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THE AUTHORS OF THE SEVERAL PAPERS ARE SEVERALLY RESPONSIBLE FOR THE
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ART. III.—*Description of a New Genus of Terrestrial Isopoda, allied to the Genus Phreatoicus.*

(Plates III. and IV.)

By PROF. BALDWIN SPENCER, M.A., and T. S. HALL, M.A.

[Read 7th May, 1896.]

For the specimens upon which our work is based we are indebted to Mr. W. H. F. Hill, by whom they were obtained burrowing in earth on the hills overlooking the Gellibrand River, about twenty miles south of Colac in Victoria. The country is covered with dense forest, principally of Eucalyptus, and owing to its rugged nature has been but little explored zoologically.

In 1882 Dr. Charles Chilton* described a new genus of subterranean Isopoda to which he gave the name of *Phreatoicus*, obtained from wells in New Zealand; in 1891† he described another species of the same genus secured in water-holes on the summit of Mount Kosciusko, close to the boundary line between New South Wales and Victoria, and in 1894, in an important paper on "The Subterranean Crustacea of New Zealand,"‡ he gave further particulars with regard to the New Zealand species of the genus.

The genus now described is evidently closely related to though distinct from *Phreatoicus*, and we therefore propose the name of *Phreatoicopsis* for it. To facilitate comparison we have adhered as closely as possible to the method of description and nomenclature of Dr. Chilton.

Phreatoicopsis, n.g.

Body long, subcylindrical, laterally compressed. Upper antennæ short, lower long, with flagellum. Mandible with an appendage. First pair of legs subchelate, others simple. The legs are divided into an anterior series of four and a posterior series of three.

* Trans. N.Z. Inst., vol. xv., p. 89.

† Records Aust. Mus., Sydney, vol. i., p. 149.

‡ Trans. Linn. Soc. London, May, 1894.

Pleon long, of six distinct segments, last joined to telson. Uropoda biramous, short and powerful. Telson large, sharply truncate.

Phreatoicopsis terricola, n.sp.

Specific diagnosis.—Body stout. Pleura of second, third, fourth and fifth segments of pleon moderately developed, being only as deep as their respective segments; their inferior margins fringed with a few small spinose setæ. Telson abruptly truncated. Lower antennæ about one-third of the length of the body; peduncle longer than flagellum; fourth and fifth joints of peduncle longest and equal in length. Legs long, slender. Lower lip with the adjacent edges of both lobes much hollowed out at the base, so as to leave a wide central space. Inner lobe of first maxilla narrow and with numerous plumose setæ at its extremity.

Colour.—Creamy white.

Length.—About 45 mm.

Habitat.—Banks of the Upper Gellibrand River, in burrows. (W. H. F. Hill).

DETAILED DESCRIPTION.

The only specimens that we have hitherto received have all been males, so that the description of the points of difference shown by the female must be deferred for the present.

Body (Plate III., Fig. 1).—The length of the largest specimen we have is 48 mm. The body is broadest at the third and fourth segments of the pereion and then gradually decreases in width posteriorly. The depth of the body is somewhat less than its breadth in the pereion, but owing to lateral compression is slightly greater than its breadth in the pleon. The differences are, however, not very marked, though, owing to the great downward prolongation of the pleura, the compression appears more considerable than it really is. The dorsal surface of the pereion is very convex, the ventral being only slightly so. In the pleon the dorsal surface is more convex than in the pereion and the ventral surface is flat.

Head.—The head is very convex on the dorsal and anterior surfaces. The anterior end, as seen from above, is truncate. The anterior margin has a slight V-shaped cleft immediately below the level of the eyes. From the antero-inferior margin of the head a strong furrow runs upwards and then backwards, parallel to the long axis of the body, and reaches as far as the posterior end of the head. This furrow divides the head into two well-marked portions, the upper of which has the form of a quarter of a sphere, while the lower, as seen from the side, is oblong and forms a prominent convex cheek. The transverse depression mentioned by Chilton in *P. australis* and in *P. assimilis* is absent in the present species.

Eyes.—The eyes are as in *P. australis*, except that they consist of about forty lenses, in proportion with the greater size of the animal.

Pereion.—The first segment of the pereion is fused to the head, the line of union being strongly marked. The first segment is very little narrower than the second. The anterior and posterior dorsal edges are straight, and parallel to one another. In side view the segment widens slightly and is bent forwards in close apposition to the side of the head. The sides of the segment are globose and larger than in the case of the succeeding segments. The second, third and fourth segments are all of about equal size. The inferior margins (epimera) of each segment have a notch in the centre for the reception of the basi of the legs. The anterior angle is thickened and slightly produced downwards. In the fourth segment the posterior angle is formed by a slight flat fold, which gradually decreases in size in the preceding segments until, in the first, it forms merely a ridge which does not reach the posterior angle. The epimera of the fifth, sixth and seventh segments are broadly notched. The anterior margin of the fifth segment is produced forwards into a broad, rounded plate. The corresponding plates in the two succeeding segments are smaller and more angular in shape. The posterior marginal plates are of the same size in the three segments, that of the seventh segment being of about the same size as the anterior one.

Pleon.—The first segment is narrower than the seventh segment of the pereion, and gradually narrows as it passes downwards. It extends downwards considerably beyond the

epimera of the seventh segment and beyond the level of the joint between the basos and ischios of the seventh appendage. There is a tendency for the breadth of the segments to increase as they pass posteriorly, and this increase is most marked in the fifth segment. The pleura of the second, third, fourth and fifth segments are produced downwards further than those of the first and are about equal to their respective segments in depth.

The sixth segment and telson are coalesced, forming a tail-piece slightly concave below and convex above in both transverse and longitudinal section; the sides are flattened and the whole structure has a characteristic horse-shoe shape in transverse section. The posterior end is truncated and gapes widely. The margin of the posterior end is bordered by a series of strong, spinose setæ of varying length. The shape of this part of the body is markedly different from that of any of the three species of *Phreatoicus* yet described.

From the level of the upper and posterior angle of the insertion of the uropod a ridge, devoid of setæ, extends upwards and forwards for about half the height of the body, probably indicating the posterior limit of the sixth segment.

The inferior and posterior margins of the pleura of segments 1-5 bear a few short, spinose setæ, a sparse, narrow row of which is continued around the posterior margin of the segment.

The anterior inferior angle of the sixth segment is produced into a process, which bears a single strong spine.

The inner side of the basal part of the appendage is produced so as to form a process running along the inner side of the inner ramus, and bearing a few short spines.

Surface of Body.—The surface of the body is smooth, with only a very few short setæ scattered about irregularly. The whole surface of the body has a light cream colour in spirit specimens.

First Antennæ.—The first antennæ are short, reaching more than half way along the fourth joint of the second antennæ.

The *peduncle* consists of three joints, and is clearly distinguishable from the flagellum. The first joint of the peduncle projects freely beyond the head. It is broader than long and about the same length as the second. The third is shorter and narrower.

The *flagellum* consists of from ten to twelve joints. The second segment is the largest. The succeeding ones are about equal in

size to one another, excepting the last two which are smaller, the terminal one being the smallest.

Setæ are scattered sparsely on the surface of the peduncle. A row of setæ (? auditory cilia) passes round the distal end of each flagellum joint. There are a few setæ on the tip of the terminal joint.

Second Antennæ.—The *peduncle* consists of five joints and is about one fourth longer than the flagellum. The first joint is much the shortest; the second and third are equal in length and short; the fourth and fifth are longest and are equal in length. The third joint is rounded on the ventro-internal aspect. A few setæ are scattered sparsely and irregularly over the segments of the peduncle, with a row round the distal end of the fourth and fifth.

The *flagellum* consists of 23–27 joints. Of these, the first is much the longest, the next two or three are very slightly shorter than the rest, which are sub-equal, and gradually become narrower towards the distal end, where they increase in length. There is an interrupted row of setæ around the distal end of each joint.

Upper Lip.—The upper lip is large and strong and is regularly rounded at its distal end. It is divided into two portions. The proximal has a median and two lateral elevations. The distal part has a median depression and a raised rim. A strong transverse ridge separates the distal from the proximal part. The distal part is bent inwards to the mouth. There are a large number of close-set setæ on the inner surface which slant towards the median line.

Mandible.—The mandible has the same general shape as in *P. australis*, and the left one differs slightly from the right.

The *left mandible* (Plate IV., Fig. 2) has a cutting edge formed by two processes, both of which bear three strong, brown teeth. Within these is a short process with a truncate end, the somewhat circular margin of which is bordered by a row of spiniform setæ about twenty in number. There are no setæ between the base of this process and that of the molar tubercle, such as occur in *P. australis*. The molar tubercle is columnar in shape, with a squarely truncate end covered by a well-developed, chitinous cap, which is slightly concave. The concavity is

crossed by numerous ridges running parallel to one another and transversely to the length of the mandible. Each ridge is divided into a series of minute tubercles by transverse lines.

The *right mandible* (Fig. 3) has a cutting edge unlike that of *P. australis* and consists of two processes, the outer with four, the inner with two projecting points, which are, however, not so strongly chitinized as the corresponding structures of the left mandible. The next process is somewhat narrower than that of the left mandible, and its distal margin is crowned with a circle of spiniform setæ. The molar tubercle is longer and more slender than the left one, the distal end is more obliquely truncate, and the grinding surface, in minute structure, resembles that of the left. The inner of the two cutting processes is united proximally with the base of the setiferous process, and these two are capable of slight movement on the basal portion of the appendage.

The *palp* is three-jointed. The proximal part is the shortest; the median is the longest and bears setæ which are especially long at the distal end. The third joint bears three long setæ at its extremity.

Lower Lip (Fig. 4).—The lower lip consists of two fleshy lobes united proximally. The distal end of each is rounded and densely fringed with short setæ which curve in towards the middle line. These setæ are carried on a series of processes of the lobes and are thus collected into little brush-like groups.

The median part, connecting the bases of the two free lobes, is produced into the buccal cavity in the form of a grooved fold fringed by setæ.

First Maxilla (Figs. 5, 5a).—Consists of two divisions, of which the outer is the larger. It bends over somewhat towards the middle line and its end is truncate and carries about twenty-five strong brown chitinous teeth. The four outer ones are the largest and are separated from the remainder, which are arranged in three rows. The inner and the outer edges bear hair-like setæ.

The inner division is much smaller than the outer and forms a narrow flattened plate pointed at its distal extremity, where there is placed a group of setæ, more numerous than those in *P. australis*, and arranged in two series, an outer row formed of stout, strong setæ not more than one-third of the length of the others and doubly pectinate at their distal ends, and an inner group of long, strong, finely plumose setæ.

Second Maxilla (Fig. 6).—The basal part is produced at its inner distal end into a rounded, elongate lobe. External to this are two processes articulated to the basal joint. The inner margin differs in form from that of *P. australis*, and its outline is represented in the figure.

The end of the inner process carries a large number of setæ of two kinds; first long, plain setæ with curved, almost hooked extremities, and secondly, pectinate setæ. The inner margin has a fringe of long, plumose setæ. The whole surface bears sparsely scattered, large, pectinate setæ.

The *two articulating lobes* are slightly longer and much more slender than the inner lobe and are flattened from side to side. Each terminates in two stout, pectinate spines. The inner lobe also bears two simple spines. Both lobes carry a large number of pectinate setæ of varying length, which are more numerous on the inner than the outer process.

Maxillipedes (Fig. 7).—Coxos distinct and broader than long. The epipodite is relatively larger than in *P. australis*. The outer edge bears a fringe of very numerous short setæ. The basos is about half as long again as broad, but not so long relatively as in *P. australis*. From the inner side of the basos distally arises a flat plate, which reaches as far forward as the middle of the carpopodite. This plate, owing to the broadening of the carpo- and meropodite, cannot be seen from the outer side. The end of this plate is rounded and bears a number of strong, pectinate setæ, which are continued for some distance along the outer margin. The inner margin is fringed by a series of long, plumose setæ and at the basal part of the outer margin are three strong setæ, which are not hooked as they are in *P. australis*.

The ischios is short and rounded. The meros has its outer angle produced into a long process which runs upwards by the side of the carpus. The carpus is broadly subtriangular and very different in appearance from that of *P. australis*. The propodos is subtriangular, and the dactylos is roundly oblong. The whole appendage is strongly setose.

First pereopod. The basos and ischios are much as in *P. australis*. The meros is subtriangular, the anterior side being produced into a long, strong process, which terminates in a single spiniform seta. The face turned towards the propodite is

flattened and expanded transversely, so as to form a surface against which rests the face of the propodite when the latter is bent back. The shape of the carpus is represented in the drawing. The propodite is much more swollen than in any of the three species hitherto described and is broadly triangular. The proximal half of the palm surface is produced so as to form a more or less flattened plate which terminates distally in a single stout tooth. Proximally to this the plate is bordered by a row of six short, stout spines, which lie slightly to the outer side, so that, when closed, the dactylos lies inside them. The dactylos is a long, powerful, curved structure, which can be closed down upon the palm of the propodite. At about half its length it bears a strongly-developed tooth, which fits into the space between the tooth on the propodite and the base of the dactylos.

Setæ are not so numerous as on the corresponding appendage of *P. australis*. The basos bears a few which are very short; the ischios carries a few tufts on its posterior side; the meros has very few; the carpus has well-developed tufts on its posterior side; a fringe of setæ lies to the outside of the spines on the posterior edge of the propodite, which also carries a narrow transverse band of setæ at the base of the dactylos on the anterior and posterior sides. The dactylos carries minute groups of little setæ, the groups being arranged in longitudinal rows.

Other Appendages of the Pereion.—The second, third and fourth appendages agree generally in form with those of *P. australis*, but the setæ are short, strong and spiny and very much less numerous. In the male there are no spines on the propodite similar to those of *P. australis*, and the dactytopodite is not bent round so as to form a claw, and has only a slight tooth developed. The fifth, sixth and seventh are similar to the fourth, the basos not being expanded as in *P. australis*.

First Pleopod (Fig. 8).—The endopodite is much stouter than the exopodite. At the inner proximal end a small lobe is indicated, and is indistinctly separated off from the main part, which terminates distally in a rounded end which is not emarginate as in *P. australis*.

The exopodite is long, narrow and pointed, with a slight curvature outwards and a lobe at its proximal end running alongside the basal portion. The margin of the exopodite is fringed with long simple setæ.

Second Pleopod.—The second pleopod is larger than the first pleopod. The endopodite consists of two parts. First the penial filament. This lies on the inner side and does not extend so far as the first joint of the exopodite. It curves slightly outwards and in transverse sections has the form of figure 8. A few short, stout setæ are present along the inner margin proximally.

The second portion is similar to the endopodite of the first pleopod except that the proximal lobe is not so well marked.

The exopodite consists of two joints. The proximal one has a process extending along the margin of the base and bears a fringe of simple setæ. The second joint is short and lanceolate. Its margin carries about forty-four simple setæ.

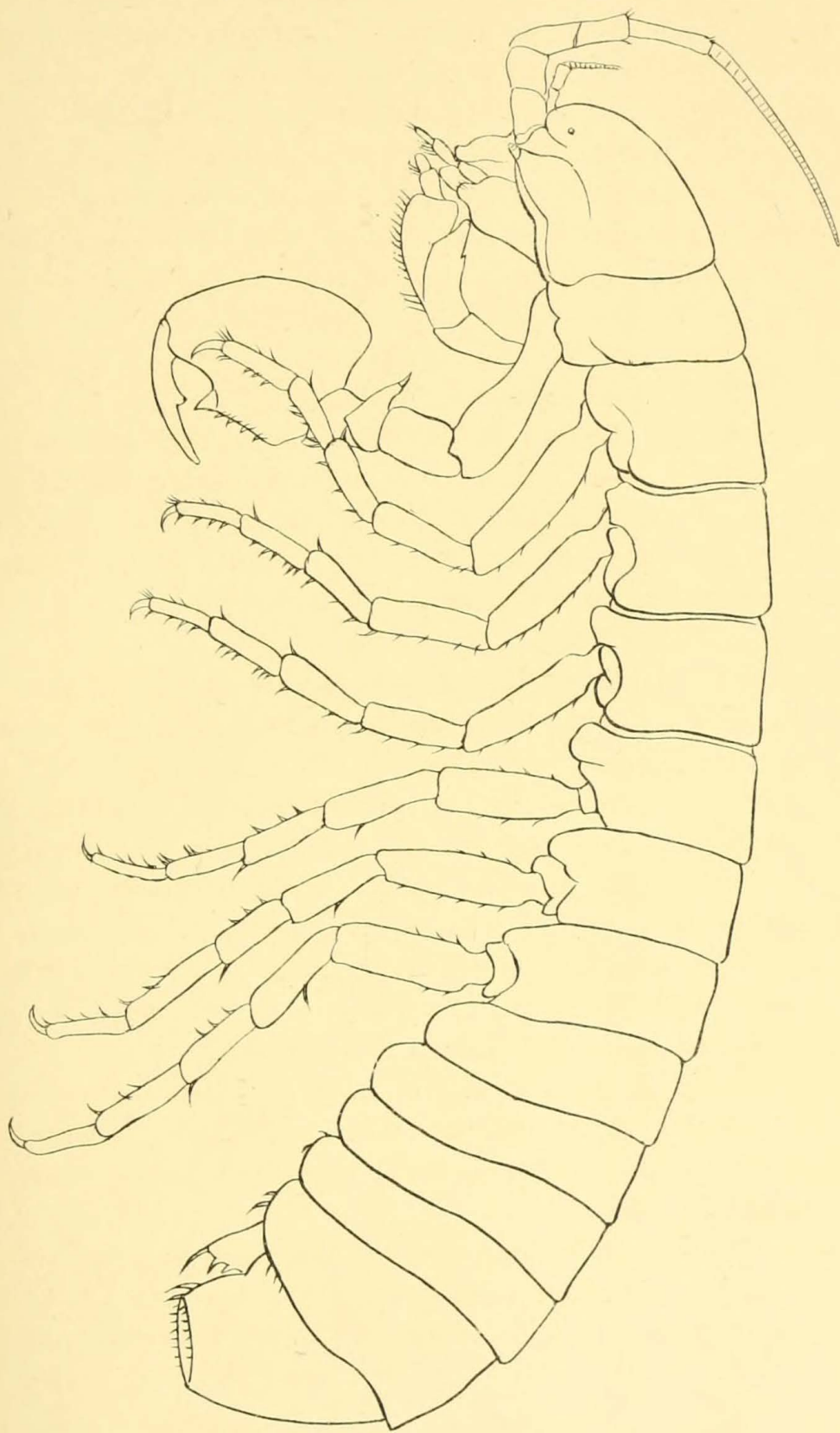
Third Pleopod.—The third pleopod has the endopodite similar in form to that of the first, except that the proximal lobe, though present, is not so large. The exopodite is similar to that of the second, except that the basal process is smaller. The protopodite gives off on the outer side a lobe which, according to Dr. Chilton, perhaps represents an epipodite, the margin of which is fringed with long, simple setæ.

The Fourth and Fifth Pleopods.—These are similar in general shape to the third, but the epipodite gradually increases in size from the third pleopod backwards.

Uropods.—The uropods do not project backwards beyond the pleon. The basal joint is as long as the longer of the two rami, and very stout. On its inner surface it bears, about half-way along its length, a strong spinose seta, and a few smaller setæ are present at intervals. Its distal extremity carries a single strong and one or two smaller spinose setæ, no pectinate ones being present in this position as in *P. australis*.

Its upper surface is broad and concave, and at the inner angle it is produced into a well-marked process terminating in a strong, spinose seta. A few large and small setæ are present along the upper inner margin.

The two rami are strong and curved; the inner is considerably longer than the outer, and both bear a few strong setæ which are not arranged in groups. The points of the rami are dark brown in colour.



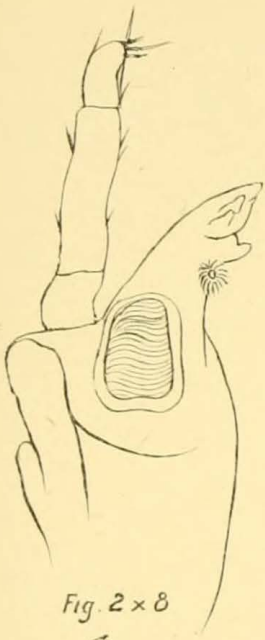


Fig. 2 x 8

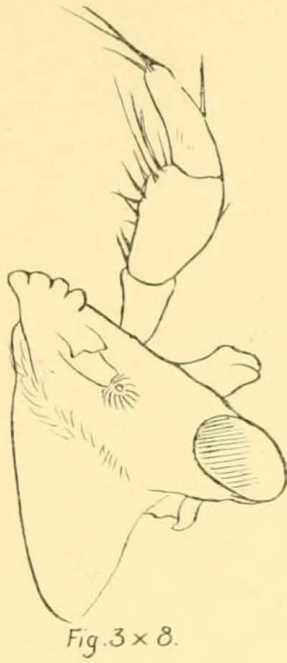


Fig. 3 x 8.

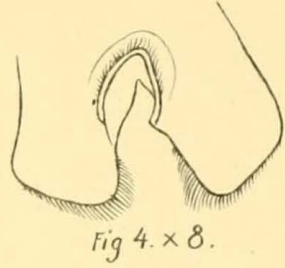


Fig 4. x 8.

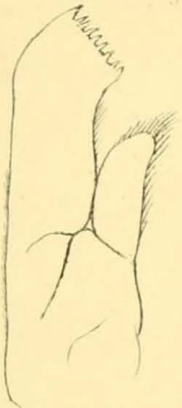


Fig. 5 x 8



Fig. 5^a x 8



Fig. 6 x 8



Fig. 7 x 8

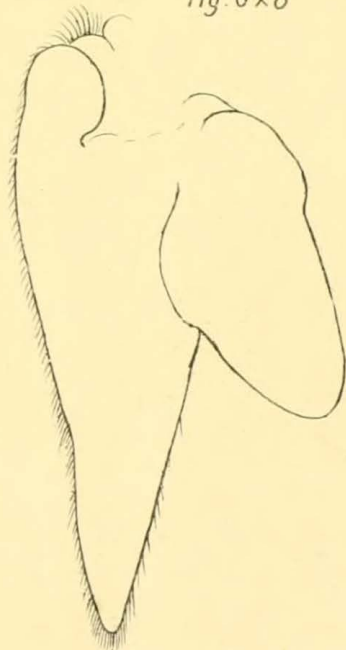


Fig. 8 x 8.

Generic Position.—The present species differs from the members of the genus *Phreatoicus*, to which it is closely allied in two particulars, and to such an extent as to warrant the formation of a new genus for its reception. These are the form of the uropods and of the telson. In his generic description of *Phreatoicus*, Dr. Chilton characterises the telson as “subconical,”* and each of the species he describes has the telson terminated by a small, prominent projection of very characteristic form. This process is absent in our species and, though it is difficult by a single word to express the form of the telson, yet it certainly is not “subconical.” Its sudden truncation and horse-shoe shape in transverse section are features which mark it off strongly from the form found in *Phreatoicus*. The uropods again are short and stout and do not project appreciably behind the telson, differing greatly in this respect from the long, styliform uropods of *Phreatoicus*.

A sexual difference found in the males of *Phreatoicus* again is not found in the present species. As described by Dr. Chilton the fourth pereopod of the male is modified slightly so as to form a grasping organ of the subchelate type; whereas in our species this modification does not occur and the appendage is similar to the others.

EXPLANATION OF PLATES III. AND IV.

Fig. 1.—*Phreatoicopsis terricola*. ♂

Fig. 2.—Left Mandible.

Fig. 3.—Right Mandible.

Fig. 4.—Lower Lip.

Figs. 5, 5a.—First Maxilla.

Fig. 6.—Second Maxilla.

Fig. 7.—Maxillipede.

Fig. 8.—First Pleopod.

The magnification is indicated in the case of each figure.

* Trans. New Zealand Institute, 1882, vol. xv., p. 89. Records of the Australian Museum, vol. i., p. 151. Trans. Linn. Soc. London, vol. vi., pt. 2, p. 185.