishes a classification based largely on the development of the respiratory apparatus in the pleopoda. This classification is used in the present work as far as its main features are concerned.

In the less highly specialized Oniscoidea the UROPODA or appendages of the sixth abdominal segment or telson consist of a BASAL SEGMENT or PROPODITE, usually rather short and wide, bearing two styliform branches of a single piece each, the ENDOPODITE or INNER BRANCH and the EXOPODITE or OUTER BRANCH, which are, however, not very elongate except in the family Ligiidae. The outer branch is generally of tapering form and usually longer and stouter than the inner, but in some of the more specialized Oniscoidea in which the body is adapted for rolling up into a ball, both branches are reduced and the outer may be a mere rudiment. In one family (*Tylidae*) of the Oniscoidea the uropoda are developed into an operculum to protect the other abdominal appendages, and various other modifications are found in some of the aquatic Isopoda.

ORIGIN AND DISTRIBUTION

The isopods are, geologically speaking, a moderately old group, though their small size and the delicacy of their structure has not been

favorable for their preservation as fossils. Although the isopod nature of the few Paleozoic fossils that have been referred to this order is regarded as more or less open to question, true Isopoda, probably referable to existing families of the suborders Flabellifera and Valvifera, are found in Jurassic and later formations.¹ All the earlier ones are aquatic species; land isopods are known only from the upper Eocene and more recent formations, though since even the earliest land forms are referable to existing families (Oniscidae, Trichoniscidae), we cannot doubt that they existed for a considerable time previous.

Interesting as the early ancestry and history of the Isopoda would be if we could clear them up, it is with the problems of their more recent evolution and dispersal that we are concerned in the present work.

In the case of our fresh water species these appear relatively simple, for with the exception of those of the family Asellidae, they appear to have acquired a fresh-water habitat comparatively recently and often independently, as in many cases they belong to genera having marine representatives in neighboring seas, or may themselves sometimes occur in salt water. With the Asellidae the case is different. These evidently have long been inhabitants of fresh water and have undergone some differentiation, with the formation of several genera, as well as many species, since their emigration from the sea. They are probably of Old World origin and may have reached North America by way of some past land connection in the Behring Strait region. So far as we know, they have not reached South America.

In the case of the land Isopoda, or Oniscoidea, we are probably dealing with the survivors of a much larger group which has passed its maximum and period of dominance, leaving today only the terminal parts of some of its phylogenetic branches and giving but little clue as to how these branches were formerly connected.

The Ligiidae are doubtless correctly regarded as the most primitive family of the Oniscoidea because of the structure of their respiratory organs, the morphology of the head and other parts, and from their more or less amphibious habits. The latter, however, may have been secondarily acquired, for they have legs as perfectly specialized as those of any isopods for rapid locomotion on land. The Tylidae, though having some primitive features, are an aberrant lateral branch with some highly specialized characters.

The land isopods fall into two classes from the point of view of dis-

¹ Van Straelen, V. 1928. 'Contribution à l'étude des isopodes Méso-et Cénozoïques.' *Mém. Acad. Roy. Belg., cl. sci.* IX, fasc. 5, pp. 1-68, Figs. 1-4, 1 Pl.

tribution. Those of markedly littoral (sea coast) habits, including most of the Ligiidae, the Tylidae, the genus *Deto*, and some of the *Philoscia* group which can stand considerably immersion in sea water, are naturally more likely to be accidentally transported on floating logs, etc., and we find such forms to be widely distributed, or represented even on widely distant coasts by very closely related, nearly indistinguishable, allies.

The problems of the origin and distribution of the remaining land isopods, those which are not littoral in habits, are more difficult and complicated. Of course, in the case of genera and species known only from America we shall usually be correct in assuming that they evolved there, yet there seem to me strong reasons for the belief that a large part of the American land isopod fauna did not originate on this continent, but that it reached America from the Old World in various ways at various past times.

Among the facts supporting this belief may be mentioned the very great scarcity of land isopods in temperate North America, except for a few littoral ones whose comparatively easy dispersal has been alluded to above, and excepting also a few originally European or Asiatic species that in some cases quite certainly, and in others very probably, have been accidentally introduced through human agency. These are species that have adapted themselves to life under the conditions of human occupation of the land, and have become so abundant that they constitute by far the greater part of the land isopod population of temperate North America.¹ It is only from the southern boundary of the United States southward that we begin to find a land isopod fauna well developed, yet even there it probably does not approach that of the warmer parts of the Old World in number of species and variety of forms, even allowing a considerable margin for the American species and genera that still remain to be discovered. Neither does there appear to me to be sufficient ground for assuming that any of the larger and more important groups are probably of American origin, with the possible exception of the *Philoscia-Oniscus* assemblage of genera, which is very well represented in America.

On the other hand, among the larger and more important groups of Oniscoidea there are a number to which we can ascribe an Old World origin without much doubt, in some cases with hardly any at all. The

¹ *Porcellio scaber*, *P. laevis*, *P. spinicornis*, *Porcellionides pruinosus*, *Tracheoniscus rathkei*, *Cylisticus convexus*, *Oniscus asellus* and *Armadillidium vulgare* may be mentioned as the chief examples in the United States; in certain tropical American places *Cubaris murina* has a similar status.

Eubelum group (the Eubelidae, if we allow them the rank of a family) and the Armadilliidae have reached America with only a few members, the latter family perhaps only through human agency, though they are important groups in the Old World. The large groups of genera centering about *Porcellio* and *Cubaris* are so much better represented in the Old World than in America, in respect to numbers and to variety of form, that we can hardly doubt their origin in the eastern hemisphere also.

How and at what periods these various groups of Oniscoidea reached America we do not know, but evidently in some cases they arrived at some fairly remote time, as much differentiation has taken place since their arrival; in other cases they may have come rather recently.

Land isopods are most numerous in tropical and warm-temperate regions. Only a few extend northward to or over the United States-Canadian border, and reasons seem insufficient for believing in any considerable migration by means of a past land connection across Behring Strait. Most of those that are of foreign origin appear to have found some means of crossing the ocean in warmer latitudes.

The prevailing oceanic currents apparently have had the effect of carrying a few littoral forms, as *Deto* and *Trichoniscus magellanicus* to South American shores from the New Zealand region, but the specific identity of the forms from the two regions is none too well established, and no real relationship appears to exist between the South American land isopod fauna and that of the New Zealand region, such as Budde-Lund seems to have believed.

NAMES AND GENERAL DISTRIBUTION OF THE AMERICAN LAND AND FRESH-WATER ISOPODA

(A few species additional to those in the present list and the regional lists that follow are dealt with in the Supplement to this work.)

ABBREVIATIONS.—A, America; Ber., Bermuda; cen., central; C. A., Central America; e., eastern; Fla., Florida; F. I., Falkland Islands; Gal., Galapagos; J. F., Juan Fernandez; litt., littoral; Mex., Mexico; n., northern; N. A., North America; nw., northwestern; N. Z., New Zealand; O. W., Old World; Pac., Pacific; s., southern; S. A., South America; tr., tropical; w., western; W. I., West Indies, wi. dis., widely distributed. New species are marked with an asterisk (*).

LAND ISOPODA

SUBORDER ONISCOIDEA

Superfamily ATRACHEATA Verhoeff

Family LIGIIDAE

- Ligia (Ligia) oceanica* (Linnaeus), 1767, n. O. W. (n. N. A.).
Ligia (Ligia) pallasii Brandt, 1833, nw. N. A.
Ligia (Megaligia) exotica Roux, 1828, wi. dis. A., O. W.
Ligia (Megaligia) occidentalis Dana, 1853, w. N. A., Mex.
Ligia (Megaligia) cinerascens Budde-Lund, 1885, w. S. A.?
Ligia (Megaligia) hawaiiensis Dana, 1853, wi. dis. Pac. region
 (w. Mex.?).
Ligia (Megaligia) olfersii Brandt, 1833, e. tr. A., Fla. (w.
 Africa).
Ligia (Megaligia) flicornis Budde-Lund, 1893, tr. S. A.
Ligia (Nesoligia) novae-zealandiae Dana, 1853, w. S. A., J. F.,
 N. Z. .
Ligia (Nesoligia) cursor Dana, 1853, w. S. A.?
Ligia (Nesoligia) litigiosa Wahrberg, 1922, J. F.
Ligia (Hirtiligia) baudiniana Milne-Edwards, 1840, Ber.,
 Fla., e. tr. A., Gal.
Ligia cajennensis Koch, 1847, e. tr. S. A.
Ligia (Pogonoligia) platycephala Van Name, 1927, tr. S. A.
Ligia (Pogonoligia) simoni (Dollfus), 1893, tr. S. A.
Stymphalus dilatatus (Perty), 1834, e. tr. S. A.
Ligidium gracile (Dana), 1856, nw. N. A.
Ligidium longicaudatum Stoller, 1902, e. N. A.
Ligidium hypnorum (Cuvier), 1792, O. W. (e. N. A.?).
Ligidium latum Jackson, 1923, w. N. A.
Ligidium kofoidi Maloney, 1930, w. N. A.
Ligidium elrodii (Packard), 1873, cen. N. A.

Family TRICHONISCIDAE

- Trichoniscus demivirgo* Blake, 1931, e. N. A.
Trichoniscus pygmaeus Sars, 1899, O. W. (e. N. A.).
Trichoniscus pseudopusillus Arcangeli, 1929, W. I.
Trichoniscus magellanicus (Dana), 1853, s. S. A., F. I. (N. Z.?).
Trichoniscus murrayi Dollfus, 1890, w. S. A.
Trichoniscus (Clavigeroniscus) riquieri Arcangeli, 1930, C. A.
Trichoniscus (Cordioniscus) stebbingi Patience, 1907, O. W.
 (e. N. A.).
Trichoniscus (Miktoniscus) halophilus Blake, 1931, e. N. A.
Haplophthalmus danicus Budde-Lund, 1877, O. W., e. N. A.
Oligoniscus monocellatus (Dollfus), 1890, J. F.
Brackenridgia cavernarum Ulrich, 1902, s. N. A.
Cylindroniscus seurati Arcangeli, 1929, W. I.

Superfamily PLEUROTRACHEATA Verhoeff

Family SCYPHACIDAE

- Scyphacella arenicola* Smith, 1873, e. N. A.
Deto bucculenta (Nicolet), 1849, w. S. A. (N. Z., etc.?).
Detonella papillicornis (Richardson), 1904, nw. N. A.
Armadilloniscus ellipticus (Harger), 1878, e. N. A., Ber.
Armadilloniscus tuberculatus (Holmes and Gay), 1909, w. N. A.
Armadilloniscus lindahli (Richardson), 1905, w. N. A.

Family ONISCIDAE

- Pentoniscus pruinus* Richardson, 1913, C. A.
Pentoniscus exilis Van Name, 1925, tr. S. A.
Philoscia (Philoscia) muscorum (Scopoli), 1763, O. W. (e. N. A.)
Philoscia (Philoscia) vittata Say, 1818, e. N. A.
 **Philoscia (Philoscia?) geiseri*, new species, s. N. A.
Philoscia (Ischioscia) variegata Dollfus, 1893, C. A., tr. S. A.
Philoscia (Ischioscia) nitida (Miers), 1877, tr. S. A.
 **Philoscia (Ischioscia) mineri*, new species, W. I.
Philoscia (Oniscophiloscia) mirifica Wahrberg, 1922, J. F.
Philoscia (Benthana) picta Brandt, 1833, e. S. A.
Philoscia (Benthana) olfersii Brandt, 1833, e. S. A.
Philoscia (Benthana) pauper Jackson, 1926, w. S. A.
Philoscia (Benthana) villosa Jackson, 1926, w. S. A.
Philoscia (Benthana?) angustata (Nicolet), 1849, w. S. A.
Philoscia (Benthana?) bilineata (Nicolet), 1849, w. S. A.
Philoscia (Balloniscus) sellowii Brandt, 1833, e. S. A.
Philoscia (Balloniscus) brevicornis Budde-Lund, 1885, s. N. A.
Philoscia (Balloniscus) nigricans Budde-Lund, 1885, s. N. A.
Philoscia (Balloniscus) maculata Budde-Lund, 1885, e. S. A.
 **Philoscia paraguayana*, new species, e. S. A.
 **Philoscia omissa*, new species, tr. S. A.
 **Philoscia kartaboana*, new species, tr. S. A.
 **Philoscia roraimae*, new species, n. S. A.
Philoscia seriepunctata Budde-Lund, 1885, tr. S. A.
 **Philoscia inquilina* new species, tr. S. A.
Philoscia richmondi, Richardson, 1901, W. I.
Philoscia incerta Arcangeli, 1932, W. I.
 **Philoscia moneaguensis*, new species, W. I.
Philoscia walkeri Pearse, 1915, tr. S. A.

- Philoscia demerarae* Van Name, 1925, tr. S. A.
Philoscia diminuta Budde-Lund, 1893, tr. S. A.
Philoscia gatunensis Van Name, 1926, C. A.
Philoscia paulensis Moreira, 1927, e. S. A.
Philoscia briani Arcangeli, 1929, W. I.
Philoscia baldonii Arcangeli, 1930, C. A.
**Philoscia langi*, new species, tr. S. A.
**Philoscia pearsei*, new species, tr. S. A.
Philoscia spinosa Say, 1818, s. N. A.
Philoscia culebrae Moore, 1901, W. I. (e. N. A.).
Philoscia culebroides Van Name, 1924, Gal.
Philoscia richardsonae Holmes and Gay, 1909, w. N. A.
Philoscia nomae Van Name, 1909, Gal.
Philoscia bermudensis Dahl, 1892, Ber.
Phalloniscus anomalus (Dollfus), 1890, w. S. A., J. F.
Pseudophiloscia inflexa Budde-Lund, 1904, w. S. A.
Pseudophiloscia (?) *angusta* (Dana), 1853, s. S. A.
Troglophiloscia silvestrii Brian, 1929, W. I.
Oniscus asellus Linnaeus, 1758, wi. dis., A., O. W.
Oniscus armatus Nicolet, 1849, w. S. A.
Calycuoniscus bodkini Collinge, 1815, tr. S. A.
Calycuoniscus spinosus Collinge, 1817, tr. S. A.
Trichorhina barbouri (Van Name), 1926, C. A.
Trichorhina thermophila (Dollfus), 1896, tr. A.
Trichorhina tomentosa (Budde-Lund), 1893, tr. S. A.
Trichorhina quisquiliarum (Budde-Lund), 1893, tr. S. A.
Trichorhina simoni (Dollfus), 1893, tr. S. A.
Trichorhina papillosa (Budde-Lund), 1893, tr. S. A.
Trichorhina ambigua (Budde-Lund), 1893, tr. S. A.
Trichorhina marianii Arcangeli, 1930, C. A.
Trichorhina pittieri (Pearse), 1921, tr. S. A.
Trichorhina isihmica (Van Name), 1926, C. A.
Trichorhina giannellii Arcangeli, 1929, W. I., C. A.
**Trichorhina bequaerti*, new species, W. I.
Bisilvestria marassinii Arcangeli, 1929, W. I.
Lyprobius pusillus Budde-Lund, 1885, w. N. A.
Lyprobius modestus Budde-Lund, 1885, e. S. A.
Alloniscus cornutus Budde-Lund, 1885, w. N. A.
Alloniscus perconvexus Dana, 1856, w. N. A.
Alloniscus mirabilis (Stuxberg), 1875, w. N. A.

- Alloniscus compar* Budde-Lund, 1893, tr. S. A.
Alloniscus borellii Dollfus, 1897, cen. S. A.
Alloniscus argentinus (Dollfus), 1897, e. S. A.
Alloniscus griseus Dollfus, 1897, cen. S. A.
Alloniscus sp. Richardson, 1913, C. A.
Synuropus granulatus Richardson, 1901, W. I.
Arhina porcellioides Budde-Lund, 1904, W. I.?
Porcellio scaber Latreille, 1804, wi. dis., O. W., A.
Porcellio laevis Latreille, 1804, wi. dis., O. W., A.
Porcellio spinicornis Say, 1818, e. N. A., O. W.
Porcellio pubescens Dollfus, 1893, tr. S. A.
Porcellio granarus Nicolet, 1849, w. S. A.
Porcellio liliputanus Nicolet, 1849, w. S. A.
Porcellio (Proporcellio) quadriseriatus Verhoeff, 1917, O. W.,
s. N. A.
Porcellionides pruinosus (Brandt), 1833, wi. dis., O. W., A.
Porcellionides sexfasciatus (Koch), 1847, O. W., Ber.
Porcellionides virgatus (Budde-Lund), 1885, s. N. A.
**Porcellionides habanensis*, new species, W. I.
Porcellionides saussurei (Dollfus), 1896, Mex.
Porcellionides chilensis (Dana), 1853, w. S. A.
Porcellionides advena (Stuxberg), 1872, e. S. A.
Porcellionides fuegiensis (Dana), 1853, s. S. A.
Porcellionides brunneus (Brandt), 1853, tr. S. A.
Porcellionides minutissimus (Boone), 1918, W. I.
Porcellionides bermudezi Boone, 1934, W. I.
Leptotrichus granulatus Richardson, 1902, Ber. (tr. S. A.?).
Leptotrichus vedadoensis Boone, 1918, W. I.
Nagara cristata (Dollfus), 1889, tr. A., O. W.
Cylisticus convexus (De Geer), 1778, wi. dis., e. N. A., O. W.
Tracheontiscus rathkei (Brandt), 1833, wi. dis., e. N. A., Mex.,
O. W.
Rhyscotus parallelus Budde-Lund, 1893, tr. S. A.
Rhyscotus ortonedae Budde-Lund, 1908, w. S. A. (Samoa).
Rhyscotus cubensis Budde-Lund, 1908, W. I.
Rhyscotus ciferrii Arcangeli, 1930, W. I.
Rhyscotus laxus Van Name, 1924, Gal.
Rhyscotus sphaerocephalus Budde-Lund, 1893, tr. S. A.
Rhyscotus nasutus Budde-Lund, 1908, C. A.
Rhyscotus turgifrons Budde-Lund, 1885, W. I.

Rhyscotus albidemaculatus Budde-Lund, 1908, e. S. A.

Rhyscotus jacksoni Arcangeli, 1930, W. I.

Rhyscotus texensis (Richardson), 1905, s. N. A.

Family ARMADILLIDIIDAE

Armadillidium vulgare (Latreille), 1804, wi. dis., O. W., A.

Armadillidium nasatum Budde-Lund, 1885, O. W., e. N. A.

Eluma caelatum (Miers), 1877, O. W., tr. S. A.

Family CUBARIDAE

Scleropactes concinnus Budde-Lund, 1885, w. S. A.

Scleropactes incicus Budde-Lund, 1885, w. S. A.

Scleropactes zeteki Van Name, 1926, C. A.

**Scleropactes tatei*, new species, w. S. A.

Scleropactes tristani Arcangeli, 1930, C. A.

Scleropactes estherae Arcangeli, 1930, C. A.

Scleropactes cavifrons Jackson, 1928, tr. A.?

Spherarmadillo schwarzi Richardson, 1907, C. A.

Sphaeroniscus flavomaculatus Gerstaecker, 1854, tr. S. A.

Sphaeroniscus frontalis Richardson, 1912, tr. S. A.

Sphaeroniscus portoricensis Richardson, 1901, W. I.

**Sphaeroniscus guianensis*, new species, tr. S. A.

**Sphaeroniscus tukeitanus*, new species, tr. S. A.

Sphaeroniscus columbiensis Pearse, 1915, tr. S. A.

Sphaeroniscus peruvianus (Budde-Lund), 1885, w. S. A.

Sphaeroniscus senex (Budde-Lund), 1893, tr. S. A.

Sphaeroniscus granulatus Dollfus, 1893, tr. S. A.

Sphaeroniscus gaigei Pearse, 1915, tr. S. A.

Sphaeroniscus sp. Dollfus, 1893, tr. S. A.

Sphaeroniscus sp. Dollfus, 1896, C. A.

Circoniscus bezzii Arcangeli, 1931, tr. S. A.

Circoniscus gaigei Pearse, 1917, tr. S. A.

**Circoniscus hamatus*, new species, tr. S. A.

Circoniscus spinosus Collinge, 1918, tr. S. A.

Cozopodias tristani (Richardson), 1910, C. A.

Cozopodias ruthveni (Pearse), 1915, tr. S. A.

Haplarmadillo monocellatus Dollfus, 1896, W. I.

Globarmadillo armatus Richardson, 1910, C. A.

Periscyphis sp. Kraepelin, 1901, e. S. A.?

Pseudarmadillo carinulatus Saussure, 1857, W. I. (Mex.?).

Pseudarmadillo dollfusi Richardson, 1905, W. I.

- Pseudarmadillo welchi* Boone, 1934, W. I.
Pseudarmadillo gillianus Richardson, 1902, W. I.
Pseudarmadillo buscki Boone, 1934, W. I.
Delatorreia hoplites Boone, 1934, W. I.
 **Cubaris watsoni*, new species, W. I.
Cubaris colomboi Arcangeli, 1929, W. I.
Cubaris zigzag (Dollfus), 1896, W. I.
Cubaris boliviana (Dollfus), 1897, tr. S. A.
 **Cubaris booneae*, new species, W. I.
Cubaris hendersoni Boone, 1934, W. I.
Cubaris aguayoi Boone, 1934, W. I.
Cubaris congenera (Budde-Lund), 1904, tr. S. A.
Cubaris venusta (Budde-Lund), 1893, tr. S. A.
Cubaris silvarum Dollfus, 1896, W. I.
Cubaris sanchezi Boone, 1934, W. I.
Cubaris clausa (Budde-Lund), 1885, tr. S. A.
Cubaris walkeri Pearse, 1911, Mex.
Cubaris multipunctata (Budde-Lund), 1885, tr. S. A.
Cubaris rubropunctata (Budde-Lund), 1893, tr. S. A.
Cubaris pumila (Budde-Lund), 1893, tr. S. A.
Cubaris viticola (Dollfus), 1896, W. I.
Cubaris scaberrima (Dollfus), 1893, tr. S. A.
Cubaris perlata (Dollfus), 1896, W. I.
 **Cubaris phylax*, new species, W. I.
 **Cubaris moneaguensis*, new species, W. I.
 **Cubaris oaxacana*, new species, Mex.
Cubaris grenadensis (Budde-Lund), 1893, W. I., tr. S. A.
Cubaris nigrorufa (Dollfus), 1893, tr. S. A.
Cubaris similis (Budde-Lund), 1885, S. A.?
Cubaris pisum (Budde-Lund), 1885, Fla.
Cubaris gigas Miers, 1877, C. A.
Cubaris dumorum (Dollfus), 1896, W. I.
Cubaris dugesi (Dollfus), 1896, Mex.
Cubaris beebei Van Name, 1924, Gal.
Cubaris truncorum (Budde-Lund), 1893, tr. S. A.
Cubaris vincentis (Budde-Lund), 1904, W. I. (tr. S. A.?).
 **Cubaris culebrae*, new species, W. I.
Cubaris jamaicensis Richardson, 1912, W. I.
Cubaris verrucosa (Budde-Lund), 1904, tr. S. A.
Cubaris galapagoensis Miers, 1877, Gal.

- Cubaris tuberosa* (Budde-Lund), 1904, W. I.
Cubaris ramsdeni Boone, 1934, W. I.
 **Cubaris wheeleri*, new species, W. I.
Cubaris brevispinis Pearse, 1915, tr. S. A.
 **Cubaris mineri*, new species, tr. S. A.
Cubaris longispinis Richardson, 1912, C. A.
Cubaris murina Brandt, 1833, wi. dis., tr. A., O. W.
Cubaris cinerea Brandt, 1833, e. S. A.
Cubaris brunnea Brandt, 1833, tr. S. A.
Cubaris flavobrunnea (Dollfus), 1896, C. A.
 **Cubaris cinchonae*, new species, W. I.
Cubaris tenuipunctata (Dollfus), 1896, W. I.
Cubaris depressa (Dollfus), 1896, W. I.
Cubaris affinis (Dana), 1854, w. N. A.
Cubaris californica (Budde-Lund), 1885, w. N. A.
Cubaris cacahuamilpensis (Bilimek), 1867, Mex.
Cubaris granaria (Nicolet), 1849, w. S. A.
Diploexochus echinatus Brandt, 1833, tr. S. A.
Acanthoniscus spiniger Kinahan, 1859, W. I.
Ethelum americanum (Dollfus), 1896, W. I., tr. S. A.
Ethelum reflexum (Dollfus), 1896, W. I.
Ethelum modestum (Dollfus), 1896, W. I.
Ethelum sp. Kraepelin, 1901, tr. S. A.

Superfamily HYPOTRACHEATA Verhoeff

Family TYLIDAE

- Tylos latreillei* Adouin and Savigny 1826, wi. dis., Ber., Fla.,
 tr. A.
Tylos punctatus Holmes and Gay, 1909, w. N. A.
 **Tylos insularis* Van Name, new species, Gal.
Tylos niveus Budde-Lund, 1885, Fla., W. I.
Tylos spinulosus Dana, 1853, s. S. A.
Tylos sp., De Borre, 1886, w. S. A.

Total species of land Isopoda for all of America 254, of which 26 are described as new in this work. Six species, probably all additional, are mentioned by various writers under generic names only.

Twenty-two of these 254 are known from Europe, Asia, or Africa also, some of which are now so well established and widely distributed in America that we cannot be certain whether they are introduced or indigenous; others are very local, if really effectively colonized in

America, besides four species that appear to have reached America from the New Zealand region by natural means.

FRESH-WATER ISOPODA

SUBORDER OR ORDER CHELIFERA

Family TANAIDAE

Tanais fluviatilis Giambiagi, 1923, e. S. A.

Nototanais beebey Van Name, 1925, tr. S. A.

SUBORDER FLABELLIFERA

Family CIROLANIDAE

Cirolana cubensis Hay, 1903, W. I.

**Cirolana browni*, new species, W. I.

Conilera stygia Packard, 1901, Mex.

Cirolanides texensis Benedict, 1896, s. N. A.

Family EXCORALLANIDAE

Excorallana herbicensis Boone, 1918, tr. S. A.

Family CYMOTHOIDAE

Nerocila fluviatilis Schioedte and Meinert, 1881, e. S. A.

Braga cichlae Schioedte and Meinert, 1883, e. S. A.

Braga patagonica Schioedte and Meinert, 1884, e. S. A., also marine

Braga fluviatilis Richardson, 1911, e. S. A.

Telotha hensellii (von Martens), 1869, tr. and e. S. A.

Telotha lunaris Schioedte and Meinert, 1884, e. S. A.

Livoneca symmetrica Van Name, 1925, tr. S. A.

Livoneca guianensis Van Name, 1925, tr. S. A.

Livoneca lazzari Pearse, 1921, tr. S. A.

Asotana formosa Schioedte and Meinert, 1881, w. S. A.

Artystone trysibia Schioedte, 1866, tr. S. A.

Family SPHAEROMIDAE

Sphaeroma terebrans Bate, 1866, Fla., wi. dis., also marine.

Exosphaeroma dugesi (Dollfus), 1893, Mex.

Exosphaeroma thermophilum (Richardson), 1905, s. N. A.

Exosphaeroma oregonensis (Dana), 1853, nw. N. A.

SUBORDER VALVIFERA

Family IDOTHEIDAE

Pentidotea lacustris (Thomson), 1879, s. S. A., (N. Z.?).

Cleantis linearis, Dana, 1849, s. S. A.

Mesidotea entomon (Linnaeus), 1767, nw. N. A.

SUBORDER ASELLOTA

Family ASELLIDAE

Asellus communis Say, 1818, e. N. A.*Asellus intermedius* Forbes, 1876, e. N. A.*Asellus aquaticus* Linnaeus, 1761, O. W., Greenland.*Asellus tomalensis* Harford, 1877, w. N. A.*Asellus attenuatus* Richardson, 1900, e. N. A.*Asellus brevicauda* Forbes, 1876, cen. N. A.*Asellus hoppinae* Faxon, 1888, cen. N. A.**Asellus incisus*, new species, cen. N. A.*Caecidotea stygia* Packard, 1876, e. and cen. N. A.*Caecidotea alabamensis* Stafford, 1911, s. N. A.*Caecidotea nickajackensis* Packard, 1881, cen. and s. N. A.*Caecidotea richardsonae* Hay, 1902, cen. N. A.*Caecidotea smithii* Ulrich, 1902, s. N. A.*Caecidotea tridentata* Hungerford, 1922, cen. N. A.*Caecidotea antricola* Creaser, 1931, cen. N. A.*Mancasellus tenax* (Smith), 1871, n. N. A.*Mancasellus dilatatus* (Smith), 1871, n. N. A.*Mancasellus brachyurus* Harger, 1876, e. N. A.*Mancasellus macrourus* Garman, 1890, cen. N. A.*Mancasellus danielsi* Richardson, 1902, cen. N. A.**Mancasellus herricki*, new name, s. N. A.*Mancasellus lineatus* Say, 1818, e. N. A.

SUBORDER EPICARIDEA

Family BOPYRIDAE

Probopyrus bithynis Richardson, 1904, s. N. A., tr. A.*Probopyrus oviformis* Nierstrasz and Brender à Brandis, 1929,
W. I.

Total fresh-water Isopoda, 49 species (2 new and 1 new name).

Total land and fresh-water Isopoda, 303 species (28 new and 1 new name).

LIST OF NEW SPECIES DESCRIBED¹*Philoscia geiseri**Sphaeroniscus guianensis**Philoscia mineri**Sphaeroniscus tukeitanus*¹ Additional new species described in Supplement *Exosphaeroma bondi*, *Porcellionides mulaiki*.

<i>Philoscia paraguayana</i>	<i>Cubaris watsoni</i>
<i>Philoscia omissa</i>	<i>Cubaris booneae</i>
<i>Philoscia kartaboana</i>	<i>Cubaris phylax</i>
<i>Philoscia roraimae</i>	<i>Cubaris moneaguensis</i>
<i>Philoscia inquilina</i>	<i>Cubaris oaxacana</i>
<i>Philoscia moneaguensis</i>	<i>Cubaris culebrae</i>
<i>Philoscia langi</i>	<i>Cubaris wheeleri</i>
<i>Philoscia pearsei</i>	<i>Cubaris mineri</i>
<i>Trichorhina bequaerti</i>	<i>Cubaris cinchonae</i>
<i>Porcellionides habanensis</i>	<i>Tylos insularis</i>
<i>Scleropactes tatei</i>	<i>Cirolana browni</i>
<i>Circoniscus hamatus</i>	<i>Asellus incisus</i>
	<i>Mancasellus herricki</i> (new name)

New subgenus, or new name, *Hirtiligia*, subgenus of *Ligia* Fabricius, type *Ligia baudiniana* Milne-Edwards, 1840. This is perhaps equivalent to *Ligyda* in the restricted sense used by Verhoeff, 1926.

REGIONAL DISTRIBUTION

Of the 254 land isopods, very nearly 75 per cent are found in that part of America that lies within or close to the tropics, including the West Indies as well as the continental areas.

In the case of fresh-water isopods, there is no such preponderance of tropical species (only 17 out of 49); this is due, however, largely to the considerable number of species of the family Asellidae which have been described from the United States, but which may not all be valid.

SPECIES FROM THE WEST INDIES (EXCLUSIVE OF TRINIDAD)

(73 species, 54 peculiar to the region)

Those which, so far as known, are exclusively West Indian are indicated by the abbreviation "excl." These number 42.

Land Isopods

(70 species, 51 peculiar to the region)

- Ligia exotica* Bahamas, Antigua, Santo Domingo, Puerto Rico, Cuba
Ligia olfersii Bahamas, St. Thomas, St. John, Guadeloupe
Ligia baudiniana Bahamas, Culebra, Puerto Rico, Jamaica, Cuba
Trichoniscus pseudopusillus (excl.) Cuba
Cylindroniscus suerati (excl.) Cuba
Philoscia mineri (excl.) Dominica
Philoscia culebrae Culebra, Puerto Rico
Philoscia richmondi (excl.) Puerto Rico, Mona

- Philoscia incerta* (excl.) Dominica
Philoscia moneaguensis (excl.) Jamaica
Philoscia briani (excl.) Cuba
Troglophiloscia silvestrii (excl.) Cuba
Oniscus asellus Cuba
Trichorhina thermophila Haiti, Jamaica
Trichorhina giannellii Cuba
Trichorhina bequaerti (excl.) Cuba
Bisilvestria marassinii (excl.) Cuba
Synuropus granulatus (excl.) Puerto Rico
Arhina porcellioides "On plants from West Indies"
Porcellio scaber St. Croix
Porcellio laevis Bahamas, Puerto Rico, Santo Domingo, Cuba
Porcellionides pruinosus Bahamas, Culebra, Puerto Rico, Mona, Desecheo, St. Croix, St. Thomas, Dominica, Cuba, Jamaica
Porcellionides habanensis (excl.) Cuba
Porcellionides minutissimus (excl.) Bahamas
Porcellionides bermudezi (excl.) Cuba
Leptotrichus vedadoensis (excl.) Cuba
Nagara cristata Dominica
Rhyscotus cubensis (excl.) Cuba
Rhyscotus ciferrii (excl.) Santo Domingo
Rhyscotus turgifrons (excl.) St. John
Rhyscotus jacksoni (excl.) Santo Domingo
Sphaeroniscus portoricensis (excl.) Puerto Rico
Sphaeroniscus guianensis Dominica
Haplarmadillo monocellatus (excl.) St. Vincent
Pseudarmadillo carinulatus (excl.) Cuba
Pseudarmadillo dollfusi (excl.) Bahamas
Pseudarmadillo welchi (excl.) Cuba
Pseudarmadillo gillianus (excl.) Cuba
Pseudarmadillo buscki (excl.) Cuba
Delatorreia hoplites (excl.) Cuba
Cubaris watsoni (excl.) Jamaica
Cubaris colomboi (excl.) Cuba
Cubaris zigzag (excl.) St. Vincent
Cubaris booneae (excl.) Jamaica
Cubaris hendersoni (excl.) Haiti
Cubaris aguayoi (excl.) Cuba
Cubaris silvarum (excl.) St. Vincent

- Cubaris sanchezi* (excl.) Cuba
Cubaris viticola (excl.) Grenada
Cubaris perlata (excl.) St. Vincent or Grenada
Cubaris phylax (excl.) Santo Domingo
Cubaris moneaguensis (excl.) Jamaica
Cubaris grenadensis Grenada, Bequia, Cuba
Cubaris dumorum (excl.) Mustique
Cubaris vincentis (excl.?) St. Vincent
Cubaris culebrae (excl.) Culebra, St. John, Desecheo
Cubaris jamaicensis (excl.) Jamaica
Cubaris tuberosa (excl.) Haiti, St. Thomas
Cubaris ramsdeni (excl.) Cuba
Cubaris wheeleri (excl.) Culebra
Cubaris murina Puerto Rico, St. Thomas, Haiti, Dominica, Cuba,
 Jamaica
Cubaris cinchonae (excl.) Jamaica
Cubaris tenuipunctata (excl.) Mustique
Cubaris depressa (excl.) St. Vincent
Acanthoniscus spiniger (excl.) Jamaica
Ethelum americanum St. Vincent
Ethelum reflexum (excl.) St. Vincent or Grenada
Ethelum modestum (excl.) St. Vincent
Tylos latreillei Puerto Rico
Tylos niveus Cuba

Fresh-water Isopods

(3 species, all peculiar to the region)

- Cirolana cubensis* (excl.) Cuba
Cirolana browni (excl.) Cuba
Probopyrus oviformis (excl.) St. Croix

The following additional land isopods are known from Trinidad.

- Philoscia demerarae?* tr. S. A.
Calycuoniscus bodkini tr. S. A.
Calycuoniscus spinosus (excl.)
Diploexochus echinatus tr. S. A.

SPECIES FROM NORTH AMERICA NORTH OF MEXICO

(80 species, 52 peculiar to the region)

Abbreviations as in General List above, except that species peculiar to this region are designated by the abbreviation "excl.," and that

common and more or less widely distributed species are marked with one or two asterisks.

Land Isopods

(52 species, 29 peculiar to the region)

- Ligia oceanica* litt. n. e., chiefly O. W.
*Ligia pallasii** (excl.) litt. nw.
*Ligia exotica** litt. s., also O. W.
*Ligia occidentalis** litt. w.
Ligia olfersii litt. s., also O. W. (West Africa)
*Ligia baudiniana** litt. Fla.
Ligidium gracile (excl.) litt. nw.
Ligidium longicaudatum (excl.) e.
 (*Ligidium hypnorum* O. W., doubtfully American)
Ligidium latum (excl.) litt. w.
Ligidium kofoidi (excl.) w.
Ligidium elrodii (excl.) cen.
*Trichoniscus demivirgo** (excl.) e.
 (*Trichoniscus pygmaeus* e., O. W., once reported in America)
 (*Trichoniscus stebbingi* e., O. W., once reported in America)
Trichoniscus halophilus (excl.) litt. e.
Haplophthalmus danicus e., chiefly O. W.
Brackenridgia cavernarum (excl.) cen.
*Scyphacella arenicola** (excl.) litt. e.
Detonella papillicornis (excl.) litt. nw.
*Armadilloniscus ellipticus** (excl.) litt. e.
Armadilloniscus tuberculatus (excl.) litt. w.
Armadilloniscus lindahli (excl.) litt. w.
Philoscia muscorum litt. e., chiefly O. W.
*Philoscia vittata** (excl.) litt. e.
Philoscia geiseri (excl.) s.
Philoscia brevicornis (excl.) s.
Philoscia nigricans (excl.) s.
Philoscia spinosa (excl.) s.
Philoscia culebrae litt. e.
Philoscia richardsonae (excl.) litt. w.
*Oniscus asellus*** wi. dis., also O. W.
Alloniscus cornutus (excl.) litt. w.
Alloniscus perconvexus (excl.) litt. w.
Alloniscus mirabilis (excl.) w.
Lyprobius pusillus (excl.) w.

- Porcellio scaber*** wi. dis., also O. W.
*Porcellio laevis*** wi. dis., also O. W.
*Porcellio spinicornis*** e., also O. W.
Porcellio quadriseriatus Texas, O. W.
*Porcellionides pruinosus*** wi. dis., also O. W.
Porcellionides virgatus (excl.), s.
*Cylisticus convexus*** wi. dis., e., also O. W.
*Tracheoniscus rathkei*** wi. dis., e., also O. W.
*Armadillidium vulgare*** wi. dis., also O. W.
Armadillidium nasatum e., chiefly O. W.
Cubaris pisum (excl.) Fla.
Cubaris affinis (excl.) w.
Cubaris californica (excl.) w.
Tylos latreillei litt. Fla., also O. W.
Tylos punctatus (excl.) litt. w.
Tylos niveus litt. Fla.

At first sight 52 would appear to be a fairly large number of species for a temperate region, but in reality the scarcity of land isopods in North America is remarkable.

No less than 22, or more than half these North American species, are littoral or coastal species and hence absent from most of the area, even though some may be locally common. No less than 9 out of the 52, though they were described many years ago, have never been recorded again. Many others are rare or local, or only barely reach the southern border of the United States. 19 of them are natives of, or known also from the Old World, and of these at least 3 are known in America only as accidental importations, evidence of their establishment on this continent being lacking. Only those species (16 in number) marked with one or two asterisks can be considered at all common and well known in this region; indeed it is a safe statement that 95 per cent of the land isopods that will come to the notice of the ordinary observer in most parts of the United States or Canada will belong to one or another of the 8 species marked with two asterisks. All of these 8 are Old World species for whose introduction man is either certainly or very probably responsible.

Fresh-water Isopods

(28 species, 23 peculiar to the region)

- Cirolanides texensis* (excl.) s.
Sphaeroma terebrans wi. dis., Fla., also marine

- Exosphaeroma thermophilum* (excl.) s.
Exosphaeroma oregonensis n. w. (chiefly marine)
Mesidotea entomon n. w. (chiefly marine)
Asellus communis (excl.), the only very common and widely distributed
 fresh-water isopod in North America
Asellus intermedius (excl.) e.
Asellus aquaticus O. W. (reaches Greenland and perhaps northwestern
 North America)
Asellus tomalensis (excl.) n. w.
Asellus attenuatus (excl.) e.
Asellus brevicauda (excl.) cen.
Asellus hoppinae (excl.) cen.
Asellus incisus (excl.) cen.
Caecidotea stygia (excl.) e. and cen.
Caecidotea alabamensis (excl.) s.
Caecidotea nickajackensis (excl.) cen. and s.
Caecidotea richardsonae (excl.) cen.
Caecidotea smithii (excl.) s.
Caecidotea tridentata (excl.) cen.
Caecidotea antricola (excl.) cen.
Mancasellus tenax (excl.) n.
Mancasellus dilatatus (excl.) n.
Mancasellus brachyurus (excl.) e.
Mancasellus macrourus (excl.) cen.
Mancasellus danielsi (excl.) cen.
Mancasellus herricki (excl.) s.
Mancasellus lineatus (excl.) s.
Probopyrus bithynis s.

Of these 28 species, no less than 22* belong to the single family Asellidae, a group characteristic of temperate latitudes.

SPECIES FROM THE TEMPERATE REGION OF SOUTH AMERICA

(37 species, 19 peculiar to the region)

Land Isopods

(32 species, 16 peculiar to the region)

Excluding a few recently described forms and those of wide distribution well known from other parts of the world, the species of this region have for the most part been insufficiently described and figured. Species peculiar to the region are designated by the abbreviation "excl." in the following list.

- Ligia exotica* litt. w.
 (*Ligia cinerascens* litt. w., doubtfully South American)
Ligia novae-zealandiae litt. s., also N. Z., etc.
Ligia cursor (excl.) litt. w.
Trichoniscus magellanicus s. S. A. (N. Z.?), only land isopod known
 from Falkland Islands
Trichoniscus murrayi w.
Deto bucculenta w. (N. Z., etc.?)
Philoscia picta e.
Philoscia olfersii e.
Philoscia pauper (excl.) w.
Philoscia angustata (excl.) w.
Philoscia bilineatus (excl.) w.
Philoscia sellowii (excl.) e.
Philoscia maculata (excl.) e.
Philoscia paraguayana (excl.) cen.
Philoscia paulensis (excl.) e.
Phalloniscus anomalus litt., also J. F.
Pseudophiloscia inflexa (excl.) w.
Pseudophiloscia angusta (excl.) s.
Oniscus armatus (excl.) w.
Alloniscus borellii cen.
Alloniscus argentinus w. cen.
Lyprobius modestus e.
Porcellio scaber wi. dis., O. W.
Porcellio granarus (excl.) w.
Porcellio liliputanus (excl.) w.
Porcellio pruinosus wi. dis., O. W.
Porcellionides chilensis (excl.) w.
Porcellionides fuegiensis (excl.) s.
Armadillidium vulgare wi. dis., O. W.
Cubaris granaria (excl.) w.
Tylos spinulosus (excl.) s.

Fresh-water Isopods

(5 species, 3 peculiar to the region)

- Tanais fluviatilis* (excl.) e.
Braga fluviatilis (excl.) cen.
Braga patagonica (excl.) e.
Telotha henselii e.
Artystone trysibia e.

SPECIES FROM THE OUTLYING ISLAND GROUPS

The few land isopods (there are no fresh-water isopods) that are known from the Bermuda, Galapagos, and Juan Fernandez Islands are largely species from the Old World and littoral forms.

There are in each case certain species (designated "excl." in the following lists) peculiar to the islands. The others are largely widely distributed forms, for whose introduction man may have been responsible in most cases.

Only one land isopod, *Trichoniscus magellanicus*, a form closely allied to if distinct from one found in New Zealand, has been reported from the Falkland Islands.

From Greenland the widely distributed *Porcellio scaber* and (less reliably) *Oniscus asellus*, also the European fresh-water form *Asellus aquaticus*, have been recorded.

SPECIES FROM BERMUDA

(12 species, 2 peculiar to the islands)

Two supposed species, *Porcellio parvicornis* and *Uropodias bermudensis*, recorded by Richardson, are to be eliminated, as they are based on immature stages of other species.

- Ligia baudiniana* litt., e. tr. A., Gal.
Ligia exotica litt. wi. dis., O. W.
Armadilloniscus ellipticus litt., e. N. A.
Philoscia bermudensis (excl.)
Porcellio scaber wi. dis., O. W.
Porcellio laevis wi. dis., O. W.
Porcellionides sexfasciatus O. W.
Porcellionides pruinosus wi. dis., O. W.
Leptotrichus granulatus (excl.)
Armadillidium vulgare wi. dis., O. W.
Tylos latreillei litt., e. tr. A., O. W.
Tylos niveus litt., W. I., Fla.

SPECIES FROM THE GALAPAGOS ISLANDS

(11 species, 6 peculiar to the islands)

- Ligia baudiniana* litt., also e. tr. A.
Ligia exotica litt. wi. dis., O. W.
Philoscia culebroides (excl.) litt.
Philoscia nomae (excl.) litt.
Porcellio scaber wi. dis., O. W.

- Porcellio laevis* wi. dis., O. W.
Porcellionides pruinosus wi. dis., O. W.
Rhyscotus laxus (excl.)
Cubaris galapagoensis (excl.)
Cubaris beebei (excl.)
Tylos insularis (excl.)

SPECIES FROM THE JUAN FERNANDEZ ISLANDS

(8 species, 3 peculiar to the islands)

- Ligia litigiosa* (excl.) litt.
Ligia novae-zealandiae litt., s. S. A., also N. Z., etc.
Oligoniscus monocellatus (excl.) litt.
Philoscia mirifica (excl.) litt.
Phalloniscus anomalus litt. (also Chile)
Porcellio scaber wi. dis., O. W.
Porcellio laevis wi. dis., O. W.
Armadillidium vulgare wi. dis., O. W.

DESCRIPTIONS OF SPECIES

LAND ISOPODA

SUBORDER ONISCOIDEA

This suborder is composed of all the terrestrial or land Isopoda and contains no species that cannot justly be called terrestrial, though a few are littoral in habits and can endure lengthy immersion in fresh or salt water without harm.

The outstanding characters of the group are the adaptation of the seven pairs of legs for progression on land, the reduction of the first antennae (antennules) to small rudiments of two or three joints, and their insertion between, instead of in front of, the second antennae, the absence of a palp or jointed appendage on the mandibles, and the adaptation of the pleopoda for respiration in air.

Other facts regarding the structure, distribution, and classification of this group have been dealt with in the introductory part of this work or are given under the three superfamilies (Hypotracheata, Atracheata, and Pleurotracheata) into which it is divided in Verhoeff's classification, which has been followed in the present book as far as its main features are concerned.

Superfamily **Atracheata** Verhoeff

Tracheae absent from the exopodites of the pleopoda. Uropoda styliform, their endopodites (inner branches) widely separated. Mandibles with a molar process. Body not capable of rolling into a ball.

This is a moderate-sized group comprising the most generalized and primitive Oniscoidea. Many of them are more or less amphibious in habits.

Ligiidae

(Syn. Ligydididae)

In this family the body is oval or elliptical in a dorsal view with more or less loosely articulated segments, the head rounded in front, without projecting lobes, and the forehead is not very conspicuously defined from the epistome. The second antennae are very long with a flagellum of numerous articles. The first pair of pleopods are similar in both sexes; in the male those of the second pair each bear a long slender stylus enlarged at the end. One or both branches of the uropoda are long and styliform.

Though structurally this is a primitive group of the Oniscoidea, it is questionable whether the littoral and almost amphibious habits of many of its members are primitive or acquired, as they have legs as well specialized for rapid locomotion on land as those of any other isopod.

LIGIA FABRICIUS, 1798

(Syn. *Ligyda* Rafinesque, 1814)

Figure 5

The generic name *Ligia*, though formerly universally accepted and still employed by most authorities, was abandoned in favor of *Ligyda* Rafinesque, 1814, by Richardson (1905, Proc. Biol. Soc. Washington, XVIII, p. 10) and by some other American authors, including myself, in consequence of the following statement by Miss M. J. Rathbun:

"*Ligia* Weber (1795) has three species, *inflexa*, *cuspidata* and *granaria* Herbst, the last is *Cancer granarius* Herbst, which is a megalopa stage of an undetermined crab. *Ligia*, therefore may be considered a synonym of *Cancer* and the name cannot be used for an isopod." (Rathbun, Proc. Biol. Soc. Washington, XVII, p. 172.)

In the present article I have returned to the use of *Ligia* in preference to *Ligyda*, as it does not seem to me that *Ligia* Weber has a very valid standing as a genus, having neither a diagnosis nor any recognizable species as its type. To upset and abandon so well established a genus as *Ligia* Fabricius on such grounds seems to me insufficiently justified.

This genus is composed of species of large or rather large size, having large eyes with very numerous ocelli; the first antennae very small; the second antennae long and stout with numerous articles in the flagellum. The last segment of the abdomen is broad with its lateral regions well developed and often produced into points at the rear lateral angles; the basal segment of the uropoda is not produced at the rear inner angle; both its branches are long and styliform.

Its members inhabit the shores of the sea just at or close to the water line, or in a few cases those of rivers and streams in forests, and are of more or less amphibious habits.

As a means of identifying the species of this region, I would recommend first consulting the figure which shows the rear end of the telson of the several species, the outline of which is often characteristic. The general resemblance between the species is so great that they are best dealt with by devoting attention chiefly to the distinguishing characters, rather than by giving full descriptions that would be chiefly mere repetition of characters common to all. While there are often differences between the species in the relative length of the uropoda and antennae and in the number of articles in the flagella of the latter, these features are subject to far greater variation individually, as well as with age

and sex, than has been commonly supposed, and differences in them are not necessarily significant or reliable as specific characters.

Ligia for a long time enjoyed unusual immunity from genus splitting, but Verhoeff (1926, pp. 347, 348) has divided it into a number of genera, retaining *Ligia* for *L. oceanica* L. and "*L. italica* B. L.," giving full generic rank to *Geoligia* Dollfus and "*Ligyda* Pearse," and establishing *Megaligia* (type "*exotica* B. L."), *Nesoligia* (type "*novaezealandiae* Chilton"), etc. In considering this innovation, it should be remarked that Budde-Lund was not the describer of *italica* or of *exotica*, nor Chilton of *novae-zealandiae*, and that the types of Verhoeff's restricted genera

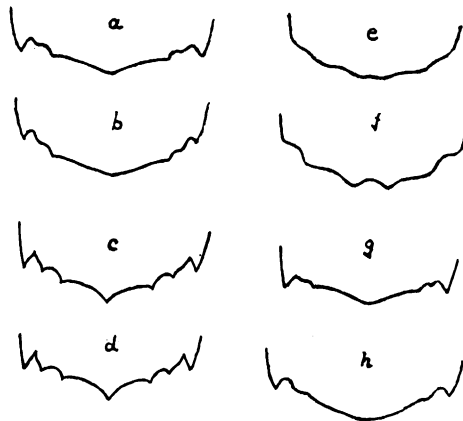


Fig. 5. Genus *Ligia*. Fig. b, after Jackson, 1922; Fig. h, after Chilton, 1916. Outline of rear border of telson in:

a, *L. baudiniana*
 b, *L. hawaiiensis*
 c, *L. exotica*
 d, *L. olfersii*

e, *L. richardsonae* (= *simoni*)
 f, *L. platycephala*
 g, *L. occidentalis*
 h, *L. novae-zealandiae*

Geoligia and *Ligyda* are apparently one and the same species, aside from the question of the propriety of using *Ligyda* in such a manner. Jackson, 1922, in his monograph of *Ligia* kept the group nearly intact. The genus *Geoligia* Dollfus, 1893, is discussed below under *Ligia simoni*.

The two following species belong to the typical subgenus *Ligia*. (Detailed diagnosis in Verhoeff, 1928, p. 119.)

***Ligia (Ligia) oceanica* (Linnaeus), 1767**

Figure 6

Ligia oceanica FABRICIUS, 1798, Suppl., 'Ent. Syst.,' p. 301.—LEIDY, 1855, p. 150.—BUDDE-LUND, 1879, p. 8; 1885, p. 259.—SARS, 1899, p. 156 (descr.), Pl. LXX.—

RICHARDSON, 1900a, p. 306; 1901, p. 574.—VERRILL, 1902, p. 845.—JACKSON, 1922, p. 691.

Ligyda oceanica RICHARDSON, 1905, p. 684 (descr.), Figs. 728, 729.—RATHBUN, 1905, p. 47, check list, p. 4.—FOWLER, 1912, p. 516.—SUMNER, OSBURN, AND COLE, 1913, p. 661.—PRATT, 1916, p. 380.—WALKER, 1927, p. 176.—BLAKE, 1931, p. 349.—PRATT, 1935, p. 444.

Oniscus oceanicus LINNAEUS, 1767, I, part 2, p. 1061 (orig. descr.).

“Male specimen described. Length, 25 mm. Breadth, 12 mm. Surface moderately coarsely granulated. Eyes of moderate size,

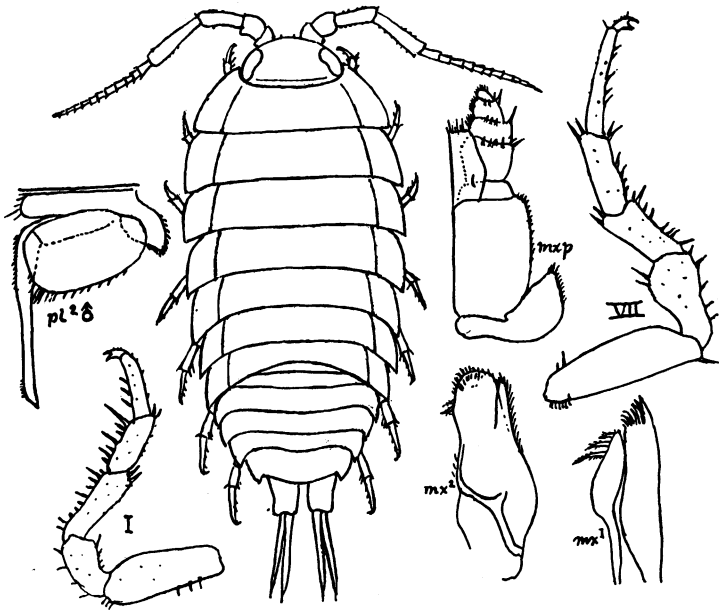


Fig. 6. *Ligia oceanica* (Linnaeus). Adapted from Sars, 1899.

rounded, and separated by twice their horizontal length. Antennae moderately long and stout; flagellum reaching as far as the hind border of the 4th thoracic somite, the peduncle halfway down the 2nd somite. Flagellum with 12 to 14 very short and stout segments. Coxal plates divided by very distinct grooves from terga of every thoracic somite in both sexes. Abdomen not abruptly contracted. Telson arcuate; the postero-lateral processes acute and nearly as long as the middle of the hind border; accessory processes not produced, but the inner forming a

prominent undulation. Mouthparts: 2nd maxilla bilobed, with two hairy bristles on inner side. Maxillipede palp clearly divided into five joints. First peraeopod of the male only has merus, carpus, and propodus produced on inner side to a flat plate-like expansion, with free border fringed with short setae. The surface of this expansion is covered by oblique serrations. Uropods, 7 mm." (Jackson, 1922, p. 691.)

DISTRIBUTION.—According to Sars, 1899, it occurs on the "coasts of Denmark, Prussia, Belgium, France, Spain, Britain, and the Faroe Islands. Along the western coast of Norway this form occurs plentifully and extends northward at least to the Trondhjem Fjord." It "deserves its specific name, being apparently restricted to those coasts that are open to the oceans. It is always found close to the shore, just above high water mark, beneath decaying algae and stones." (Sars, 1899.)

The only American records appear to be those given by Richardson, 1901, "Off Newport, Rhode Island," and Blake, 1931, p. 349, who found a cast skin on the rocks at East Gloucester, Mass.

Verrill, 1902, p. 845, speaking of Bermuda, says, "*Ligia oceanica* probably also occurs but we did not obtain it. Its distribution is world wide in warm climates." This is undoubtedly a mistake for *L. exotica*. There is not the slightest reason to expect the occurrence of this northern species in the almost tropical waters of Bermuda. A *Ligia* was, according to Harger, 1880, p. 310, doubtfully reported by Leidy, 1855, from Point Judith, Rhode Island (see also remarks under *L. exotica*).

This species is the type of the genus and hence of the typical subgenus (*Ligia*). For detailed information of it on the European coast see Nicholls, A. G., 1931, 'Studies on *Ligia oceanica*,' Jour. Marine Biol. Assoc., Plymouth, XVII, pp. 655-706, 1 Pl., 14 text figs.

Ligia (Ligia) pallasii Brandt, 1833

Figure 7

Ligia dilatata STIMPSON, 1857, p. 507, Pl. xxii, fig. 8.—SMITH, 1880, p. 218.—UNDERWOOD, 1886, p. 360.

Not *L. dilatata* BRANDT, 1833; not *L. dilatata* PERTY, 1834 (= *Stymphalus dilatatus* BUDE-LUND).

Ligia pallasii BRANDT, 1833, p. 172 (orig. descr.).—BUDE-LUND, 1879, p. 8; 1885 (descr.), p. 261.—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1899, p. 866 (Ann. Mag. Nat. Hist., (7) IV, p. 334); 1900a, p. 306; 1904, p. 670; 1904a, p. 226.—JACKSON, 1922, p. 691 (descr.), Pl. I, fig. 4.—JOHANSEN, 1928, p. 106.

Ligia septentrionalis LOCKINGTON, 1877, p. 46 (descr.).

Ligia stimpsoni MIERS, 1877a, p. 671.

Ligyda pallasii RICHARDSON, 1905, p. 682 (descr.), Figs. 726, 727; 1909a, p.

125.—JOHANSEN, 1926b, p. 167.—FEE, 1927, p. 30 (descr.).—WALKER, 1927, p. 176.—JOHNSON AND SNOOK, 1927, p. 292, Fig. 251.—PRATT, 1935, p. 444 (*pallasii*).

“Male specimen described. Length, 35 mm. Breadth, 20 mm. Surface coarsely granulated. Eyes of moderate size, rounded, and separated by twice their horizontal length. Antennae moderately long and stout; flagellum reaching as far back as hind border of 5th somite, peduncle to hind border of 2nd somite; flagellum with 15 short and stout segments, without large setae but densely covered with exceedingly minute setae. Coxal plates divided by deep and distinct grooves on every thoracic somite in both sexes. Abdomen not abruptly contracted, with prominent oblique carinae on each side of 3rd, 4th, and 5th

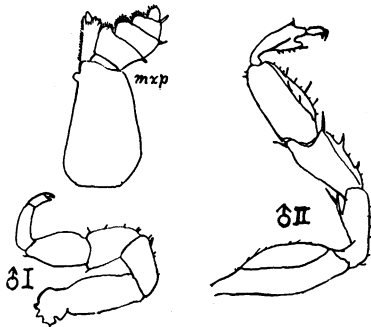


Fig. 7. *Ligia pallasii* Brandt. Adapted from figures of Richardson, 1905, and Jackson, 1922.

somites. Telson arcuate; posterolateral processes acute, produced as far as, or beyond, middle of hind border; accessory processes not produced, but the inner forms a prominent undulation. Telson twice as broad as long. Mouth parts as in *L. oceanica*. First, 2nd, and 3rd pereopods with carpus and merus expanded as in *oceanica*. Second and 3rd legs with small process on propodus not reaching beyond the dactyl in both sexes. Uropods 8 mm.” (Jackson, 1922, p. 691.)

DISTRIBUTION.—Coasts of Alaska including the Aleutian Islands, and southward along the American coast at least to the Farallone Islands, California (Richardson); Litycha (Jackson). Found on rock beach under stones (Richardson).

Closely similar to, if distinct from, *L. oceanica*. Walker, 1927, states that Stimpson's figure, which is reproduced by Richardson, 1905,

is wider than any specimen he had seen, though large females are wider-bodied than males and smaller females. It is said to be distinguished from *L. oceanica*, which it resembles in the rounded rear outline of the telson, by the uropoda, which are much longer in *L. oceanica* with longer and slenderer branches. Walker states that "the branches of the uropoda in *L. pallasii* are one-fifth . . . as long as the entire body from the tip of the terminal abdominal segment," but unless this species is unique among other members of the family, considerable allowance for variation with age, sex, etc., and individually, must be made in the case of such a character.

SUBGENUS MEGALIGIA VERHOEFF

See remarks under the genus *Ligia*. Detailed diagnosis of *Megaligia* in Verhoeff, 1928, p. 120. Type *Ligia exotica* Roux, 1828.

***Ligia* (*Megaligia*) *exotica* Roux, 1828**

Figures 5c, 8

Ligia exotica ROUX, 1828, 'Crustacés de la Méditerranée et de son littoral' (orig. descr.), p. 3, Pl. XIII, fig. 9.—BRANDT, 1833, p. 173.—MILNE-EDWARDS, 1840, VII, p. 157.—BUDE-LUND, 1879, p. 8; 1885, p. 266 (incorrectly includes *L. baudiniana* as a syn.).—DOLLFUS, 1890, p. 7; 1893*b*, p. 24, Fig. 3; 1896*b*, p. 2; 1896*d*, pp. 46, 48 (incorrectly includes *L. baudiniana*).—PORTER, 1899, p. 180.—RICHARDSON, 1899, p. 866; 1901, p. 575; 1902, pp. 306, 307, Pl. XL, figs. 62*a*, 62*b*.—MOORE, 1901, p. 175.—PORTER, 1903, p. 153.—CHILTON, 1916, p. 462 (new detailed description), Figs. 1–22.—JACKSON, 1922, p. 693 (new descr.), Pl. II, fig. 10.—ARCANGELI, 1927, p. 268; 1930*a*, p. 5.—PANNING, 1928, p. 196, etc., Fig. 11*m*.—BARNARD, 1932, p. 192, Figs. 1*b*, 2*d*, 3*c*.

Ligia gaudichaudii MILNE-EDWARDS, 1840, III, p. 157 (descr.).—NICOLET, 1849, p. 265.—DANA, 1853, p. 741, Pl. XLIX, figs. 6*a*, 6*b*.—STUXBERG, 1875, p. 43.

Ligia grandis PERTY, 1830–1834, p. 212 (descr.), Pl. XL, fig. 13.

Ligyda exotica RICHARDSON, 1905, p. 676 (new descr.), Figs. 716–718*b*.—PRATT, 1916, p. 380, Fig. 611.—VAN NAME, 1924, pp. 185, 208; 1925, pp. 467, 497; 1926, p. 2.—MOREIRA, 1927, p. 194.—GIAMBIAGI, 1931, p. 425, Pls. VIII, IX.—MOREIRA, 1932, p. 433.—PRATT, 1935, p. 443, Fig. 612.

Megaligia exotica VERHOEFF, 1926, p. 348; 1928, p. 116, Figs. 24–29 (details).

NOTE.—The *L. baudiniana* of von Martens, 1869, p. 33, appears to be really *exotica*, while those of Bate, 1868, and Miers, 1877, may also be *exotica*. *L. exotica* var. *hirtitarsis* Dollfus, 1890, p. 7., and 1893*b*, p. 25, however, is certainly *L. baudiniana*.

This species, the most widely distributed and probably the largest of the genus, is characterized by the form of the body, which widens rapidly in the anterior part of the thorax and then tapers gradually to the last segment of the abdomen; the soft integument; loose articulation of the segments and their appendages (few specimens reach the

museum with the antennae and uropoda attached and unbroken); the large epimera separated from the body of the segment by distinct sutures in both sexes; the large bulging eyes and very long antennae and uropoda. It sometimes reaches a length of about 30 mm. exclusive of the long uropoda. Body surface noticeably granulated.

The males have on the distal end of the propodus of the first leg a small process that overlaps the base of the dactylus on the inner aspect of the limb, and the inner edges of the carpus and merus are devoid of spines and roughened with regular minute file-like ridges. In the fe-

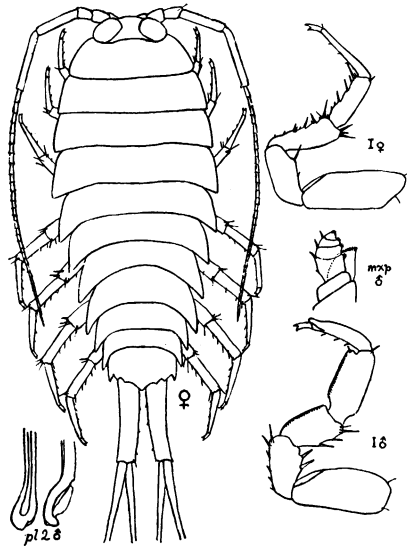


Fig. 8. *Ligia exotica* Roux.

male the process and file-like ridges are wanting, but a number of spines are present in the position of the latter. The antennae in some individuals reach, when fully drawn back, to or even beyond the end of the body, but are often shorter. 'See Figure 5 for outline of the telson. Styloid process of the second pleopod of the male straight with a longitudinal furrow on the ventral aspect and a small expansion at the tip which is asymmetrically oval in a ventral view, but in a lateral view it exhibits a double curvature slightly suggesting the head of a violin, though less curved.

DISTRIBUTION.—Undoubtedly of Old World origin, but now found

on the rocks and piles just above the water in harbors, sometimes in great abundance, in many of the warm and in some of the cooler parts of both hemispheres. On the American coasts, it occurs from North Carolina (Fort Macon, Harger, 1880, genus only reported) (and probably also Norfolk, Virginia) to Rio de Janeiro, including the Bahamas and Antigua, Cuba, Porto Rico, Santo Domingo, and Guadeloupe in the West Indies, and from California to Chile (Balandra Bay near Point Diablo and Puntarenas). Also reported from the Galapagos and Hawaiian Islands.

In former times, when wooden ships were more in use, this species was probably sometimes carried to more northern ports. Gould, 1841, p. 337, records a *Ligia*, perhaps this species, or perhaps *L. oceanica*, from the piles of a wharf, probably at Boston, but it is not likely that the present species could survive the winter in that latitude.

Verhoeff, 1926, p. 348, makes this species the type of a genus, *Megaligia*.

***Ligia (Megaligia) occidentalis* Dana, 1853**

Figures 5g, 9

Ligia occidentalis STIMPSON, 1857, p. 506.—HARFORD, 1877a, p. 116.—BUDDELUND, 1879, p. 8; 1885, p. 264 (descr.).—UNDERWOOD, 1886, p. 360.—RICHARDSON, 1899, p. 866 (1899, Ann. Mag. Nat. Hist., (7) IV, p. 334); 1900a, p. 306; 1904, p. 670; 1904a, p. 226.—CHILTON, 1916, p. 466.—JACKSON, 1922, p. 692 (descr.), Pl. II, figs. 7, 8.

Ligyda occidentalis RICHARDSON, 1905 (descr.), p. 681, Figs. 724, 725.—STAFFORD, 1912, p. 121 (descr.), Figs. 67, 68.—HILTON, 1915, p. 211, Figs. 1 and 2, 6 Pls. (development).—JOHNSON AND SNOOK, 1927, p. 292, Fig. 250.—PRATT, 1935, p. 444.

Lygia occidentalis DANA, 1853, p. 742 (orig. descr.), Pl. XLIX, figs. 7a-7e; 1856, p. 176.

The following is quoted from Jackson, 1922, p. 692:

“Male specimen described. Length, 25 mm. Breadth, 11 mm. Surface minutely granulated. Eyes large and quadrangular, separated by less than the horizontal length of one eye. Antennae moderately long and slender; flagellum reaching as far back as hind border of 6th thoracic somite, peduncle to hind border of 2nd. Flagellum with 22 long and slender segments. Division of coxal plates lightly marked on all thoracic somites. Abdomen not abruptly contracted. Telson very obtusely triangulate; postero-lateral processes are as long as or longer than median process; accessory processes very small. Mouth parts: 2nd maxilla weakly bilobed, with no hairy bristles; maxillipede with five distinctly marked joints. Propodus of 1st peraeopod with promi-

ment process on inner side of distal end, which projects forward by the side of the dactyl. Carpus and merus of 1st and 2nd legs and carpus of 3rd flattened and striated as in *oceanica*. Uropods 10 mm."

Though there is a process on the distal end (inner aspect) of the propodus of the first legs of the male, as in *exotica*, this species has the apex of the telson obtuse instead of sharply angular, as it is in *exotica*, which it much resembles in other respects.

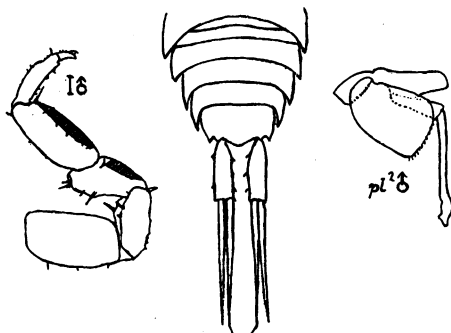


Fig. 9. *Ligia occidentalis* Dana. Adapted from Dana, 1853 (middle figure), and Stafford, 1912.

DISTRIBUTION.—Pacific seacoast on rocks, piles, etc., just above the water, from the Farallones to Lower California (S. Bartolomé Bay) and the Gulf of California, inclusive. Type locality near Sacramento River, California.

***Ligia (Megaligia) cinerascens* Budde-Lund, 1885**

Ligia cinerascens BUDDE-LUND, 1885, p. 265 (orig. descr.).—JACKSON, 1922, p. 693 (new descr.), Pl. II, fig. 9 (antenna).—PANNING, 1928, pp. 196, 199.—MACCAGNO, 1931, p. 154.—BARNARD, 1932, p. 187.

Ligyda cinerascens RICHARDSON, 1909, p. 126.

Very closely related to *L. occidentalis* but described as having the posterior lateral points of the telson no longer than the adjacent accessory teeth just inside them, and antennae shorter though with even more numerous segments than in that species.

DISTRIBUTION.—Doubtful. Budde-Lund (1885, p. 265) says, "Specimen descriptum in Museo Kiloniensi asservatur, incertum, utrum in 'Manila' an in 'Chile' an in Japonia captum; hic locus mihi verisimillimus videtur."

This incompletely known species, even if valid, is probably not

South American. Jackson's description and figure seem to be based on Budde-Lund's original specimens. Specimens from Hakadote, Japan, are "hesitatingly" referred to this species by Richardson, 1909*a*, p. 126.

Ligia (Megaligia) hawaiiensis Dana, 1853

Figures 5*b*, 10

Ligia hawaiiensis DOLLFUS, 1889, p. 92 (descriptive notes) (specimens from Guayanas Bay, Mexico, doubtfully assigned to this species); 1893*b*, p. 25 (makes syn. of *L. exotica*).

Lygia hawaiiensis DANA, 1853, p. 740 (orig. descr.), Pl. XLIX, figs. 4*a*-4*c*.

Megaligia hawaiiensis VERHOEFF, 1928, p. 116, Figs. 18-23 (details).

See JACKSON, 1922, p. 696, Pl. II, fig. 16, for full description.

According to the statements and figures of Jackson (1922) this species is distinguished by the outline of the telson, which has the median

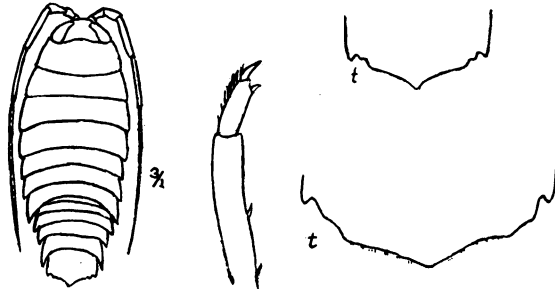


Fig. 10. *Ligia hawaiiensis* Dana. Adapted from Dana, 1853 (except lower right figure from Jackson, 1922).

part, though very obtusely angular, much more produced backward than the lateral teeth, which are distinct but very small. The first leg of the male has a distal process on the propodus and the carpus, merus, and propodus produced on the inner side into a flat plate-like expansion whose free border is fringed with short setae.

Verhoeff, 1928, p. 117, denies the existence of much difference in the telsons of *exotica* and *hawaiiensis* but considers the two species distinct on account of minor differences in the legs and mouth parts, and the much smoother body surface in *hawaiiensis*.

DISTRIBUTION.—Pacific Islands; China Straits; New Guinea. No reliable American record; the above-mentioned Mexican specimens of Dollfus were more probably *exotica*.

Ligia (Megaligia) olfersii Brandt, 1833

Figures 5d, 11

Ligia olfersii BRANDT, 1833, p. 173 (orig. descr.), Pl. iv, fig. 11 (detail).—MILNE-EDWARDS, 1840, p. 157.—BUDDE-LUND, 1879, p. 8; 1885, p. 268 (brief diagnosis); 1893, p. 129.—DOLLFUS, 1893a, p. 345; 1893b, p. 25 (*L. olfersi*); 1897, p. 212 (makes it var. of *exotica*).—RICHARDSON, 1901, p. 575.—MOORE, 1901, p. 175.—CHILTON, 1916, p. 466.—JACKSON, 1922, p. 694.—PANNING, 1928, pp. 196, 199 (*olfersi*).—BARNARD, 1932, p. 187 (*olfersi*).

Ligyda olfersii RICHARDSON, 1905, p. 674 (new descr.), Figs. 714, 715.—VAN NAME, 1920, p. 77 (descr.), Figs. 31–34.—MOREIRA, 1932, p. 433.

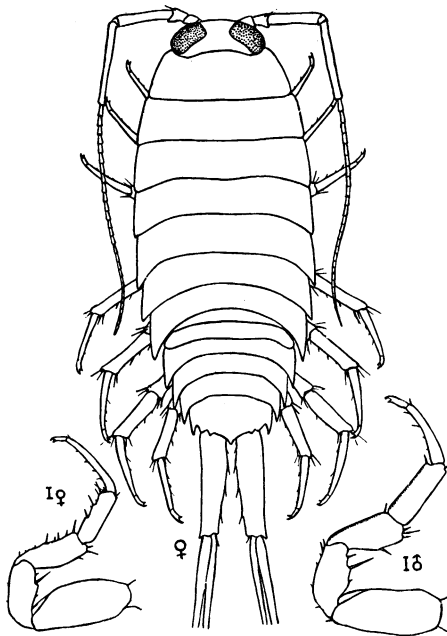


Fig. 11. *Ligia olfersii* Brandt. Adapted from Van Name, 1920.

Smaller than *L. exotica*; usually not over 17 or 18 mm. in body length. The body is proportionately narrower, especially in its anterior portion, so that the outline when seen from above is elliptical rather than oval. The surface is less granulated, appearing smooth when wet; the antennae shorter; the eyes more elongate transversely and less bulging, the epimera more completely fused with the body of the segment, the difference being especially noticeable in the male; the integument firmer and the articulation more compact. The sexual differences

in the first pair of legs resemble those in *exotica*, except that there is no process on the propodus in either sex. Outline of rear end of telson very similar in both species; there is also great similarity in the styloid processes of the males.

DISTRIBUTION.—Florida to Brazil (type locality); also certain of the West Indies (St. Thomas, St. John, Guadeloupe, Andros Island, Bahamas); west coast of Africa, Belgian Congo (Van Name, 1920). Moreira, 1932, reports it common at Rio de Janeiro.

This is a species which has often been confused with *L. exotica*. Brandt, 1833, in describing it, is not sure of its distinctness from *exotica*, and Milne-Edwards, 1840, Dollfus, 1893*b*, p. 25, and 1897, p. 212, express the same doubt or regard it only as a variety, but with well-preserved material the species are easily distinguished.

***Ligia (Megaligia) filicornis* Budde-Lund, 1893**

Ligia filicornis BUDDE-LUND, 1893, p. 128 (orig. descr.).—DOLLFUS, 1893*a* p. 345; 1893*b*, p. 25.—BARNARD, 1932, p. 187.

Budde-Lund's description is here quoted:

"*Ligiae olfersii* similis et affinis. Superficies laevis, nitida. Antennae corpore paulisper breviores (9:10) flagellum scapo duplo longius, 35 articulatum. Linea transversa epistomatis in medio subrecta vel potius levissime recurva (in *Ligia olfersii* haec linea subrecta vel levissime procurva, in *Ligia exotica* manifeste in medio procurva). Tarsi trunci pedum primi paris apud marem simplices. Long. 10.5. Lat. 5 mm."

TYPE AND ONLY LOCALITY.—Lighthouse at Puerto Cabellos, Venezuela.

Nothing additional to Budde-Lund's description has been recorded. It is certainly very close to *L. olfersii* and requires further investigation.

SUBGENUS NESOLIGIA VERHOEFF, 1926

See remarks under genus *Ligia*.

***Ligia (Nesoligia) novae-zealandiae* Dana, 1853**

Figures 5*h*, 12

Ligia cursor (see remarks under *L. cursor*) STUXBERG, 1875, p. 43.—BUDDE-LUND, 1879, p. 8; 1885, p. 265.—DOLLFUS, 1890, p. 67; 1893*b*, p. 25.

Ligia novae-zealandiae BUDDE-LUND, 1885, p. 271.—CHILTON, 1901, p. 106 (full description), Pl. XL (detailed illus.).—JACKSON, 1922, p. 697 (descr.).—PANNING, 1928, pp. 196*ff.*, Figs. 11*b*, 11*h*.—BARNARD, 1932 pp. 185, 187.

Ligia porteri MACCAGNO, 1931, p. 151, Pl. III.

Lygia novi-zealandiae DANA, 1853, p. 739 (orig. descr.), Pl. XLIX, figs. 2*a*–2*d*.

(Name emended to *novae*- by all subsequent authors.)

Nesoligia novaezealandiae VERHOEFF, 1926, pp. 348, 350.

See also *L. cursor* Dana, 1853, and *L. litigiosa* Wahrberg, 1922.

The following is quoted from Jackson, 1922, p. 697:

"Male specimen described. Length, 12 mm. Breadth, 5.5 mm. Surface minutely granular. Eyes rather small and quadrangular, and separated by twice their horizontal length. Antennae very long and slender; flagellum reaching as far back as hind border of 4th abdominal somite; peduncle to hind border of 3rd thoracic somite. Flagellum with 20 small and setose segments. The antennae are shorter in the female. The whole is as long as the thorax, and the peduncle reaches halfway

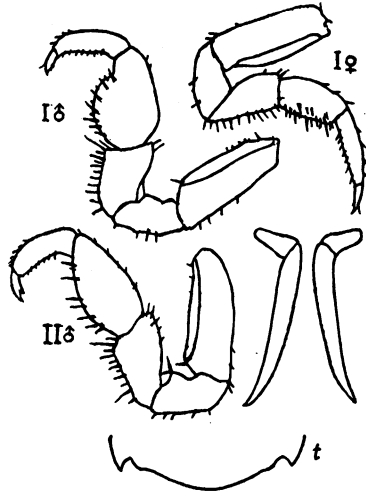


Fig. 12. *Ligia novae-zealandiae* Dana. Adapted from Chilton, 1901.

across the 3rd somite. The segments of the flagellum are more setose than in the male. Coxal plates very faintly marked or absent. In the female, they are marked by deep grooves on the 2nd, 3rd, and 4th thoracic somites. Abdomen abruptly contracted. Telson arcuate; posterolateral processes acute and produced, but shorter than middle of hind border; accessory processes marked by slight undulations. Mouth parts: 2nd maxilla with no trace of division into two lobes, without hairy bristles on inner side. Maxillipede with 1st and 5th joints only completely separated, remainder only indicated by indentations on inner side. First and 2nd peraeopods with carpus much swollen in male only; subchelate. Uropods 5 mm."

It is perhaps worthy of remark that in neither the descriptions nor the illustrations of Chilton or Jackson are there any allusions to areas of file-like ridges on the first legs of the male. As described and illustrated by Chilton (1901), the styloid processes of the second pleopoda of the male are longitudinally grooved and curve gradually outward, tapering to a sharp tip.

DISTRIBUTION.—Coast of New Zealand, Stewart Island; Sunday Island, Victoria; Chile; Juan Fernandez, shore (Jackson, 1922); Tierra del Fuego (*L. cursor* Stuxberg, 1875). The American Museum of Natural History has several specimens from the Chinch Islands, Peru. Type locality: Bay of Islands (shore), New Zealand. *Ligia porteri* Maccagno, from Bahia Carumhilla, Chile, appears to be a synonym.

Ligia (*Nesoligia*) *cursor* Dana, 1853

Figure 13

Ligia cursor BUDE-LUND (part), 1879, p. 8; 1885, p. 265.—STEBBING, 1893, p. 421.—JACKSON, 1922, pp. 701 (697).—BARNARD, 1932, p. 187.

Lygia cursor DANA, 1853, p. 743 (orig. descr.), Pl. XLIX, figs. 8a-8c.

Other references appear to apply chiefly or entirely to *L. novae-zealandiae*. See under that species.

Dana's description is as follows:

"Antennae as long as the cephalothorax, flagellum twenty-one-jointed (in the specimen examined, after the fourteenth joint, a constriction and then seven smaller joints); surface of the joints towards extremity bearing many setae, which are as long as the diameter of the joints, and have often a setule on either side. Abdomen sparingly longer than its breadth, abruptly a little narrower than thorax; last segment triangulate at apex, the posterior angles short acute.

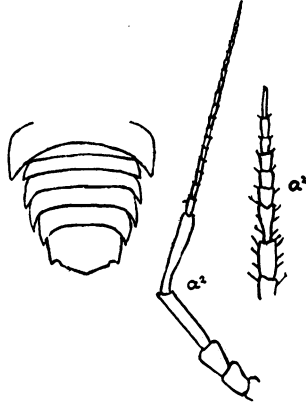
"Length of body, exclusive of stylets, ten lines. The stylets were not present in our specimen. The last joint of the flagellum is much longer than the preceding, and as in other species, has a tuft of setules or very short hairs at apex, as seen when magnified. The constriction in the flagellum appears to separate the extremity from the rest, and as it occurs just seven joints from the extremity (one-third the whole number), it may be a permanent characteristic of the species."

LOCALITY.—"Valparaiso?"

This is a very doubtful species, perhaps identical with *L. novae-zealandiae* Dana. Jackson, 1922, pp. 697, 698, though he does not unite it with *L. novae-zealandiae*, says that it apparently has not been found again, and that the examples referred to it by Budde-Lund were

in reality *L. novae-zealandiae*. This is probably true of the references of other authors to "*Ligia cursor*" except possibly to the very limited extent that they may apply to Dana's original example. Chilton, 1924,

Fig. 13. *Ligia cursor* Dana.
Adapted from Dana, 1853.



pp. 287, gives reasons for including Dana's *cursor* also as a probable synonym of *novae-zealandiae*. The latter name has page precedence in Dana's work.

Ligia (*Nesoligia*) *litigiosa* Wahrberg, 1922

Ligia litigiosa WAHRBERG, 1922a, p. 277 (orig. descr.), Fig. 1.

Although Wahrberg gives a description of considerable length, and several figures of certain details, it is not made clear why we should regard this species as distinct from *L. novae-zealandiae* Dana, which has also been recorded from Juan Fernandez. From the description the telson would seem to be of similar form to that of Dana's species. Wahrberg says the first legs are alike in the two sexes, but this might be due to immaturity of his male specimens.

TYPE AND ONLY LOCALITY.—Juan Fernandez (Masatierra) on the beach.

HIRTILIGIA, NEW SUBGENUS

Apparently *Ligyda*, either as a generic or subgeneric name is synonymous with *Ligia*, and is not available as a subgeneric name for the section of the genus to which the following species belongs, though Verhoeff, 1926, pp. 347, 348, seems to have intended to employ it that way. The group apparently being without a valid name, I propose the subgenus *Hirtiligia*, with *Ligia baudiniana* Milne-Edwards as the type. Its chief distinguishing character is the expanded, flattened merus and

carpus bordered with a single row of spiny hairs, of the first legs of the male.

Ligia (Hirtiligia) baudiniana Milne-Edwards, 1840

Figures 5a, 14

Ligia baudiniana IVES, 1891, p. 185, Pl. VI, fig. 2.

Ligia baudiniana MILNE-EDWARDS, 1840, III, p. 155 (orig. descr.).—SAUSSURE, 1858, p. 476.—(?)BATE, 1868, pp. 443-446.—STUXBERG, 1875, pp. 43, 46, 48.—(?)MIERS, 1877a, pp. 670, 671 (new descr., see below).—BUDDÉ-LUND, 1879, p. 8; 1885, p. 267.—IVES, 1891, pp. 185, 199, 200, Pl. VI, fig. 2.—DOLLFUS, 1893b, p. 25 (made syn. of *exotica*), Pl. XL, fig. 61.—VERRILL, 1902, p. 845, Fig. 233.—RICHARDSON, 1904, pp. 24, 30.—CHILTON, 1916, pp. 464, 466, 473 (compared with *L. exotica*).—JACKSON, 1922, pp. 689, 698 (new descr.), Pl. II, figs. 17, 18.—WAHRBURG, 1922, pp. 18, 37, 47, etc., details shown in Figs. 3, 4, 13, 19, 21, 27, 28.—PANNING, 1928, pp. 196, etc., Fig. 11k.—ARCANGELI, 1930a, p. 6.—BARNES, 1932, p. 496, etc.; 1934, p. 124, etc. See also note under synonymy of *L. exotica*.

Ligia exotica var. *hirtitarsis* DOLLFUS, 1890, p. 7 (descr.), Figs. 5, 6 (see Richardson, 1902, p. 307); 1893b, p. 25.

Ligia gracilis MOORE, 1901, p. 175 (descr.), Pl. XI, figs. 7-12 (see Richardson, 1902, p. 308).

Ligia hirtitarsis DAHL, 1892, p. 111, Pl. III, figs. 1, 6, 7, 11, 12.

Ligyda baudiniana MOREIRA, 1932, p. 433.

Ligyda baudiniana RICHARDSON, 1905, p. 678 (new descr.), Figs. 719-722.—PEARSE, 1915, p. 550.—VAN NAME, 1924, p. 205 (descr.), Figs. 31-36 (drawn from Galapagos specimens); 1925 p. 468; 1926, p. 2.

NOTES.—*L. baudiniana* is incorrectly made a doubtful synonym of *L. exotica* Roux by Budde-Lund, 1885, p. 267, and a synonym without question by Dollfus, 1890, p. 7, and 1896d, p. 46.

L. baudiniana von Martens, 1869, p. 33, is apparently really *L. exotica*.

A smaller and somewhat rougher species than *L. exotica*, having the head wider and the eyes more elongate laterally, the epimera more firmly united with the main part of the segments and the median apex of the telson slightly rounded off instead of angular. Antennae very variable in length; in some specimens they can be drawn back to the end of the body.

The first legs of the male lack the process at the distal end that occurs in *exotica*; they have the merus and carpus flattened and provided on the thin anterior edge with a single row of short, closely set spiny hairs, and are provided with elongate areas of fine, oblique, parallel, file-like ridges. The second and third legs of the male have an area of the file-like ridges on the carpus which is somewhat swollen, but they lack the row of closely placed spiny hairs. In the female the three

anterior pairs of legs are similar to the fourth and more posterior pairs, which are alike in both sexes.

The styloid process of the second pleopoda of the male was examined in West Indian and Galapagos specimens and was found to be very similar in both. These organs taper to a not very acute tip which

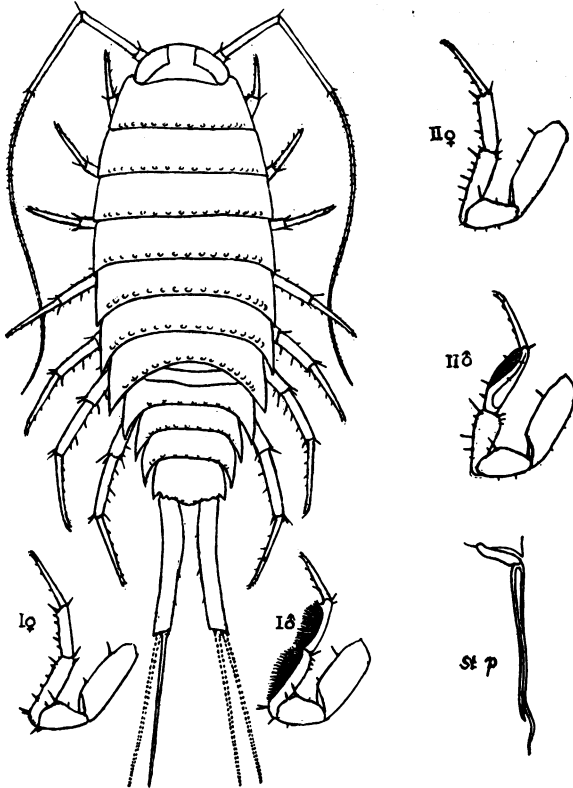


Fig. 14. *Ligia baudiniana* Milne-Edwards. From specimens from Galapagos Islands. Adapted from Van Name, 1924.

is twisted slightly inward toward the median line. The ventral aspect bears a shallow groove along the entire length of the organ. From a small cleft in the dorsal surface near the distal end, a tapering flexible fleshy process protrudes.

DISTRIBUTION.—Atlantic Gulf and Caribbean Sea coasts from

Florida (Miami) to Brazil (Rio de Janeiro), inclusive of Bermuda and the West Indies, under stones and on damp rocks, piles, etc., near the water's edge. There are no records from the Pacific side of the continent, but specimens from the Galapagos Islands that I have studied do not appear to be specifically separable from it (Van Name, 1924). Type locality: San Juan d'Ulloa, near Vera Cruz, Mexico. For specific localities see Richardson, 1905; Jackson, 1922.

This species has been confused with *L. exotica* Roux by some authors, and of the references above given those of Bate, 1868, and Miers, 1877, may apply to *exotica*. The distinguishing characters between the two are discussed in detail by Richardson, 1902, pp. 306, 307; Jackson, 1922, p. 698; and Van Name, 1924, p. 206 (see above).

***Ligia cajennensis* Koch, 1847**

Figure 15

Ligia cajennensis KOCH, 1847, p. 212 (orig. descr.), Pl. ix, fig. 102.—BUDDLUND, 1879, p. 8; 1885, p. 271.—JACKSON, 1922, pp. 689-701.

Ligia cayennensis STUXBERG, 1875, p. 43.

Ligyda cajennensis VAN NAME, 1925, p. 468.

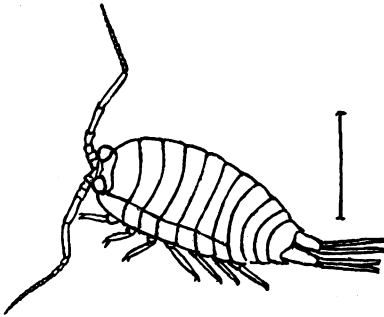


Fig. 15. *Ligia cajennensis* Koch. Adapted from Koch, 1847.

Koch describes this as extremely like the well-known *Ligia italica* of southern Europe, differing materially only in that the body is relatively narrower, the anterior margin of the head is not impressed, the surface of all the segments noticeably more coarsely granulated, the first branch of the uropoda wider and the second as well as the basal segment both twice as long as the first branch. The antennae are of the same length (as in *L. italica*), their flagellum also has fifteen articles.

Length, $6\frac{1}{2}$ lines. Color dark rusty yellow with antennae and legs lighter than the body; the eyes brownish black. (Translation of original description.)

DISTRIBUTION.—Cayenne.

Nothing is known about this species except what Koch's description and figure give us. Budde-Lund and Jackson treat it as an insufficiently known form.

SUBGENUS **POGONOLIGIA** JACKSON

Distinguished from the typical members of *Ligia* by having the telson with a median notch or emargination, and certain peculiarities of the mouth parts and first antennae, notably a conspicuous setose tuft on the outer side of the outer branch of the first maxilla near the tip. (See Jackson, 1927, p. 134.) This group may be synonymous with the unsatisfactorily characterized genus *Geoligia* Dollfus. See remarks under *Ligia simoni* below. Type *Ligia muscorum* Jackson, 1927, which apparently is a synonym of *Ligia platycephala* (Van Name), 1925.

Ligia (Pogonoligia) platycephala (Van Name), 1925

Figures 5f, 16, 17

Ligia (Pogonoligia) muscorum JACKSON, 1927, p. 130, Pl. II.

Ligyda platycephala VAN NAME, 1925, p. 497 (orig. descr.), Figs. 67-71.

Body soft and weakly articulated, as in *L. exotica*, the thorax more oblong when seen from above, but the abdomen more contracted than in that species. The head is longer antero-posteriorly, more prominently convex in its front outline and much more flattened. Eyes more elongate from side to side and less bulging, and the antennae considerably shorter, reaching when well drawn back about to the abdomen in the male and only to the sixth or seventh thoracic segment in the female. Epimera smaller than in *exotica* and more completely fused with their respective segments in both sexes.

Jackson, 1927, has described and figured several peculiarities of the mouth parts in which it differs from typical members of *Ligia*. The mandible has a large setose plume but no penicilli, the first maxilla has near the distal end a large brush of setae on the outer aspect, and the inner branch is tipped with a setose knob distal to the plumose tufts. The endopod of the maxilliped is large and longer than the basis. I have confirmed these characters in British Guiana specimens.

Sexual differences in the anterior legs were not found. Styloid appendages of male straight with a short, obliquely directed claw-like point at the tip. Examination of more and better material shows that there is a small longitudinal fin-like projection on the convex aspect of the tip, which apparently was worn or damaged in the original specimens and was not shown sufficiently large in the figure (Fig. 66,

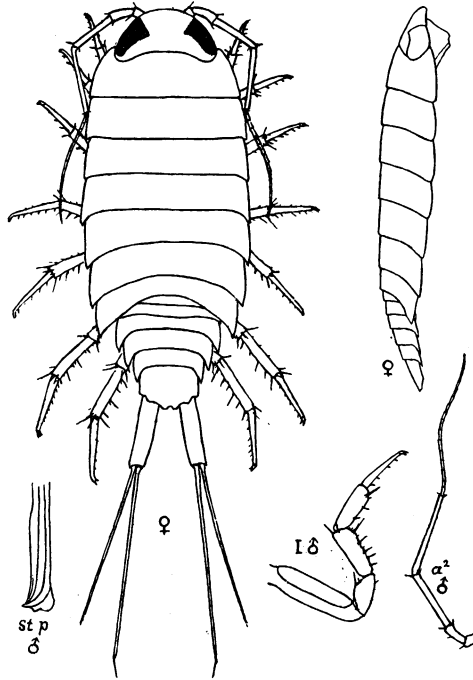


Fig. 16. *Ligia platycephala* (Van Name). From Zoologica, VI, p. 498, Figs. 67-71.

Van Name, 1925) given of this appendage. Rear outline of telson very characteristic, having a small median notch, each side of which are small rounded projections.

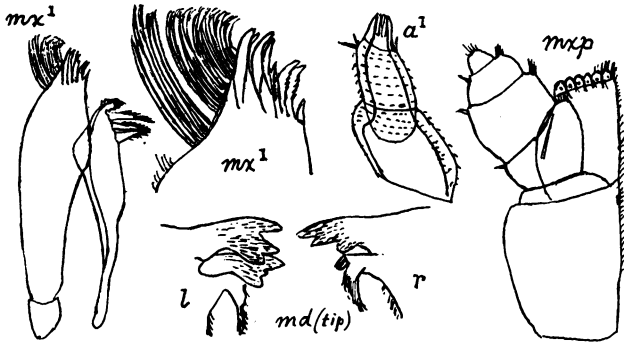


Fig. 17. *Ligia platycephala* (Van Name). Adapted from Jackson's (1927) figures of "*L. muscorum*."

The Kartabo specimens are handsomely colored with three broad longitudinal dark bands; one median, the others along the basal ends of the epimera which are very light-colored and form a conspicuous whitish border along each side of the body. The specimens from other localities have the dark bands less well marked.

Length of largest male 16.5 mm., of largest female 18 mm. See original description for more details.

DISTRIBUTION.—British Guiana, in damp forest along the rivers, under dead leaves, etc. Type and several other specimens from Kartabo; many specimens collected by Herbert Lang in 1922 along the Kurupung River and at the mouth of the Mermuc River. Type in the American Museum of Natural History.

This species is related to *L. simoni* (Dollfus), 1893 (see below), also an inland species, though unlike *platycephala* it is found in a mountainous region.

***Ligia (Pogonoligia) simoni* (Dollfus), 1893**

Figures 5e, 18, 19, 20

Geoligia simoni DOLLFUS, 1893a, p. 343 (orig. descr.), Pl. x, figs. 11a-11c.—CHILTON, 1922, p. 4; 1924 (referred to as "species from Venezuela").—VERHOEFF, 1926, p. 348.

Ligia richardsonae JACKSON, 1922, p. 701 (says probable syn. of *simoni*).

Ligyda richardsonae PEARSE, 1915, p. 549 (descr.), (534), Fig. 9.—JACKSON, 1922, pp. 688, 701 (probable syn. of *L. simoni*).—VAN NAME, 1925, p. 499, Fig. 72.

Ligia simoni JACKSON, 1922, pp. 688, 690, 701.—MACCAGNO, 1931, p. 153.

The original description is here quoted:

"Corps ovale, un peu rétréci postérieurement, très finement granulé-sétacé.

"Cephalon.—Front régulièrement arrondi. Prosépistome plan, mésépistome bien développé. Yeux très grands. Antennes atteignant environ les deux tiers du corps, fouet formé d'environ 16 articles.

"Pereion.—Premier somite à bord postérieur très faiblement sinueux de chaque côté.

"Pleon, Telson.—Pleotelson grand, présentant une dent de chaque côté et à bord postérieur arrondi. Uropodes à base très développée, aplatie et un peu carénée, dépassant le pleotelson d'une longueur égale à celui-ci; exopodite long et grêle; endopodite?

"Couleur.—D'un gris clair, finement moucheté de noir, avec une tache postéro-médiane sur chaque somite, et une bande également foncée de chaque côté du pereion.

"Dimensions.—13 × 7 mm."

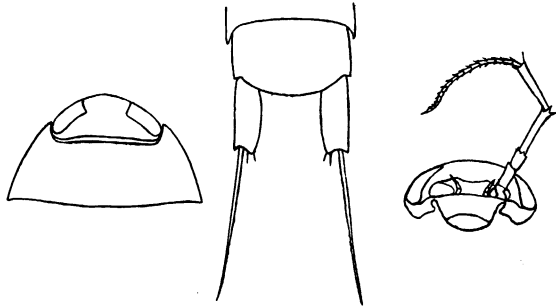


Fig. 18. *Ligia simoni* (Dollfus). After Dollfus, 1893a.

The following statements are condensed from Pearse's description of his *Ligyda richardsonae*.

Length, 13.3 to 18.3 mm. Color mostly gray with a broad light band at the sides of the thorax; sometimes a few white spots along the posterior borders of thoracic segments; usually a broad, rather in-

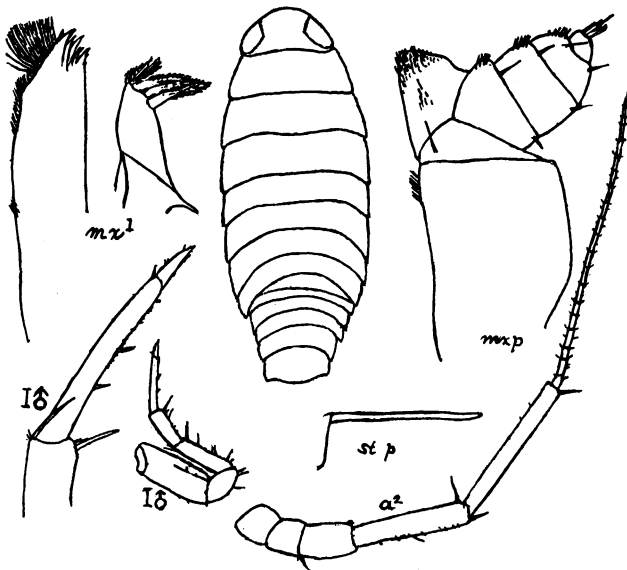


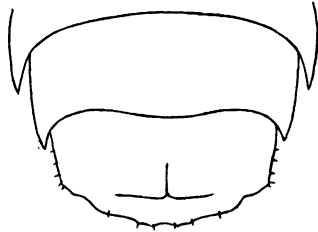
Fig. 19. *Ligia simoni* (Dollfus). Adapted from Pearse's (1915) figures of "*L. richardsonae*."

distinct darker band along median dorsal line. Flagellum of second antenna with about twenty segments; reaches to end of fourth thoracic segment. Epimera coalesced with segments of thorax. First pair of legs of male slender with vertical border of merus finely serrate; they lack the armature characteristic of *L. baudiniana*. Unlike most of the genus, this is not a seacoast species.

DISTRIBUTION.—Cumbre de Valencia, Venezuela, in forest at 1200 meters altitude (Dollfus, type locality); Santa Marta, Colombia, in damp places or in brooks in forest at 3800 feet (Pearse). Type of *richardsonae* in University of Michigan Museum, cotypes in U. S. National Museum.

Jackson, 1922, p. 701, points out the probability of the identity of Dollfus' and Pearse's species, and it seems so strong that I am venturing to treat them as synonyms. The figures of both authors are here re-

Fig. 20. *Ligia simoni* (Dollfus). Rear end of cotype of "*L. richardsonae*" in U. S. National Museum.



produced as well as one showing the rear end of the telson, made after a drawing by Dr. Shoemaker, of the U. S. National Museum, from a cotype of *richardsonae*. I cannot consider that the smoothly rounded outline of the rear end of the telson in Dollfus' figure is an obstacle to regarding the two species as identical, since Dollfus had only one specimen, and the slight undulations of the margin present in this species may readily have been overlooked or regarded as due to accident or injury.

Dollfus, 1893, made this species the type of a genus, *Geoligia*, giving as the only distinguishing character that the epimera are "not distinct." The distinctness of the line of demarcation between the epimera and the main part of the segments, however, is very variable and often very slight in the genus *Ligia*, and, moreover, is dependent on sex, in some species at least.

So far as I am aware, only one other species, *L. perkinsi* (Dollfus), has been assigned to *Geoligia*, no doubt because it is an inhabitant of

mountain forests like *L. simoni*. But it is not closely related to that species, being nearer to *L. exotica*, though distinct according to Jackson, 1927, pp. 134, 135. (Chilton, 1922, pp. 1, 2, had claimed it to be identical with *exotica*.)

If, as seems probable, this species belongs in the same subgenus as *L. platycephala*, the name *Geoligia* will have priority over *Pogonoligia* Jackson, 1927, but I feel in no haste to substitute an insufficiently characterized name which has never been anything but a source of confusion and uncertainty for *Pogonoligia*, for which Jackson gave a careful diagnosis.

STYMPHALUS BUDDÉ-LUND, 1885

See remarks under *Stymphalus dilatatus*, its type.

Stymphalus dilatatus (Perty), 1834

Figure 21

Ligia dilatata PERTY, 1830-1834, p. 212 (orig. descr.), Pl. XL, fig. 14.

Stymphalus dilatatus BUDDÉ-LUND, 1879, p. 9; 1885, p. 271.—STEBBING, 1893, p. 421.

Not *Ligia dilatata* Brandt, 1833, from the Cape of Good Hope; not *Ligia dilatata* Stimpson (= *L. pallasii* Brandt, 1833, and *L. stimpsoni* Miers, 1877) from Alaska.

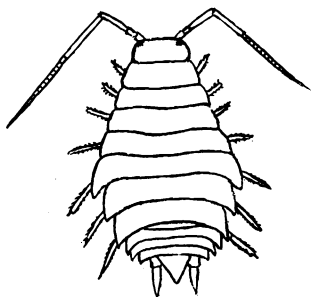


Fig. 21. *Stymphalus dilatatus* (Perty). After Perty, 1834.

The following is Perty's description:

"Olivaceo-grisea; corpore retrorsum valde dilatato; styli cauda brevioribus. Lg. 5.

"Habitat prope Bahiam.

"Species ab omnibus facillime distinguenda. Olivascens-grisea, segmentis mediis et caudalibus pallidioribus, granulis asperatis. Segmentum quintum, sextum et septimum praecedentibus multo latiora;

caudae segmentum primum et secundum maxima e parte sub praecedentibus occulta. Antennae externae corpore breviores; internae minimae, vix conspiciendae. Styli caudales cauda ipsa breviores."

LOCALITY.—Near Bahia, Brazil.

Nothing is known about this animal except what information is contained in Perty's work. On the strength of his figure Budde-Lund separated it from *Ligia*, establishing for it the new genus *Stymphalus* (1885, p. 271).

LIGIDIUM BRANDT, 1833

Small species inhabiting moist places, damp forests, etc., having the first antennae better developed than in *Ligia* and more or less conspicuously projecting in front of the head, and the lateral parts of the last abdominal segment less developed and never forming posteriorly projecting points. The uropoda have the inner rear angle of the basal segment produced and bearing at its apex the inner branch, which is smaller than the outer.

This genus has been monographed by Verhoeff, 1918, and Jackson, 1923.

Ligidium gracile (Dana), 1856

Figures 22, 23

Alloniscus maculosus HARFORD, 1877, p. 54 (descr.).

Ligidium gracile RICHARDSON, 1905, p. 690 (*L. gracilis*; descr. of Dana and Harford quoted), Fig. 732.—VERHOEFF, 1918, p. 114.—JACKSON, 1923, p. 832, Fig. 6.—JOHANSEN, 1926, p. 167 (*Ligidium* sp.).—WALKER, 1927, p. 176, Figs. 1-5.—FEE, 1927, p. 31.—MALONEY, 1930, p. 292, Fig. 4 (telson).—ARCANGELI, 1932, p. 140.

Ligidium tenue BUDDE-LUND, 1885, p. 258.—RICHARDSON, 1899, p. 867; 1900a, p. 306.—STOLLER, 1902, p. 208.—RICHARDSON, 1905, p. 688 (descr.).—VERHOEFF, 1918, p. 114.—JOHANSEN, 1926, p. 167.—WALKER, 1927, p. 176.

Styloniscus gracilis DANA, 1856, p. 176 (orig. descr.).—STIMPSON, 1857, p. 506.—BUDDE-LUND, 1879, p. 9; 1885, p. 271.—UNDERWOOD, 1886, p. 364.—RICHARDSON, 1899, p. 867 (1899, Ann. Mag. Nat. Hist., (7) IV); 1900a, p. 306.—HOLMES, 1904, p. 318, Pl. xxxvi, figs. 29-31.

See also remarks under *L. hypnorum*.

"Length: ♂ 7 mm., ♀ 9 mm. Breadth: ♂ 2 mm., ♀ 3 mm.

"Surface smooth and shining. Head: Frontal margin sinuate; median V sharply drawn out and produced to slight rostrum. Transverse groove deep and short, reaching to inner edge of eyes. Frontal grooves obsolete or very faintly indicated. Eyes rather small and somewhat pear-shaped. Thorax: 1st somite finished with bristles at regular intervals on lateral edges, none on posterior margin. A deep

lateral depression on each side reaching hind border. No bristle group. Coxal-plate sutures distinctly marked on last four somites in both sexes; drawn backwards on last three somites only, the 5th somite little if at all drawn back. Antennal flagellum reaching back to hind margin of 2nd somite; with 12 segments. Uropods: Inner process of base stout, slightly curved and about half as long as base. Endopod by itself slightly longer than exopod; combined with inner process exceeds exo-

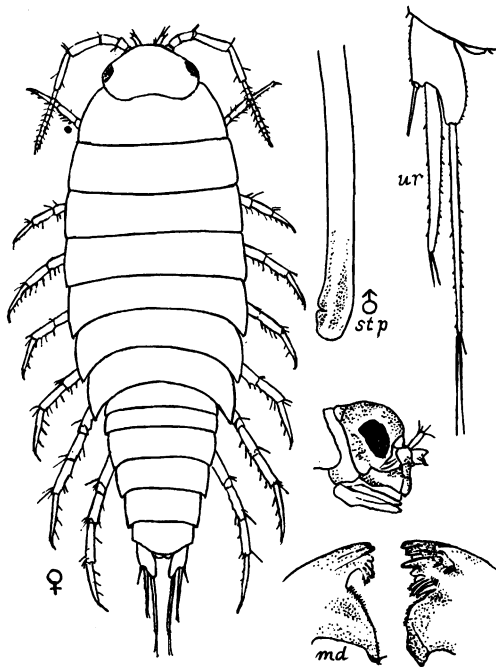


Fig. 22. *Ligidium gracile* (Stimpson). Adapted from Walker, 1927.

pod by about one-sixth of the latter. Exopod about four times as long as inner process. Telson with blunt postero-lateral angles moderately deeply notched over uropods.

“Pleopoda of ♂.—1st exopod with one long bristle; 1st endopod with process moderately drawn-out and blunt, with 3 bristles; 2nd endopod with small rounded lappet.

“Color.—Brown ground; brown median stripe; mottled on each side with yellow. Yellow stripe along and above sutures of coxal plates,

which are brown on each side. Legs yellow. Head mottled." (Jackson, 1923, p. 832.)

DISTRIBUTION.—California (Santa Clara, and Angel Island, San Francisco Bay) to Sitka, Alaska. It is not exclusively a species of the seacoast and its vicinity, as it is recorded by Arcangeli, 1932, from points in the Cascade Mountains. Harford records it from Angel Island, California, under the roots of the fern *Woodwardia radicans*, and Walker from under stones on the shore on Vancouver Island; Jackson records it from Massett on the Queen Charlotte Islands.

The investigations of Jackson, 1923, and Walker, 1927, have apparently cleared up the confusion regarding this species, which has been described from different localities under different names, and which

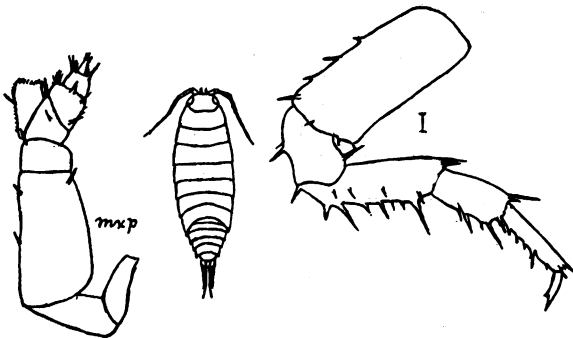


Fig. 23. *Ligidium gracile* (Stimpson). Adapted from Holmes, 1904.

appears to be somewhat variable in its characters. The type specimens of Harford were redescribed by Holmes, 1904, whose description was quoted in full by Richardson, 1905. Harford considered that his specimens were "doubtless identical with some specimens of this genus which Prof. Dana had before him while describing his *Alloniscus perconvexus* and which he says may probably be another species" (1854, Proc. Phila. Acad., p. 176). Holmes and all later writers have identified the form here described with Dana's *Styloniscus gracilis*.

Ligidium gracile* variety *flavum

A variety established by Jackson, 1923, p. 834, for some specimens from British Columbia which are unpigmented and have the eyes smaller. He believed them to have come from a cave.

Ligidium longicaudatum Stoller, 1902

Figure 24

Ligidium longicaudatum STOLLER, 1902, p. 208 (orig. descr.), Fig. 1.—RICHARDSON, 1905, p. 689 (descr.), Fig. 731.—PEARSE, 1910, p. 73.—FOWLER, 1912, p. 516.—VERHOEFF, 1916, p. 114.—JACKSON, 1923, p. 838.—JOHANSEN, 1926b, p. 167 (*Ligidium* sp.).—WALKER, 1927, p. 176, Figs. 6–10.—MALONEY, 1930, p. 292, Fig. 3 (telson).

Richardson's description, based on an examination of the original specimens, is here quoted in full:

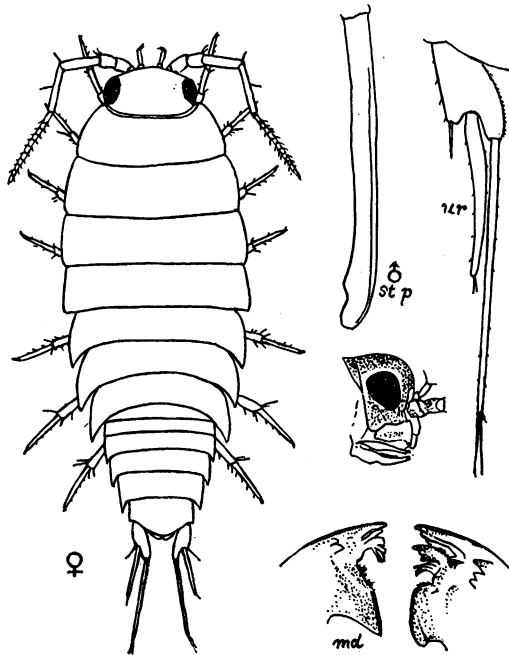


Fig. 24. *Ligidium longicaudatum* Stoller. Adapted from Walker, 1927.

“Body oblong-ovate, about twice as long as wide, 3 mm.: 6 mm. Uropoda, 2 mm. Length of body with uropoda, 8 mm. long.

“Head twice as wide as long, 1 mm. : 2 mm., with the anterior margin widely rounded. Eyes round, composite, and situated close to the lateral margins. The first pair of antennae are small and almost inconspicuous. They are composed of three articles—two subequal ones and a minute terminal one. They extend to the end of the second

article of the peduncle of the second pair of antennae. The second pair of antennae have the first two articles short and subequal; the third is but little longer than the second; the fourth and fifth are equal in length and each is about twice as long as the third. The flagellum is composed of eleven articles, the terminal article ending in a bunch of hairs. When retracted, the second antennae extend to the posterior margin of the third thoracic segment.

"The first four segments of the thorax are subequal and each is a little longer than any of the last three, which are subequal. The epimera are not distinctly separated on any of the segments.

"The first segment of the abdomen has the lateral parts concealed by the seventh thoracic segment. The four following segments have the lateral parts well developed. The sixth or terminal segment is rounded posteriorly, with a slight emargination on either side of the rounded median lobe for the reception of the basal articles of the uropoda. The basal article of the uropoda has the inner distal angle produced so that the inner side measures one and a half times longer than the outer side. The inner branch of the uropoda is two and a half times longer than the peduncle measured from the inner side; it terminates in two long subequal hairs, which are a little less than one-fourth the length of the inner branch. The outer branch is shorter than the inner branch, the inner branch being a little less than one and a half times longer than the outer branch. The outer branch is also tipped with two short hairs.

"All the legs are ambulatory.

"In color, it is a reddish brown, mottled with yellow, and with two longitudinal rows of yellow spots, one on either side of the body about the place where the epimera are united with segments." (Richardson, 1905, pp. 689, 690.)

LOCALITIES.—Schenectady, New York, type locality, "in a deep shaded ravine, under stones (at time when collected, late in November) at the foot of a limestone talus" (Stoller). Pearse, 1910, reports it from Ann Arbor, Michigan ("near the overflow"), and Walker, 1927, gives three localities in Ontario (Lake Simcoe, near Richmond Hill, and Credit River, in wet places). See also remarks on *L. hypnorum*.

Ligidium hypnorum (Cuvier) 1792

Figures 25, 26

Oniscus hypnorum CUVIER, 1792, Jour. d'Hist. Nat., II, p. 19 (orig. descr.), Pl. xxvi, figs. 3-5.

Ligidium hypnorum STUXBERG, 1875, p. 48 (see note below).—SARS, 1899, p.

158 (descr.), Pl. LXXI.—BUDDE-LUND, 1885, p. 254.—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1899, p. 867 (Ann. Mag. Nat. Hist., (7) IV, p. 335); 1900a, p. 306.—STOLLER, 1902, p. 208.—RICHARDSON, 1905, p. 686 (descr.), Fig. 730.—JACKSON, 1923, p. 830; 1928a, p. 571, Fig. 3.—JOHANSEN, 1926b, p. 167.—WALKER, 1927, p. 176.—MALONEY, 1930, p. 292, Fig. 5 (telson).

“Body oblong oval, greatest width not attaining half the length, dorsal face rather convex, and perfectly smooth and shining. Cephalon of moderate size, and evenly rounded in front, dorsal face transversely

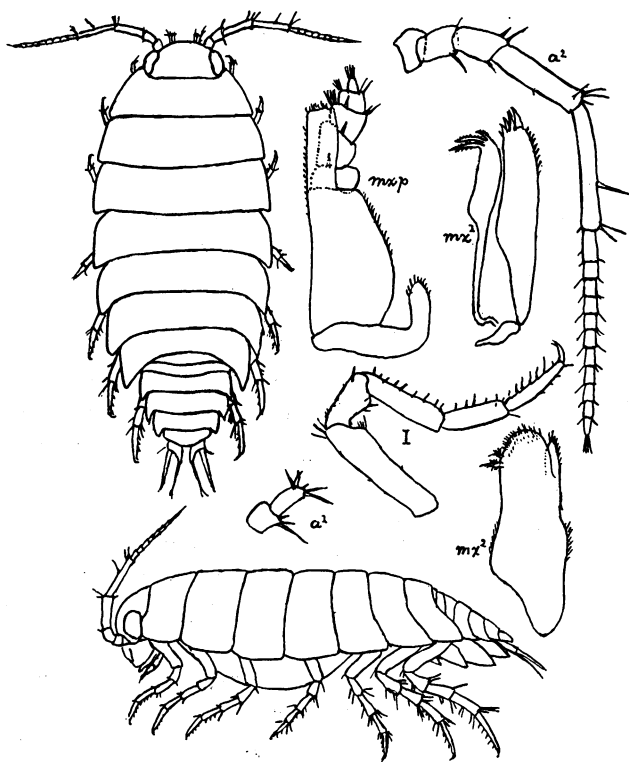


Fig. 25. *Ligidium hypnorum* (Cuvier). Adapted from Sars, 1899.

grooved behind the eyes. Lateral parts of the 3 anterior segments of mesosome but slightly prominent; those of the 4 posterior segments somewhat larger, and terminating behind in obtuse points. Metasome scarcely exceeding in length $\frac{1}{3}$ of the mesosome, and much narrower, with the epimeral plates small and appressed; last segment obtusely

rounded at the tip, with a slight angle on each side. Eyes very large, oval, extending down the sides of the cephalon. Antennulae with the 1st joint rather thick, 2nd longer but much narrower, both armed at the tip inside with 3 rather long diverging spines, last joint very small, narrow cylindrical. Antennae rather slender, though not nearly attaining half the length of the body, flagellum somewhat shorter than the peduncle, and composed of about 11 articulations, the last tipped with a dense bunch of delicate hair-like bristles. Legs armed with scattered slender spines, propodal joint very narrow and elongated, dactylus simple. Inner plate of 1st pair of pelopoda in male slightly produced at the tip, and provided with 4 apical bristles. Uropoda scarcely exceed-

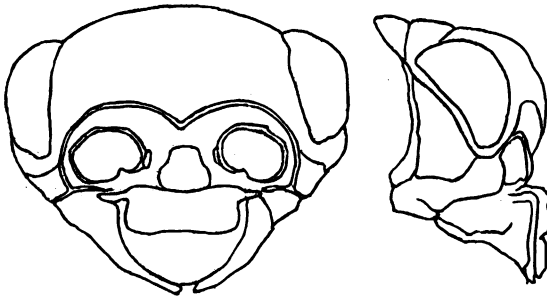


Fig. 26. *Ligidium hypnorum* (Cuvier). Head, adapted from Jackson, 1926a.

ing half the length of the metasome, inner projection of the basal part occupying about half its length, outer ramus gradually tapering distally and carrying on the tip 3 short bristles, inner ramus very narrow, linear, not extending to the tip of the outer, apical bristles nearly as long as the ramus. Colour of dorsal face light fuscous, variegated with irregular dark patches, which on each side, at the base of the lateral plates of mesosome, form a nearly continuous longitudinal band. Length of adult female 9 mm." (Sars, 1899, p. 158.)

DISTRIBUTION.—A widely distributed European species inhabiting very moist situations. Recorded by Stuxberg, 1875, p. 48, from "California" and "Niagara," the only American records. Their correctness is doubted by Budde-Lund, 1885, p. 256, and Walker, 1927, p. 176, and has not, so far as I know, ever been confirmed. Probably Stuxberg's records refer to *L. gracile* and *L. longicaudatum*, respectively.

Ligidium latum Jackson, 1923

Figure 27

Ligidium latum JACKSON, 1923, p. 834 (orig. descr.), Figs. 7, 8.—MALONEY, 1930, p. 292.

“Length: ♂ 6 mm., ♀ 8.5 mm. Breadth: ♂ 3 mm., ♀ 4 mm.

“Surface rough and covered with small scales. Head: Frontal margin sinuate; median V very sharp and produced. Transverse groove deep and passing behind eyes; frontal grooves very deep and curving back to join transverse groove abruptly. Eyes large and pear-shaped. Thorax: 1st somite without lateral depressions or bristle groups. Setae at intervals on lateral border, but absent on posterior border. Coxal-plate sutures well marked on last four somites in the female, only lightly

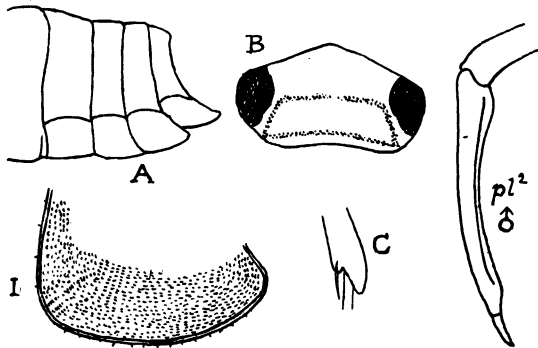


Fig. 27. *Ligidium latum* Jackson. A, last four thoracic somites from left side; B, head from above; C, uropod from below. I, Epimeron of first thoracic segment. Adapted from Jackson, 1923.

marked on last two in male; well drawn backwards on last three somites and slightly on fourth somite. Antennal flagellum long, reaching back as far as hind margin of 4th somite; with 12 segments. Uropods: Inner process of base shorter than base by about half its length, stout and conical. (None of my specimens have undamaged uropods.) The single seta arising from outer side of base, set on sharp and pointed process. Telson deeply notched over uropods; blunt, rounded posterolateral angles.

“Pleopods of ♂.—1st exopod with one (?) bristle; 1st endopod with moderate process and one (?) bristle; 2nd endopod ending in pointed process.

“Colour.—Brown and yellow mottled; slightly lighter streak down middle of back. Coxal plates light and sharply defined from brown of tergite at the suture. Legs banded with yellow and brown.” (Jackson, 1923, pp. 834, 835.)

LOCALITY.—San Francisco, California. This is distinguished from the other American species here included by the rough surface of the body.

***Ligidium kofoidi* Maloney, 1930**

Figure 28

Ligidium kofoidi MALONEY, 1930, Univ. Calif. Pub. Zool., XXXIII, p. 291 (orig. descr.), Figs. 5-13.

This form, described from two mutilated and incomplete female specimens, is included in *Ligidium* by its describer in spite of having no eyes, largely on account of the mandibles conforming to those of that genus.

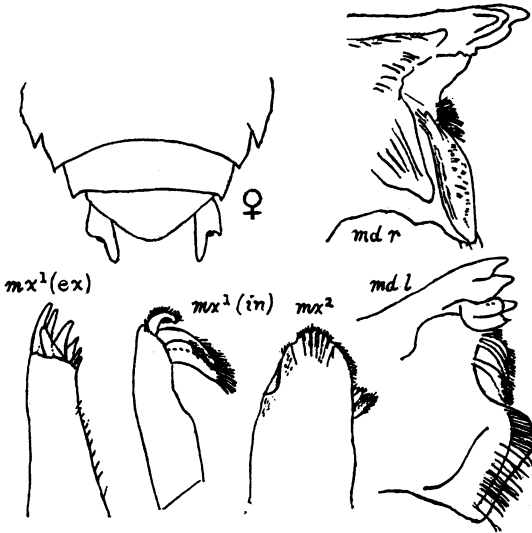


Fig. 28. *Ligidium kofoidi* Maloney. Adapted from Maloney, 1930.

“The body without antennae and uropod measures $5\frac{1}{2}$ mm. in length, in width $2\frac{1}{2}$ mm. Because of the diagnostic value of the first two pairs of pleopods in this genus, an individual of the male sex would have been preferable as the type; but the only two specimens found are of the opposite sex.

"Eyes wanting. Head twice as long as broad. The V-shaped process above and between the insertion of the antennae vestigial. Transverse groove shallow, and no frontal groove discernible. Outer branch of first maxilla with four large teeth and three smaller ones; inner branch with three hairy bristles, the two lower of which are about equal in size, while the upper is smaller and curved. A small spine behind upper bristle. Right mandible with four strong biting teeth. No lacinia mobilis found—perhaps broken off. Molar tubercle not high crowned, a bunch of non-setose bristles at its upper extremity. Left mandible with three biting teeth; a small spine on anterior tip of lower lobe of lacinia mobilis; four hairy bristles between lacinia mobilis and molar tubercle; molar tubercle high crowned. Thoracic segments about equal in length. First segment without lateral depressions or bristle groups. No coxal plate suture on any of the segments. Telson triangulate and with no trace of notches above the insertion of the uropods.

"Color.—In alcohol, a yellowish brown.

"Type Locality.—Potter Creek Cave, Shasta County, California.

"Remarks.—*Ligidium kofoidi* differs from the other known members of the genus in the shape of the telson and the absence of notches in the margin of the telson above the insertion of the uropods.

"Type in U. S. National Museum."

Ligidium elrodii (Packard), 1873

Euphiloscia elrodii PACKARD, 1873, p. 97 (orig. descr.).—SMITH, 1875, p. 477.—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1900a, p. 306; 1905, p. 692.

Nothing appears to be known about this animal except what is contained in Packard's (1873) original statements, from which it seems that it can be included in *Ligidium* as suggested by Richardson, 1905, p. 673, and that the genus *Euphiloscia* which he established for it is superfluous. His statements as quoted by Richardson, 1905, are below. I have not seen the original article.

"Having no other species with which to compare my two specimens of this species, I can only remark that it is of the usual color of the species of *Philoscia* found running about in moss, and the cave specimens had not been altered by their subteranean life. The eyes are dark as usual, while the body is mottled with brown and carneous, with no well-marked dorsal streak."

LOCALITY.—Indiana.

Other characters of this species are given in Packard's (1873, pp.

96, 97) diagnosis of his genus *Euphiloscia* which is quoted by Richardson as follows:

"The genus *Euphiloscia* differs from *Philoscia* in the flagellum of the outer antennae being subdivided into fifteen joints, while it is no longer than in the latter genus. The second and third joints are rather short; the inner (and smaller) antennae are very much larger. The body is longer and slenderer, and the abdomen much longer and wider in proportion to the rest of the body, being large and rounded, not mucronate. Uropoda much longer and slenderer than in *Philoscia*, being as long as the basal abdominal segment is wide; they are subequal. Eyes larger than in *Philoscia*. In the form of the legs and the setae this genus more closely resembles *Philoscia* than *Philougria*, and is in some respects intermediate between the two genera."

Trichoniscidae

As here restricted, this group is composed of a few genera (chiefly Old World) of small, rather narrow-bodied species with small eyes if any, small lateral lobes to the head, no tracheae in the external plates of the pleopoda. The endopodites of pleopoda 1 and 2 are modified in the male. Antennae with a flagellum of a few articles. Both the antennae and uropoda bear delicate terminal pencils of hairs. Telson narrowed and usually truncated at the tip.

Packard (1888, Pl. iv, fig. 5) illustrates a small, rather narrow-bodied terrestrial isopod which, if we disregard the telson and uropoda which are crudely and probably not correctly represented in the figure, may probably be assigned to this family. In the description of plates, page 151, where the only information about the figure is given, the statement is as follows:

"Fig. 5. Undetermined; locality unknown."

The locality, however, was doubtless somewhere in the central part of the United States. Eyes of fair size, a sinuous forehead and bulging epistome below it are shown in the figure, which is a dorsal view. The external branches of the uropoda are very wide, tapering to a point.

TRICHONISCUS BRANDT, 1833

In the typical members of this genus the eyes are small but composed of several ocelli. No longitudinal ribs or longitudinal rows of tubercles on the back. Reproduction mainly parthenogenetic in some species. See statements under *T. demivirgo*. Verhoeff, 1908, p. 196, makes this genus the type of a subfamily, Trichoniscinae.

Brandt, 1833, who established this genus, gave so brief a diagnosis of his type species, *T. pusillus*, that it is impossible to tell certainly which of several species he based it on. His type is not known to be in existence and the locality he gives, "Germania," is too vague to determine the question without any doubts. The use of the name *pusillus* therefore has been abandoned in some recent works on the European isopods. (See Graeve, 1914, pp. 203, 204.) Its application to the American form, here called *T. demivirgo* Blake, is incorrect according to Blake's opinion, though this has been the universal practice.

Owing to the uncertainty in regard to the type of the genus, there has been doubt as to what should be the typical subgenus. Apparently the group designated as the subgenus *Spiloniscus* by Racovitza, 1908 (Arch. Zool. Exper., (4) VII, p. 247), should be so considered and should become the subgenus *Trichoniscus*. Of the species here dealt with, *T. demivirgo* and *T. pygmaeus* unquestionably belong in this subdivision.

In the species that reproduce principally by parthenogenesis, which is the case with those of northern Europe and our North American species, males are very rare and in many cases unknown. This is the cause of the difficulty in distinguishing the species, as the males afford, in the form of the endopodite of the first pleopoda, the only conspicuous distinguishing character, the females being all very similar, though probably not without minor differences when closely compared.

The species of *Trichoniscus* and its near allies are animals of very active habits.

Trichoniscus demivirgo Blake, 1931

Figure 29

Trichoniscus demivirgo BLAKE, 1931, p. 341 (orig. descr.), Figs. 1a-1h; 1931, p. 350.—PROCTER, 1933, p. 247.—PRATT, 1935, p. 443 (*demiverge*).

Trichoniscus pusillus STUXBERG, 1875, p. 49.—BUDDE-LUND, 1885, p. 244 (descr.).—UNDERWOOD, 1886, p. 364.—RICHARDSON, 1900a, p. 307; 1901, p. 575; 1905, p. 694 (descr.), Fig. 733.—RACOVITZA, 1908, p. 248.—NORTON, 1909, p. 251.—FOWLER, 1912, p. 515.—PRATT, 1916, p. 381, Fig. 612.—ARCANGELI, 1922, p. 4.—JOHANSEN, 1926b, p. 167.—LOHMANDER, 1927, pp. 1, 2.—WALKER, 1927, p. 177.

Not *Trichoniscus pusillus* BRANDT, 1833. (European.)

"DESCRIPTION OF FEMALE.—The ground color is salmon. This is overlaid by a heavy, dark brown reticulation. The general form of the body is about as in *T. caelebs* (= *pusillus* G. O. Sars). The surface of the head, terga, and uropods is densely scaly. The head and dorsum are sparsely beset with short setae. Tubercles are wanting. Length, 3.2-4.0 mm.

“The eyes are conspicuous and triocellate. The antennal lobe is nearly semicircular, slightly angulated ventro-laterally, and ends abruptly ventrally to the middle of the eye. The anterior margin of the lobe bears three small spines, rather distant from one another. Seen from above, the medio-anterior margin of the lobe is slightly excavate.

“The telson has the posterior margin slightly excavate and provided with a pair of fine spines just mediad to the corners. Adventitious additional spines may occur still more medially.

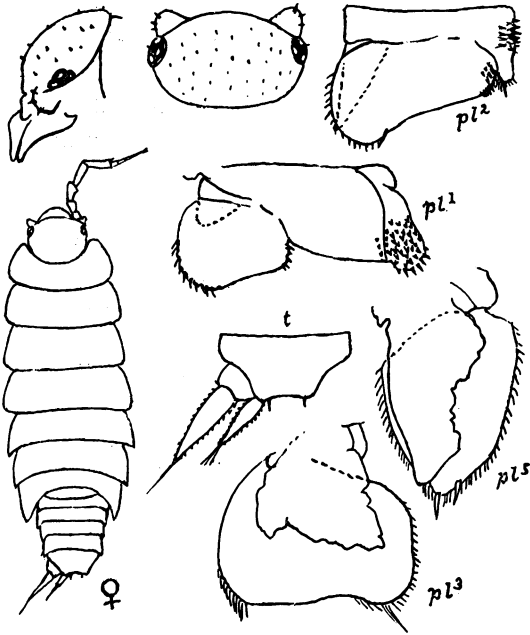


Fig. 29. *Trichoniscus demivirgo* Blake. Adapted from Blake, 1931.

“The mouth parts are as in other members of the subgenus. The thoracic legs and the uropods show nothing noteworthy, except that the uropods are strongly divergent.

“The pleopods are especially distinguished by the strong development of the lateral scaly areas on the bases of the first two pairs and the exopod of the second pair. The endopod of the third pair is about as wide as long and has a well-marked lateral lobe. The medial and posterior margins are somewhat indented or crenate. The endopod of the

fifth pair has the lateral margin concave and crenate." (Blake, 1931, pp. 341-342.)

LOCALITIES.—Blake, who established this species, records it from Mount Desert Island, Maine; Middlesex Falls (type locality), Boston, Forest Hills, Sharon, Wood's Hole, and Nantucket, in Massachusetts, apparently on the basis of specimens personally studied. The American Museum of Natural History has specimens from Fort Lee, New Jersey.

The following other records (all reported as *T. pusillus* Brandt, 1833) are probably to be referred here. St. Andrews, New Brunswick; Toronto and Lake Simcoe, Ontario (Walker); Westbrook, Maine (Norton); Chester County, Pa. (Fowler); Haverford, Pa. (Lohmander). The last named author also reports a specimen found in New York City "on a fern imported from England" and which might therefore possibly belong to one of some closely allied European species.

It occurs, according to Blake, in damp shady places under stones or the decaying leaves and wood of deciduous trees, avoiding exclusively coniferous woods, and is distinctly gregarious. The male has not been found.

Trichoniscus pygmaeus Sars, 1899

Figure 30

Trichoniscus pygmaeus Sars, 1899, p. 162 (orig. descr.), Pl. LXXII, fig. 2.—LOHMANDER, 1927, p. 3.—BLAKE, 1931, p. 345.

Spiloniscus pygmaeus VANDEL, 1933, pp. 41, 42, Fig. 7.

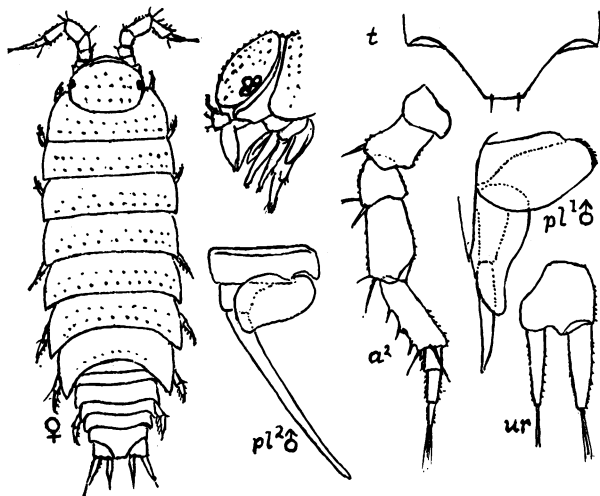


Fig. 30. *Trichoniscus pygmaeus* Sars. Adapted from Sars, 1899

Smaller than *T. demivirgo* (adult females are scarcely 2 mm. long), narrower-bodied and having numerous small tubercles arranged in transverse rows on the back. The flagellum of the second antennae has but three articles.

A species of northern Europe. It was once found at New York on lily bulbs imported from Sweden (Lohmander, 1927), but there is no evidence of its having become established in America.

***Trichoniscus pseudopusillus* Arcangeli, 1929**

Figure 31

Trichoniscus pseudopusillus ARCANGELI, 1929, p. 145 (orig. descr.), Fig. 6.

According to Arcangeli's description, which was based on a single female specimen, this species evidently closely resembles *T. demivirgo* in form and color. The head is set back half its length into the thorax and is a little wider than long. The frontal margin is slightly convex

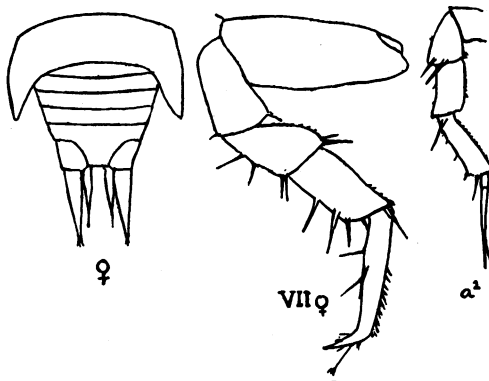


Fig. 31. *Trichoniscus pseudopusillus* Arcangeli. Adapted from Arcangeli 1929.

with small lateral lobes, which are triangular, not divergent, and have their apex right-angled and rounded off. Eyes relatively large with probably four indistinct ocelli. Second antennae about one-third the length of the body. Segmentation of the flagellum, except between the first and second articles, not noticeable.

Thoracic segments I to III with the rear lateral angle rounded but not produced backward. In segment VI, it is a right angle, becoming more acute and more produced backward in successive segments. Legs

gradually, but not greatly, longer toward the rear of the body.

Abdomen rather short, its third to fifth segments have the rear angles acute but bent down so as not to be seen in a dorsal view.

Length of only specimen (a female), 3.5 mm.; width, 1.5 mm.

LOCALITY.—Puerto Boniato, Santiago Province, Cuba, April 10, 1928.

NOTE.—The following two species (*T. magellanicus* and *T. murrayi*) doubtless belong to distinct subgenera, but they are too little known to determine their exact status.

Trichoniscus magellanicus (Dana), 1853

Figure 32

Styloniscus magellanicus Dana, 1853, p. 736 (orig. descr.), Pl. XLVIII, figs. 7-7a.—STUXBERG, 1875, p. 43.—MIERS, 1881, p. 77.—BUDE-LUND, 879, p. 9; 1885, p. 271.—DOLLFUSS, 1891, p. F2 (descr.), Pl. VIII, figs. 14-14c.—CHILTON, 1901, p. 106.

Trichoniscus magellanicus STEBBING, 1900, p. 566 (new descr.).—BUDE-LUNDE, 1908, p. 83, Pl. IV, fig. 25.—CHILTON, 1909, pp. 602, 606, 668, 799; 1910, p. 287; 1914, p. 453 (distribution).—STEBBING, 1914, p. 342.—WAHRBERG, 1922, p. 76.—GIAMBIAGI, 1925, p. 18.—MONOD, 1926, p. 41, Figs. 42, 43.—STEPHENSEN, 1927, Vidensk. Meddel. Dansk. Nat. Foren., LXXXIII, p. 370.

Trichoniscus verrucosus, see remarks below.

“Body shining, narrow elliptical, rounded in front. Abdomen abruptly a little narrower than thorax, oblong, second segment very short, last not longer than penult. Head a little shorter and narrower than next segment. Caudal stylets divaricate, nearly as long as abdomen, longer branch nearly twice the length of the other. Flagellum of antennae subulate, seven to ten-jointed.

“In damp woods, under rotten stumps and trunks of trees, near Nassau Bay, Tierra del Fuego.

“Length, four lines. Colour, dirty brown, a little clouded. The head is transverse, and arcuate less behind than before. The first three thoracic articulations are convex backward; the last two convex forwards. Lateral margins of thoracic segments finely serrulate, with a few minute spinules at intervals. Last joint of base of antennae longer than preceding and a little shorter than flagellum; posterior margin very minutely and evenly spinulous; anterior margin with four or five short spines. Claw of legs short and more or less spinous. In the posterior pair, the outer or superior margin of the fifth joint is finely pectinated for a part of its extent; on the inner side, adjoining the base, the

joint is enlarged and villose, and there are a few short spinules beyond. The pectination on the dorsal margin of the joint is seen only with a high magnifier, and is often not visible in dried specimens." (Dana, 1853, p. 736.)

The following, also other particulars, are given by Stebbing, 1900, p. 566:

Body smooth. Eyes dark with three visual elements. First maxillae; inner plate with their plumose setae; outer plate strap-shaped surrounded by eight unequal spines. The uropods are as Dana figures them, the inner ramus fully two-thirds as long as the outer, though in his description he says "longer branch nearly twice the length of the other."

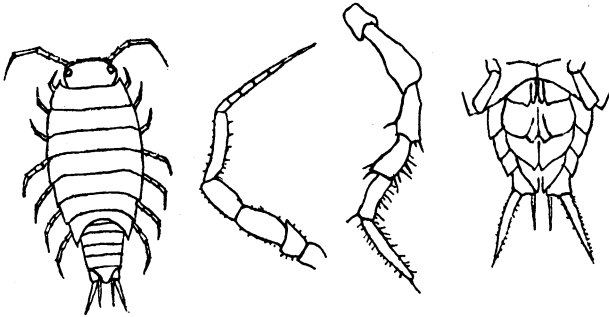


Fig. 32. *Trichoniscus magellanicus* (Dana). Adapted from Dollfus, 1891.

Color brown, mottled with yellowish white, especially in a series of light patches just above the side-plates of the pereion. Length about 8 mm.

DISTRIBUTION.—Region of the Straits of Magellan and Southern Patagonia (type locality: Nansan Bay, Tierra del Fuego, Dana), Trinidad Channel, Port Henry, Cochle Cove, Tom Bay (Miers), Lapataia, Beagle Channel (Monod); Falkland Islands (Stebbing). According to Chilton 1914, p. 453 (see also 1909, p. 602, etc.; 1910, p. 287) *Trichoniscus verrucosus* Budde-Lund, from the subantarctic islands of New Zealand and Marion Island, is identical with this species, giving it a wide distribution. It is apparently a fairly common species near the seashore, occurring according to Dana under rotten stumps and trunks of trees. Stebbing records it from a damp cave near Stanley, Falkland Islands, on a hill 450 feet high.

Trichoniscus murrayi Dollfuss, 1890

Figure 33

Trichoniscus murrayi DOLLFUS 1890, p. 68 (orig. descr.), Figs. 2-2a—BUDE-LUNDE, 1908, p. 83

“Corps ovale, rétréci postérieurement, très poilu et couvert de petites granulations.

“Cephalon.—Lobes frontaux latéraux arrondis; lobe médian nul et ligne frontale droite ou plutôt légèrement concave. Yeux moyens. Antennes externes poilues—spinescentes; fouet poilu, 5-articulé presque aussi long que l'article précédent, terminé par un pinceau de poils.

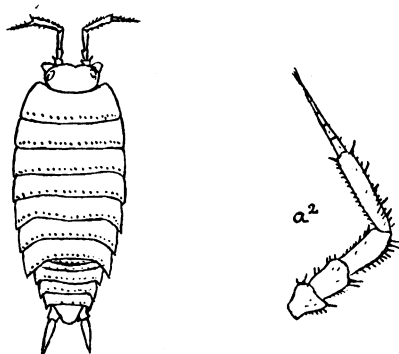


Fig. 33. *Trichoniscus murrayi* Dollfuss. Adapted from Dollfuss, 1890.

“Pereion.—Deux premiers segments à bord postérieur non sinueux. Le processus postéro-latéral des épimères de derniers segments est moins développé que dans la plupart des espèces du genre.

“Pleon.—Deux premiers segments très courts; les segments 3 à 5 à processus postéro-latéral plus développés.

“Telson.—Triangulaire tronqué, aussi long que large. Base des telsopodes n'atteignant pas tout à fait l'extrémité du telson; appendice extrême assez robuste, conique, appendice interne?

“Couleur.—Brunâtre avec une large zone claire plus ou moins marbrée de brun de chaque côté; une tache claire sur la région épiméri-euse des quatre premiers segments; telson claire; pattes et antennes plus ou moins tachées de brun.

“Dimensions.—Longueur, 6 millim.; largeur, 2 millim. $\frac{1}{2}$.

“1 exemplaire ♂ Valparaiso, November 1815.” (Dollfuss, 1890.)

DISTRIBUTION.—Only record, Valparaiso, Chile.

Though Dollfus, in a footnote, expresses doubt in placing this in the genus *Trichoniscus*, not having examined the mouth parts because of having but one specimen, Budde-Lund includes it there without question in his list (1908, p. 83) of the species of that genus.

SUBGENUS *CLAVIGERONISCUS* ARCANGELI

Arcangeli (1930a, p. 29) established this subgenus to contain the following species, but without giving any diagnosis.

Trichoniscus (*Clavigeroniscus*) *riquieri* Arcangeli, 1930

Figure 34

Trichoniscus riquieri ARCANGELI, 1930a, p. 25 (orig. descr.), Fig. 8; 1931a, p. 12.

The body is coarsely tuberculate on the thorax, the tubercles disposed in three not very regular rows (four rows on the front segment); on the abdomen the tubercles are smaller and less evident. Scattered hairs are also present on the dorsal surface.

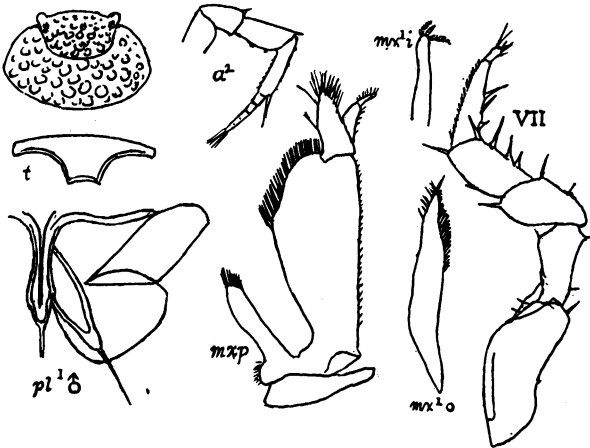


Fig. 34. *Trichoniscus* (*Clavigeroniscus*) *riquieri* Arcangeli. Adapted from Arcangeli, 1930a.

Eyes small with three or sometimes four ocelli. Antennae with a flagellum of four or perhaps five articles. The uropoda (not figured by Arcangeli) are stated to have the basal joint of truncated concave form with the external branches one and one-half times its length. The internal branches, though inserted near the base of the basal joint, reach more than two-thirds the length of the external branch.

Color.—Chestnut brown above, with yellowish markings.

Dimensions.—Length about 2.5 mm., width about 1 mm.

Many additional details will be found in the original description.

DISTRIBUTION.—Costa Rica: collected at Puente de Las Mulas, Orijuaco, and San José (Arcangeli).

SUBGENUS OR GENUS *CORDIONISCUS* GRAEVE, 1914

Established as a subgenus of *Trichoniscus* to contain the present species and a variety of it (var. *rhenana*) described previously (1913, Verh. naturh. Ver. preuss. Rheinlande u. Westfalen, ann. LXX, p. 191) from a single male specimen found in a greenhouse in Germany. Excellent figures of the details of this variety, which probably would serve equally to represent the typical form of the species, are given in Graeve, 1914, Pl. v, figs. 36-39, and Pl. vi, figs. 40-46.

Trichoniscus (*Cordioniscus*) *stebbingi* Patience, 1907

Figure 35

Cordioniscus stebbingi BLAKE, 1931, p. 350.—VANDEL, 1933, p. 44.

Trichoniscus stebbingi PATIENCE, 1907, Jour. Linnaean Soc. Zool., XXX, p. 42 (orig. descr.), Pl. vii.

“Body oblong oval in form, about two and a half times as long as it is broad. It attains the greatest width about half the total length. Dorsal face convex and very strongly tuberculated, the tubercles being arranged transversely in rows across the segments. Cephalon with the front obtusely rounded; lateral lobes moderately produced, and armed with two small spines on outer edge. Lateral parts of the segments of mesosome edged with very small spicules, which are concealed, however, in a fringe of short hairs; the lateral parts of the three posterior segments prominent, recurved, and acuminate. Metasome with the terminal expansion of last segment broadly and evenly rounded at the tip and armed with four triangular spines, the two central being the largest. Eyes consisting of three visual elements imbedded in dark pigment. Antennulae with the last joint much longer than the second and having five to seven filaments. Antennae about one-third the length of body, the flagellum being composed of from four to seven articulations. Left mandible with two, right with one, penicil behind the cutting part. Last pair of legs in both sexes with the last joint densely ciliated on the outside. Inner ramus of first pair of pleopoda in male not very conspicuous, biarticulate; the terminal joint about twice the length of first, slender and needle-shaped, and produced just slightly beyond the first joint of inner ramus of second pair. Inner ramus of second pair biarticulate, proximal joint short; the distal joint greatly produced, reaching

almost to tip of last pair of pleopoda, comparatively robust, and gradually tapering to a needle-like point. Uropoda with outer ramus about twice the length of basal part, inner ramus being narrower and shorter. Colour in the living animal dark reddish brown marbled with white. Length of largest males and females about 3.5 mm." (Patience, 1907, pp. 42, 43.)

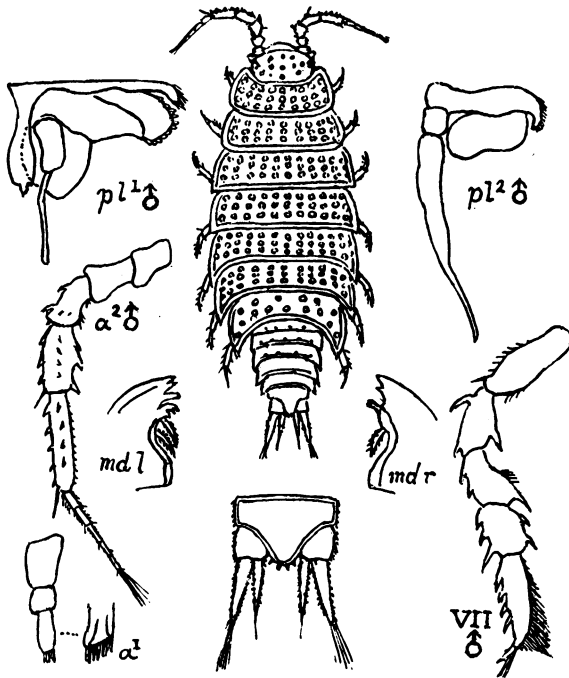


Fig. 35. *Trichoniscus* (*Cordioniscus*) *stebbingi* Patience. Adapted from Patience, 1907.

LOCALITIES.—Originally described from near Glasgow, Scotland. Recorded by Blake from a hothouse in Cambridge, Massachusetts.

SUBGENUS OR GENUS *MIKTONISCUS* KESSELYÁK, 1930

Members of this group differ from typical species of *Trichoniscus* in having eyes composed of only one ocellus, the back tuberculate, and in minor characters of the mandibles and pleopoda.

Trichoniscus (Miktoniscus) halophilus Blake, 1931

Figure 36

Miktoniscus halophilus BLAKE, 1931, p. 345 (orig. descr.), Figs. 1i-1j and 2a-2i; 1931, p. 350.—VANDEL, 1933, p. 43.

Trichoniscus halophilus BLAKE, 1930, p. 279 (*nomen nudum*).

“The female, when alive, is salmon-colored. This color fades out after death, leaving a yellowish, cutaneous pigment. The pereion has

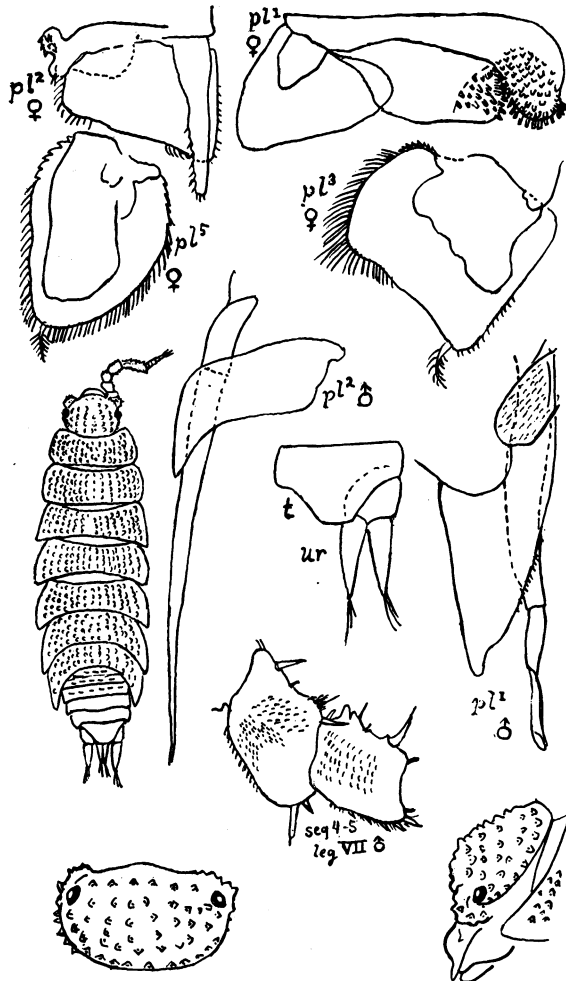


Fig. 36. *Trichoniscus (Miktoniscus) halophilus* Blake. Adapted from Blake, 1931.

two submedian bands of white spots (fenestrae in the pigmentation). The surface of the head and pereion is thickly, but irregularly, beset with acute tubercles. The first three pleon segments bear each a row of tubercles. Length of body, 4.5–4.7 mm.

“The eyes are densely black, each provided with a single large lens. The antennal lobe is large and seen from the side, semicircular.

“The tip of the telson is truncate and without spines. The terminal margin may be either slightly concave or convex.

“The appendages show nothing of especial note. Pleopods I–III and V are shown in Fig. 2, *f-i*. The scales on the lateral portion of pleopod I are blunt ended.

“The male is a little more slender than the female and shows the usual sexual peculiarities of the pleopods and pereopod VII (Fig. 2, *c-e*). Otherwise, the two sexes are alike. Length, 4.3–4.5 mm.

“The male pleopods are subject to some variation. The lateral margin of the exopod of pleopod I may or may not have a reëntrant angle about one-third the distance from tip to base. The inner distal angle of the basis may be rounded or rectangular. The serration of the inner margin of the exopod of pleopod II is almost imperceptible. The medial margin of the basis of pleopod I is produced basally into a lobe which is folded over ventrad.

“The medial, distal, scaly area on the third segment of pereopod VII is replaced by rows of minute spines, doubtless representing scales. There is a marginal double row of these spines, one-third the length of the margin, and two shorter sub-marginal rows rather distinctly separated from each other. The indentation of the medial edge of the fifth segment is sub-basal, not median as in *linearis*.” (Blake, 1931, pp. 345–347.)

DISTRIBUTION.—Coastal regions of Massachusetts (Woods Hole, Marthas Vineyard, and Nantucket Islands). Type locality Katama on Marthas Vineyard Island; type in collection of Boston Society of Natural History. According to Blake, it is exclusively an inhabitant of salt marshes and similar situations, living under dead eelgrass (*Zostera marina*), driftwood, etc., with *Armadilloniscus ellipticus*, *Scyphacella arenicola*, *Armadillidium vulgare*, and *Porcellio scaber*.

HAPLOPHTHALMUS SCHÖBEL, 1860

Eyes simple (each of a single ocellus).

Segments of thorax with longitudinal, raised ribs or rows of small tubercles.

Epimera well developed.

Unlike *Trichoniscus* and its allies, the members of this group are inactive and slow in their motions. Verhoeff, 1908, p. 196, makes this genus a subfamily (Haplophthalminae).

Haplophthalmus danicus Budde-Lund, 1879

Figure 37

Haplophthalmus danicus BUDDE-LUND, 1879, p. 9; 1885, p. 250 (descr.).—SARS, 1899, p. 168, Pl. LXXIV, fig. 2.—VERHOEFF, 1908, p. 189.—ARCANGELI, 1923, pp. 260, 274.—LOHMANDER, 1927, p. 3 (detailed descr.), Figs. 1, 2 (details.).—WALKER, 1927, p. 175.

Haplophthalmus puteus HAY, 1899, p. 871 (orig. descr.), Pl. LXXXVI.—RICHARDSON, 1905, p. 697 (descr.), Fig. 739.

The tubercles are in eight or ten rows, at least six of which are well marked, on the thoracic segments. On the last two, there is a tendency

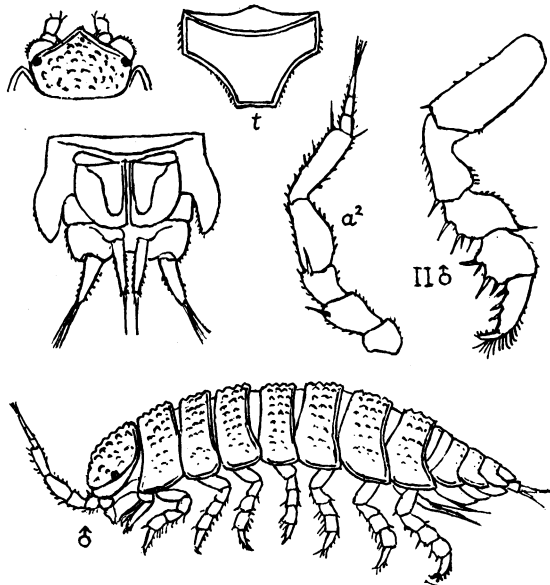


Fig. 37. *Haplophthalmus danicus* Budde-Lund. Adapted from Sars, 1899.

for the tubercles to form distinct raised longitudinal ribs. The epimera are conspicuously flared outward, those of the thorax are truncate and separated by notches, those of abdominal segments 3, 4, and 5 are acute and turned backward. No distinct rows of tubercles or ribs on the abdominal segments.

For detailed descriptions and figures, see Lohmander, 1927, and Sars, 1899.

Color, whitish.

Length, 3 to 4 mm.

DISTRIBUTION.—Widely distributed in Europe. It was first reported in America by Hay, 1899, "from an old well in Irvington, Marion County, Indiana," who described it as a new species (*puteus*) and incorrectly considered it aquatic. Lohmander, 1927, has reported it from Plummer's Island, Maryland, from a deep layer of old leaves, and on asparagus roots brought to Philadelphia from Germany. The American Museum has a specimen found with *Trichoniscus demivirgo* at Fort Lee, New Jersey.

The position of the following three genera is more or less uncertain. As suggested by Arcangeli, 1929, p. 145, *Cylindroniscus* may require the establishment of a subfamily.

OLIGONISCUS DOLLFUS, 1890

An imperfectly known genus containing only the following species.

Oligoniscus monocellatus (Dollfus), 1890

Figure 38

Microniscus monocellatus DOLLFUS, 1890, p. 7, Pl. II, fig. 4.

Oligoniscus monocellatus DOLLFUS, 1890a.—BUDE-LUND, 1908, p. 84 (says probably a *Trichoniscus*).

"Corps allongé, atténué postérieurement, granulé surtout antérieurement et très finement poilu.

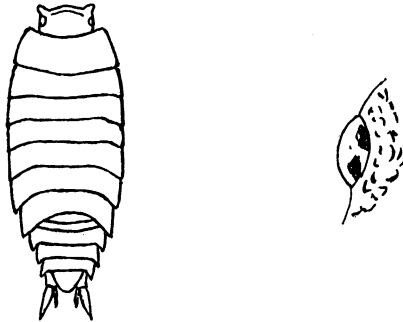


Fig. 38. *Oligoniscus monocellatus* (Dollfus). Adapted from Dollfus, 1890.

"Cephalon.—Infléchi en avant, le bord frontal empiétant aussi sur la région faciale; lobes latéraux médiocres. Yeux avec une double tache de pigment noir. Antennes?

“Pereion.—Segments antérieurs à bord postérieur un peu sinueux de chaque côté: bord postérieur des deux derniers segments régulièrement courbé.

“Pleon.—En retrait sur le pereion; processus postlateral des segments 3-5 court.

“Telson.—Triangulaire aussi long que large, à sommet tronqué arrondi. Telsopodes à base n’atteignant pas tout à fait l’extrémité des telson, appendice conique, l’extrême plus long d’un tiers environ que l’appendice interne (1).

“Couleur.—(Dans l’alcool) Blanc uniforme.

“Dimensions.—4 mm. $\frac{3}{4}$ \times 1 mm. $\frac{3}{4}$.” (Dollfus, 1890, p. 7.)

DISTRIBUTION.—Only record, Juan Fernandez Island, beach.

The type and only species of its genus (first called by the preoccupied name *Microniscus*), which Dollfus says he cannot place, not having examined the mouth parts because of having but one specimen.

BRACKENRIDGIA ULRICH, 1902

The following is the only known species. As suggested by Lohmander, 1927, it may not belong in this family.

Brackenridgia cavernarum Ulrich, 1902

Figure 39

Brackenridgia cavernarum EIGENMANN, 1900, p. 230 (*nomen nudum*).—ULRICH, 1902, p. 90 (orig. descr.), Pl. XVI, figs. 1-9.—RICHARDSON, 1905 (descr.), p. 699, Fig. 740.—LOHMANDER, 1927, pp. 1, 2.—ARCANGELI, 1932, p. 137.

“Body oblong-ovate, about three times longer than wide, $1\frac{1}{2}$ mm.: $4\frac{1}{2}$ mm.

“Head wider than long, with the frontal margin almost straight, the median and lateral lobes being almost obsolete. Eyes absent. The first pair of antennae are rudimentary and inconspicuous. The second pair have the first and second articles subequal in length; the third article is a little longer than the second; the fourth is one and a half times as long as the third; the fifth is a little longer than the fourth. The flagellum is composed of seven articles.

“The segments of the thorax are subequal in length. The lateral margins are straight. The epimera are not distinctly separated from the segments.

“The abdomen is abruptly narrower than the thorax. The first two segments have the lateral parts covered by the seventh thoracic segment. The sixth or terminal segment has the posterior margin rounded. The basal article of the uropoda does not extend beyond the extremity

of the last abdominal segment. The inner branch is about half as long as the outer branch.

"The legs are all ambulatory in character. The seventh pair has the outer distal extremity of the propodus surmounted with a crest of hairs." (Richardson, 1905, pp. 699-700.)

Ulrich's description contains some details not in Richardson's, but

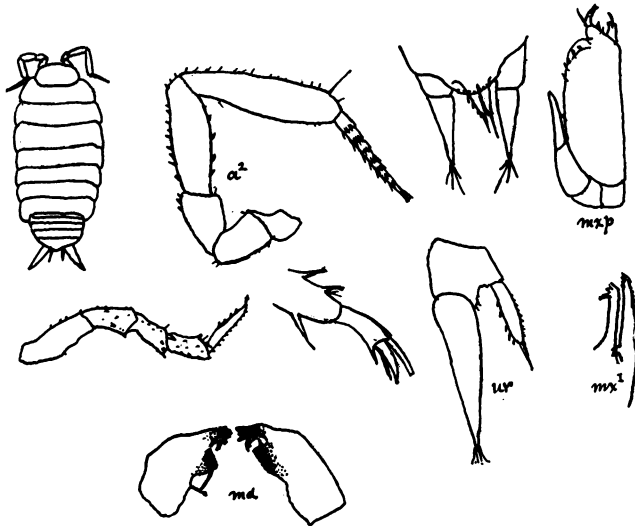


Fig. 39. *Brackenridgia cavernarum* Ulrich. Adapted from Ulrich, 1902.

most of these are discernible from the figures. The body seems to be practically without pigment.

LOCALITY.—Ezell's and Beaver Caves, near San Marcos, Texas.

CYLINDRONISCUS ARCANGELI, 1929

A genus established for the following peculiar species which Arcangeli, 1929, p. 145, places in the family Trichoniscidae, with the remark that perhaps it should constitute a subfamily.

Cylindroniscus seurati Arcangeli, 1929

Figure 40

Cylindroniscus seurati ARCANGELI, 1929, p. 141 (orig. descr.), Fig. 5; 1932, p. 137.

The reader must be referred to Arcangeli's description for the details of this species. Only females were obtained. Some of its more conspicuous features are as follows:

The body is elongate, narrow, convex, covered with scattered fine

setae not abruptly contracted in the abdominal region, the integument soft and flexible.

Head without lobes; eyes wanting, antennae moderately long; the flagellum short, of three articles.

Thoracic segments with the epimera small, only the sixth and seventh have the rear corner angular. Legs of moderate length and all approximately equally long; in the sixth and seventh pairs the propodus is widened and of somewhat rectangular outline and provided with a comb-like row of curved, pointed bristles on its distal margin, external to the insertion of the dactylus.

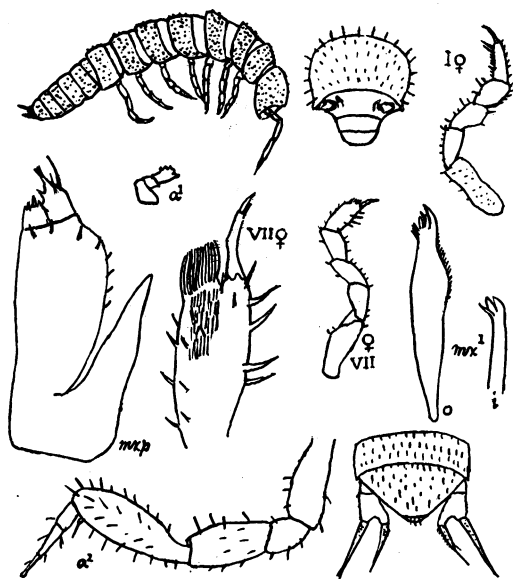


Fig. 40. *Cylindroniscus seurati* Arcangeli. Adapted from Arcangeli, 1929.

No tracheae in the external plates of the pleopoda.

The body is unpigmented and somewhat translucent.

Length, 2.4 mm.; width, 0.4 mm.

LOCALITY.—Guayabal, Cuba. Seven females collected in October, 1928. Probably lives in humus.

Superfamily **Pleurotracheata** Verhoeff

Tracheae commonly developed in the exopodites of two or five pairs of pleopoda, though sometimes wanting, especially in small species. They open in the lateral part of the appendage by one or more orifices.

Endopodites (inner branches) of uropoda near together and often capable, when pressed together, of forming a channel for absorbing water and leading it to the pleopoda to keep them moist. Molar process of mandibles replaced by a process bearing tufts of setae. Some of the members of the superfamily are capable of rolling the body into a ball.

This superfamily contains most of the Oniscoidea, and though the extremes of variation found among its numerous members are apparently far apart, there exist so many intermediate connecting forms and so many cases of convergence or parallelism in characters that its satisfactory division into families is difficult, and the determination of the phylogenetic relationship of the genera still more so. The most convenient way to handle the problem of its classification seems to be to recognize a very few families, each with sufficiently broad definitions.

Scyphacidae Chilton, 1901

A group of littoral genera related to the Oniscidae, and possibly not worthy of separation from it as a distinct family, found along the seacoasts of many parts of the world. With a few alterations the following diagnosis (and also that of the genus *Scyphacella*) is taken from Richardson, 1905.

Front not margined, but continuous with the epistome. Second pair of antennae with flagellum composed of four (or five?) articles. First maxillae with the inner lobe furnished with two plumose setae; outer lobe furnished with teeth. Second maxillae furnished with hairs. Mandibles with the molar process reduced, consisting of a low base and a tuft of setae. Maxilliped with masticatory lobe acutely produced; palp elongate, much longer than masticatory lobe, with articles large and not distinctly defined.

Abdomen not abruptly narrower than thorax. Uropoda extending beyond the tip of the abdomen; inner branch inserted at the upper inner angle of the basal article.

SCYPHACELLA SMITH

“Outer lobe of first maxillae furnished along the distal half of the inner margin with recurved spines. Inner lobe furnished with two widely separate plumose processes, one at the tip and the other on the inner margin. Second maxillae furnished with hairs at the tip. Both first and second maxillae long and slender. Palp of maxillipeds long and narrow, acutely produced at the tip. Eyes large, composed of many ocelli.

“Abdomen not narrower than thorax. Uropoda exposed, both branches styliform.” (Richardson, 1905, p. 671.)

Scyphacella arenicola Smith, 1873

Figure 41

Scyphacella arenicola SMITH (in Verrill and Smith), 1873, pp. 337, 568 (orig. descr.).—HARGER, 1879, p. 157; 1880, p. 307, Pl. I, fig. 2.—UNDERWOOD, 1886, p. 363.—STEBBING, 1893, p. 422.—HAY, 1899, p. 871.—RICHARDSON, 1900a, p. 307; 1901, p. 576; 1905, pp. viii, 671 (descr.), Fig. 710.—RATHBUN, 1905, p. 47, check list, p. 4.—FOWLER, 1912, p. 223 (descr.), Pl. LXVI.—BLAKE, 1929, p. 12, Fig. 2; 1930, p. 279; 1931a, p. 350.

Trichoniscus arenicola BUDDE-LUND, 1885, p. 249.

“Body oblong-ovate, a little more than twice as long as wide, 2 mm. : 4½ mm.; surface very scaly, thickly covered with small tubercles, each tipped with a small spine.

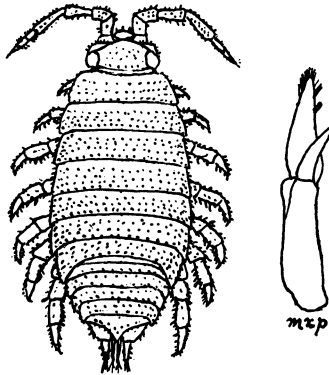


Fig. 41. *Scyphacella arenicola* Smith. Adapted from Harger, 1880.

“Head wider than long; frontal margin but little produced; lateral lobes small. Eyes large, round, composite, and placed at the sides of the head, close to the lateral margin. The epistome is continuous with the front of the head, so that the head seems to be produced forward in a triangular extremity which is rounded anteriorly. The first pair of antennae are small, inconspicuous, the terminal article fringed with hairs at the apex. The second pair of antennae have the first two articles short, the second one a little longer than the first; the third and fourth articles are nearly subequal, and each is a little longer than the second; the fifth is one and a half times longer than the fourth. The flagellum is composed of four articles, the first article being twice as long as the

second; the articles are with difficulty to be distinguished. The antennae are thickly beset with spines.

"The segments of the thorax are subequal; the last two have the post-lateral angles produced backward.

"All the segments of the abdomen are distinct. The first two have the lateral parts covered by the seventh thoracic segment. The three following segments have the post-lateral angles produced backward. The terminal abdominal segment is narrow, produced in the middle posteriorly in a long, narrow process, broadly rounded at the apex. The peduncle of the uropoda extends to the end of the terminal abdominal segment. The branches are of nearly equal length.

"Color of the specimens, for a long time preserved in alcohol, dark brown, with the margins of the segments of a lighter brown." (Richardson, 1905, p. 672, 673.)

To this it may be added that the color in life, according to Smith, is "nearly white with chalky white spots and scattered blackish dots arranged irregularly. Eyes black," and that in the specimens I have seen, as well as in Blake's figure, the body is somewhat narrower than in the figure here given (based on that of Harger). The width relative to the length, however, is largely dependent on the state of muscular contraction of the body.

DISTRIBUTION.—A littoral species that, according to Verrill and Smith, 1873, burrows in sandy sea beaches just above high-water mark making a little conical mound around the mouth of the holes. Recorded from the vicinity of Woods Hole, Massachusetts, southward to Dorchester, Maryland.

DETO GUÉRIN, 1836

Body not highly arched; epimera expanded; dorsal surface with spines or tubercles; head with broad lateral lobes. Eyes with many ocelli. Antennae with a four-jointed flagellum. Mandibles with one penicil behind the cutting edge. External plates of pleopoda without tracheae. Uropoda reaching considerably beyond the telson.

Considerable sexual differences exist in this genus; as a rule the body is more strongly tuberculate and the antennae are stouter in the male. The large balloon-like expansions of the first thoracic segment of the male apparently are peculiar to the species described below. (See Chilton, 1914, for further details.) It belongs, according to Chilton, to a subgenus or section *Vinneta* Budde-Lund, 1906, distinguished by having the external branch of the uropoda not reaching beyond the inner branch.

***Deto bucculenta* (Nicolet), 1849**

Figures 42, 43

Oniscus bucculentus + *O. tuberculatus* NICOLET, 1849, pp. 267, 268 (orig. descr.), Pl. III, fig. 9.—STUXBERG, 1875, p. 43.—BUDDÉ-LUND, 1879, p. 1; 1885, p. 206.

Philoscia bucculenta DOLLFUS, 1890, pp. 67, 68.—STEBBING, 1893, p. 431.

Deto bucculenta CHILTON, 1909, pp. 603, 608; 1910, p. 288; 1914, p. 449 (new descr.), Pl. XL, figs. 45–49.—JACKSON, 1928a, p. 578, Fig. 8.—BARNARD, 1932, p. 224.

“*O. oblongus, spinosus, oleagino-fuscus*; antennis externis crassis, rugosis, elongatis; fronte bimarginata; lobis lateralibus latis, prominentibus, truncatis; segmento primo thoracis ad latera fortiter inflato; ultimo abdominis trianguliformi, lateraliter sulcato; pedibus antennisque pallide fuscis.”

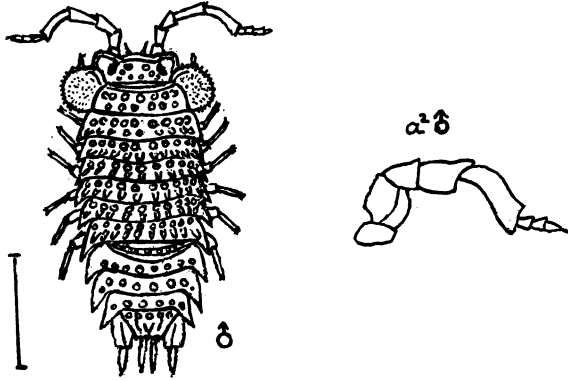


Fig. 42. *Deto bucculenta* (Nicolet). Adapted from Nicolet, 1849.

This species is bristly with strong obconical spiniform tubercles arranged in transverse lines, two lines on the thoracic and one on the abdominal segments; head also tuberculated above and subtriangular, rounded at the front end which is nearly vertical and separated from the lateral lobes by a deep notch which makes the projection of the lobes more considerable; these lobes are long, broad and roundly truncated at the end and directed very obliquely forward; their margin is raised into a border and forms between itself and the central part of the lobe a nearly circular canal. The external antennae are stout and irregular, angular and crooked, the internal antennae are scarcely visible. The lateral lobes of the first thoracic segments are inflated or dilated in such a way as to form on each side of the head near its base a swollen

cheek, very convex above and below, testaceous and bristly with spiniform papillae which make it rough to the touch like the tongue of a cat. The other segments have the latero-posterior angles directed backwards, increasing the length of the thorax so that it approximates to that of the abdomen. These angles in the three abdominal segments next to the last are very long and much curved backwards. The last segment ends in a rather pronounced angle truncated at the tip with raised lateral borders forming a broad oblique canal at the sides. Stylelets of the last appendages little elongate, and stout; their basal article very wide. Color olive-brown, with the posterior margins of the segments washed with dark yellow. (Nicolet, 1849, pp. 267, 268, translation of description of male.)

Length of a male, 11 mm.; female somewhat smaller (Chilton, 1914).

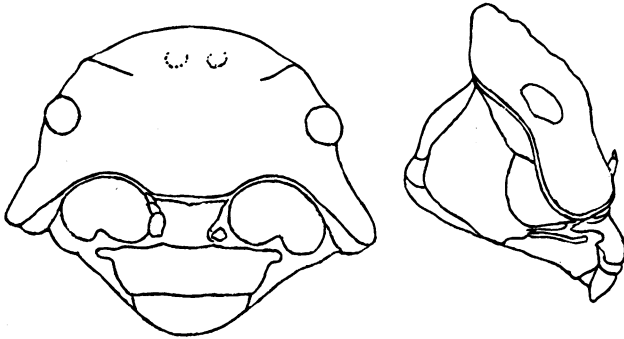


Fig. 43. *Deto bucculenta* (Nicolet). Adapted from Jackson, 1928a.

DISTRIBUTION.—“Bay of Valparaiso,” type locality (Nicolet); Chilton, 1914, includes as a synonym *Deto novae-zealandae* (Filhol), 1855, a species recorded from the Chatham Islands, Stewart Island, and Wellington, New Zealand, thus giving it a wide geographical range.

Two supposed species found together, *Oniscus bucculentus* and *O. tuberculatus*, were described by Nicolet. They differed in that the former possessed large rounded expansions of the lateral parts of the first segment of the thorax, which were covered with short spiny projections. The general surface of the back was covered with large tubercles in both. Dollfus, 1890, came to the correct conclusion that the two were male and female of one species, the rounded expansions being a sexual character of the male, but he thought that Nicolet's illustration

was incorrect and that the expansions were really on the first pair of legs, which in some species of *Philoscia* bear large flattened rounded expansions bordered with spines in the males. He consequently included the species in *Philoscia*, uniting both under the name *Philoscia bucculenta*.

Chilton appears to have been the first to recognize that the species belongs in *Deto*, thus establishing the correctness of Nicolet's figure. He calls attention to this in several articles and considers a New Zealand species of that genus, *D. novae-zealandiae*, as a possible synonym, and later (1914) as an actual synonym of the Chilean species. Chilton's figure, however (1914, Pl. XL, fig. 45), apparently shows the rounded expansions as smooth, although he states in the text (p. 451) that the specimens coming from the Chatham Islands have them spiny, as in Nicolet's figure. He also mentions, however, that they are smooth in a specimen from Stewart Island and apparently attaches small weight to the difference. As Nicolet's name has long priority, its validity is in no way affected, whether the New Zealand form is identical or not. It is certainly closely allied.

DETONELLA LOHMANDER, 1927

Established to contain the following species as the type and only known form. It differs from *Deto* chiefly in small details of the mouth parts, and in the smaller eyes, and the rank of a subgenus might perhaps suffice for it.

Detonella papillicornis (Richardson), 1904

Figure 44

Detonella papillicornis LOHMANDER, 1927, p. 10 (detailed descr. and figures), Figs. 3-6.

Trichoniscus papillicornis RICHARDSON, 1904, p. 670 (orig. descr.), Figs. 18-22; 1904a, p. 227 (descr.), Figs. 113-117; 1905, p. 695 (descr.), Figs. 734-738.—JOHANSEN, 1926b, p. 167.—FEE, 1927, p. 32 (descr.).—WALKER, 1927, p. 177.

The following extracts are quoted from Richardson's original description:

"Body covered with low tubercles. Color light brown.

"Head with sides produced at the antero-lateral angles in large lobes; front triangularly produced with a slight emargination at the apex of the triangle. Eyes situated on the lateral margins at the base of the antero-lateral lobes; they are small and black and apparently simple in structure. The peduncle of the antennae consists of five stout joints, the last three of which have the inner margins beset with numer-

ous strong tubercular-like papillae, each surmounted with a tuft of short stiff hairs or bristles; the fifth joint is also produced at the outer distal angle in an acute process. The flagellum is composed of about seven articles, rather indistinctly defined; the last article is tipped with a bunch of hairs. The buccal mass is very prominent below.

"The segments of the thorax are about equal in length. The post-lateral angles of all the segments, except the first, are produced backward, very slightly in the case of the second, third, and fourth, but becoming gradually more so, until the last two segments show this character very markedly.

"The abdomen is narrower than the thorax. All the segments are

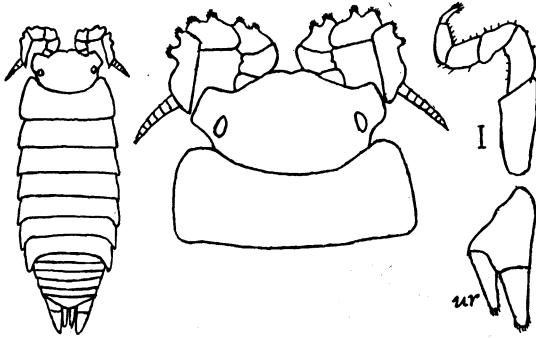


Fig. 44. *Detonella papillicornis* (Richardson). Adapted from Richardson, 1904.

visible in entirety, not being covered laterally by the last thoracic segment."

Length, 3 mm.

LOCALITIES.—The type specimen was found on the beach at Selkovia, Cook Inlet, Alaska, and is in the U. S. National Museum (Richardson), which also contains additional specimens from Bering Island (Lohmander). Fee records it "in a tide pool" at Hammond Bay, British Columbia (one specimen).

According to the latter author, the number of articles in the antennal flagellum is only four; the length of the male is given as 3 mm. of the female as 3.8 mm.

ARMADILLONISCUS ULJANIN, 1875

Front outline of head very deeply three-lobed. Flagellum of second antennae described as having four articles, but apparently with also

a rudimentary fifth article. Basal joint of uropoda broad, both of its branches short and styliform, the outer one inserted about the middle of the inner margin of the basal joint. No tracheae in the external plates of any of the pleopoda (according to Verhoeff, 1916, p. 160). *Actoniscus* Harger, 1878, is a synonym of this chiefly Old World group (Budde-Lund, 1885, p. 239; Blake, 1930, p. 282). Verhoeff, 1916, pp. 160, 161, regards it as a subfamily (Armadilloniscinae) of the Oniscidae.

Armadilloniscus ellipticus (Harger), 1878

Figure 45

Actoniscus ellipticus HARGER, 1878, p. 373 (orig. descr.); 1879, p. 157; 1880, p. 309, Pl. 1, fig. 3.—BUDDE-LUND, 1879, p. 5.—RICHARDSON, 1900a, p. 307; 1901, p. 576; 1902, p. 305.—VERRILL, 1902, p. 845.—RICHARDSON, 1905, pp. 634 (orig. descr. repeated), 635, Fig. 678 (after Harger).—RATHBUN, 1905, p. 47, check list, p. 4.—HOLMES AND GAY, 1909, p. 378.—FOWLER, 1912, p. 517.—KUNKEL, 1918, p. 249, Fig. 83.—BLAKE, 1929, p. 12.

Armadilloniscus ellipticus BUDDE-LUND, 1885, p. 239.—BLAKE, 1930, p. 279, Figs. 1-11; 1931, p. 350.

The following statements are taken from Harger's description:

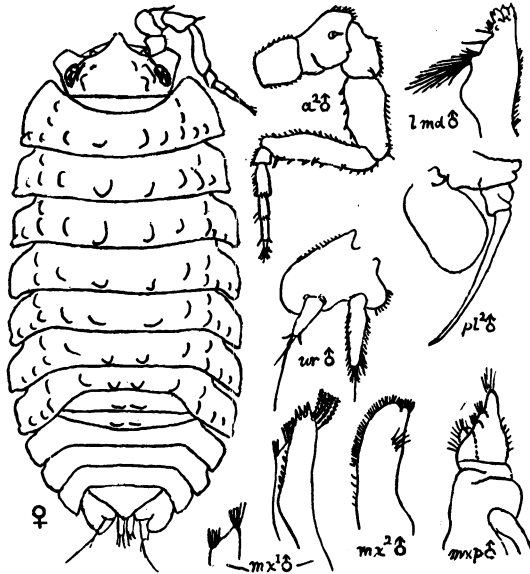


Fig. 45. *Armadilloniscus ellipticus* (Harger). Adapted from Blake, 1930.

“The body is oval in outline. The head appears triangular, as seen from above, and is angularly produced in a median lobe, but the lateral

lobes are also large and divergent and broadly rounded. The eyes are small, oval, black, and prominent. They are situated at the sides of the median triangular part of the head, and at the base of the lateral lobes. . . . Flagellum (of antennae) shorter than the last peduncular segment, tipped with setae and composed of four segments, of which the second and third are equal and longer than the first, while the last is the shortest and presents indication of another minute rudimentary terminal segment.

"The first thoracic segment is excavated at the front for the head, admitting it to the eyes. . . . The second and to an increasing degree the succeeding segments are produced backward at the sides. The legs are rather small and weak. . . .

"The third, fourth, and fifth (abdominal) segments are produced laterally into broad plates, which are close together and at their extremities continue the regular oval outline of the body with scarcely a perceptible break between the thorax and the pleon. This outline is further continued by the expanded basal segments of the uropods, which are even larger than the adjacent coxae of the fifth segment. . . .

"Length, 4 mm.; breadth, 2 mm.; color in life, slaty gray." (Harger.)

Blake (1930) calls attention to tubercles on the thorax not mentioned by Harger, and to white spots or markings on the dorsal surface especially on the thoracic segments each side of the median area. He states that it has a limited power of enrollment.

DISTRIBUTION.—Savin Rock and Stony Creek near New Haven, Connecticut (Harger); Woods Hole, Massachusetts (Blake); Bermuda, at Hungry Bay (Richardson). Occurs under stones and rubbish near salt water ("near high water mark" according to Blake), but appears to be a rare species, or at least very local in distribution.

***Armadilloniscus tuberculatus* (Holmes and Gay), 1909**

Figure 46

Actoniscus tuberculatus HOLMES AND GAY, 1909, p. 377 (orig. descr.), Fig. 5.

"Body elliptical in outline and furnished with small tubercles. Head deeply inserted, with an acute median lobe and prominent rounded lateral ones. Eyes oval. Antennae not one-third the length of the body, the second joint of the peduncle a little longer than the third and about twice the length of the first; fourth joint longer than the third but not quite so long as the fifth; flagellum with four evident joints and a minute terminal fifth joint. The peduncle is bent between the second and third, and the fourth and fifth joints.

“Maxillipeds with a rounded setose inner lobe; palp short and broad, the first joint much wider than long, the second triangular with slightly lobulated inner margin, the tip with a brush of long setae.

“Legs similar, spiny, a long ciliated spine on the lower margin of the fifth joint.

“Basal joint of uropods large, similar to the coxal plates of the preceding segments, and setose on the distal margin; rami extending about to the tip of the peduncle, the outer one inserted at the middle of the inner margin of the basal plate, the inner one near the base; both tipped with setae.

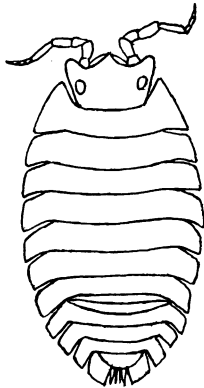


Fig. 46. *Armadilloniscus tuberculatus* (Holmes and Gay). Adapted from Holmes and Gay, 1909.

“Length, 3.25 mm.” (Holmes and Gay, 1909, pp. 377–378.)

LOCALITY.—San Diego, California, on moist ground near the seashore. Type in the U. S. National Museum.

“This species seems to be closely allied to *A. ellipticus* (Harger) from the Atlantic coast. The body is somewhat broader and the lateral processes of the segments are more nearly rectangular in outline, especially in the abdomen, and more prominent.” (Holmes and Gay, 1909, p. 378.)

***Armadilloniscus lindahli* (Richardson), 1905**

Figure 47

Actoniscus lindahli RICHARDSON, 1905, p. 635 (orig. descr.), Figs. 679, 680.—BLAKE, 1930, p. 282.

The concluding part of Richardson's description is as follows:

“This species is very similar to the type and only described species of the genus, *Actoniscus ellipticus* Harger, but differs in having the

surface of the body covered with low tubercles; in having the three lobes of the head anteriorly truncate, while in *A. ellipticus* the median one is acutely pointed, the lateral ones rounded; in having the fourth and fifth articles of the peduncle of the antennae subequal, and the second article of the flagellum longest, the terminal article not minute, but as long as the preceding one; in having the post-lateral angles of the first thoracic segment produced in acute processes, and in having the sixth or terminal segment of the abdomen triangular rather than rounded.

“Color reddish brown with wavy lines of a light yellow on either side of the median line.” (Richardson.)

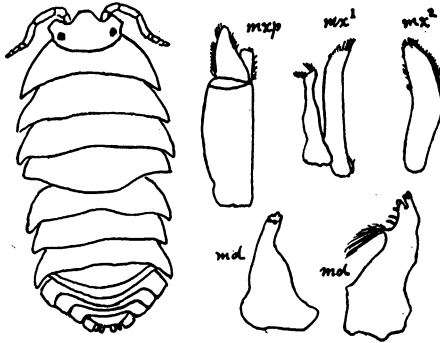


Fig. 47. *Armadilloniscus lindahli* (Richardson). Adapted from Richardson, 1905.

Length about 4.5 mm.

LOCALITY.—Oakland, California. About ten specimens collected by Prof. Josua Lindahl. Types in the Museum of the Cincinnati Society of Natural History. (Richardson.)

Oniscidae

“Body oval or oblong, with the lateral parts of the segments more or less expanded. Metasome with the 2 anterior segments rather small, and having the epimeral plates concealed; last segment much narrower than the preceding ones, and conically produced at the end. Eyes generally well developed, compound. Antennulae very small, with the apical sensory appendages short, papilliform. Antennae, as a rule, slender, with the flagellum pauciarticulate. Buccal mass not very prominent below. Mandibles with the cutting part highly chitinized and, as usual, composed of 2 superposed dentate lamellae, behind which

is a membranous hairy lappet and a varying number of penicils, molar expansion obsolete, without any triturating surface, it being replaced by a brush-like recurved seta. Anterior maxillae with the outer masticatory lobe very strong and coarsely spinous at the tip, inner lobe much narrower and provided with only 2 hairy bristles. Posterior maxillae distinctly bilobed at the tip, and having the outer edge angularly produced near the base. Maxillipeds with the basal part broad and laminar, though scarcely expanded distally, terminal part poorly developed and never composed of more than 3 joints, the last very narrow; masticatory lobe short, truncate at the tip; epignath large, flanking the basal part. Legs, as a rule, slender, increasing in length posteriorly. Sexual appendage of male simple, conic, and generally connected with the inner rami of the 1st pair of pleopoda; the latter very largely developed, terminating each in a highly chitinized, conical joint obliquely grooved below, for conducting the evacuated sperm. Inner ramus of 2nd pair of pleopoda in male terminating in a slender lash finely pointed at the tip. Uropoda with the outer ramus more or less flattened, lanceolate, inner much smaller, sublinear, and, as a rule, attached far in front of the outer." (Sars, 1899, pp. 169, 170.)

As above defined by Sars and as employed in the present work, this group is a very large and comprehensive one. It comprises a large part of the Oniscoidea, containing by far the greater part of those which do not have the ability to roll up into a ball, though a few (notably among them the widely distributed *Cylisticus convexus*) have acquired that power. It is composed of two main groups. One, more generalized and presumably more primitive in its characters (usually having no tracheae in the external plates of the pleopoda and commonly having the flagellum of the second antennae composed of three articles), centers around the genera *Philoscia* and *Oniscus*. The other, a more advanced group in which tracheae are generally present in the external plates of the pleopoda 1 and 2, if not of all the pairs, and which most frequently has only two articles in the antennal flagellum, centers about the genus *Porcellio*. There are also certain smaller outlying groups of which the genus *Rhyscotus* is the most striking instance among our forms. All these groups may deserve recognition as subfamilies; indeed, in some classifications the *Philoscia-Oniscus* and *Porcellio* groups are made separate families, Oniscidae (in a narrow sense) and Porcellionidae, respectively. I have not followed this course here, or attempted a formal division of the group into subfamilies partly because of the large number of more or less intermediate forms which often exhibit puzzling

combinations of characters, making the determination of their proper position difficult and breaking down the distinctness of, and rendering difficult the task of making exact and definite diagnoses of the subfamilies. My decision is due still more to the fact that in the case of many of our American forms we have so little information regarding the details of their structure that often we could not place them in the classification if we had it.

On the other hand the Oniscidae are mostly well separated from the Cubaridae, as far as the American forms are concerned. *Cylisticus*, which approaches the latter group in its adaptation for rolling up, must be considered an example of convergence, but we have a few genera with combinations of characters that make them difficult to place.

PENTONISCUS RICHARDSON, 1913

"Body with the abdomen abruptly narrower than the thorax.

"Head with median and antero-lateral lobes small.

"Second antennae with a flagellum composed of five articles, the third and fourth rather indistinctly separated.

"Mouth parts as in the other genera referred to this family. Inner lamella of the second maxilla furnished with two plumose setae. Mandibles with molar expansion obsolete, and replaced by a recurved seta; cutting edge formed of three blunt teeth. Maxillipeds with palp composed of three articles, the last very narrow and elongate; masticatory lobe short and truncate at tip.

"Terminal segment of abdomen triangular, with apex obtuse.

"Uropods of a structure similar to those in the other genera in the family." (Richardson, 1913, p. 337.)

As pointed out by Verhoeff, 1928, p. 31, this diagnosis is not sufficiently detailed, but additional details of the male pleopoda have been given in the case of the type species (*P. pruinus*) by Arcangeli, 1930a, p. 25. The structure is much as in the European genus *Chaetophiloscia* Verhoeff, the rear apices of the exopodites of the fifth male pleopoda being prolonged and channeled, forming when apposed a tubular organ in which the attenuated processes of the second pleopoda are contained.

Arcangeli has also described a species of this genus from Formosa and Japan.

Pentonicus pruinus Richardson, 1913

Figure 48

Pentonicus pruinus RICHARDSON, 1913, p. 338 (orig. descr.), Figs. 1-5.—PICADO, 1913, p. 337.—ARCANGELI, 1927, p. 266; 1930a, pp. 5, 23, Fig. 8; 1931a, p. 12; 1932c, pp. 1, 2.

"Body oblong-ovate, 4 mm. long and $1\frac{1}{2}$ mm. wide. Color reddish brown with wavy lines of yellow on either side of the median line.

"Head wider than long, with the front not margined. Antero-lateral lobes small; front slightly produced in the middle in a widely rounded lobe. Eyes very small, black, and situated about the middle of the lateral margin. The second antennae have the first article short, the second and third subequal, and each a little longer than the first;

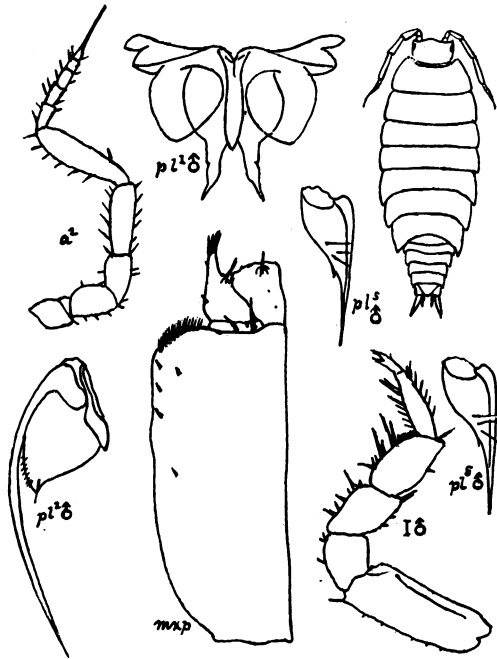


Fig. 48. *Pentoniscus pruinus* Richardson. Adapted from Arcangeli, 1930a (details), and Richardson, 1913 (dorsal view).

the fourth is one and a half times longer than the third; the fifth is a little longer than the fourth. The flagellum consists of five articles, the third and fourth being rather indistinctly separated, and a long terminal spine equal in length to the flagellum.

"The first segment of the thorax is a little longer than any of the following segments, which are subequal. The post-lateral angles of the last three segments are produced backward; those of the first four segments are rounded.

"The abdomen is abruptly narrower than the thorax. The lateral

parts of the first two segments are concealed by the seventh thoracic segment. The post-lateral angles of the three following segments are produced backward in very acute angles. The first segment is a little shorter than any of the others, which are subequal. The sixth or terminal segment is triangular, with the apex rounded. The peduncle of the uropoda extends almost to the extremity of the terminal abdominal segment. The branches are styliform, the inner being the shorter and about equal in length to the terminal abdominal segment; the outer branch is about one and a third times as long as the inner." (Richardson, 1913, pp. 338, 339.)

Arcangeli, 1930a, pp. 23-25, describes and figures the male pleopoda as noted above under the genus *Pentoniscus*.

LOCALITIES.—Various points in mountains of Costa Rica: Estrella, at an altitude of 2000 meters; La Mica (in mountains south of Orosé); Pitahaya (south of Cartago). Collected by Mr. C. Picado. Some of the specimens were found in bromeliads several meters from the ground. "Commum partout par tout l'année" (Picado, 1913). Type in U. S. National Museum. Arcangeli, 1930, records a number of other Costa Rican localities for this species.

***Pentoniscus exilis* Van Name, 1925**

Figure 49

Pentoniscus exilis VAN NAME, 1925, p. 500, Figs. 73-77.—ARCANGELI, 1927, p. 266; 1930a, p. 25.

Pentoniscus sp. VERHOEFF, 1928, p. 31.

Described from a single specimen.

"The individual is a female without a well-developed marsupium. It measures only 1.95 mm. long in a nearly straightened position of the body and while perhaps not fully grown, the fairly deep pigmentation and general characters of the specimen do not indicate any great degree of immaturity, and the species is evidently an exceedingly minute one.

"The body is rather elongate, more so actually than appears to be the case, as the epimeral parts of the segments are considerably developed, increasing its apparent width. Its surface is covered with small tubercles arranged on most of the thoracic segments in two rows, the anterior row being irregular and consisting of about twelve larger tubercles; the posterior row (situated along the rear margin) contains about seventeen tubercles. On the first thoracic segment the tubercles form three (on the lateral parts four) rows, and on the head the tubercles are smaller and quite numerous. The upper parts of the specimen are

brown with small light markings; the lower parts and legs are unpigmented.

“The head is fairly large and wide and somewhat set back into the thorax. The eyes are well pigmented, but the ocelli are rather indistinct, so that their number, which is evidently small, is difficult to determine. The mouth parts project prominently, not only downward but in a forward direction. The second antennae are large, reaching well along the second segment of the thorax, and are covered with short stiff hairs. The segments of the peduncle are rather short and fairly stout, the flagel-

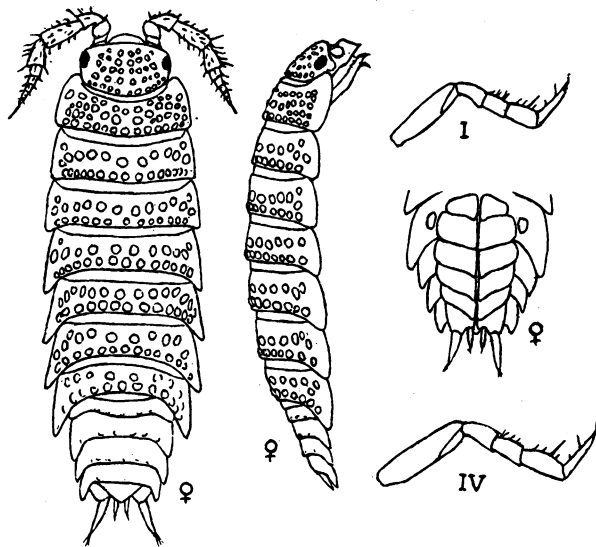


Fig. 49. *Pentoniscus exilis* Van Name. From Van Name, *Zoologica*, VI, p. 501.

lum is tapering and consists of five segments, decreasing in diameter, the last one bearing a very stout though rather short terminal bristle.

“The posterior lateral angles of the thoracic segments are extended back to a successively increasing extent, but the apices of the angles are in no case actually sharp. The specimen lacks some of the legs; none of the last three pairs are preserved, but those of the anterior four pairs that are present show them to be rather long and provided with but few spines. The abdomen forms about one-quarter of the total length and is considerably narrower than the thorax. Its third, fourth, and fifth segments have the posterior lateral angles considerably extended backwards. The telson is small, triangular, and somewhat wider than long;

its apex hardly projects farther back than the produced angles of the fifth abdominal segment. The basal joint of the uropods is large and wide; the branches are terete, tapering, and proportionately small (the inner ones especially so), and bear short, terminal hairs." (Van Name, 1925, pp. 500-501.)

LOCALITY.—Kartabo, British Guiana, collected by sifting in the jungle. Type in the American Museum of Natural History.

PHILOSCIA LATREILLE, 1804

In its older and broader sense, this group, a near ally of the well-known genus *Oniscus*, is one of the largest genera of land isopods. Its species for the most part are small, rather narrow-bodied, and of delicate structure, ranging from less than 4 mm. to usually not more than 7 or 8 mm. in length (only occasionally much larger), usually smooth or slightly setose, and generally devoid of conspicuous peculiarities in color or form of the body or its parts. The antennae, usually fairly long, have a flagellum of three elongate articles, the head is more or less rounded in front and with only slightly developed lateral lobes, if any at all; the frontal line is usually somewhat indefinite and never elevated into a sharply defined ridge, the abdomen small and tapering with the rear angles of segments 3, 4, and 5 produced into backwardly directed points; the telson widely triangulate, often rounded at the apex, and the outer branches of the uropoda elongate and tapering, the inner pair much shorter and usually laterally compressed. The body cannot be rolled up.

In coloration most of the species are much alike, having above a brown or purplish-brown ground color with yellowish (unpigmented) spots or elongate markings on the lateral regions of the back, and smaller spots on the head, and are mostly unpigmented below and on the legs, though some species have those parts somewhat marbled with the brown pigment of the back. Yet this simple color pattern is modified in some species so as to be very handsome, on account of the strong contrast between the dark and light areas, and by darker median and lateral longitudinal bands (the latter situated along the point of junction of the epimera) which may bear series of light spots; sometimes the entire epimera are nearly unpigmented, giving the dorsal surface a wide light border. There is much individual variation in the degree of contrast and in the shade of the ground color of the back even among examples of the same species.

The development of the eyes is very variable, some species being

blind or nearly so, and some having large eyes with many ocelli. Many of them have long, strongly developed legs and run rapidly. Their delicate integument compels them to inhabit chiefly damp and shaded places. The external plates of the pleopoda are without tracheae in the typical members of the group.

In the above broad sense, *Philoscia*, even after some of the more aberrant species have been split off as distinct genera, is still divisible into a large number of well-marked subgenera and sections, some of which have been treated as full genera in recent works, in some cases perhaps with justice, though I believe that to do so in many cases involves losing sight of important resemblances and relationships in the effort to emphasize small differences.

In some of these groups there are well-marked modifications of certain of the legs (especially pairs I, II, and III) in the male; in others there is little or none. Other characters available for classification are the form of the pleopoda in the male, the shape of the head and the development or absence of its more or less vestigial lateral lobes, the form and arrangement of the teeth and setose appendages of the mouth parts, especially the mandibles, first maxillae and maxillipeds. Tracheae, though usually absent in the external plates of the pleopoda, are said to occur in one section of the group, which may not be so closely allied to the typical members as their superficial appearance indicates.

In distinguishing closely allied species, as those of the same subdivision, the outlines of the thoracic and abdominal epimera and of the telson often afford easily observed characters. The relative lengths of the antennae and of their segments, especially the articles of the flagellum, are, in this group, too much subject to individual, age, and sex variation to be much trusted as specific characters. The subdivision of *Philoscia* has been carried out in detail in the case of the Old World forms, but the American species in many cases fail to fit into that classification, requiring either widening of the diagnoses or the establishment of new subdivisions.

Several American subgenera have already been established by European specialists for species that have happened to come to their notice, but no comprehensive and thorough study of the American *Philoscias* has yet been made, so that there are still a large proportion of our species that cannot as yet be satisfactorily assigned to a subgenus or section, either because their characters are not sufficiently known, or because no suitable subdivision has yet been established to receive them. In the present work, only such species are assigned to subgenera

as can be placed with more or less probability in those already established, as I believe the establishment of the necessary new subdivisions should await a more comprehensive study of the group than I have had the opportunity to make.

SUBGENUS *PHILOSCIA*

In this group the male has the carpal segments of the first and, to a less extent, the second and third thoracic limbs somewhat widened and with a brush of stiff hairs on the inner aspect. The lateral lobes of the head are practically wanting, the head though not greatly widened above, being contracted below the eyes. The frontal line is distinct but not very prominent. In the latest classification this is a very restricted group, evidently of Old World origin, though represented on the east coast of North America by one or two apparently indigenous representatives. See also remarks under the subgenus *Ischioscia*.

Philoscia muscorum (Scopoli), 1763

Figures 4, 50, 51

Oniscus muscorum SCOPOLI, 1763, 'Entomologica Carniolica,' p. 415 (orig. descr.).

Philoscia muscorum SARS, 1899 (descr.), p. 173, Pl. LXXVI, fig. 1.—?RICHARDSON, 1910a, p. 95 (record from Woods Hole, Mass., not those from Costa Rica, which are *P. variegata* Dollfus).

Not *P. muscorum* PICADO, 1913, p. 337 (= *P. variegata* Dollfus).

Probably not *P. muscorum* GEISER, 1928, which may be *P. geiseri*; not *P. cf. muscorum* GEISER, 1932, p. 6, which is *Porcellio quadriseriatus*. For other American records see *Philoscia vittata* Say, perhaps only a variety of this species.

Body oblong oval, slightly widening behind, greatest width not attaining half the length and occurring rather behind the middle; dorsal surface moderately convex, smooth and shining.

Head seen from above transversely oval, with the front outline evenly arched. Lateral lobes are practically wanting. The lower margin of the forehead is distinct and situated rather low, not reaching above the level of the middle of the eyes, and it dips down into an obtuse V-shaped angle in the middle. Eyes with about eighteen ocelli. Antennae, when well drawn back, reaching more than half the length of the body, with a very slender flagellum whose first article is more than one and one-half times the length of either of the others, the second being the shortest.

Only the first three, and to a less extent also the fourth, thoracic segments have the posterior angles rounded. Beginning with a very slight curvature of the fourth segment, the posterior angles of the thoracic segments are produced backward to an increasing degree. The legs increase considerably in length toward the rear of the body. In the male

the carpus and merus of the first three pairs of legs bear a brush-like setose area on the inner aspect, and, especially in the case of the first pair, the above joints are appreciably wider than in the female.

Abdomen abruptly narrower than the thorax, its third, fourth, and fifth segments have the lateral ends rather narrowly acute and bent directly backward, but not appressed to sides of the the abdomen. Telson triangular with concavely curved sides and a prominent, but not very acute, median apex.

Color of dorsal surface fulvous or reddish brown with the usual ir-

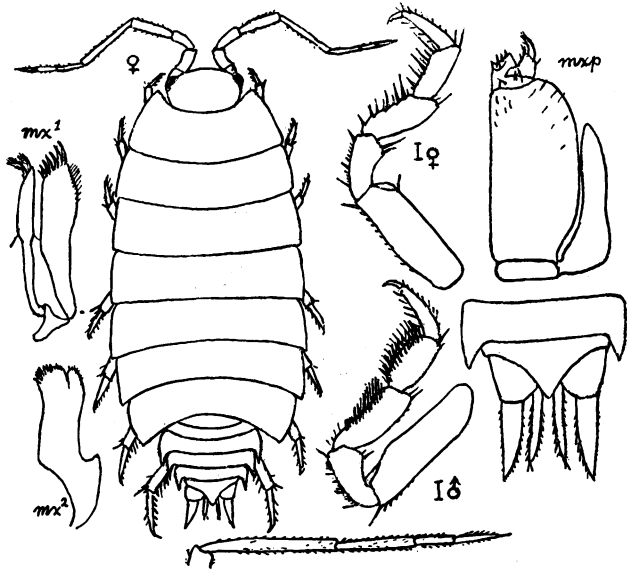


Fig. 50. *Philoscia (Philoscia) muscorum* (Scopoli). Adapted from Sars, 1899.

regular light markings on the dorso-lateral region and smaller ones on the head. The ground color is often darker along a median longitudinal stripe and along the bases of the thoracic epimera, which are mostly light (unpigmented). There are light spots on each thoracic segment on the median band and along the sides near the junction of the epimera with the main part.

Length of adult females about 8.5 mm. Males usually a little smaller.

This small species, the type of the genus *Philoscia* and of its typical subgenus, is found under stones, decaying logs, and rubbish in damp,

shady places, and is widely distributed in Europe, but the occurrence of the typical form in America is not any too well authenticated, though its establishment here by accidental importation on cultivated plants would not seem an improbability. Richardson (1910, p. 95), though

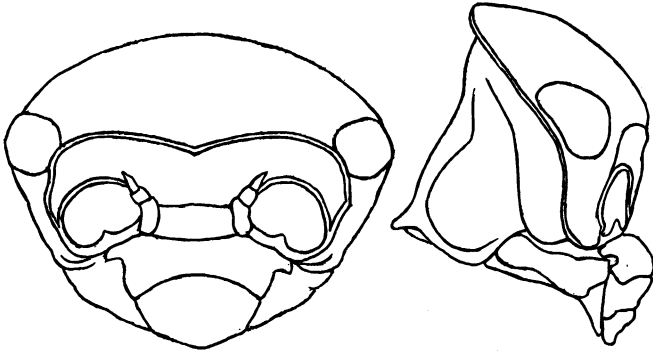


Fig. 51. *Philoscia (Philoscia) muscorum* (Scopoli). Head. Adapted from Jackson, 1928.

familiar with Say's "*P. vittata*," reported *P. muscorum* from Woods Hole, Mass., and the American Museum of Natural History has a specimen from Nahant, Mass., which in coloration and general appearance resembles supposedly typical specimens of *muscorum* from "Rheinland, Germany," received from Dr. Verhoeff.

Philoscia vittata Say, 1818

Figure 52

Philoscia muscorum var. *sylvestris* BLAKE, 1931, p. 351.—PROCTER, 1933, p. 248.

Philoscia vittata SAY, 1818, p. 429 (orig. descr.).—DE KAY, 1844, p. 50.—WHITE, 1847, p. 99.—VERRILL AND SMITH, 1873, p. 569.—HARGER, 1879, p. 157; 1880, p. 306 (descr.), Pl. I, fig. 1.—BUDDE-LUND, 1885, p. 209 (says very probably = *P. muscorum*).—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1900a, p. 305; 1901, p. 565; 1905 (descr.), p. 605, Figs. 661–663 (Fig. 662 not accurate).—PAULMIER, 1905, p. 181, Fig. 53.—RATHBUN, 1905, p. 45, check list, p. 4.—FOWLER, 1912, p. 233 (descr.), Pl. LXVI.—SUMNER, OSBURN, AND COLE, 1913, p. 661.—PRATT, 1916, p. 379, Fig. 606.—KUNKEL, 1918, p. 240 (descr.), Fig. 77.

Here probably may also be referred most of the following citations of *Philoscia muscorum* insofar as they apply to its occurrence in America:

Richardson, 1910a, p. 95 (see remarks above).—VAN NAME, 1926, p. 11.—JACKSON, 1928a, p. 582, Fig. 11.—ARCANGELI, 1930a, p. 4.—PRATT, 1935, p. 442, Fig. 611.

In the specimens of this form that I have examined, the antennae

are noticeably shorter and less slender, and they have the articles of the flagellum more nearly equal (though the first is the longest) than in European specimens of *muscorum* from "Rheinland, Germany," and the front outline of the head less smoothly curved when seen from above (being a trifle more prominent toward the sides); the epimera of the abdominal segments 3, 4, and 5 are a trifle wider and less sharply bent back, and the color pattern, though the same in its main features, is so developed as to give the animal a more conspicuously longitudinally banded appearance.

Whether these differences would hold good if extensive series of the two forms were to be compared, I cannot say, and the problem is

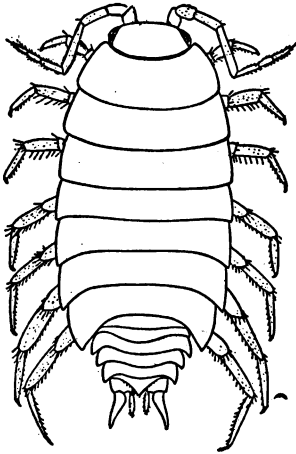


Fig. 52. *Philoscia*
(*Philoscia*) *vittata* Say.
After Harger.

complicated by the probable occurrence of true *P. muscorum* in America also, but I am considerably inclined to agree with the view of Blake, 1931, that this is no more than a variety of *P. muscorum*, and that it belongs to the variety *sylvestris* (Fabricius).

DISTRIBUTION.—In Europe, the above variety of *P. muscorum* is reported to be "associated with soils of marked salinity." In America, *P. vittata* occurs on the coasts of the northeastern states, being found under stones, rubbish, etc., in the vicinity of salt or brackish water, the only exception being a single record from Sharon, Mass., about eighteen miles inland. It has been reported from various points on the coasts of Maine (Blue Hill and Mt. Desert Island); Massachusetts (including Woods Hole, points on Cape Cod, Nantucket Island, etc.); Rhode Island; Connecticut; New York; and New Jersey (Egg Harbor, N. J., the type locality of *P. vittata* Say).

Philoscia (Philoscia?) geiseri, new species

Figure 53

Two incomplete female examples received from Prof. S. W. Geiser from Texas prove to be of a species having considerable superficial resemblance to *P. muscorum* but differing from it as shown in the figures and as stated below. In the absence of male specimens I do not know whether sexual differences in the legs similar to those of *P. muscorum* occur in this species.

Body somewhat narrower and more flattened; the dorsal surface with scattered granules or minute low tubercles.

Head with distinct though very small downwardly and slightly forwardly extending lateral lobes under the eyes. Their lower margin is sharply rounded off and they are not appressed to the sides of the head. These lobes are only slightly visible in a dorsal view when the head is in its ordinary position. Eyes with about twenty-three ocelli. Antennae missing in both specimens. The frontal line is very distinct, more arched than in *P. muscorum*, reaching to the level of the upper edge of the eyes. It starts from the inner margin of the lateral lobes of the head above described and is very prominent as it curves upward past the inner side of the eyes. In the median region it dips down slightly in a gentle curve.

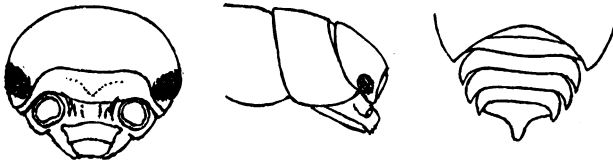


Fig. 53. *Philoscia (Philoscia?) geiseri*, new species.

Four (and to a slight extent also the fifth) thoracic segments have the posterior angle rounded off. Beginning (slightly) with the fourth segment the rear angles are produced backward to an increasing degree. The lateral ends of all the thoracic segments are less squarely cut off than in *muscorum*, the ends forming a noticeable though gentle curve.

Abdomen wider, with the lateral ends of segments three, four, and five more expanded laterally and curved backward and tapering to a triangular tip. Telson of similar shape to that of *P. muscorum* but with the median apex larger and more produced. Uropoda missing in these specimens.

Ground color of upper parts purplish brown with the usual small light markings on the head and lateral regions of the back. Though small light areas or spots are present in the median and epimeral regions, the general coloration is more uniform, without a longitudinally banded appearance.

Length of largest specimen (type, A. M. N. H. Cat. No. 5954) about 6.8 mm.

LOCALITY.—Texas, presumably near Dallas, two females collected by Prof. S. W. Geiser, for whom the species is named, June 8, 1928. Both in the collection of the American Museum of Natural History.

Perhaps the *Philoscia muscorum* reported by Geiser, 1928, should be referred to this species, but not *P. cf. muscorum* Geiser, 1932, p. 6.

SUBGENUS *ISCHIOSCIA* VERHOEFF, 1928

Hesca Budde-Lund, 1908

The males in this subgenus have the carpus of the three anterior pairs of legs expanded and flattened and fringed with spines, and armed with a brush of stiff hairs on the inner surface and, in some cases at least, a slight modification of the seventh legs also. The group is well distinguished from the typical *Philoscias* by the broad head, which is entirely without lateral lobes, but has a prominent rounded frontal margin extending between the eyes. These are widely separated and below them the head is abruptly contracted in width. It differs also in the considerably more developed abdominal epimera and stronger legs.

The group was recognized by Budde-Lund, 1908a, p. 289, and named *Hesca*, but he gave no characters, merely mentioning two species, *P. nitida* Miers and *P. debilis* Budde-Lund, as examples, and stating that it shows affinity to *Sphaeroniscus* (in what way I do not understand). Verhoeff (1928, p. 26) was the first to give a diagnosis of this group, which he named *Ischioscia*, giving it generic rank, and I am therefore employing his name in preference to that of Budde-Lund. Verhoeff's type species, *I. lobifera*, is perhaps identical with *Philoscia variegata* Dollfus, described below.

Philoscia (Ischioscia) variegata Dollfus, 1893

Figures 54, 55, 56

Hesca debilis WAHRBERG, 1922, p. 58.

?*Ischioscia lobifera* VERHOEFF, 1928, p. 27, Figs. 1-6.

Philoscia debilis BUDDE-LUND, 1893, p. 121 (orig. descr.).—DOLLFUS, 1893a, p. 345; 1896b, p. 2.—BUDDE-LUND, 1908a, p. 289. (This name may have priority over *variegata*.)

Philoscia muscorum RICHARDSON, 1910a, p. 95; 1913, p. 339.—PICADO, 1913, p. 337.—ARCANGELI, 1930a, p. 4 (part). Not *P. muscorum* (Scopoli), 1763.

?*Philoscia nitida* BUDDE-LUND, 1885, p. 222 (new descr.); 1893, p. 122.—DOLLFUS, 1896b, p. 2.—BUDDE-LUND, 1908, p. 289.—VAN NAME, 1925, p. 465 (only in part); not pp. 491-494 or Figs. 52-59. (The name *nitida* may have priority; see statements under that name.)

Philoscia nitida PEARSE, 1915, p. 542 (see remarks below), pp. 532, 534.

Philoscia variegata DOLLFUS, 1893a, p. 343 (orig. descr.), Pl. x, figs. 10a-10d; 1896b, p. 2.—RICHARDSON, 1912c, p. 30.—VAN NAME, 1926, p. 9 (descr.), Figs. 14-20.—ARCANGELI, 1930a, pp. 4, 5, 18, Fig. 5.—BARNARD, 1932, p. 250.—ARCANGELI, 1932c, p. 2 (see *P. mineri*).

?*Philougria nitida* MIERS, 1877a, p. 670 (orig. descr.), Pl. LXIX, figs. 3-3b.

NOTE.—The "*Philoscia* not yet described," mentioned by Dollfus, 1890, p. 66, and the *Philoscia* sp. recorded by Allee, 1926, pp. 448, 453, are doubtless this species. Evidently *P. variegata* Dollfus, 1898, Weber Zool. Ergeb., IV, p. 377, from Celebes, has nothing to do with it.

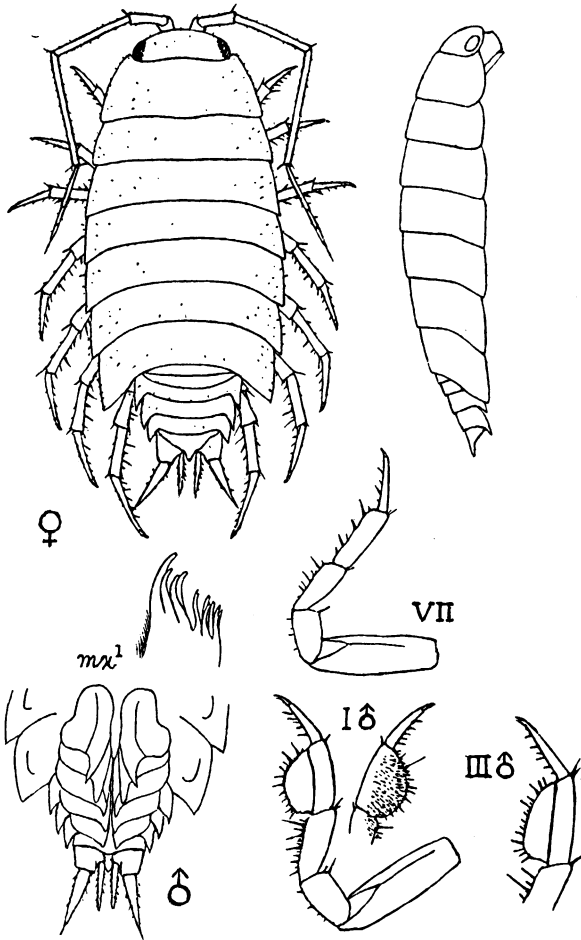


Fig. 54. *Philoscia (Ischioscia) variegata* Dollfus. Specimens from the Panama Canal Zone. Adapted from Van Name, 1926.

This a wide-bodied species with the abdomen small and short, and the head very broad and short with widely separated eyes and no lateral lobes. The body surface is smooth and shining, though bearing

scattered short stiff hairs. The following description is based on specimens from the Panama Canal Zone.

Head greatly and abruptly narrowed below the eyes. The forehead slopes down to form a horizontal, somewhat rounded-off border extending between the eyes and slightly convex when seen from above. Immediately below this for a short distance, the surface of the face is nearly vertical, only slightly inclined downward. Eyes wide from side to side, with 25 or more ocelli arranged in four rows. There is a low, broad, slightly indicated median tubercle or elevation between the antennules which is often divided into an upper and lower part by a transverse depression, also a prominent downwardly directed tubercle below each antennal socket. Second antennae long and slender, reaching, when well drawn back, along the sixth (in some individuals to the seventh) thoracic segment, but there is considerable individual variation, as well as variation with age and probably with sex, the antennae in old males



Fig. 55. *Philoscia (Ischioscia) variegata* Dollfus.

appearing to average longer. The flagellum is shorter than the last segment of the peduncle, which is itself very long and slender in many specimens. In adults, the first article of the flagellum is usually considerably the longest, and the terminal article, which bears a bristle of no great length, is the shortest.

The first three thoracic segments have the rear angles much rounded, the third has them less rounded. The posterior lateral angles of the third, fourth, and fifth abdominal segments are bent directly backward, and extend into quite prominent triangular projections. Telson triangular, broader than long, its apex moderately sharp and its lateral borders sinuously concave. The basal segments of the uropoda slightly exceed the tip of the telson. Their branches are rather long, the inner being slender and laterally compressed, and the outer somewhat widened from side to side and sharply tapering. Both the basal segment and the outer branches have a furrow along the external aspect.

Aside from the usual sexual differences in the pleopoda, the males have the carpus of the first three pairs of thoracic legs widened into a

broad, flat expansion whose inner or anterior face is covered with short stiff hairs; the corresponding surface of the merus is similarly covered with short hairs, though not expanded. This expansion of the carpus, when fully developed, may be almost semicircular on the first pair of legs; it is somewhat narrower on the second, and still more so on the third. On young males it is more or less narrow; on females it is entirely wanting, the anterior legs being similar in form and spination (except for being shorter) to those of the posterior segments. There are also, as shown by Verhoeff, 1928, small sexual differences in the ischium of the seventh leg of the male.

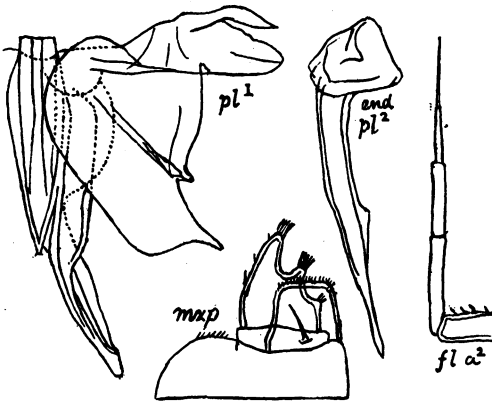


Fig. 56. Details of *Ischioscia lobifera* Verhoeff, probable synonym of *Philoscia variegata* Dollfus. Adapted from Verhoeff, 1928.

Length, largest individuals (females) in the American Museum collections, about 10 mm. (Dollfus mentions specimens 14 by 7 mm.)

Coloring usually quite conspicuous. In the Panama specimens the ground color of the upper parts is dark brown with a purplish shade, deepening to nearly black along the line of the basal ends of the epimera. Outside this darker stripe, there is a broad, light band or border (unpigmented except for scattered, stellate pigment dots of brown) occupying the whole epimeral part of each thoracic segment. On the abdominal segments the epimera are less conspicuously lighter. The usual small irregular light-colored bars and spots are present on the dorso-lateral regions of the thorax, also there is often a series of small median light spots in a darker median stripe. Below, the body and legs are practically unpigmented except for scattered, stellate, brown pigment dots.

Arcangeli (1930) deals at considerable length on the variability of this species, not only in color, but in other characters, such as the number of ocelli, the acuteness of the telson, and the relative lengths of the articles of the flagellum of the antennae, the last article sometimes equaling or exceeding the first, while in other cases the first is much the longest. Richardson also notes much variation in color in her supposed specimens of "*P. muscorum*" which are really of this species, and according to my own observations specimens from Santa Marta, Colombia, differ from those from the Canal Zone in having darker, more subdued coloration and in sometimes having the thoracic epimera nearly or quite as dark as the main part of the surface. They also have a conspicuous elongate light spot just inside the dark lateral stripe that is almost or entirely lacking in Panama specimens, but is mentioned by Verhoeff in his examples from Maracay, Venezuela.

DISTRIBUTION.—This appears to be a very common and widely distributed species in Central America and northwestern South America, occurring from near sea level to altitudes of 3700 meters in Colombia, and 2500 meters in Costa Rica. It inhabits forests, and while it apparently prefers damp situations (Pearse reports finding it in brooks), it can maintain itself where there are long continued dry seasons. Ordinarily, it is found under dead leaves, decaying logs, etc., on the ground. Picado collected it in bromeliads. It is of very active habits and is not only able to run rapidly and climb trees, but has some power of jumping.

Budde-Lund, 1893, recorded it (as *P. debilis*) from Caracas, La Moka, and St. Esteban, Venezuela. Dollfus, 1893 (as *P. variegata*), from Caracas (first mentioned and hence type locality), Corozal, Petairé, Cumbre de Valencia, and Colonie Tovar in the same country, and (1896) from Rio Lara, Darien; Verhoeff, 1928 (as *Ischiosia lobifera*), from Maracay, Venezuela. Richardson, 1912c, records it from various localities in Colombia at altitudes from 1200 to 3700 meters, including Bogota and Medellin, and Pearse, 1915 (as *P. nitida*), from the Santa Marta region at various altitudes up to 8300 feet. I have reported it (Van Name, 1926), as *P. variegata*, from Barro Colorado Island in the Panama Canal Zone at but little above the level of the canal. From Costa Rica, it has been reported by Richardson, 1910, 1913; Picado, 1913 (as *P. muscorum*); and Arcangeli, 1930 (as *P. variegata*), from various points at altitudes which range, when stated, from 1200 to 2500 meters. The U. S. National Museum has some imperfect specimens from Casitagna, Equador, 3600 meters, which are of this species or extremely close to it, also a specimen from the River Charape, Province

Jaen, in northern Peru, at 5000 feet altitude. I have not seen specimens from British Guiana, although I have studied several collections of Isopoda from that country, but if this species is not distinct from *P. nitida* (Miers), 1877, its range extends there also.

I include Richardson's "*P. muscorum*" from Costa Rica, and Pearse's "*P. nitida*" from the Santa Marta, Colombia, region in the above statement of the distribution after examining some of their material, through the kindness of the officials of the U. S. National and University of Michigan museums.

The only West Indian record appears to be one by Arcangeli, 1932c, from Dominica. There is however, a very similar but distinct species (*P. mineri*) described below, found on that island, to which Arcangeli's specimens may possibly belong, instead of to the true *variegata*.

The well-developed lateral lobes of the head, mentioned by Dollfus, 1893a, p. 343, apparently were a mistake in his description. His carefully drawn figure of the head shows no such lobes.

The question may well be raised whether this wide distribution and the variability ascribed to this species may not be due to the confusion of two or more allied forms. I would not deny this possibility, and even if that is not the case, distinct geographical races can probably be recognized. Nevertheless the variability, even in examples from one region, may be considerable, so that a hasty division of the species on the basis of the material now available would be likely to lead to errors.

***Philoscia (Ischioscia) nitida* (Miers), 1877**

Figure 57

Hesca nitida BUDE-LUND, 1988a, p. 289.

Philoscia nitida BUDE-LUND, 1879, p. 2; 1885, p. 222 (new descr.).—DOLLFUS, 1896b, p. 2.—BUDE-LUND, 1908, p. 289.—VAN NAME, 1925, p. 465 (only in part), not pp. 491-494 or Figs. 52-59.

Philougria nitida MIERS, 1877a, p. 670 (orig. descr.), Pl. LXIX, figs 3-3b.

While the probability that *Philoscia variegata* Dollfus, 1893, and *Philougria nitida* Miers, 1877, are the same is quite strong, I have been unwilling to replace Dollfus' name with the specific name *nitida* on account of the unsatisfactory description and figures given by Miers and the brevity of the description of Budde-Lund (1893) who examined original specimens of Miers' at the Warsaw museum. Miers' figures are very small and do not agree with each other in respect to the form of the head and anterior part of the thorax; Budde-Lund did not figure the species at all, and did not identify his *debilis* (described in 1893) with it.

The descriptions given by these two writers follow.

Miers (1877a, p. 670):

"Oblong-oval, shining, very convex; segments closely articulated, with minute scattered granules. Head transverse, with the anterior margin straight, without antero-lateral lobes. Eyes black, granulated, and extending along the whole length of the lateral margins. Segments of the body subequal, lateral margins with a raised marginal line; posterior margins of the first three segments straight, and forming a right angle with the lateral margins; last four segments slightly excavate on the sides, postero-lateral angles acute. Third, fourth, and fifth (exposed) segments of the tail with the lateral part bent backward, almost at a right angle to the median portion of the segment. Terminal segment much broader than long, obtusely triangular, with a well-marked depression between the bases of the uropoda (which, however, is more

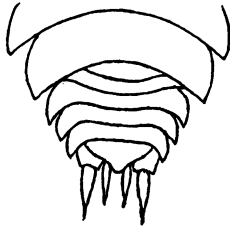


Fig. 57. *Philoscia (Ischioscia) nitida* (Miers). Adapted from Miers, 1877.

conspicuous in some specimens than in others). Antennae shorter than the body, very slender: flagellum three-jointed, and terminating in a long, slender, transparent filament. Legs very slender, with short hairs on the last three joints. Basal joints of the uropoda very short, terminal joint more than three times as long as the basal joint, acute. Colour purplish-brown; with irregular yellow spots and patches. Length $\frac{1}{3}$ inch, breadth $\frac{1}{6}$ inch. Hab. Peru, Guiana.

"Distinguished by its convex, shining appearance, the form of the head and of the terminal segment, and of the far longer slender terminal filament of the flagella of the external antennae, from the known species of the genus.

"The specimens from Guiana generally appear rather more coarsely granulated."

Budde-Lund, 1885, pp. 222-223, described it as follows:

"Oblonge ovalis, convexiuscula, nitidissima, glabra, vix vel minutissime et sparsissime punctata.

"Antennae exteriores dimidium corpus aequantes; flagelli articuli subaequales, articulus tertius seta apicali longa instructus. Oculi magni; ocelli numerosi, minus inter se discreti. Frons ante inter oculos crassius marginata; linea marginalis recta; lobi laterales nulli; epistoma linea transversa; subrecta.

"Trunci annuli tres priores margine posteriore subtransverso, utrinque ad latera levissime sinuato, angulis posticis subrectis; annuli sequentes post magis magisque margine posteriore medio sinuato; omnes annuli lateribus marginatis.

"Cauda trunci vix abrupte angustior; annuli duo priores breves, annuli 3-4-5 epimeris majoribus, distantibus, acutis. Annulus analis brevis, triangulus, lateribus leviter incurvis, apice obtusiore, supra vix impressus. Articulus basalis pedum analium brevis, annulo anali subbrevior; ramus terminalis exterior articulo basali plus duplo longior, teres, substiliformis; ramus interior exteriore vix brevior sed gracilior, compressiusculus.

"Color e nigro brunneus, crebro albedo irroratus, maxime in trunci epimeris; subtus flavus, pedes nigropunctati.

"Long. 7-8 mm. Lat. 3.5 mm. Alt. 1.7 mm."

***Philoscia (Ischioscia) mineri*, new species**

Figure 58

Specimens from Dominica Island, W. I., resemble those of *P. variegata* from the Canal Zone very closely, but exhibit the following differences that are evidently of specific importance.



Fig. 58. *Philoscia (Ischioscia) mineri*, new species.

Body slightly narrower with the back more arched. Head somewhat narrower in front outline, more convex in a dorsal view, the forehead higher and the eyes less widely separated. The surface of the epistome between the eyes is more obliquely forwardly and downwardly directed, the front border of the head thus forming a more sharply prominent transverse ridge. Antennae considerably shorter than in *variegata*, reaching only along the fourth or fifth thoracic segment when well drawn back. The

articles of the flagellum are successively shorter, as in *variegata*. The legs appear to be shorter proportionately than in that species.

The males have the carpal expansions very well developed, and of somewhat semicircular outlines on all the three anterior pairs of legs. The epimera of abdominal segments 3, 4, and 5, however, are somewhat less acute and less extended backward.

The coloration is similar in both forms, but, at least so far as the available specimens show, it is much less conspicuously contrasted in the Dominica form.

Length of largest specimens of either sex, 9 to 10 mm.

LOCALITIES.—Dominica, West Indies (Long Ditton near Roseau, and Laudat). Over 30 adult specimens collected by Dr. F. E. Lutz, June, 1911, by sifting dead leaves in the forest. The type specimen, a male, is from Long Ditton. The lots from each locality contain some additional very immature specimens, probably of this species also. All are in the American Museum of Natural History (type, Cat. No. 6509). It would seem possible that Arcangeli's (1932c, p. 2) record of *P. variegata* from Dominica really refers to this species.

This species is named for Dr. Roy W. Miner of the American Museum of Natural History.

SUBGENUS *ONISCOPHILOSCIA* WAHRBERG

Rear border of the epimera of thoracic segments 1 to 3 straight with slightly rounded angle. Lateral lobes of head small yet distinctly prominent; anterior marginal line clearly though slightly marked. Abdomen not set off from the thorax, its epimera well developed, not bent downward. The angles of the epimera of segment 5 reach as far as the tip of the telson. Telson triangular with lightly concave sides, the middle part not prominent.

Mandibles: left mandible with penicilla 1 (2) + 2; right mandible penicilla 1 + 1. Seta inferior with a short stem and many branches, so that a bristly tuft is formed.

First maxillae: Teeth 4-6, the six inner ones all with a single point. Inferior lacinia with two penicilla; the upper outer corner is rounded and provided with one spine. (Translated from Wahrberg, 1922a, p. 281.)

TYPE.—*Philoscia (Oniscophiloscia) mirifica* Wahrberg, 1922, from Juan Fernandez.

Philoscia (Oniscophiloscia) mirifica Wahrberg, 1922

Figures 59, 60

Philoscia (Oniscophiloscia) mirifica WAHRBERG, 1922a, p. 282 (orig. descr.), Figs. 2-4.

The following details are taken from Wahrberg's description:
 "Body elongate oval; length 12-13 mm., width 6-7 mm. Color



Fig. 59. *Philoscia (Oniscophiloscia) mirifica* Wahrberg. Adapted from Wahrberg, 1922.

brown of mingled shades with a long whitish yellow spot on each thoracic segment at the junction of the epimera and tergite.

"Head with a marginal line in front; about twice as wide as long. Lateral lobes small. Antennae slender, reaching to rear border of segment III, the articles 1, 2, 3, of the flagellum in the ratio of length 3:3.3:4, excluding from consideration the terminal sensory spine.

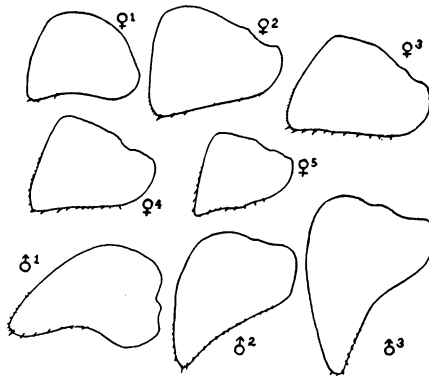


Fig. 60. *Philoscia (Oniscophiloscia) mirifica* Wahrberg. External lamellae of pleopoda. Adapted from Wahrberg, 1922.

“Thoracic segments I to III with pronotum over one-third their length, with posterior border straight and rear lateral angles rounded, not produced backward; segments IV–VII with the rear angles somewhat sharp and extended backward.

“In the females, the carpus of the first pair of legs has longer but fewer spines (about 6–7 larger ones); in the male, shorter and more numerous ones (11–12).

“Abdomen not abruptly set off from thorax but with outlines gradually merging into those of the latter. Abdominal epimera strong, sharply pointed and extended backward; not bent downward. Telson triangular, about twice as wide as long, with the apex rounded off, and with slightly concave sides. External laminae of pleopoda without tracheae.”

LOCALITY.—Juan Fernandez (Masatierra, beach) several specimens. (Wahrberg.)

SUBGENUS BENTHANA BUDDE-LUND, 1908

Subgenus of *Philoscia* (or genus) distinguished by having the teeth of the inner group on the outer division of the first maxilla serrate along their inner margin. Budde-Lund (1908a, p. 289), in establishing it, gave no further diagnosis but stated that it includes *P. olfersii* Brandt, *P. picta* Brandt, and others. As he gave a figure of *P. picia*, that species may be taken as the type.

Jackson, 1926, pp. 189–197, has recently made a study of this subgenus based on a re-examination of Budde-Lund's material, as well as other specimens. He includes five species in it, four South American (see below), and *P. minima* Dollfus, a small species, distinguished from the others by its simple eyes, which is known only from Spain and Portugal, but which Jackson suspects, from its relationship to the others, to be of South American origin.

Jackson gives the following key to the species.

- | | | |
|----|--|----------------------|
| 1. | { Eyes composite..... | 2. |
| | { Eyes simple..... | 5. |
| 2. | { Mesepistome plain..... | 3. |
| | { Mesepistome with large tubercle..... | 4. |
| 3. | { Telson rounded (colour of antenna uniform)..... | <i>B. olfersii</i> . |
| | { Telson acute (antenna with white band)..... | <i>B. picta</i> . |
| 4. | { Endopod of uropod very short (1/3 exopod), glabrous surface..... | <i>B. pauper</i> . |
| | { Endopod of uropod moderate (3/4 exopod), setose surface..... | <i>B. villosa</i> . |
| 5. | | <i>B. minima</i> . |

A detailed diagnosis of the subgenus is also given by Jackson. The following are some of the more conspicuous characters common to all the species and are stated here to avoid repetition in all the descriptions.

Body surface smooth and shining (except in *villosa*).

Forehead and upper border of epistome marked only by a change in curvature of the surface of the head. Only the last two thoracic somites have the rear corners angular and produced backward. The first four have the rear margin nearly straight.

Legs without special modification.

Abdomen abruptly contracted, small and narrow.

Telson triangulate, the sides straight or very slightly curved.

***Philoscia (Benthana) picta* Brandt, 1833**

Figure 61

Benthana picta BUDE-LUND, 1908, Pl. XVI, fig. 43.

Philoscia (Benthana) picta BUDE-LUND, 1908, p. 289, Pl. XVI, fig. 43.—JACKSON, 1926, p. 193, Pl. VII, figs. 133-136.

Philoscia picta BRANDT, 1833, p. 183 (orig. descr.).—MILNE-EDWARDS, 1840, p. 165.—STUXBERG, 1875, p. 43.—BUDE-LUND, 1879, p. 2; 1885, p. 213 (new descr.).—DOLLFUS, 1897a, p. 2.—KRAEPELIN, 1901, p. 204.—GIAMBIAGI, 1931, p. 424, Pl. VII.

“Length, 7 mm.; breadth, 3 mm. Shape.—Oblong-oval. Head.—

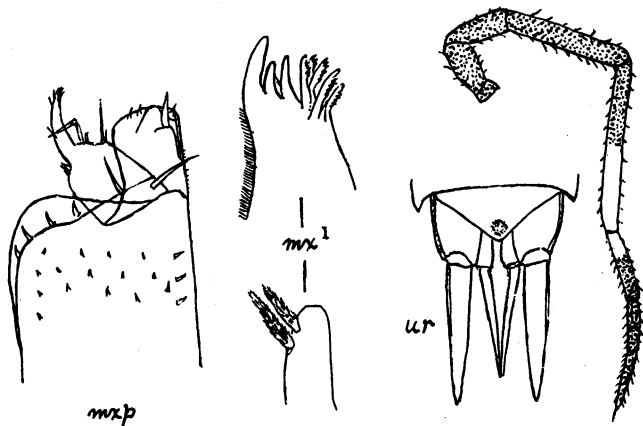


Fig. 61. *Philoscia (Benthana) picta* Brandt. Adapted from Jackson, 1926.

Eyes large, prominent, convex, 20 ocelli; lateral lobes slightly marked in front of eyes; transverse line of prosepistome sinuate, broadly

rounded in the middle, not confluent with posterior marginal line; mesepistome concave, no tubercle. Abdomen.—Postero-lateral angles of tergites sharp and prominent, but not so drawn out as in *olfersii*; telson moderately deeply sulcate at tip, which is subacute.

Appendages.—Antennula as *olfersii*. Antenna long and slender (equals length of thorax and head), proportion to body 5 to 7, 5th segment slightly grooved and equal to flagellum, 2nd segment of flagellum distinctly the smallest, 1st and 3rd nearly equal, first slightly the longer. Maxillula, maxilla, maxillipede, and pleopoda similar to *olfersii*. Uropod similar to *olfersii*, but exopodite is shorter.

“Colour (in spirit) reddish brown with yellow spots; yellow patches over coxal plates; indication of median yellow line on thorax; telson, yellow spots and with distinct yellow mid-line; distal end (not quite one-half) of 5th segment of antenna and proximal end of 1st flagellar segment white; lower surface yellow, bases of legs banded with brown pleopods spotted with brown. . . .

“Remarks.—This species is nearly related to *B. olfersii*, from which it differs in its small size, the marginal line of the prosepistome and frons is slightly more marked, the 5th segment of the antenna equals the flagellum, which is of slightly different proportions, the exopod of the uropod is shorter, the telson is more acute, and the antennae have a curious piebald appearance.” (Jackson, 1926, pp. 193–194.)

LOCALITY.—Brazil (Brandt); Buenos Aires (Dollfus, 1897, specimen compared with examples received from Budde-Lund who had examined Brandt's type). Reported from Hamburg, Germany, on plants imported from Brazil (Kraepelin, 1901).

Giambiagi, 1931, figures a specimen from Tigre, Province of Buenos Aires (Cat. No. 14,479, Mus. Nac. Buenos Aires) “found on aquatic plants” which she assigns to this species. From her figure of the uropoda it would appear that those appendages are shorter and stouter than Jackson's figure indicates for *P. picta*.

Philoscia (*Benthana*) *olfersii* Brandt, 1833

Figure 62

Oniscus nigrescens DANA, 1852, p. 728, Pl. XLVIII, figs. 1a–1c.—STUXBERG, 1875, p. 43.

Philoscia (*Benthana*) *olfersii* BUDDÉ-LUND, 1908, p. 289.—JACKSON, 1926 p. 193, Pl. VI.

Philoscia olfersii BRANDT, 1833, p. 183 (orig. descr.).—MILNE-EDWARDS, 1840, p. 164.—STUXBERG, 1875, p. 43.—BUDDÉ-LUND, 1879, p. 2; 1885, p. 212 (new descr.).—KRAEPELIN, 1901, p. 204.—VAN NAME, 1925, p. 465 (in part).

Not *P. olfersii* PEARSE, 1917, p. 7.

marked in front of eyes; transverse line of prosepistome sinuate (almost angulate in mid-line), not confluent with posterior marginal line; mesepistome concave, no tubercle; metepistome slightly setose. Abdomen.—Postero-lateral angles of tergites sharply drawn back into long narrow spines; telson slightly sulcate, tip not acute and almost rounded.

“Appendages.—Antennula prominent, tip exceeding transverse line of epistome. Antenna long and slender, proportion to body 7 to 12; flagellum longer than 5th segment, very slender, setose, its proximal segment double as long as either of the others, which are equal, or the distal is slightly longer. Uropod.—Protopodite massive, much longer than telson; exopodite rather longer than endopodite; endopodite long, bladelike.

“Colour (in spirit) reddish- or purplish-brown, mottled on head and body with yellow; large yellow patches over coxal plates, yellow marks on mid-line of each thoracic tergite; abdomen hardly mottled; under surface yellow, pleopods spotted with brown.” (Jackson, 1926, p. 193.)

LOCALITIES.—“Brazil” (Brandt), type in Berlin Museum; Rio de Janiero (Budde-Lund, three specimens in Copenhagen Museum); Rio de Janiero under stones (Dana); Hamburg, Germany, on orchids brought from southern Brazil (Kraepelin).

***Philoscia (Benthana) pauper* Jackson, 1926**

Figure 63

Philoscia (Benthana) pauper JACKSON, 1926, p. 194, Pl. VII, figs. 137-144.

“Male described. Length, 6 mm. Breadth, 2.5 mm. Shape.—Oblong-oval. Head.—Eyes moderate, not prominent, 14 ocelli; lateral lobe, ridge in front of eye is larger than previous two species; transverse line of prosepistome moderately curved in middle, confluent at sides with posterior marginal line; mesepistome with prominent semi-circular transverse tubercle in middle; lateral parts of metepistome (which is sparsely setose) project slightly in front of antennary sockets. Abdomen.—Postero-lateral angles sharp and abrupt but not long; telson not sulcate, apex obtuse.

“Appendages.—Antennula slender, not exceeding line of epistome. Antenna absent. Maxillula.—Outer lacinia 4 + 6 (1, 3, 4, 6 ctenate, 2 trifurcate, 5 acute and small); inner lacinia, penicilli short, thick, and nearly equal. Maxillipede absent on both specimens. Pleopoda.—I without posterior hook, inner edge moderately drawn out; remainder similar to *olfersii*, but with few bristles and not at all setose. Uropod.—

Protopodite not much longer than tip of telson; exopodite moderately long and 3.5 times longer than endopodite, which is very small and flattened.

“Colour (in spirit) light brown mottled with yellow; under surface yellow.

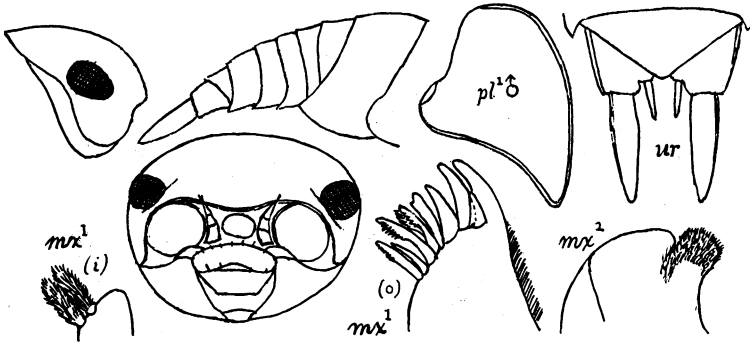


Fig. 63. *Philoscia (Benthana) pauper* Jackson. After Jackson, 1926.

“DISTRIBUTION.—Valparaiso (from Michaelsen in Mus. Hamburg). Type in British Museum (Nat. Hist.).

“Remarks.—Distinguished by the small size of the eyes, the large tubercle on the mesepistome, the telson and uropods, and the small size.” (Jackson, 1926, pp. 194–195.)

***Philoscia (Benthana) villosa* Jackson, 1926**

Figure 64

Philoscia (Benthana) villosa JACKSON, 1926, p. 195, Pl. VII, figs. 145–151.

“Female described. Length 8 mm. Breadth 3 mm. Shape.—Elongate-oval. Surface.—Minutely setose; row of large setae on each side of posterior border of thoracic somites, sides of head covered with large setae which encroach on eye; abdomen thickly, not densely, covered with large setae. Head.—Eyes moderate, not very prominent, 16–17 ocelli; lateral lobe only slightly marked; transverse line of prospistome broadly rounded in middle; confluent at sides with posterior marginal line; mesepistome with prominent rounded tubercle in middle. Abdomen.—Postero-lateral angles abrupt and sharp but not long; telson not sulcate, subacute.

“Appendages.—Antennula reaching to epistomial line but not surpassing it. Antenna absent. Maxillula.—Outer lacinia 4 + 6 (3, 4, 6

ctenate, 2 ctenate or acute, 1 fissured): inner lacinia, penicilli almost terminal, long, lower more slender and longer than upper. Maxillipede.—Small spine on inner side of top of endite. Pleopoda.—Bristles on posterior border and ventral surface of all but the first; no setae. Uropod.—Protopod short and broad, only slightly grooved; exopod short and conical; endopod stout and not grooved, only slightly flattened, $3/4$ as long as exopod, very hairy.

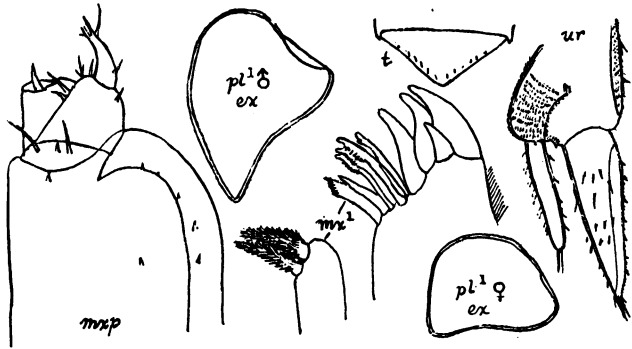


Fig. 64. *Philoscia (Benthana) villosa* Jackson. Adapted from Jackson, 1926.

“Colour (in spirit) yellow very slightly mottled with brown, paired brown bands on either side of mid-line, mottled brown band along coxal plates; middle of abdomen yellow, sides dark brown; under surface yellow.

“DISTRIBUTION.—Peru (Matucana, 2500 m. N. E. of Lima, by Mr. R. Paesler, Mus. Hamburg). Type in British Museum (Nat. Hist.).

“Remarks.—This species is distinguished by the shape, the comparatively hairy condition, the tubercle on the mesepistome, the telson and uropods, and the colour-pattern.” (Jackson, 1926, pp. 195–196.)

The two following species, *P. angustata* and *P. bilineata*, from Chile, described by Nicolet, 1849, may also belong in *Benthana*.

***Philoscia (Benthana?) angustata* (Nicolet), 1849**

Figure 65

Oniscus angustatus NICOLET, 1849, p. 268 (orig. descr.), Pl. III, fig. 8.—STUXBERG, 1875, p. 43.—BUDDE-LUND, 1879, p. 1; 1885, p. 213 (says allied to *Philoscia olfersii* Brandt).

“*O. fusco-rufescens*; corpore elongato, angustato; capite subgloboso; antennis externis filiformibus, fuscis; abdomine subparallelo, postice angulato.” (Nicolet, 1849.)

This species is very narrow, elongate, and shining, with the head somewhat globosely rounded, transversely widened and truncated in front, without noticeable median or lateral lobes; thorax a little wider than the head, with parallel sides. Lateral plates of the first five segments very short and having the outer border rounded; the two following segments have the posterior lateral angle much prolonged backward and sharply pointed. Abdomen narrower than the thorax, not much wider at its base than at its end. The lateral extremities of the dorsal plates are bent down so that its side outlines appear straight without indentations; the next to the last segment has the posterior

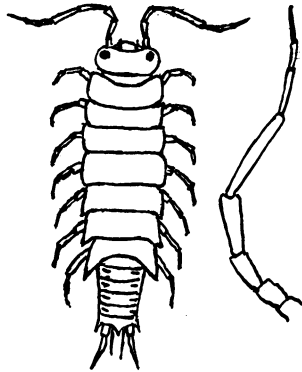


Fig. 65. *Philoscia* (*Benthana*?) *angustata* (Nicolet).
Adapted from Nicolet, 1899.

lateral angles ending in short points directed backward; the last segment ends in a very obtuse angle. Color rather light reddish, marbled with dark brown; the legs and antennae brown.

Length, 5 lines; width, 1 line.

The species presents a variety in which all the segments of the abdomen are bristly with small upright spines, while in the type individual only the last segment is spiny. (Translated from original description.)

LOCALITY.—Chile.

***Philoscia* (*Benthana*?) *bilineata* (Nicolet), 1849**

Oniscus bilineatus NICOLET, 1849, p. 269 (orig. descr.).—STUXBERG, 1875, p. 43.—BUDDE-LUND, 1879, p. 1; 1885, p. 213 (says allied to *Philoscia olfersii* Brandt).

“O. corpore oblongo, flavo fuscoque variegato, bilineata fusca in medio longitudinaliter ornato; antennis externis gracilibus, elongatis; articulo ultimo abdominis subangulato.”

Body shining, rather narrow and elongate; head small, transversely widened, forehead vertical with the median lobe slight, the lateral lobes

closely applied to the sides of the head and little noticeable; the external antennae long, slender, and shining; lateral ends of the thoracic segments little prolonged, wide and somewhat rounded; those of the last segment are directed backward and equal the first three segments of the abdomen. The latter is short and its segments, except the last, are equal and end in very acute points, sharp and much bent backward. The last segment forms a very obtuse triangle and is much shorter than the basal segment of the uropoda, whose external terminal stylet is elongate, conical, and very sharp.

Color.—The upper surface of the body is whitish, marbled and spotted with pale yellow and brown, with two parallel longitudinal brown lines separated by a whitish median stripe. The head is rather dark brown and the legs yellow. Length, 4 lines; width, 1 line. (Translated from original description.)

LOCALITY.—Chile.

SUBGENUS OR GENUS **BALLONISCUS** BUDDÉ-LUND, 1908

Established by Buddé-Lund (1908a, p. 289) without a diagnosis. He merely stated that its species are distinguished by having well-developed tracheae in the pleopoda, and mentioned *Philoscia sellowii* Brandt, *P. brevicornis* Buddé-Lund, *P. nigricans* Buddé-Lund, and *P. maculata* Buddé-Lund as members, naming them in that order. According to recent views on the importance of tracheae in the exopodites of the pleopoda this should have recognition as a group of at least generic rank, and possibly should be removed to a position nearer to *Porcellio*. I hesitate, however, to take any such step without more information about these species and about the type of tracheae that they have.

***Philoscia (Balloniscus) sellowii* Brandt, 1833**

Philoscia (Balloniscus) sellowii BUDDÉ-LUND, 1908a, pp. 289, 290, Pl. XVI, fig. 3.

Philoscia sellowii BRANDT, 1833, p. 183 (orig. descr.).—MILNE-EDWARDS, 1840, p. 164.—STUXBERG, 1875, p. 43.—BUDDÉ-LUND, 1879, p. 2; 1885, p. 218 (descr.).

“Oblongae ovalis, laevis, vix punctata.

“Antennae exteriores sparse hirsutae, dimidio corporis vix longiores; flagellum scapi articulo quinto paulo brevius; flagelli articuli omnes subaequales, vel primus potius maximus.

“Linea marginalis frontalis oblitterata vel nulla; lobi laterales breviores, latiores, rotundati; epistoma medio linea elevata transversa, leviter sinuata.

“Trunci epimera linea marginali impressa.

"Cauda trunco vix abrupte angustior; epimera distantia. Anulus analis brevis, triangulus, lateribus leviter incurvis, apice subobtusos, supra planus.

"Color e subolivaceo brunneus, in lateribus flavomarmoratus et supra utrinque macularum oblongarum, flavarum, subrufescentium linea notatus." (Budde-Lund, 1885, p. 218.)

LOCALITY.—Montevideo, according to Brandt; "Brasilia," according to Budde-Lund.

Brandt's type (in the Berlin Museum) was the basis of Budde-Lund's description. The figure given by Budde-Lund (1908) represents only a minute detail of the mandible.

Philoscia (Balloniscus) brevicornis Budde-Lund, 1885

Philoscia (Balloniscus) brevicornis BUDDE-LUND, 1908a, p. 289.

Philoscia brevicornis BUDDE-LUND, 1879, p. 2 (*nomen nudum*); 1885, p. 218 (orig. descr.).—RICHARDSON, 1900a, p. 305; 1901, p. 565; 1905, p. 606 (descr.).

The following is Richardson's translation of the original description:

"Body oblong-oval, subconvex, smooth, slightly covered with a few dots.

"Second pair of antennae shorter than half the length of the body; articles of the flagellum short, subequal.

"Frontal margin produced a little in the form of an arch in the middle, almost entirely inconspicuous; epistome subconvex in the middle.

"Abdomen scarcely abruptly narrower than the thorax. The terminal segment short, almost triangular, with sides slightly incurved, and apex obtusely rounded; sulcate above.

"The color varies in the two specimens, being a very light or a very dark violet, covered with white spots, with the margins white. Legs all yellow, or covered with black dots.

"Length, 11 mm.; width, 5 mm.; height 2.5 mm." (Richardson, 1905, pp. 606-607.)

LOCALITY.—Biloxi, Mississippi. Two examples, apparently including the type, in the Copenhagen Museum (Budde-Lund).

Referred by Budde-Lund, 1908a, p. 289, to the subgenus *Balloniscus* and incorrectly called a South American species.

Philoscia (Balloniscus) nigricans Budde-Lund, 1885

Philoscia (Balloniscus) nigricans BUDDE-LUND, 1908a, p. 289.

Philoscia nigricans BUDDE-LUND, 1879, p. 2 (*nomen nudum*); 1885, p. 210 (orig. descr.).—RICHARDSON, 1900a, p. 305; 1901, p. 565; 1905 (descr.) p. 608.

The following is Richardson's translation of the original description:

"Body oblong-oval, rather convex, smooth, slightly covered with a few dots.

"Second pair of antennae lost in the specimen.

"Frontal margin straight; epistome with a median transverse line.

"Abdomen abruptly narrower than the thorax; epimera distant. The last segment of the abdomen short, subtriangular, with the sides straight or slightly incurved; apex obtuse, sulcate above.

"Color dark brown, covered with numerous white spots or little stripes. Legs yellow, with the coxae spotted with black.

"Length, 9 mm.; width, 4 mm.; height, 1.6 mm." (Richardson, 1905, pp. 608, 609.)

LOCALITY.—Biloxi, Mississippi; the type, which lacks the antennae, in the Copenhagen Museum (Budde-Lund).

Referred by Budde-Lund, 1908a, p. 289, to the subgenus *Balloniscus* (characterized by having well-developed tracheae in the pleopoda) and incorrectly called a South American species.

***Philoscia (Balloniscus) maculata* Budde-Lund 1885**

Philoscia maculata BUDDE-LUND, 1879, p. 2 (*nomen nudum*); 1885, p. 215 (descr.).—KRAEPELIN, 1901, p. 204.—BUDDE-LUND, 1908a, p. 289.

Not *Philoscia maculata* VAN NAME, 1925, p. 494, Figs. 60–63.

Budde-Lund's description is as follows:

"Oblongae ovalis, laevis, nitidissima, densissime punctata; caudae cum pedibus analibus sparse crinita.

"Antennae exteriores dimidio corporis satis longiores, ad apicem densius hirsutae; flagellum scapi articulo quinto brevius, articuli flagelli ad apicem longitudine gradatim paulo decrescentes. Linea marginalis frontalis nulla; lobi frontales laterales breviores, angustati; epistoma linea elevata transversa, medio leviter sinuata.

"Trunci epimera linea minuta longitudinali impressa.

"Cauda trunco abrupte angustior; epimera parva satis adpressa. Annulus analis brevis, triangulus, lateribus rectis, apice acute rectangulo, basi impressione minuto. Articulus basalis pedum analium latere exteriori canaliculato, articulo terminali sesqui brevior.

"Color ex nigro brunneus, maculis et striolis numerosis albidis conspersus; in lateribus trunci linea nigra et supra hanc linea albida macularum oblongarum; in dorsi medio niger; cauda medio lineis

tribus macularum subrotundarum albidis; pedes albid, coxis nigromaculatis; antennae griseae; articulus quintus ad apicem albidus.

"Long. 8 mm. Lat. 3.5 mm. Alt. 1.5 mm." (Budde-Lund, 1885, p. 215.)

LOCALITIES.—"America Australis. Ad St. Nicolas; ad Barodero prope Riacho del Oro; a cl. W. Sörensens pauca exempla capta sunt quae in Museo Hauniensis asservantur." (Budde-Lund, 1885.) These places are on the Paraná River northwest of Buenos Aires.

The specimens from British Guiana which I assigned to this species in my article of 1925 cannot belong here, as I can find no tracheae in the external plates of the pleopoda.

***Philoscia paraguayana*, new species**

Figure 66

Body rather widely elliptical in a dorsal view, the head and the short, rapidly tapering abdomen set quite deeply into the thorax, the dorsal surface, antennae and uropoda rough-pubescent with extremely short glandular hairs which are evenly

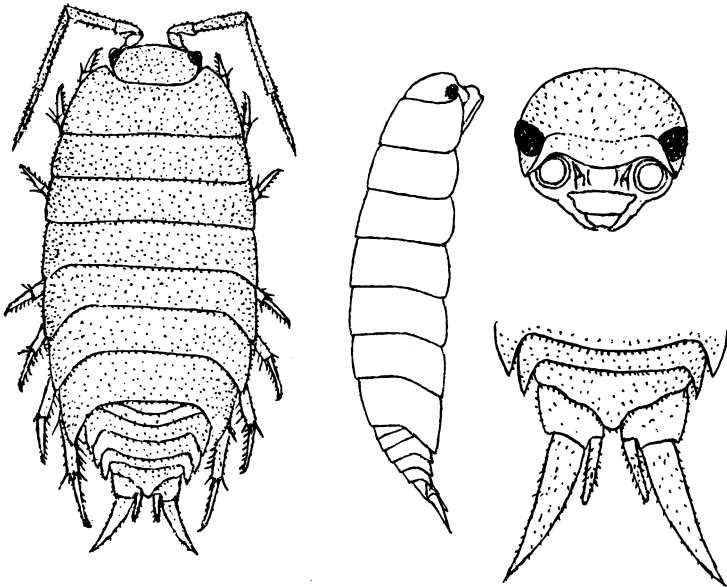


Fig. 66. *Philoscia paraguayana*, new species.

scattered without regularity except along the rear borders of each segment, where they form a regular row.

Head with the outline convex in front and with fairly large, somewhat square,

lateral lobes extending down below the eyes and somewhat appressed to the antennal sockets, so that they show very little in a dorsal view of the animal unless the head is tilted up. The upper line of the epistome is sinuous, but not very sharply defined in the median region where it dips down only slightly; toward the sides it forms a prominent ridge where it bends down along the inner border of the eyes. The latter have about eighteen well-developed ocelli. The antennae are rather long and would more than reach the fourth thoracic segment if well drawn back. The terminal joint of their peduncle is rather long and slender, slightly exceeding the flagellum, which is likewise long and slender and has the middle article a little shorter than either of the others. The terminal bristle is short. The inner teeth of the outer branch of the first maxilla are smooth and notched at the tip, as in most *Philoscias*.

The first three thoracic segments have the rear angles broadly rounded off; the fourth and fifth have them also slightly rounded; in the sixth and seventh the angles are acute. Beginning slightly with the third, these angles are extended back to an increasing degree. The legs are strong, increasing rapidly in length and stoutness toward the rear of the body, and are armed with well-developed spines. Sexual differences in the legs were not observed.

The epimera of the third, fourth, and fifth abdominal segments are extended back as triangular, somewhat appressed points, which are conspicuous in a dorsal, as well as lateral, view. Telson with outlines sinuously concave on the sides and produced into a prominent but slightly rounded point at the apex. The basal joint of the uropoda extends beyond the tip of the telson. Both branches are tapered, the inner, which is quite short, is inserted rather near the end of the basal joint, which is only slightly grooved on its external aspect.

The ground color of the upper parts is the purplish brown that is usual in this group. Small light spots on the head and the usual small irregular bars on the lateral regions of the back are present. In addition, the epimera of the thoracic segments are but little pigmented, so that the thorax has a broad, light border, inside of which is a narrow, longitudinal, very dark band in the region of the junction of the epimera with their segments. The region of the median line is also dark, giving the dorsal surface a longitudinally banded color-pattern, as in many allied species of this group.

Length of largest specimen nearly 10 mm. The above description is from a female; the single male specimen has the body proportionately a little narrower.

LOCALITY.—“Paraguay.” Three specimens (including the type, Cat. No. 6508), collected by Karl Fiebrig, are in the American Museum of Natural History collection. The long, strongly spined legs and well-developed eyes indicate a species of active habits.

***Philoscia omissa*, new species**

Figures 67, 68

Philoscia olfersii PEARSE, 1917, p. 7 (not Brandt, 1833).—VAN NAME, 1925, p. 465 (in part).

Philoscia nitida VAN NAME, 1925, p. 491, Figs. 52-59 (not Miers, 1877).

General outline of body elliptical, in a dorsal view rather wide (width often exceeding 0.4 of the length of body and head); the back well arched; the head and

abdomen very small. Body surface very smooth and shining, though bearing a few scattered setose hairs. These are more numerous on the antennae, pleopoda, and a few other parts. Lateral ends of thoracic segments with a very narrow slightly thickened border, but this is not conspicuous.

Head small and narrow, not very deeply set back into the thorax. Seen from above, its front outline is smoothly convex without a suggestion of lobes. Seen from one side or in front, the forehead slopes down to form a prominent though somewhat rounded-off horizontal border extending across between the eyes, below which the head is abruptly much contracted. The mouth parts form a downwardly and

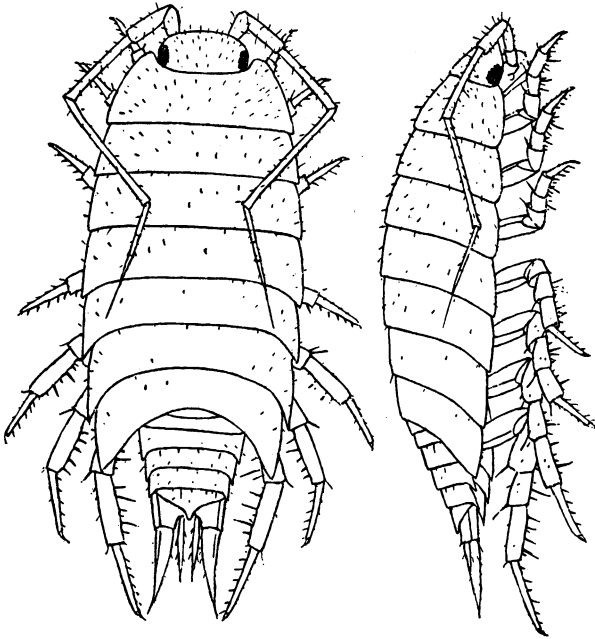


Fig. 67. *Philoscia omissa*, new species.

somewhat forwardly projecting mass of smaller proportionate size than in many other members of the genus. Eyes obliquely oval with sixteen to nineteen ocelli.

Antennae of very variable length in different specimens, always rather long and slender, especially the last joint of the peduncle and the flagellum, which is tipped with a very long bristle. The antennae, when drawn back, reach beyond the middle of the thorax, in some cases three-quarters way or more along it. Their flagellum has the first article considerably the longest, the second the shortest.

The thoracic segments have the rear lateral angle extended back slightly in the first segment, and attaining a maximum in the sixth. The first and second, and to a less degree the third, have these angles rounded off. The fourth has them nearly or quite acute, and in the remaining segments they are always acute. The legs are similar in the two sexes.

The abdominal segments 3 to 5 have the posterior lateral angles extended into narrow, sharp points directed straight backward. The telson is wider than long, of somewhat triangular outline with the curve of the sides very slightly sinuous or concave and a not very sharp though slightly acuminate tip. I did not succeed in finding tracheae in the external plates of the pleopoda. The basal joints of the uropoda are rather long, exceeding the tip of the telson, and are conspicuously furrowed on their external aspect. Their external branch is quite long and sharply tapering or subulate, little flattened, though slightly furrowed on the external aspect. The inner branches are quite slender, somewhat compressed from side to side and

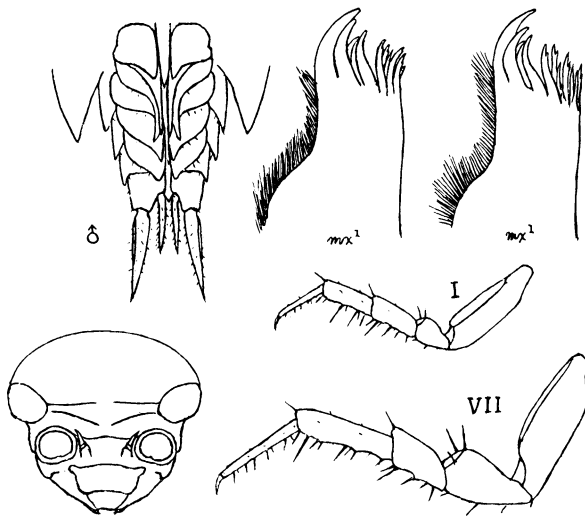


Fig. 68. *Philoscia omissa*, new species.

scarcely reach halfway along the outer ones. They are inserted considerably forward of the end of the basal joint.

Coloration rather conspicuous; in addition to the usual irregular light markings on the lateral regions of the back and on the head, the purplish-brown ground color of the back is variegated by a darker stripe on each side in the region of the bases of the thoracic epimera; in this stripe there is on each segment a large, conspicuous, more or less irregularly oblong light (unpigmented) spot; there is also a median series of light spots which in some individuals lie in a darker median stripe. On the thoracic epimera the purplish pigment fades out so that the thorax seems to be bordered by a broad, somewhat lighter stripe outside the dark lateral stripe in which the large spots lie. Abdomen and telson mostly purplish brown, though median lighter spots are present and the projecting angles of the segments are not pigmented. External branches of the uropoda with a light band across the middle.

Length of largest specimens: males, 11.2 mm.; females, 11.5 mm.;

DISTRIBUTION.—This is one of the commonest and most widely distributed land isopods in the forest regions of British Guiana. It is the species described and figured in Van Name, 1925, and there doubtfully referred (incorrectly) to *P. nitida* (Miers). Pearse, 1917, reports it as "*P. olfersii*," in rotten logs and under fallen leaves, near Dunoon, British Guiana (specimens in University of Michigan Museum). These specimens were kindly loaned to me for examination. The American Museum of Natural History has numerous specimens, including some collected by Mr. William Beebe at Kartabo (among these the type, Catalogue No. 5327), and many obtained by Mr. Herbert Lang at Kamakusa, Kurupung, Bartica, and at the mouth of the Meama River. Also two from Tukeit, collected by Dr. F. E. Lutz.

This species is certainly not identical with either of those to which it has been referred.

***Philoscia kartaboana*, new species**

Figures 69, 70, 71

?*Philoscia culebrae* PEARSE, 1915, p. 541, Fig. 3 (not Moore, 1901).

Philoscia maculata VAN NAME, 1925 p. 494, Figs. 60–63 (not Budde-Lund, 1885).

Body of oblong-elliptical outline in a dorsal view, broadly rounded in front, with the head rather narrow and somewhat set back into the thorax, the abdomen rather

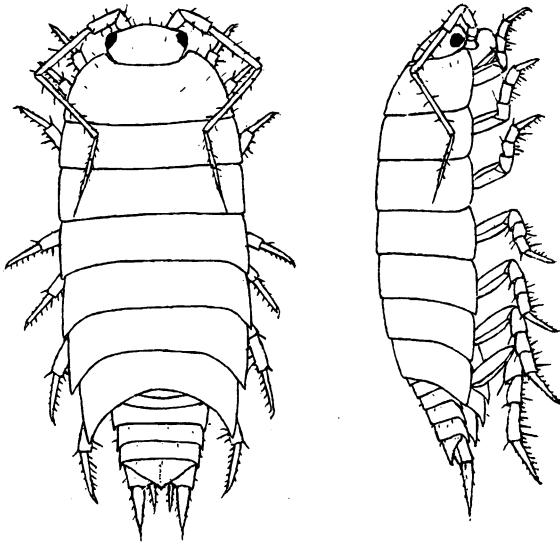


Fig. 69. *Philoscia kartaboana*, new species. After Van Name, 1925 (incorrectly identified with *P. maculata* Budde-Lund).

small and tapering. The body surface is very smooth and for the most part free from setose hairs, though a few are present on the head, antennae, uropoda, etc.

The front outline of the head, seen from above, is obliquely prominent in the middle, but no lateral lobes are visible, though in a lateral view slight vestiges of them, closely appressed to the antennal sockets, and of rather long narrow outline, rounded off below, appear to be present. Eyes rounded, with about fifteen well-formed ocelli. Antennae moderately long, especially in adult males, where they may reach the fifth thoracic segment when well drawn back. The first article of the flagellum is usually noticeably the longest in adult specimens, the terminal article is the next longest, and bears a long bristle at its tip.

The first three thoracic segments have the posterior lateral angles rounded and not at all extended backward. The fourth has the angle nearly sharp, in the remain-

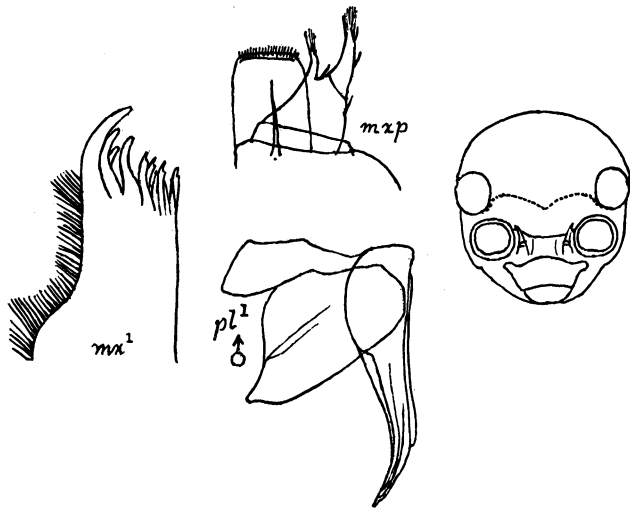


Fig. 70. *Philoscia kartaboana*, new species.

ing three it is actually so. Beginning with a very slight extension in the fourth, the remaining thoracic segments have the posterior lateral angles extended back to an increasing extent. Legs only moderately long, increasing considerably in length toward the rear of the body. No sexual differences in the legs were discovered, though the anterior pairs appear stouter in the male.

The third, fourth, and fifth abdominal segments have the posterior lateral angles extended back into small appressed triangular points. Telson triangular with nearly straight sides forming an angle of somewhat more than a right angle and meeting in a sharp but not acuminate apex. Basal joints of uropoda and outer branches of same with a furrow on the external aspect; the basal joints extend about as far as the tip of the telson. The outer branches are short and taper rapidly, and are tipped by a short bristle, which, however, is not always present. The inner branches are small and compressed from side to side. No tracheae were found in the external plates of the pleopoda.

Color, light brown or purplish brown usually with a noticeably darker median stripe and lateral stripes along the bases of the thoracic epimera. Inside the lateral dark stripe a row of large light spots, one on each thoracic segment on each side, besides the usual light spots and markings on the lateral regions of the back.

Length of largest specimens (females) slightly less than 7 mm.

LOCALITIES.—Apparently widely distributed and common in the forests of British Guiana, perhaps also in Colombia (see below).

Three specimens were obtained by Mr. William Beebe, at Kartabo, by sifting leaf mould in the forest, and numerous specimens at Kamakusa by Mr. Herbert Lang, who also obtained at Bartica, from underground ants' nests, a few small specimens that appear to belong to this species. All these specimens, including the type (from Kamakusa, Cat. No. 6510), are in the American Museum of Natural History.

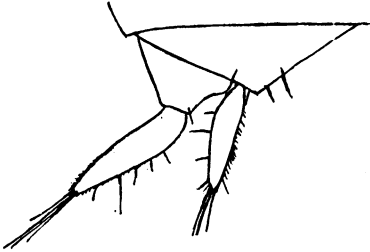


Fig. 71. *Philoscia kartaboana*(?), new species. After Pearse, 1915. Telson and uropoda of a species he regarded as identical with *P. culebrae* Moore. It is not *P. culebrae*, but is perhaps *P. kartaboana*.

This is not identical with *P. seriepunctata* Budde-Lund, as no rows of punctae are visible along the rear margins of the segments even on considerable magnification.

The species reported as *P. culebrae* Moore by Pearse (1915, p. 541, Fig. 3), common in the Santa Marta region, Colombia, in the forest at altitudes from 2000 to 4500 feet, though found also in a cane field at a low altitude, is evidently not Moore's species, but may be the present one, judging from the figure he gives of the telson and uropoda.

***Philoscia roraimae*, new species**

Figure 72

Some specimens from Mt. Roraima represent a species apparently rather closely allied to *Philoscia kartaboana*, described above.

The body is compactly articulated and moderately narrow, but quite highly arched for a *Philoscia*; the epimera of the thoracic segments are well developed, but extended almost directly downward. Integument hard, smooth, and shining, not noticeably setose or pubescent. In a dorsal view the body is elliptical, the abdomen tapering, rather small and short, its base considerably narrower than the last thoracic segment.