NOTES ON TASMANIAN CRUSTACEA, WITH DESCRIPTIONS OF NEW SPECIES.

By Geo. M. Thomson, F.L.S.
(Corresponding Member Royal Society of Tasmania).

When in Tasmania in January of this year I collected a few specimens of Crustacea in the neighbourhood of Hobart, and also obtained others from Messrs. A. Simson, of Launceston, and L. Rodway, of Hobart. Since my return to New Zealand several specimens have been forwarded to me by Mr. C. Chilton, who obtained them from Mr. R. M. Laing, and a number of others have been received from Mr. Morton.

As far as I am aware, no one in Tasmania has devoted special attention to the Crustacea, though a few species have been described in foreign publications from material gathered in the colony. In the "Catalogue of Australian Stalk and Sessile-eyed Crustacea," by Prof. Haswell, of Sydney, which was published in 1882 by the Trustees of the Australian Museum, 42 species are recorded (and 41 described) from Tasmania. Seven more are described as occurring in Bass Straits, some of which are no doubt to be found on the Tasmanian shores. In the various reports of the collections made by the "Challenger" expedition several additional species are also recorded from Bass Straits, to which the same remark applies.

Only *four* of the previously described forms are fresh-water species, namely: *Astacopsis franklinii* and *A. tasmanicus*, *Engæus fossor* and *E. cunicularius*, all fresh-water crayfishes. The latter genus is found in Gippsland as well as in Tasmania. Judging by past experience as to the limits of variation among fresh-water crayfishes, it will probably be found on further examination that the two Tasmanian species of *Engæus* are not entitled to rank separately; Erickson's descriptions are not very satisfactory.

The collection examined by me includes 22 species. Of these only 5 have been recorded in the Catalogue of the Australian Crustacea; 10 have been already described from other parts of the world, but are now recorded for the first time from Tasmania, while 7 are quite new and are described here for the first time. In an appendix I add a species described by Budde-Lund. These additions bring the total number of species now known to occur in Tasmania to 58. It is manifest that this represents only a fraction of the forms which must occur in the colony.

The most interesting of my finds is certainly the Schizopod shrimp (*Anaspis*) found in pools at the top of Mt. Wellington. How an animal of such conspicious size should have hitherto escaped the observation of collectors, occurring as it does in a locality which residents, as well as visitors, to Hobart visit in numbers every season, is only another proof of the small amount of attention which has hitherto been paid to this section of the Tasmanian fauna.

This animal is, I think, one of the most remarkable Crustaceans found of late years. How and when its ancestors reached its present habitat is one of those questions which we have no present means even of guessing at. Its nearest allies—and even they are very distantly related—appear to be among the Euphausiidæ, a deep sea group of Schizopods. But the whole structure of the animal has become so profoundly modified from that of all known Thoracostraca, that I think we must assign it a very high antiquity. To take only two of its most prominent characteristics, it has completely lost the shield or carapace so distinctive of all other animals of the order Thoracostraca, and no doubt in association with this its gills have become plate-like and project externally along the sides of the thorax. The loss of the carapace is the feature which has suggested the name *Anaspis* to me. In respect to this feature, and also in its gills, the animal resembles an Amphipod, the resemblance being, however, purely external and having no importance. It is this feature again which suggests the great antiquity of the form, for among all the Thoracostraca the carapace appears at an extremely early stage of the development of the individual, and is present in all the sub-orders. In the Euphausiidæ the young animal is hatched as a Nauplius with a large well-developed carapace. At what stage of its development *Anaspis* loses its carapace, or has already in the course of its evolutionary history lost it, is a question which I am unable at present to solve; meanwhile I think it advisable to create a new family Anaspidæ (Tribe Schizopoda) for its reception.

The occurrence of fresh-water Amphipoda of the genus *Niphargus* is another point of great interest. *N. montanus* seems common enough in the smaller pools and among the swampy ground on the top of Mt. Wellington. I did not find it in the large pools with *Anaspis;* the latter would, perhaps, exterminate it in such open localities. I collected *N. mortoni* originally in a small rill at an elevation of only 200 or 300 feet above high-water mark, at Franklin on the Huon, and was at first under the impression that it might prove only a transitional form between a littoral and a fresh-water species. But it appears to be abundant in the streams coming down the seaward side of Mt. Wellington at elevations of 2000 feet and more. It is just questionable whether my specimens are strictly referable to the genus *Niphargus,* occurring, as the latter does, only in the subterranean waters of Europe. The genus is probably of considerable antiquity, for it has undergone a good deal of modification. *N. montanus* is also probably of very considerable age as a species, for not only does it occur at a much greater elevation than *N. mortoni,* but it has also undergone greater modification of structure. It would aid us, perhaps, in the elucidation of this problem if all the fauna of the pools on Mt. Wellington were to be examined. The researches conducted by Mr. Chilton and myself on the New Zealand Crustacea have brought to light some interesting facts in this connection. For example, of fresh-water Amphipoda and Isopoda there are eight known species in New Zealand, three of which occur in streams, etc., and five are subterranean—of the former, *Idotea lacustris* ranges from brackish waters, just above tide-marks, to a height of 1200 ft. The species belongs to a genus having several marine representatives in the New Zealand, and is apparently identical with a form found in the Straits of Magellan. Our species therefore is apparently in course of development into a truly fresh-water form. One species of *Pherusa* (marine) occurs in the shallow coastal waters, another, very different, has only hitherto been found at elevations of 2000 feet, quite 100 miles from the sea. One species of *Calliopius* is marine (littoral), one occurs in fresh-water streams, and a third in the underground waters of the South Island. On the other hand, *Gammarus fragilis, Crangonyx compactus, Phreatoicus typicus,* and *Cruregens fontanus* are all species occurring only in subterranean waters, and of which no related marine species have been found. They have very probably been long isolated, especially the two last, and have undergone a very considerable amount of modification. It may ultimately be possible to trace the developmental relations of several of these fresh-water forms from allied marine forms now occurring in the adjacent seas, and this is being gradually done in New Zealand. In the case of Tasmania however, so little is yet known of the Crustacean fauna, that any speculations as to the origin of the fresh-water forms are premature. In light of the finds recorded by me, however, naturalists will wait with some impatience for further researches on the fresh-water fauna of Tasmania.

The terrestrial Crustacea are of very great interest as bearing on the question of geographical distribution. *Talitrus sylvaticus* is an Amphipod common to Tasmania and the eastern parts of Australia. It is the representative in damp woods of the New Zealand *Orchestia sylvicola.* How widely these species differ, or whether they are not indeed too closely allied to be separated even specifically, is still an undetermined point, the whole relationships of the Orchestidæ requiring to be carefully worked up. *Oniscus punctatus*, the common wood-louse of the bush, found along with the last species under dead leaves, etc., is also common in New Zealand, where it is associated with *Orchestia sylvicola*. *Porcellio graniger*, another common wood-louse of New Zealand, and which has also been recorded from Tasmania, is not, as a rule, found in the damp bush in the eastern colony. It affects drier situations, and is the species which frequents houses and gardens. It may prove to be a cosmopolitan species. It is certainly likely to be widely spread by artificial means, as New Zealand and Tasmanian ferns and other bush plants, especially when packed for export in nurserymen's establishments, are almost certain to contain specimens. The question requires examination. Gustave Budde-Lund (Crust. Isop. Terrestria) thinks that probably this species does not differ from *P. lævis*, a form found in nearly every country of the world.

I have, in this paper, described the new species of Amphipoda at—what may appear to some to be—undue length. But in face of the confusion which has arisen in the past from imperfect descriptions of species of this group, I think it better to err in the direction of minute treatment than to leave in doubt the characters of the forms which are being described.

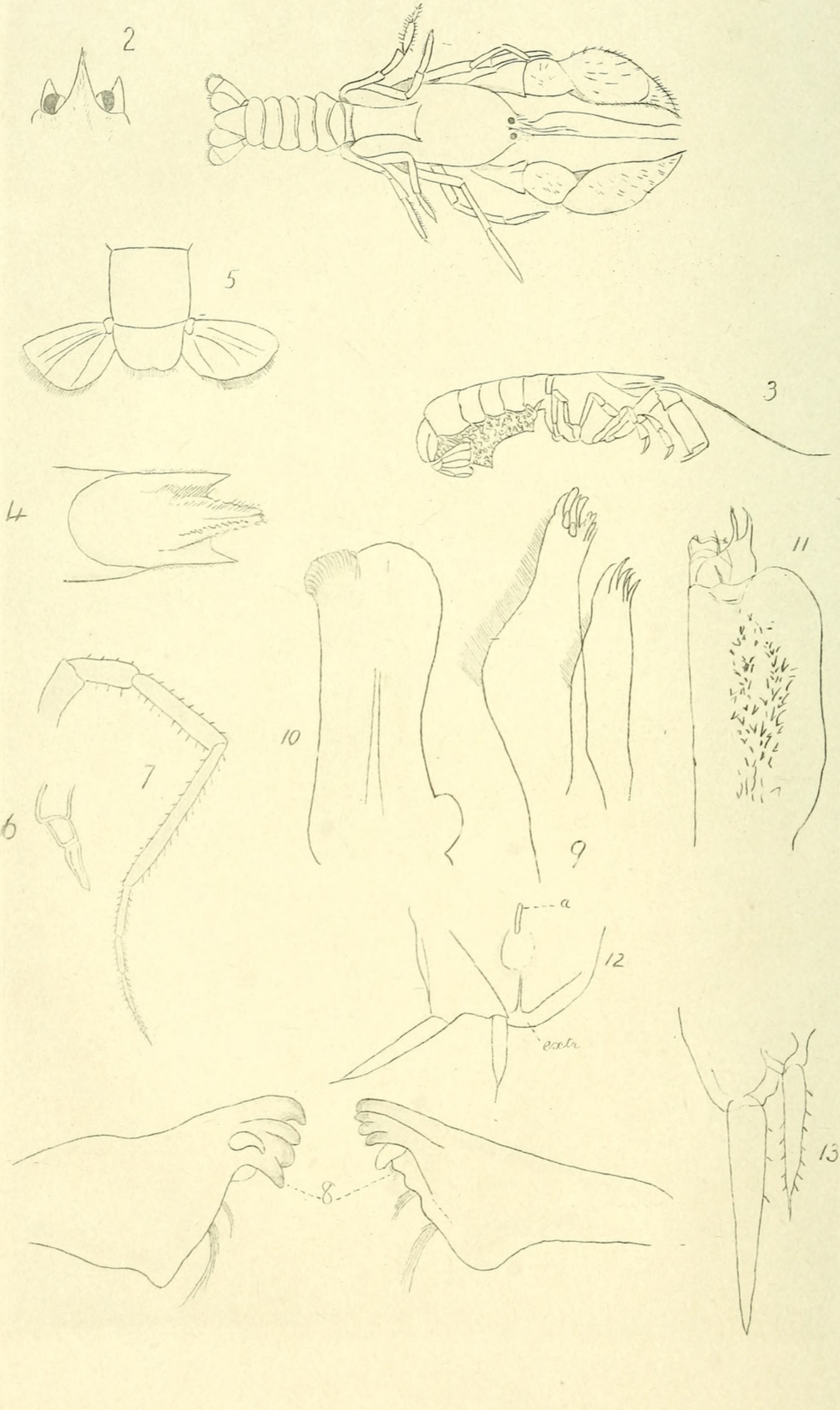
The following species are described here for the first time:—

Gebia simsoni.
Anaspis tasmaniæ
Rocinela spongicola.
Lysianax stebbingi.
Atyloides tasmaniæ.
Niphargus mortoni.
———— montanus.

The following species, already described, are here added to the fauna of Tasmania:—

Pinnixa faba, Dana (Australia, etc.)
Petrolisthes elongatus, Heller (Australia & New Zealand).
Leander intermedius, Stimpson (Australia).
Oniscus punctatus, mihi (New Zealand).
Ligia australiensis, Dana (New South Wales).
Actœcia euchroa, Dana (New Zealand).
Sphæroma gigas, Leach (Kerguelen Island, Australia, New Zealand, Auckland Islands, Falkland Islands, Tierra-del-Fuego).
Iais pubescens, Dana (Kerguelen Island, New Zealand, and Tierra-del-Fuego).

Pl I



Hyale rupicola, Haswell New South Wales).
Mæra fasciculata, mihi (New Zealand).

Tribe *Brachyura.*

Fam. *Pinnotheridæ.*

1. *Pinnixa faba.* Dana.

I picked up a single specimen (female) of this small crab on the beach near Hobart, and Mr. Morton has sent me a number collected by himself from mussels, also all females. I follow Prof. Haswell in assigning my specimens to this species, though it seems questionable to me whether all the species of *Pinnixa* and *Pinnotheres* are not referable to one and the same slightly varying form. This species appears to be common enough about Hobart, though it has not previously been recorded from Tasmania.

Tribe *Anomoura.*

Sub-tribe *Porcellanidea.*

2. *Petrolisthes elongatus.* M. Edw.

Specimens of this shore crab, so common on the coasts of New Zealand, were found under stones between tide-marks on the beaches in the neighbourhood of Hobart. It has not previously been recorded from Tasmania.

Tribe *Macroura.*

Fam. *Callianassidæ.*

3. *Gebia simsoni.* Nov. sp. (Pl. I., figs. 3—5.)

Front three-lobed, the carapace being produced in the median line into a blunt rostrum, and the margins also produced forwards into acute points. The anterior portion of these margins and of the rostrum are crenately toothed and somewhat hairy. External antennæ three-fourths as long as body, internal pair having the peduncle reaching as far as the peduncle of the external pair; both flagella extremely short. First pair of legs very stout; mesos broad and flattened, with about four small teeth on its lower distal margin, and one on its upper margin near the end; carpus with one strong tooth on the lower inner margin; propodos elongate sub-quadrate, the lower margin produced into a long stout tooth; palm transverse; dactylos nearly straight, acute, very hairy, and twice as long as palm.

In the general form of the front of the carapace (fig. 4), this species resembles *G. spinifrons* (Haswell), but is distinguished by the almost total absence of spines by the form of the hand in the first pair of legs, and by the absence of distinct epimeral thickenings on the sides of the abdominal segments. The legs of the second to the fifth pairs are destitute of spines, but have the carpus, propodos, and especially the dactylos somewhat thickly furnished with hairs. The telson (fig. 5) is short, very broadly rounded, and is thinly membranous in texture. The external plate of the last pair of pleopoda broadens posteriorly, and is strengthened by two stout nearly parallel median ridges in addition to its marginal thickening; the internal plate is obliquely fan-shaped, and is strengthened by one median ridge. Length 44 mm. (1¾ inch).

A single specimen was handed to me by Mr. A. Simson (after whom the species is named), who obtained it on the East Coast. It is a female, having the whole under surface of the abdomen covered with ova.

Fam. *Astacidæ.*

4. *Astacopsis franklinii.* Gray.

A few small specimens of this common freshwater Crayfish, obtained at Zeehan (?), were handed me by Mr. Simson. Gray's short description reproduced in the Australian Museum Catalogue (p. 176) is substantially accurate. In none of my specimens, however, were "the sides of the second abdominal rings spinose." On all of them examples of the parasitic *Temnocephalus qudricornis* (Haswell) were found.

5. *Engæus cunicularius.* Erichson (Pl. I., figs. 1 and 2).

Specimens of this small freshwater crayfish, collected at Zeehan (?), were handed me by Mr. A. Simson. The name is wrongly printed *E. cunicularis* in the Australian Mus. Cat. It differs from *E. fossor,* according to Erichson (Archiv fur Naturg., 1846, p. 102) not only in the absence of a toothed border on the lower side of the hand, but also in its more rounded carapace, its broader rostrum, larger eyes, sharp-pointed antennary scale, and in the greater breadth of the posterior part of the abdomen. In the absence of examples of *E. fossor,* I cannot compare the two forms, but the characters seem hardly good enough to found a specific distinction upon.

My largest specimen was 1¾ inches in length from the point of the rostrum to the extremity of the caudle swimmerets; the chelæ were about 1½ inches long. In the figure (fig. 1) the relative narrowness of the abdominal segments as compared to the carapace is not brought out. The carapace is deep relatively to its breadth, and in general appearance the whole body is much compressed, The carapace is produced in front into a minute sharp rostrum (fig. 2), reaching slightly beyond the eye-sockets, and on the upper part of it are two minutely setose ridges which converge towards it extremity. The eye-peduncles are very short, and the acutely-pointed scales of the outer antennæ hardly reach beyond them. The whole body is nearly smooth, and there are only a few small hairs on tho outer joints of the legs.

Fam. *Palæmonidæ.*

6. *Leander intermedius.* Stimpson.

A single specimen of this prawn,—a female carrying an immense number of ova beneath the abdomen,—was obtained on the East Coast by Mr. A. Simson. The species has not been recorded from Tasmania before.

Tribe *Schizopoda.*

Fam. *Anaspidæ,* fam. nov.

Carapace wanting; the cephalon and all the segments of the body distinct. Maxillipeds and succeeding seven pairs of legs nearly uniform in structure, adapted for walking. Branchiæ lamellar, all external. No egg-pouch. Pleopoda with well-developed natatory exopodites; endopodites of first and second abdominal segments, specially modified in the males as copulatory appendages. Uropoda, normal. Development?

Genus *Anaspis,* gen. nov.

Integument thin and flexible. Whole body divided into fifteen distinct subequal segments, viz., cephalon, eight thoracic, and six abdominal. Eyes well developed. First antennæ, with three-jointed peduncle and two flagella. Second antennæ, with well developed scale on the second joint. Mandibles with three-jointed palpi. First maxillæ two-branched; second pair four-branched. Maxillipeds pediform, with two rudimentary branchiæ projecting externally from the coxa; exopodite small and rudimentary. Legs generally uniform in structure, seven-jointed, each furnished with a claw-like dactylos. The coxa of each leg (except those of the last pair) bear two external lamellar branchiæ which project forward, and the basos bears a well-developed natatory exopodite. Genital opening of the female on the sternum in front of the last pair of thoracic legs. Telson short, rounded. Uropoda with the plates subequal; inner with a slight longitudinal median ridge; outer, with an imperfect transverse articulation near the middle.

7. *Anaspis tasmaniæ,* sp. nov.

The characters of this remarkable and interesting shrimp—the only truly freshwater schizopod I think yet found—are briefly expressed in the diagnosis of the genus. A few details may be added here, but I propose elsewhere to describe the animal more fully, and to discuss its affinities.

The cephalon is hardly larger than any of the body segments, and is produced in a very short acute rostrum between the bases of the antennæ; its sides are sub-equal in depth to the succeeding segments. The first thoracic segment alone has its sides divided by a very distinct and somewhat oblique line into a broad epimeron; none of the other segments bear any traces of epimera. The lateral margins of all the thoracic segments but the last are more or less covered by the plate-like branchiae of their respective segments, which are all external to the body and project forwards. The abdominal segments are somewhat longer than the thoracic; their margins are smooth, except the two last, which are slightly fringed with short tooth-like spines or setæ.

The cephalic segment carries the ophthalmites, two pairs of antennæ, the mandibles, and two pairs of maxillæ. The first thoracic segment carries the first pair of walking legs, which are the modified maxillipeds. Each of the succeeding segments bears a pair of appendages, those of the thorax acting partly as walking legs and partly as natatory organs, and those of the abdomen as natatory organs. The telson is bluntly triangular in form, slightly ridged down the median line and thickened along its outer margins; the posterior rounded margin is furnished with a comb-like row of short spines.

The eye-peduncles are short, one-jointed, and directed obliquely outwards. The antennæ of the first pair have a three-jointed peduncle, the joints of which are broad and rather flattened. The last joint bears two flagella, the outer of which is composed of a great number of articulations—usually from 75 to 100—and is from two-thirds to three-fourths the length of the whole animal; the inner is less than one-fourth the length of the animal, and is divided into from 20 to 25 articulations only. The *second antennæ* have a four-jointed peduncle, with a long multi-articulate (50-60 joints) flagellum, the first joint of which is probably, however, to be reckoned as the fifth of the peduncle. The moveable plate at the end of the second joint is oval, and has a smooth margin fringed with long plumose setæ. The flagellum is about two-thirds as long as the body of the animal.

The *mandibles* are strongly developed and are placed so as to close the mouth opening with their exposed part. The cutting edge is furnished with a double row of strongly indurated teeth, and at right angles to it stands the large oval grinding tubercle. The *first maxillæ* are two-branched only, the outer branch ending in a double row of strong spines which are pectinately toothed on the inner side, and the inner branch, which is both smaller and more rounded, being fringed with short plumose setæ. The *second maxillæ* are four-branched, each branch being one-jointed. These two pairs of organs appear to be purely masticatory in their function and to differ from those of other Schizopods, not only in the number of their articulations, but also in the total absence of any external appendages. The *maxillipeds* are similar in general form to the succeeding pairs of legs. They are very distinctly seven-jointed, and bear on the inner side of the coxal joint two small lamellar organs fringed with setæ, and which appear to act as masticatory lobes subsidisary to the maxillæ. These resemble in a more highly developed form the masticatory lobe found on the corresponding joint on the maxilliped of most species of the Euphausiidæ. On the outer side of the coxa are two small lamellar branchiæ, while the basos bears a short slender one-jointed exopodite which just shows at its extremity traces of the articulation which characterises the same organ in the succeeding appendages. The dactylos of this limb (and of nearly all the succeeding pairs) ends in two or three powerful hooked claws which are almost hidden among setæ.

The other seven pairs of *walking legs* increase in length up to the fourth, which is the longest, and then gradually decrease in length and robustness to the last. The branchiæ, which greatly resembles the same organs among ordinary amphipod crustaceans, undergo a somewhat similar progression and diminution in size, but are quite wanting on the last pair. The exopodites or natatory branches increase in size relatively to the limbs which bear them from the first up to the sixth pair, in the seventh they are reduced to small branchia-like processes, quite destitute of segmentation, in the eighth they are quite wanting.

The five pairs of *pleopoda* are all similar in form in the females. Each consists of a basal joint carrying a large natatory exopodite near its outer angle, and a small lamellar endopodite, like a rudimentary gill, on its inner angle. In the males the endopodite of the first pair is developed into a lamelliform plate, projecting inwards and apparently furnished with a duct, while the corresponding limits of the second pair are produced into two scoop-like processes, with their hollow faces meeting in the median line. I have not discovered the use of these organs. The sixth pair or *uropoda* are developed into a large tail-fin as in most Schizopods, but owing to the shortness of the telson this is formed of four (not five) plates. The plates are sub-equal in length, narrow-oblong in form, and are fringed with long comb-like setæ. The outer plates are ridged on their outer proximal margins, and are partly divided by a transverse ridge defined by a row of short spines. The telson is short, rounded and toothed round the end.

Large specimens are about $1\frac{1}{2}$ inches in length, the average length being about one inch.

The colour is grayish, becoming brown in spirit specimens.

I discovered these remarkable shrimps in a pool near the top of Mount Wellington, that is, at an elevation of over 4,000 feet. The pool had deep crevices among the boulders, and in these dark recesses large specimens seemed to be abundant, but they were shy and difficult to capture. Crumbs, etc., dropped on to the sloping rock bottom of the pool attracted them however, and I was able to secure several specimens, apparently all females. This was in January. At my request, however, Mr. L. Rodway visited the spot on the 24th May. The ground was then covered with snow and the pools all frozen over. After breaking the ice, he put in a small net baited like a crayfish net, and as the result of several hours' patient waiting in an extremely cold situation he succeeded in securing a large series of specimens of both sexes and of considerable range of size. I wish to take this opportunity of thanking Mr. Rodway for his kindness to me in carrying out my request with so much enthusiasm.

I believe this form to be the most interesting Crustacean which has been discovered for very many years.

Tribe *Isopoda.*

Fam. *Oniscidæ.*

Sub-Fam. *Oniscinæ.*

8. *Oniscus punctatus*, mihi (Pl. I. figs. 6-13).

This terrestrial Isopod, so common among fallen leaves, etc., in the New Zealand bush, seems to be equally common in similar situations in Tasmania. I obtained some specimens along with *Talitrus sylvaticus* on the slopes of Mount Wellington, and received a number also from Mr. Morton, collected from the same locality. My original description in the Transactions of the New Zealand Institute, vol. xi., is very meagre, and the figure most unsatisfactory; I therefore take this opportunity of amplifying both.

The length of the body is more than twice its breadth, the lateral margins of the segments are rounded, and—except the last—hardly produced backwards. The thoracic segments are unequal in length, the first being the longest, then diminishing to the fifth, which is the smallest, the two last being somewhat longer. The abdomen is about two-thirds as broad as the thorax, and rather more than one-third as long.

The head is short and much narrower and shorter than the succeeding segment, with which it articulates closely ; the eyes are small and are placed quite at the sides of the head. Seen from the front the epistome is slightly arched. The first antennæ (fig. 6) are very minute and three-jointed, the third joint being minutely setose at the extremity. The second antennæ (fig. 7) are about as long as the head and first three body segments, they are strongly geniculate; the three-jointed flaggelum is sub-equal in length to the last joint of the peduncle. The mandibles (fig. 8) end in four chitinised brown curved teeth, in addition there stands on the inner side of these a single pale-coloured tooth or tubercle; the cutting edge inside of the teeth bears three tufts of hair-like setæ, the innermost (hindmost) being the longest. The first maxillæ (fig. 9) have the outer plate strongly curved on the outer margin, the distal portion of which carries a dense fringe of fine setæ ; the end is furnished with seven (or eight) strongly chitinised teeth, which are dark brown in colour; the slender inner plate ends in five weak slightly curved teeth. The second maxillæ (fig. 10), as in other members of the sub-family, have the two plates anchylosed together throughout their length, and have the extremity of the inner margin produced into a brush-like process. The maxillipeds (fig. 11) have the characteristically large basal plate somewhat rounded on the outer margin, and carrying on the inner extremity a small, nearly square, plate, the rest of the limb not being developed ; outside of, and obliquely placed to this, is the small palp of which the basal joint bears two small processes, while the terminal joint is small and is produced into a slightly fringed pointed apex. The large basal plate is always more or less ornamented by dark pigment.

The uropods (figs. 12 and 13), as seen from below, have their appendages very freely articulated to the basal plate, the inner and shorter one being placed usually anterior to the outer; the former has several and the lateral a few small marginal spines.

The species is now recorded for the first time from Tasmania.

Sub-Fam. *Ligiinea.*

9. *Ligia australiensis,* Dana.

This species was found by me in abundance under stones on the beaches in the neighbourhood of Hobart, and several specimens from the same locality were forwarded to me by Mr. Morton. These animals usually occur just above tide-marks, and run with great agility when their hiding places are exposed.

The species has not been recorded before from Tasmania.

Sub-Fam. *Scyphacinæ.*

Actœcia, Dana.

The generic character as given by me (in the Trans. N.Z. Inst. Vol. xi., p. 49), and which I adapted from Dana, is somewhat incorrect. I would alter it as follows:—"External antennæ stout, curved, five-jointed, with a three (or, counting the apex, four) jointed flagellum. Maxillipeds having the palp in the form of a slender acutely-pointed plate. Legs of the seventh pair as long as the preceding pairs."

10. *Actœcia euchroa,* Dana (Pl. II., figs. 1-8).

I found specimens of this little Isopod on the sea-beach between tide-marks at Eaglehawk Neck. They ran rapidly along the sand, and when pursued rolled themselves into a ball. The species is common on the New Zealand coast.

The few specimens found by me were very small, being less than $\frac{1}{6}$th of an inch (4 mm.) in length. In colour they were light gray with irregular black markings. Under the microscope the integument appears to be minutely scale-like, with a few short scattered spinules, particularly on the margins of the abdominal segments and on the appendages.

The first antennæ (fig. 3) are minute and indistinctly two-jointed; they are very difficult indeed to distinguish. The second antennæ (fig. 4) have a five-jointed base, with a four-jointed flagellum (counting the apical joint); all the articulations are dotted with numerous short spines. The mandibles (fig. 5) are strong and thick; at the apex is a stout bifid tooth, inside of this there are two simple teeth and then a strong trifid tooth standing at right angles to the cutting ridge of the limb; behind these stands a short comb-like process and a brush of fine setæ.

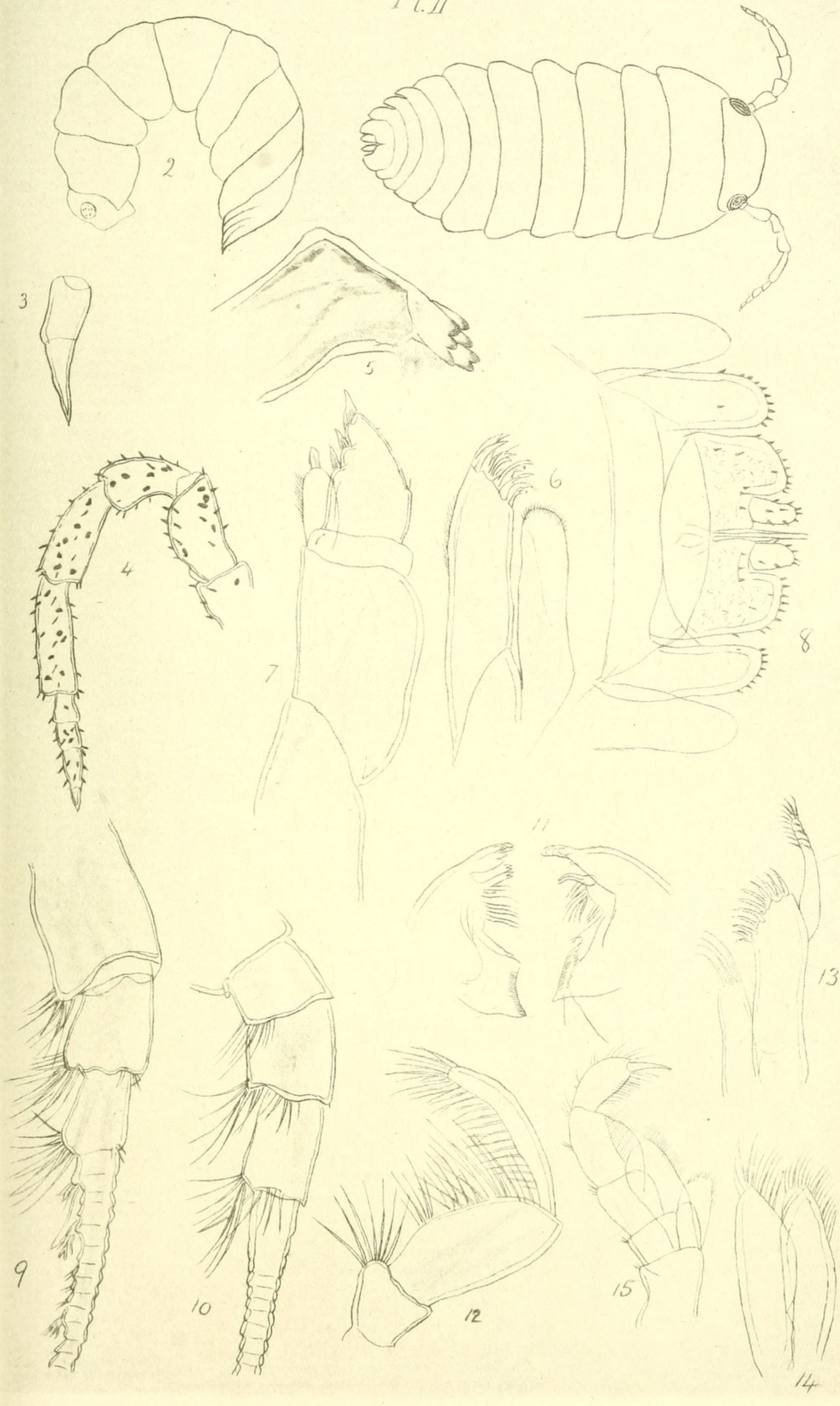
The first maxillæ (fig. 6) have the outer plate slender but armed at the extremity with about twelve acute curved spines; the inner plate ends in a rounded finely setose edge. (The second maxillæ were not seen, being lost in the dissection.)

The maxillipeds are stated by Dana to be two-jointed in the scyphacinæ,* and the second joint to be lamellate; they are so figured for his *scyphax ornatus* of which he originally took the present species to be the young form. In *Actœcia,* however, they are four-jointed (fig. 7), the basal joint being very short and having the large second joint attached to it obliquely. There is no inner plate attached to the basal joint, but the second joint bears a small oval plate fringed at the extremity. The third joint is short and extremely indistinct, while the fourth is in the form of a flattened, acutely-pointed lamella fringed (not serrately toothed) on its inner edge.

The abdominal segments (fig. 8) are short, the last being

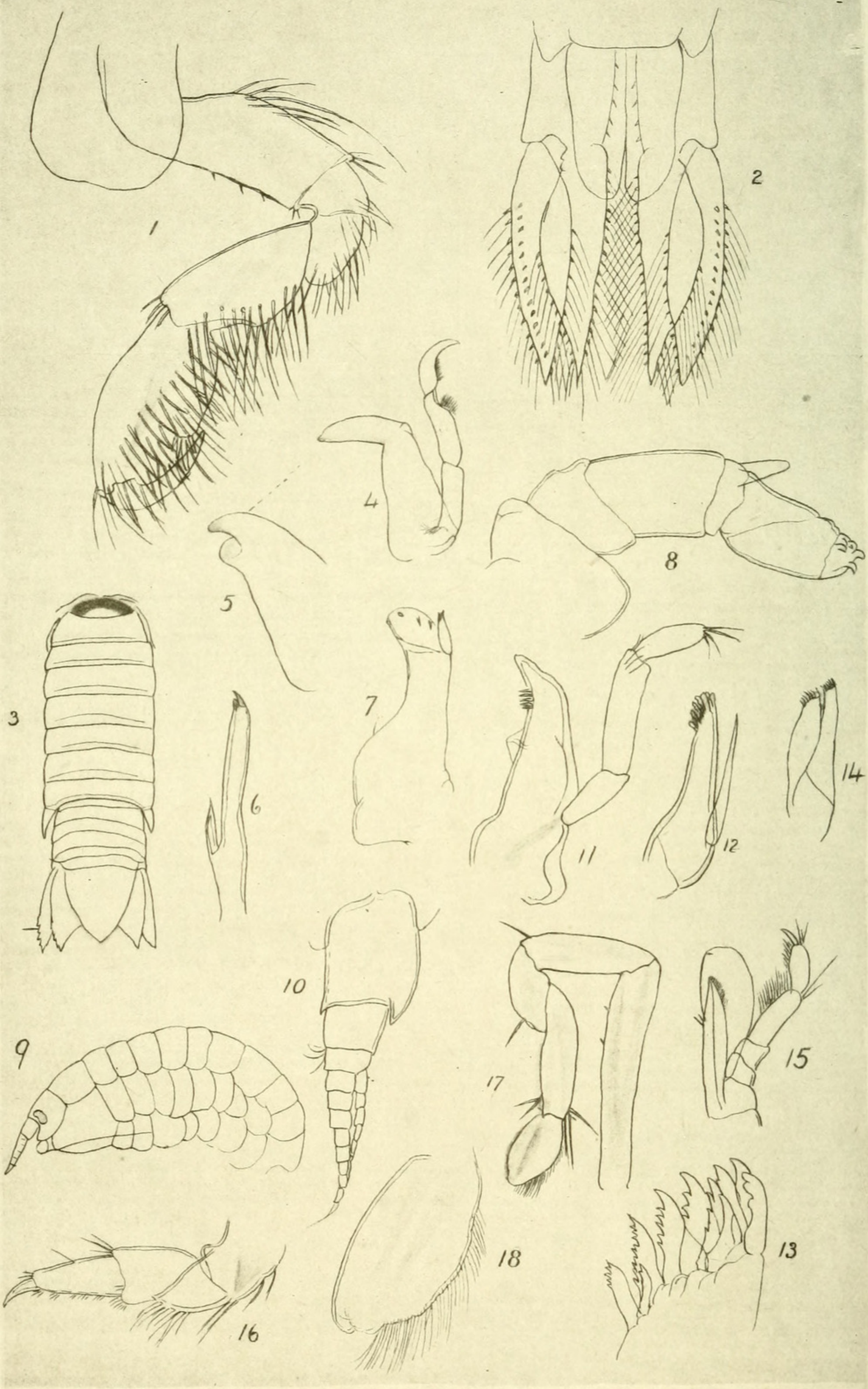
Face p. 58

Pl. II



Face p. 57

Pl. III



the shortest of all; the lateral portions of the third, fourth, and fifth are greatly produced backwards, and have their margins rounded and edged with short acute spines. The uropods have a very large basal joint, its outer portion resembling the lateral portion of the preceding segment, but with the inner margin only about half as long as the outer and transversely truncate; the outer rami are stout, blunt, and spinose; the inner are long and very slender, are tipped by a long bristle and have their margins finely scabrous; they appear to spring from the very base of the uropods and lie together in the median line.

The whole appearance of these animals suggests that they may be in reality, as Dana suggested, only young forms, but though I have collected them in abundance on the New Zealand coasts during several years past, I have never met with any other species resembling them.

Harger's genus *Actoniscus* (Amer. Journ. Sci. iii., Vol. xv. p. 373, 1878), must evidently be relegated to *Actoeia*, the characters of which were so imperfectly defined by Dana.

Family *Ægidæ.*

11. *Rocinela spongicola*, n. sp. (Pl. iii., figs. 3-8.)

Two specimens belonging to this genus were sent me by Mr. A. Morton, with the remark that they were found in some sponge which had been dredged; the exact locality, however, was not stated. The following is a description:—

Body (fig. 3) scarcely convex, smooth, narrow, oval in form, the length being three times as great as the breadth. Head short, rounded in front; eyes occupying nearly the whole of the segment, crescent shaped. The thoracic segments increase slightly in length to the sixth, which is the longest. Epimeræ small, those of the last three pairs produced backwards (especially the last) into acute angles. Last abdominal segment triangular, pointed, longer than the anterior portion of the abdomen, setose on the posterior half of the margin.

First antennæ reaching nearly to the end of the thoracic segment, hardly separated at the base by a minute acute process of the cephalon; peduncle and flagellum sub-equal in length, the latter about fourteen-jointed setose, the second joint as long as the three succeeding. Second atennæ half as long again as the superior; joints of the peduncle slightly increasing in length to the fifth, which is the longest; flagellum as long as the peduncle, about fourteen-jointed.

Mandibles (figs. 4 and 5) with the strong basal portion ending in a minutely two-lobed extremity, viz., a sub-acute tooth and a shorter rounded lobe; palp with the joints subequal in length, the last curved setose on its inner margin and capable of folding against the setose inner margin of the second joint.

First maxillæ (fig. 6) with outer plate long and narrow, very slender, and ending in one strong tooth, and three smaller ones; inner plate rudimentary with a minute terminal seta. Second maxillæ (fig. 7) somewhat dilated, ending in a feeble rounded lobe, and bearing on its inner extremity a very small uni-articulated process.

Maxillipeds (fig. 8) pediform, the terminal portion ending in a few (about four) small claws; the palp represented by a very small one-jointed process

The three anterior pairs of thoracic feet are furnished with sickle-shaped dactyli. The four posterior pairs are directed backwards and are elongated; the sixth and seventh pairs are the longest.

The basal part of the caudal appendages is produced backwards on its inner side into a long acute ciliated process; the external ramus is long, narrow, pointed and ciliated all round, it bears a row of spines on its outer margin; the internal ramus is about twice as broad; and is obliquely truncate at its widest part; it is ciliated all round, and bears a row of spines towards the extremity of both margins.

Length of the animal 15mm. (about $\frac{5}{8}$ inch.)

Fam. *Sphæromidæ.*

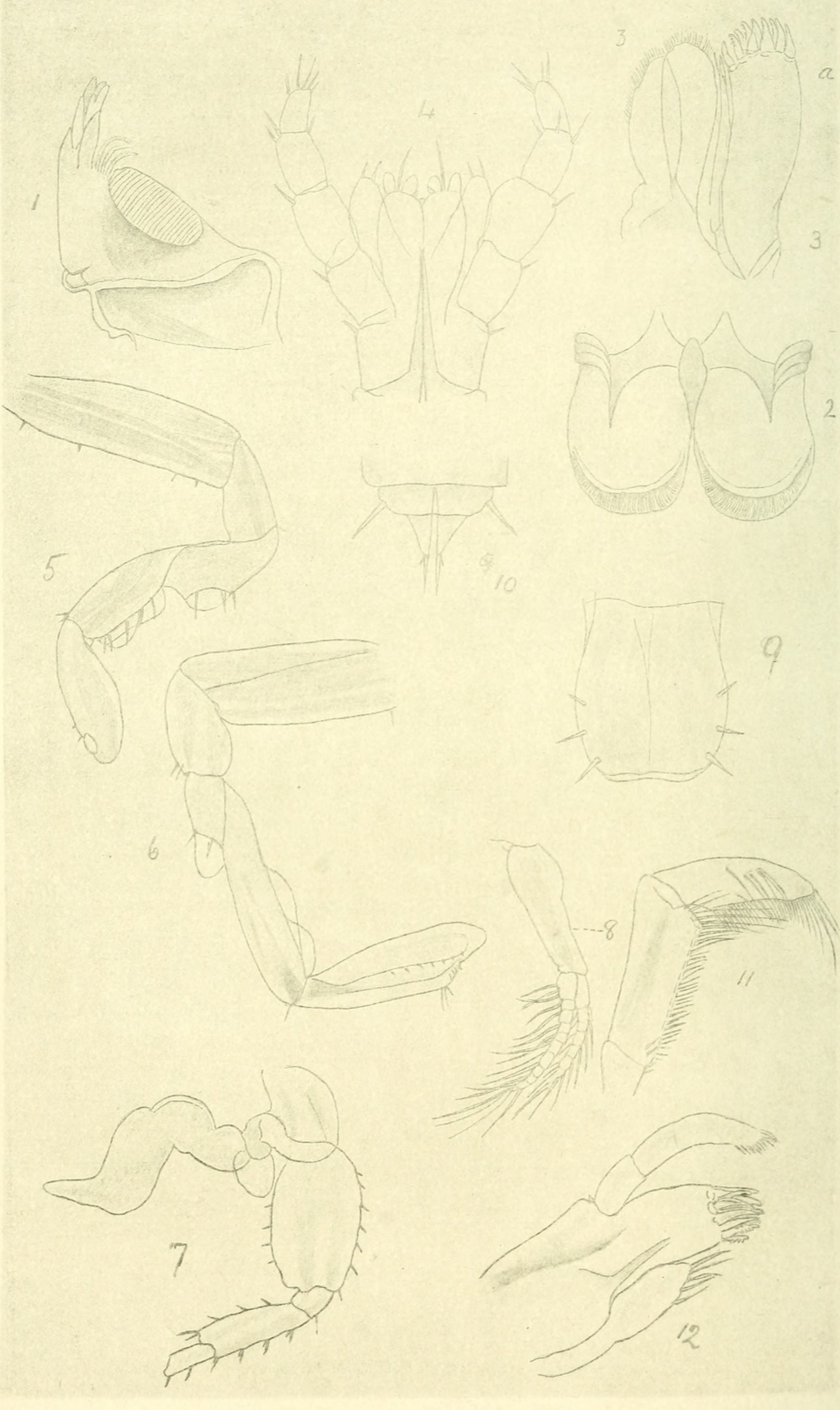
12. *Sphæroma gigas.* Leach.

A small specimen, which I provisionally refer to this widely-spread Antarctic species, was picked up by me on the rocks between tide-marks at Pirates Bay, and a second from the same locality, collected by Mr. R. M. Laing, was handed to me by Mr. Chilton. It is identical with a species common on the East Coast of New Zealand, but, with them, differs in a few details from a large form, of which I have specimens from the Auckland Islands. In no group of Isopoda is there more need of a thorough revision of the genera and species than in the Sphæromidæ; and identification of many of the described forms is now a matter of extraordinary difficulty. This is chiefly owing to the fact that various naturalists have taken sexual characters as of generic importance, and have, consequently, in many cases placed males and females of the same species in genera. This species has not previously been described from Tasmania.

13. *Sphæroma quoyana.* M.-Edw.

I obtained a solitary specimen of this well-marked species between tide-marks on the Huon River, a little below Franklin. The species was originally described by Milne-Edwards, from specimens gathered on the coast of Tasmania by M. M. Quoy

Pl. IV



and Gaimard. It was also found by Heller (Voy. of the "Novara") at Sydney.

Fam. *Asellidæ.*

14. *Jais pubescens.*

Jæra pubescens. Dana: U.S. Expl. Expedn. Crustacea (vol. ii., p. 744, pl. xlix.)

A number of specimens of this little Crustacean were found in the tube in which the specimen of *Sphæroma Quoyana* was placed. According to Dana, the forms originally described by him were taken at Nassau Bay, Tierra del Fuego, parasitic on *Sphaæroma lanceolata.* I have gathered this species at Auckland and Dunedin, and Mr. Chilton has recorded it from Lyttelton, all on the New Zealand coast. Mr. Chilton described his specimens under the name *Jæra novæ-zealandiæ* (Trans. N.Z. Inst., vol. xv., p. 189), the generic name being, however, changed to *Jæra* by Carl Bovallius (" Notes on the Asellidæ." Roy. Swedish Acad. of Sc.) We have since, however, discovered that our New Zealand form agrees with Dana's, and it therefore comes under Bovallius' genus *Jais,* the most distinctive character of which is the tri-unguiculate dactyli of the walking legs.

My Tasmanian specimens agree with those from New Zealand in most points. In Dana's brief description, the first pair of antennæ are said to be 4-jointed; in my specimens they are 6-jointed, which is also the case in the only other species of the genus, *J. Hargeri.*

Tribe *Amphipoda.*

Family *Orchestidæ.*

15. *Talitrus sylvaticus.* Haswell (Pl., iv., figs 1-10).

This terrestrial species was originally described from New South Wales, where, according to Professor Haswell, it is "abundant on moist ground, in wood and scrubs." He adds;—"I have received specimens obtained by Mr. Geo. Masters, from Rootyhill (a point about 30 miles from the coast) where it is very common; how much further inland its range may extend I have no exact data to enable me to determine; probably it is confined to a maritime belt of moderate breadth, as I am informed that it is not met with in the far interior." I think that perhaps the long and severe droughts, to which the interior of Australia is liable, would prove more effective barriers against the spread of Amphipoda, than either distance or even ranges of mountains. He goes on to say: "I have never observed it on the sea-shore." The Tasmanian specimens in the Australian Museum, Sydney, originally described by Haswell as *T. affinis,* were collected by

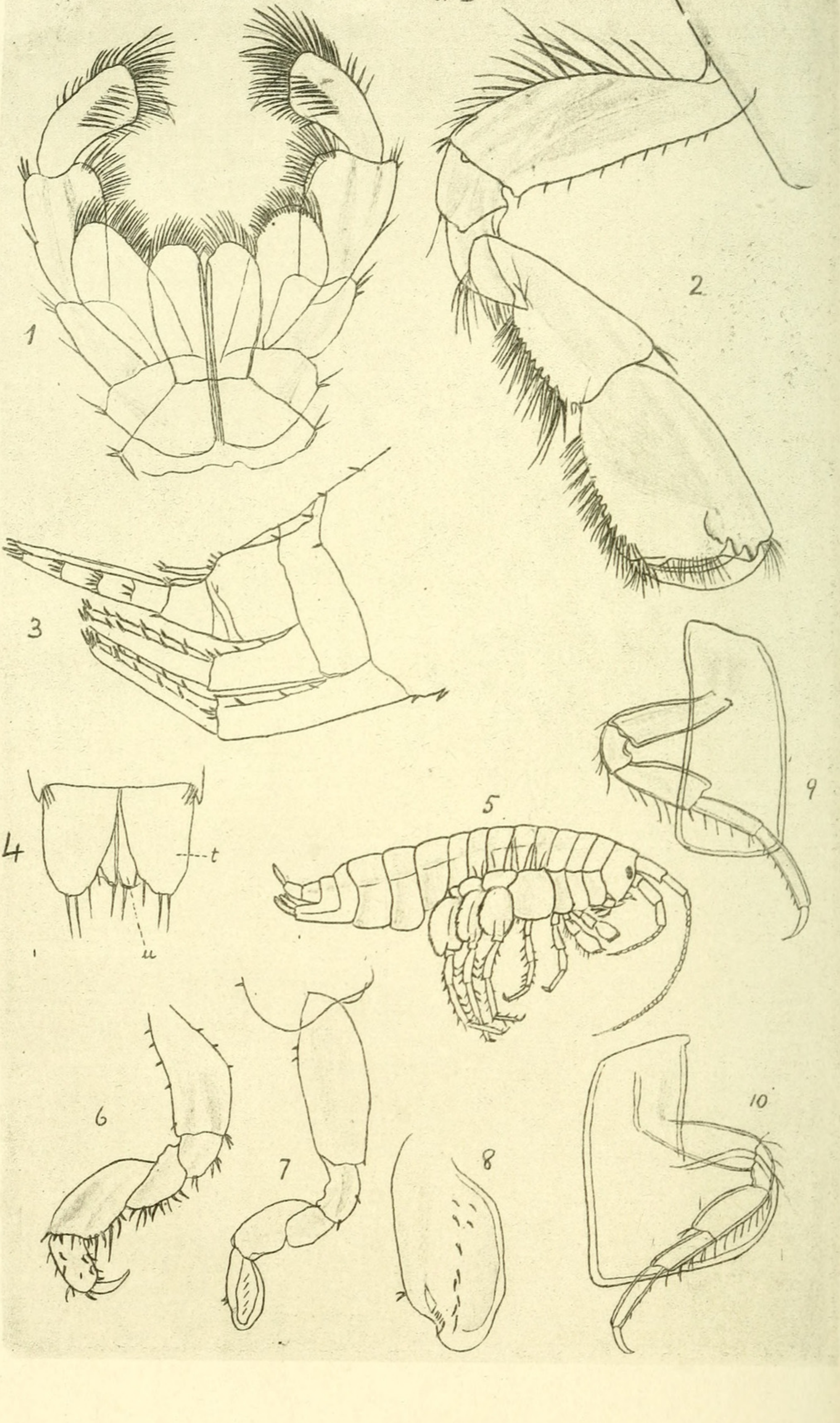
Mr. Kendall Broadbent, but no precise locality is given. Mr. C. Chilton writes me (June 13th, 1892) : " I have an abundance of specimens from two situations on the Mount Kosciusko plateau "; these were collected by Mr. R. Helms. I collected several specimens among dry leaves, moss, etc., in the bush on the slopes of Mt. Wellington, a short distance above " The Springs," at a height, therefore, of about 2500 feet; and I have since received numerous specimens, collected by Mr. Morton from the same locality, as well as from other parts in the neighbourhood of Hobart.

By the kindness of Prof. Haswell, I have been enabled to compare my specimens with types of the New South Wales form, to note any differences, and to amplify the description in the catalogue of the Australian Crustacea.

Both pairs of *antennæ*, as is the case in most or all Amphipoda, vary considerably in length and in the number of the joints of the flagella, according to the age of the individuals. This character, it seems to me, has generally been accorded too much importance as a basis of classification in this group. The Australian specimens, however, are more strongly setose than the Tasmanian, and this feature prevails throughout most of the appendages. The *upper lip* is large, rounded and prominent. The *mandibles* (fig. 1) are slightly different in the two forms, my Tasmanian specimens having the molar ridge more prominent and less cup-shaped than the others, while the ciliated spines are fewer. The *lower lip* (fig 2) is of a more or less uniform type in all Orchestidæ; the outer edge has a finely corrugated border, which is very marked in some of my specimens. The *maxillæ* are normally developed; the *first pair* (fig. 3A) have the outer plate ending in about ten stout spines toothed on their inner edge, while the inner plate is slender and ends in two short spines; the *second pair* (fig. 3B) have both plates rounded at the end and fringed with fine spines. The *maxillipeds* (fig. 4) do not quite agree with Haswell's description; the inner plates are tipped with two rounded teeth (between which stands a seta) with a small tooth on the inner side; the outer plates, which are more slender and extend forward a little further, end in two short setæ; the three succeeding articulations—forming the so-called palp—become slender proximally and bear very few setæ, while there is only the rudiment of a blunt terminal joint (dactylos ?). The *posterior gnathopoda* (fig. 6) in the male show some points of difference—best seen by reference to the figures. The dactylos is rounded, and the point of contact with the margin of the propodos marked by a few minute hairs. The propodos tapers to a rounded end, and its upper edge is thin and flange-like, as are the projecting processes of the carpus and meros. In my Sydney specimens (fig. 5) the flanges on the lower side of

p. 67

Pl. V



the carpus, and the tubercular projection of the meros are protected by a few small spines. In the Mt. Wellington specimens, on the other hand, the flanges on the carpus are thinner and more flattened; the meral projection is also flange-like and rounded, and the whole limb is almost destitute of hairs. The *pereiopoda* are generally simpler and less spinous in the Tasmanian than in the N.S. Wales form. The branchiæ of the *fifth* pair in the males (fig. 7) are peculiarly modified. I cannot find any reference to this structure in any other of the Orchestidæ, and would provisionally suggest that they serve as a sort of clasping organ to assist in copulation. In the largest specimen examined they were curled up, instead of being somewhat flattened, as they appear in the figure. I am not sure, also, whether they are equally developed on both sides of the body. The *pleopoda* are reduced to a very rudimentary condition. The *first* pair (fig. 8) have both branches developed, but they are small and feeble, and the setæ are extremely slender; the *second* pair are still smaller and more feeble, while I have failed to find the third pair at all in those specimens examined. This defective condition is probably due to the terrestrial habits of these Crustacea, as in aquatic Amphipods these appendages serve as swimmerets, and aid the animal in forward progression. In terrestrial forms this function being no longer required, the necessity for the organ ceases, and it has accordingly retrograded in its development. The three pairs of *uropoda* (posterior pleopoda of most authors) are much as figured in Haswell's original paper (Proc. Linn. Soc. N.S.W., vol. iv., pl. vii., fig. 1) the ante-penultimate pair being much the longest, and reaching furthest back. The *telson* (fig. 9) appears to me to be quite entire, rounded at the extremity, and furnished with *three* small spines on each side. There is a delicate longitudinal median line visible with a high power, but this is due to the paired organs underneath showing up through its semi-transparent substance. I can detect no trace of cleavage of the organ. Close underneath it lie the very short ultimate *uropoda* (fig. 10) with their conical terminal joint, ending in a single spine. Looking at the telson from above, the extremities of these appendages slightly protrude, and this, probably, led Prof. Haswell to conclude that the telson was "cleft in the middle line posteriorly."

The specimens found by me were yellowish or yellowish-brown in colour. The largest was $\frac{4}{10}$ inch (or 10 mm.) in length.

16. *Talorchestia diemenensis*. Haswell (Pl. v., figs. 6-8.)

This species is relegated to the genus *Orchestia* by the Rev. T. T. Stebbing (Ann. & Mag. of Nat. Hist., Oct. 1891, p. 325) —"Since both the figure and the description show that the first gnathopod in the female is not simple, but sub-chelate, that is to say, it has the precise character which separates *Orchestia* from *Talorchestia.*" Unfortunately the figures which accompany Haswell's original description (in Proc. Linn. Soc. N.S.W., vol. iv., pl. vii., fig. 6) are too imperfect to be of any value for reference, while the description of the female gnathopod (l.c. p. 248) is by no means clear, and may easily stand the interpretation put on it by Mr. Stebbing. In specimens examined by me, the first gnathopod in the female is simply unguiculate (fig. 6) while the second (figs. 7 and 8) is imperfectly sub-chelate. There is no doubt, therefore, that Prof. Haswell is correct in his identification of this species as a *Talorchestia.*

The species is apparently abundant on the beaches between tide-marks, as I have numerous specimens taken from the undersides of stones in the Derwent and Huon estuaries, and from Pirates Bay. I have also one large female specimen, caught in a rock-pool at Pirates Bay, which looks different in general appearance, but appears in details of structure to assimilate so closely to this species that I am unable to separate it. It is fully half an inch long, and has the whole anterior part of the body more tumid than my other specimens. The New Zealand *Talorchestia quoyana* and *T. tumida* are species which cannot bear immersion in water, as they drown in a short time. This Tasmanian species appears to resemble littoral species of orchestia in this respect.

17. *Hyale rupicola.*

Allorchestes rupicola. Hasw. (Proc. Linn. Soc. N.S. Wales, vol. iv., p. 250, pl. viii., fig. 1.)

Specimens of this species were obtained by me from under stones between tide-marks in the neighbourhood of Hobart. They differ from specimens taken in Port Jackson, and kindly sent me by Prof. Haswell, in having the inferior antennæ stouter and more densely fringed with setæ on the lower margin. Prof. Haswell has not described the differences in the sexes; his description of the gnathopoda applies to the male only.

In the females the first gnathopod very closely resembles the corresponding limb in the male, but is smaller. The second gnathopod is also very similar in general form, but is considerably larger than the limb anterior to it, and has a somewhat similar ciliated projection on the lower side of the carpus. The so-called marsupial plate is large, rounded in front, ending in an acute postero-inferior angle, and is finely fringed all round with cilia. The coxal plate of the same limb is nearly circular, and its margin is quite smooth.

This species has not hitherto been recorded from Tasmania.

Fam. *Lysianassidæ*

18. *Lysianax stebbingi* * n. sp. (Pl. iii, figs., 9-18; Pl. v., figs. 9 and 10.)

The species is founded on a single specimen (a male) which was obtained in a rock-pool at Pirates Bay by Mr. R. M. Laing, and was handed to me by Mr. Chilton. The following is the specific character :—

Head, with a very minute rostrum, lateral lobes rounded; the back is smooth; eyes large, somewhat reniform, with very numerous ocelli; anterior antennæ stout, almost pyriform; peduncle longer than flagellum; second antennæ long and smooth; mandibles smooth at the apex, without cutting teeth; maxillipeds, with the outer plate, large, rounded and entire; dactylos of second pair of gnathopoda almost obsolete; last pair of uropods very short, inner ramus rudimentary.

The *first antennæ* (Pl. iii., fig. 10) are as long as the head and first segment of the thorax; the first joint is very stout, one-third the length of the whole appendage, and quite smooth; the second and third joints are shorter and less swollen, and together only about two-thirds as long as the basal joint; the second with a few setæ on the lower margin; flagellum, about ten-jointed, tapering to a very fine point, each joint bearing a few setæ; secondary appendage, about six-jointed, rather shorter than the principal flagellum.

The *second antennæ* are as long as the head and three anterior thoracic segments; the peduncle is short, and has the fifth joint bent, almost at right angles with the fourth, so that the rest of the limb is bent back along the side of the body; the flagellum is long and many (30-40) jointed, the joints are as broad as they are long, and are destitute of setæ.

The *mandibles* (fig. 11) end in a smooth point, and have about five minute blunt spines on the margin behind it; the molar tubercle is very feeble; the three-jointed palp is placed at a considerable distance from the apex of the limb; the second joint is the longest, and bears three small setæ near its extremity; the third joint is longer than the very short first one, and has about four small terminal setæ.

The *first maxillæ* (figs. 12 and 13) have the outer plate ending in about ten or eleven spines pectinately, toothed on the inner margin; palp very slender, ending in one long seta; inner plate short, ending in a minute seta.

The *second maxillæ* (fig 14) have the outer plate narrow, and ending in about ten very slender spines; inner plate, broader, with rather more spines, which are stouter and slightly shorter.

* In compliment to the Rev. Thos. R. R. Stebbing, author of the Report on the Amphipoda of the "Challenger" Expedition.

The *maxillipeds* (fig. 15) have the basal plate elongated, notched at the apex, and finely setose on the margin; the outer plate is large, rounded, and has the margin perfectly entire, except below the middle of the inner side, where it bears two or three minute spines; the palp reaches a little beyond the outer plates, and has the joints finely setose.

The *first gnathopoda* (fig. 16) are simple and pediform; the side plates are large, and are produced anteriorly; the basos is straight; the ischium short, and the meros is sub-equal to it in length, and is produced on the lower setose margin into a conical projection; the carpus is rather longer, convex above, with tufts of setæ at the upper and lower extremities; propodos longer than carpus, tapering to the end, and with tufts of setæ on the lower margin; dactylos slightly curved, simple.

The *second gnathopoda* (figs. 17 and 18) are long and slender; the basos is long and narrow; the ischium about half as long, articulated almost at right angles to it, and with one terminal seta; the meros again is jointed almost at right angles to the ischium (so that the rest of the limb—in the dead specimens—is nearly parallel to the basos), and bears one long seta and a fringe of very minute hairs on its lower margin; the carpus is about as long as the ischium, is fringed with minute hairs on both surfaces, and bears two or three long setæ at the extremity of its upper and lower margins; the propodos is oval, broader than the carpus, but little more than half as long; it is fringed with very minute hairs on its lower margin, and on the upper half of its upper margin bears a number of long setæ; the dactylos is curved, and so small at to be almost undistinguishable even when magnified 150 diameters.

The *first pereiopoda* (Pl. v., fig. 9) have the side-plate nearly rectangular in form, and twice as deep as it is broad. In the *second* (Pl. v., fig. 10) the side-plate is the same depth, but the lower half is produced backwards as a rounded lobe, at right angles to, and twice as broad as, the upper half. The limb of the first pair is rather longer and more slender than that of the second; both are furnished with a few slender setæ on the lower side of the ischium, meros, and carpus. The *third pereiopoda* are somewhat shorter than the two anterior pairs; the side-plates are only about half as deep as those of the second pair, but are considerably broader than deep; the basos is posteriorly produced into a large rounded plate, while the meros is also produced into a broadened flange, which extends downwards at its apex, and ends in a seta; the front margin of the basal joints is furnished with simple setæ. In the *fourth* and *fifth* pairs the side-plates are successively smaller, and the plates on the basos larger than in the third; the margins also have short spines instead of setæ; the dactylos of the last pair is slender and nearly straight; in all the anterior pairs it is stronger and more curved. The *uropoda* decrease in length posteriorly, the last pair being very short; the outer branch of this pair ends in a stout terminal, and two short lateral spines, the inner is short and quite rudimentary; the telson appears to be cleft to the base, and each lobe to end in two small spines. Unfortunately my observation was made from the side, as I had mounted my only specimen as a permanent slide before I observed this detail from above.

Length, 6 mm. (about $\frac{1}{4}$ inch).

Colour, nearly white.

Integument, very hard and brittle, without any markings.

Fam. *Atylidæ.*

19. *Atyloides tasmaniæ.* Nov. sp. (Pl. ii., figs 9-15; Pl. iii., figs. 1 and 2.)

The specimens referred to this genus agree in nearly all respects with Stebbing's definition (" Challenger " Amphipoda, p. 913). In the first antennæ, however, I can discover no trace of the small accessory flagellum; but this is such a small organ, that, except in dissected specimens, it would be easily overlooked. The first maxillæ, also, have only about six setæ on the inner plate, in this respect resembling Stebbing's genus, *Atylopsis*, from which, however, it differs in not having the upper lip bilobed.

The body is compressed, perfectly smooth (minutely rugose under a high power), and not in any way carinated dorsally. The front of the cephalon is hardly produced between the rather large subquadrate eyes.

The *first antennæ* (fig. 9) are about half as long as the body; the joints of the peduncle are short and broad, diminishing in size distally, and are densely tufted on the ends of the lower margin with setæ; the flagellum is nearly twice as long as the peduncle; the joints are broader than long, and at intervals of half a dozen or more (fewer at the proximal end) occurs a broader joint tufted with the auditory (?) setæ so characteristic of this and allied genera. In one dissected specimen the flagellum had about forty articulations.

The *second antennæ* (fig. 10) are sub-equal in length with those of the first pair; the second joint of the peduncle has a stout spine at its lower extremity, while the next three joints are sub-equal in length, and are tufted with numerous setæ on the end of the lower margin; the flagellum is between two and three times as long as the peduncle; the joints are very numerous, are broader than long, and about every second is tufted with minute setæ; the *upper lip* is rounded and not incised.

The *mandibles* (fig. 11) have seven slender spines serrated on the convex margin on the spine-row; the molar tubercle is large, and is crossed by about twenty lines of serrations; its inner edge is defined by a tuft of small spines; the palp (fig. 12) has the second and third joints sub-equal in length; the basal joint is broadened distally, and has numerous strong spines on its inner margin; the second joint is fringed with two rows of setæ, especially towards the distal end, thus forming a kind of sheath, into which the somewhat falcate third joint can be bent; this last joint is setose on the inner margin, and ends in about nine spines, of which the inner four are pectinate.

The *first maxillæ* (fig. 13) have the inner plates small and furnished at the extremity with *six* plumose setæ; outer plates, with about ten stout spines, more or less toothed on their inner margins; outer joint of palp fringed with about ten toothed spines, and a corresponding number of short, simple setæ.

Second maxillæ (fig. 14) having the inner plate fringed with about fifteen plumose setæ on the inner margin—both plates ending in fine setæ.

The *maxillipeds* (fig. 15) have the inner plates narrow, and reaching considerably beyond the extremity of the first joint of the palp, densely fringed with curved setæ, which hide the three short teeth at the apex; outer plates almost reaching the end of the second joint of the palp, also densely fringed round the ends and inner margins with spines and plumose setæ; palp densely setose.

First gnathopoda (Pl. iii., fig. 1) with the coxal plates rounded and very short; basos with numerous setæ near the base on the lower margin and at the distal end; the short ischium and meros are also thickly furnished with setæ; the carpus is nearly smooth on the upper margin, while the lower is considerably rounded, and is densely fringed on the edge and on both sides; the propodos is broader than the carpus, the distal half of the lower margin forming the oblique palm, which is defined by a group of three or four strong, straight spines on each side; the whole joint is furnished with tufts of short setæ on the upper, and numerous rows of long setæ on the lower margin, sides, and end; dactylos, slender and curved.

Second gnathopoda, somewhat similar to the first pair, and sub-equal in size with coxal plates, short and rounded; gill, large, not reaching to the meros; basos, long, straight, and with very few spines on the margins; ischium and meros short, the latter densely setose on its distal half; carpus nearly triangular, with its lower margin produced downwards and thickly setose; propodos, tapering distally, the palm defined by a group of four pairs of stout spines, the whole joint densely setose; dactylos, stout, minutely setose on the inner margin.

Pereiopoda, increasing in length posteriorly. Second pair with coxal plates broadened and rounded behind; third pair with coxal plate short, two-lobed, front lobe rounded, hind lobe produced somewhat downwards, and bearing three spines; fourth and fifth pairs with the coxal plate developed only as a posterior lobe; basal plates extended widely.

Pleopoda, with the peduncles smooth, their extremity produced--in some pairs at least—into a curved process beside the base of the outer ramus.

Uropoda (Pl. iii., fig. 2)—First pair with a long peduncle and short rami; second pair with peduncle not reaching to extremity of that of the preceding pair, rami sub-equal; both pairs furnished with a row of marginal spines on the peduncle, and three or four on the rami; Peduncles of the third pair much shorter than the telson; rami, sub-equal in length, broadly lanceolate in form and tapering to a very acute apex, fringed on both margins with numerous spines, each carrying a long plumose seta in its axil.

Telson, long, reaching as far as the extremity of the second pair of uropoda, cleft beyond the centre, the lobes slightly tapering and rounded at the ends, margins quite destitute of spines or setæ.

Length of the largest specimen, 7 mm. (about $\frac{5}{16}$th of an inch).

This species was found in rock-pools at Pirates Bay.

This species may belong to Boeck's genus, *Pontogeneia*, but differs in having the third joint of the mandible-palp nearly as long as the second, and in wanting the accessory one-jointed appendage to the first antennæ.

On the other hand, Stebbing defines *Atyloides* as having "spine-teeth (not slender spines) on the inner margin of the outer plate of the maxillipeds." In the present species the inner margin has slender spines and no teeth. The distinctions between the two genera seem to me altogether too slight.

Fam. *Gammaridæ.*

Genus Niphargus, Schiödte.

This genus was instituted in 1851, for the reception of an eyeless Amphipod, found in the subterranean waters of various parts of Europe. Spence Bate, in the British Museum Catalogue, gives us one of the characters of the genus "eyes minute," and describes four species, all subterranean. Czerniavski, in 1868, added a species from the Black Sea, with "oval, fairly large eyes," while Grimm obtained another, a blind species, in the Caspian, at depths of 35-90 fathoms.

Among the Crustacea examined by me in the present collection are two fresh-water species, which I think must be placed in this genus, though they are somewhat different in appearance, and diverge somewhat from the generic character ot *Niphargus*, as defined by Spence Bate. On the other hand, neither is sufficiently distinct to justify the institution of a new genus for its reception, especially as the classification of the whole group is in want of revision. I accordingly place these forms here, pointing out under each species the features in which they differ from the generic character.

20. *Nipharyus mortoni*,* n. sp. (Pl. iv., figs. 11 and 12 ; Pl. v., figs. 1-5)

The specimens described here were first found by me in a small stream above Franklin, on the Huon River, at an elevation of 200 to 300 feet above tide-marks The stream at the time of my visit was a minute runnel of water, which had cut a subterranean channel in many parts, and only here and there showed itself above ground. The little Crustacea were somewhat difficult of capture. They were mostly found creeping about under the little stones and bits of wood in the stream; but, as soon as their hiding-places were disturbed, they abandoned themselves to the current, and were swept at once into darkness.

About the same time Mr. Laing, of Christchurch, N.Z., obtained one specimen (handed to me by my friend, Mr. Chilton) from the under side of a stone in a stream near The Springs, Mt. Wellington, that is is at an elevation of some 2000ft. More recently I have received a considerable number of specimens from Mr. Morton, who obtained them from the same locality. These were found clinging to the undersides of stones, pieces of wood, etc. There is some slight diversity amongst the different specimens from Franklin and Mt. Wellington, chiefly, however, in the relative number of hairs, setæ, etc., occurring on the different organs. Such variations are probably only individual or sexual.

The gnathopoda in this species, have not the propoda as broad as is usual in the genus. This, however, is not a feature of such importance as the fact that the telson is cleft into two distinct divisions, while in *Niphargus* it is a single telson, though deeply cleft. This, along with various other characters, induced me at first to place the species in the genus *Melita*, to which it approximates in many respects. But the latter genus is characterised *inter alia* by the great diversity of the gnathopoda in the two sexes, a feature which is quite wanting in the present form. The following are the specific characters :—

Body (Pl. v., fig. 5) greatly compressed; Coxæ of four

*In honour of Mr. Alex. Morton, F.L.S., Secretary of the Royal Society of Tasmania.

anterior thoracic segments, as deep as the segments themselves, the three posterior not half as deep; fourth much wider than those in front of it; eyes small, oblong, close to the front margin of the cephalon; upper antennæ with joints of the peduncle sub-equal; lower, with the peduncle slightly shorter than that of the upper pair; maxillipeds, stout, with 4-jointed palp; both pairs of gnathopoda sub-equal, much compressed; terminal uropoda longer than the preceding pairs, inner branch almost obsolete; telson cleft into two portions.

The length of the largest specimen was $\frac{9}{10}$ inch (14mm.) The integument is generally smooth, but with a few minute hairs on the back and sides of the abdominal segments. The margins of the segments are also nearly quite smooth.

The *upper antennæ* were, in both instances, about two-thirds as long as the whole body; the joints of the peduncle were sub-equal in length, the middle one being slightly the longest; the flagellum, in most instances, was about twice as long as the base, but in one example it was quite short. This may, or may not, be a sexual difference; I could detect no other distinction in the animal. The secondary appendage was very small and 3-jointed.

In the *lower antennæ* the peduncle was rather shorter than the corresponding part in the superior pair; the fifth joint was rather shorter than the elongated fourth; the flagellum was composed of only some dozen joints, which were almost quite destitute of setæ, while those of the superior pair had only a few minute ones at the extremities.

The *mandible* palp (Pl. iv., fig. 11), which is three-jointed, has the basal joint, as usual, very short; the second is the longest, and has its lower margins broadened, flattened, and fringed in their proximal part. This seems to form a kind of sheath or hollow, into which the somewhat long terminal joint, which is beautifully setose along its lower margin, can apparently be folded.

The *first maxillæ* (Pl. iv., fig. 12) have the outer plate ending in about ten strong spines, the inner ones pectinately toothed on the inside; the inner plate is small, and carries four weak plumose setæ near its extremity; the palp is flattened, and placed nearly at right angles to the rest of the limb, its elongated second joint ends in a row of short spines.

The *second maxillæ* have the outer plate carrying numerous setæ at the extremity, while the smaller inner plate is fringed along the whole inner border.

The *maxillipeds* (Pl. v., fig. 2) are stout; the plates on the first joint are long, oval, and thickly fringed with setæ at the end; the plates on the second joint are larger, more rounded, and thickly setose on their inner sides; the palp is strong and four-jointed, with numerous setæ on the inside and extremities;

the claw, or fourth joint, is really two-jointed near its sharp apex.

The *first* and *second pairs of gnathopoda* (Pl. v., fig. 2) are sub-equal in size and form, and though distinctly sub-chelate are not very large ; they have the basos long ; the ischium and meros very short—the latter produced at its extremity into an acute point ; the carpus broadening distally, with several tufts of setæ along its lower margin ; the propodos sub-quadrate, with the palm obliquely transverse, and defined by a stout spine ; dactylos, long, and slightly curved. Both pairs of limbs have the joints much compressed, and the propoda fringed with tufts of setæ, especially along their lower margins.

The *pereiopoda* increase in length posteriorly, are rather slender, with narrow basa, and have very short spinous setæ, which are only sparingly produced at the extremities of the joints.

The *uropoda* (Pl. v., fig 3) of the first and second pair, are sub-equal in length, and shorter than the outer branch of the third pair, which is very long, while the inner branch is so short as to be only seen with difficulty.

The *telson* (Pl. v., fig. 4) is cleft into two irregularly triangular portions, each tipped with a few spines ; the number of the latter varying in different specimens.

21. *Niphargus montanus*, n. sp. (Pl. vi., figs. 1-13.)

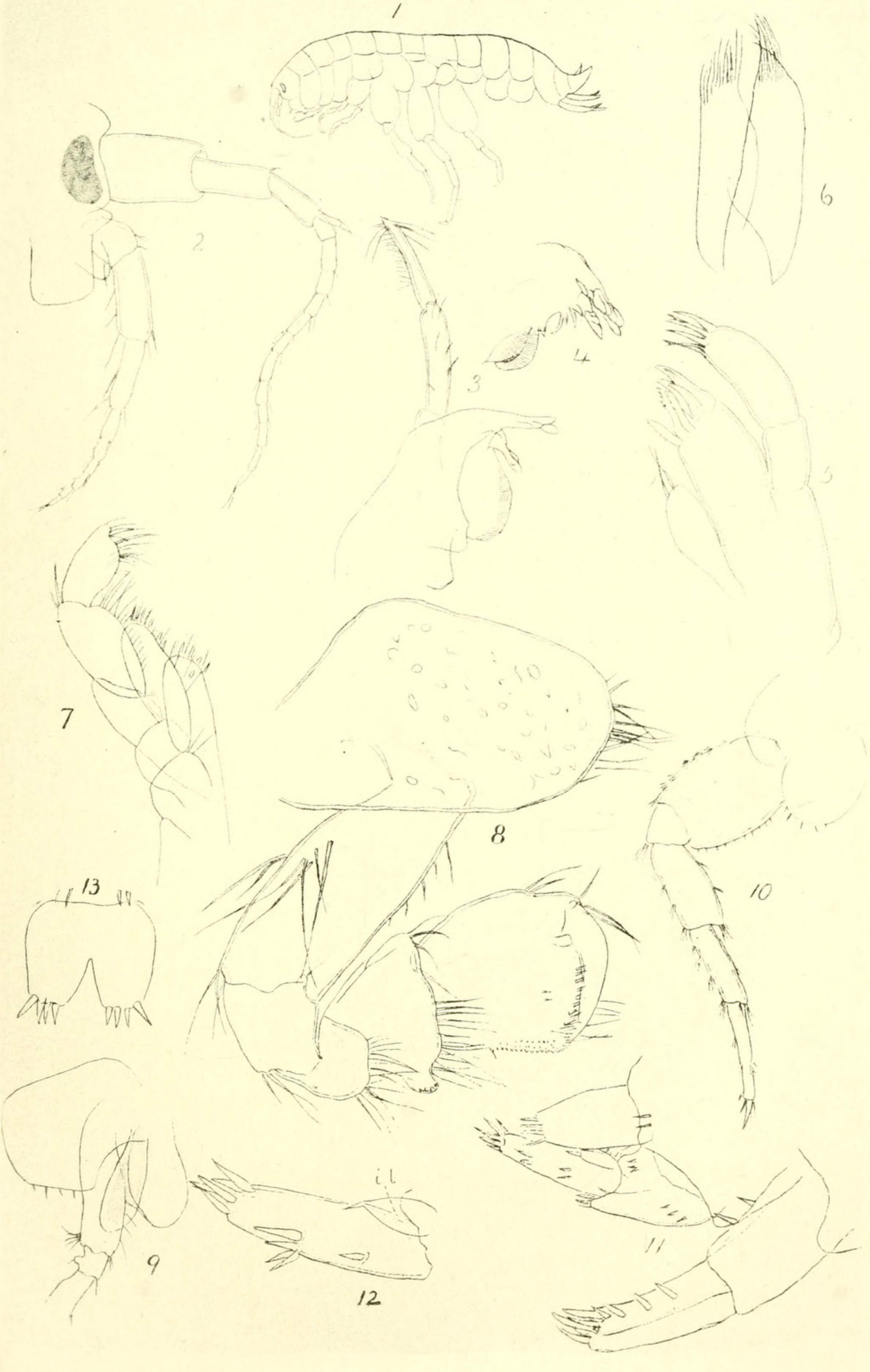
My first specimens of this interesting form were handed me by Mr. L. Rodway, who obtained them on the top of Mt. Wellington (4000ft). He had collected a bunch of sedges from some swampy ground near the summit, and on washing out the roots in a basin of water, observed a number of small amphipods swimming about ; these he secured and handed to me. During this last winter, Mr. Morton made the ascent of the mountain, and obtained a considerable number of specimens from the pools, which were frozen over at the time.

The chief point in which this species differs from the generic character, is in the length of the last pair of uropods. These are hardly longer than those of the preceding pair ; but, with this exception, it coincides very well with Spence Bate's definition. The following are the specific characters :—

Coxæ of four anterior segments produced considerably downwards, the posterior pairs only about half as deep ; eyes, relatively large, subreniform, close to the rounded front margin of the cephalon ; antennæ, short, superior pair not longer than the cephalon, and two anterior thoracic segments; lower pair with the joints of the peduncle sub-equal, and flagellum short ; Maxillipeds, stout, with 4-jointed palp ; both pairs of the gnathopoda sub-equal, with broad carpi and nearly square propoda ; pereiopoda and uropoda furnished with short, very stout marginal spines ; terminal uropoda, hardly longer than

p. 70

Pl. VI



the preceding pairs, inner branch minute ; telson cleft half-way to the base.

Length of largest specimens 6 mm. (about $\frac{1}{4}$ inch.) The colour varies from whitish-yellowish to brown, probably, according to the vegetation of the pools in which they occur. The integument is quite smooth.

The *first antennæ* (fig. 2) are about as long as the cephalon and two anterior segments of thorax; the first joint of the peduncle is stout ; the second shorter and more slender ; the third half as long, and not half as stout as the first ; the flagellum is few (about 14-) jointed, and is somewhat longer than the peduncle ; the secondary flagellum is very short and two-jointed.

The *second antennæ* are about half as long as the first; the peduncle only shows two joints, which are about two-thirds as long as the peduncle of the first pair; flagellum, about eight-jointed, shorter than peduncle ; both pairs of antennæ have very few short hairs on them.

The mandible-palp (figs. 3 and 4) is three-jointed ; the second joint has only a few short setæ on it; the third, which is sub-equal with it in length, is sparingly fringed with setæ on its lower margin and extremity.

The first maxillæ (fig. 5) end in six stout spines, which are all, more or less, pectinately toothed on the inner edge; the palp is stout, two-jointed, and ends in five short spines ; the inner plate is rounded at the end and bears two slender terminal setæ.

The second maxillæ (fig. 6) are very thin and foliaceous, each plate ending in a number of slender setæ.

The maxillipeds (fig 7) have the plates on the first joint short, rounded, and bearing four blunt teeth and numerous setæ at the extremity ; the plates on the second joint are also rather short and rounded ; the inner edge at the extremity carries five short, blunt teeth, outside of which are five rather long and stout spines ; the four-jointed palp has numerous setæ on its inner margin, while its third joint bears a small rounded tubercle.

The gnathopoda (fig. 8) are sub-equal in size and form in both sexes ; the side-plates are deeper than broad, are evenly rounded, and carry a few fine setæ on the lower margin ; the straight basos has a few long, slender setæ on the posterior margin ; the meros is short ; the ischium still shorter, and fringed with setæ on its distal margin ; the carpus broadly tri-angular, and carrying a few setæ along its lower edge; the propodos is nearly square, its upper edge is slightly rounded, and bears a few cilia ; the lower edge is rugose ; the trans-verse palm is fringed with minute teeth, and ends in two or three stout spines.

The pereiopoda (figs. 9 and 10) increase slightly in length to the fourth, which is the longest, the fifth being rather shorter; all the joints are furnished with clusters of short, acute spines; the side-plate of the first pair resembles those of the gnathopods; that of the second pair is broad and excavate in front; the third is two-lobed, the posterior lobe being the largest and having five or six short marginal spines.

The first and second uropods (fig. 11) reach almost as far back as the extremity of the third pair; the last has the outer branch well developed, but shorter than is usual in the genus; the inner branch (fig. 12) is represented by a minute lobe tipped with a single seta; the telson (fig. 13) is cleft half-way to the base, each division ending in four short spines.

22. *Mæra fasciculata*, mihi.

Megœmera fasciculata, mihi (Ann. and Mag. of Nat. Hist. Ser. 5, vol. vi., p. 5, pl. i., fig. 5.)

Some small specimens of this species were collected by Mr. R. M. Laing in shallow pools between tide-marks on the Huon river. They agree very closely with specimens from New Zealand.

This species agrees with Boeck's definition of *Mæra*, except in regard to the second gnathopoda, which have *not* the hand "much larger than in the first pair." It is somewhat larger, but not more than half as long again, the breadth in both being about the same.

The species has been found abundantly on the east coast of New Zealand (South Island) by both Mr. Chilton and myself.

Addendum.

In Budde-Lund's Crustacea Isopoda Terrestria, p. 285, a species of *Armadillo* is described from Tasmania, unfortunately, without figures. I append here a translation of his description. The species belongs to the section of the genus, characterised by him as follows:—

"External terminal rami of the anal feet obliquely tetragonal (trapezoidal), usually much smaller and shorter than the basal articulation, rarely equal in size; epimera of the first segment of the body simple, slender; anal segment of the abdomen triangular, with the apex more or less acute."

Armadillo misellus.

Oblong-oval, very convex, opaque (?); body everywhere distinctly tubercled; the whole surface minutely pubescent.

External antennæ rather shorter than half the body; flagellum 5-articulate, shorter than the peduncle; first articulation of the flagellum rather shorter than the next three.

Clypeus, with shorter lobes, sub-triangular, epistome somewhat convex, with the superior margin not reaching beyond the front.

First segment of the body with the lateral margin thickened, slightly revolute, somewhat furrowed longitudinally, sub-equally cleft behind; epimera of the second segment cleft, interior part short, toothed ; posterior margin of the first three segments slightly sinuate on both sides.

Anal segment of the abdomen not broader than long, contracted in the middle, posterior margin nearly straight, with the external angles rounded, nearly straight (?) ; basal articulation a little longer than broad, external branch shortest, inserted above the broader internal; internal branch somewhat shorter than the anal segment.

Colour, greyish.

Length, 8 mm. ; breadth, 3·75 mm. ; height, 2 mm.

The specimen described, which was taken in Tasmania by Dr. Scheyer, is presented in the Berlin Museum.

A somewhat allied species (*A. vulgare*) is described by Budde-Lund as having been collected at Melbourne.

EXPLANATION OF FIGURES.

Plate I.

Figs. 1 & 2. Engæus cunicularius.

1. Female, nat. size. (The abdomen is too broad in the figure.)
2. Rostrum (mag.)

Figs. 3-5. Gebia simsoni.

3. Animal, nat. size.
4. Rostrum, from above x3.
5. Telson and uropods spread out, x2.

Figs. 6-13. Oniscus punctatus.

6. First antenna, x40.
7. Second antenna x10
8. Right and left mandibles, x56.
9. First maxilla, x56.
10. Second maxilla, x56.
11. Maxillipeds, x40.
12. Extremity of abdomen from below (*an*-anus) x19.
13. Uropod, x26.

Plate II.

Figs. 1 to 8. Actœcia euchroa.

1. Outline of animal, x10.
2. Same from above, x10.
3. First antenna, x56.
4. Second antenna, x40.
5. Mandible, x56.
6. First maxilla, x56.
7. Maxillipeds, x56.
8. Last segment of abdomen and uropods, x40.

Figs. 9-15. Atyloides tasmaniæ.

9. First antenna, x40.
10. Second antenna, x40.
11. Mandibles, x56.
12. do. palp, x56.
13. First maxilla, x56.
14. Second maxilla, x56.
15. Maxilliped, x40.

Plate III.

Figs. 1 & 2. Atyloides tasmaniæ.

1. First gnathopod, x26.
2. Telson and last pair of uropoda, x26.

Figs. 3-8. Rocinela spongicola.

3. Animal, dorsal view, x3.
4. Mandible, x26.
5. Extremity of mandible, x56.
6. First maxilla, x41.
7. Second maxilla, x41.
8. Maxilliped, x41.

Figs. 9-18. Lysianax stebbingi.

9. Outline of body, x9.
10. First antenna, x41.
11. Mandible, x41.
12. First maxilla, x41.
13. Extremity of same, x184.
14. Second maxilla, x41.
15. Maxilliped, x41.
16. End of first gnathopod, x41.
17. Second gnathopod, x41.
18. Hand of second gnathopod, x125.

Plate IV.

Figs. 1-10. Talitrus sylvaticus.

1. Mandible, x56.
2. Lower lip, x84.
3. Maxillæ (*a*) first pair; (*b*) second pair, x56.
4. Maxillipeds, x56.
5. Second gnathopod of male (Sydney specimen), x13.
6. do. do. do. (Mt. Wellington specimen), x13.
7. Fifth pereiopod, x40.
8. Pleopod of first pair, x40.
9. Telson, x56.
10. Last pair of uropoda, x56.

Figs. 11 & 12. Niphargus mortoni.

11. Mandible-palp, x40.
12. First maxilla, x40.

Plate V.

Figs. 1-5. Niphargus mortoni.

1. Maxillipeds, x40.
2. Second gnathopod, x26.
3. Extremity of abdomen from the side, x17.
4. Telson (*t*), with inner branch of last uropod (*u*) from above, x28.
5. Outline of body (of female), x5.

Figs. 6-8 Talorchestia diemenensis (female.)

6. First gnathopod, x26.
7. Second gnathopod, x26.
8. Hand of second gnathopod, x56.

Figs. 9 & 10. Lysianax stebbingi.

9. First pereiopod, x26.
10. Second pereiopod, x26.

Plate VI.

Figs. 1-13. Niphargus montanus.

1. Animal, x7.
2. Front of head and antennæ, x41.

Figs. 3 & 4. Mandibles, x56.

5. First maxilla, x125.
6. Second maxilla, x125.
7. Maxilliped, x56.
8. First gnathopod, x56.
9. Second pereiopod, x26.
10. Third do. x26.
11. Two last uropods and telson, x56.
12. Last uropod, showing the inner branch (i.b.), x125.
13. Telson, from above, x56.

Phreatoicus australis. Chilton.

Post Scriptum.

In putting aside my specimens, described in this paper, I found in the tube containing *Niphargus montanus*, collected by Mr. Rodway, a single immature specimen of the remarkable Isopod, *Phreatoicus australis.* The specimen was only about 4 mm. (a little over $\frac{1}{6}$ inch) in length. The occurrence of this species adds another to the singular group of forms found in the pools on the top of Mt. Wellington. The genus was established in 1882 by Mr. C. Chilton, for the reception of a blind subterranean Isopod—*P. typicus*—which occurs in wells in Canterbury, New Zealand. In 1889, Mr. Chilton received a small collection of Australian Crustacea, and this included a new species of *Phreatoicus* (*P. australis*) from Mt. Kosciusko, at a height of 5,700 feet.

I have already pointed out that the characters of *Anaspis*, possessing, as it does, an extremely generalised structure, lead to the conclusion that it is of great antiquity. The same evidence is borne by the occurrence of *Niphargus montanus.*

The evidence of the antique character of this fresh-water fauna is still further strengthened by *Phreatoicus.* The distribution of the genus is, in the first place, remarkable, one blind species occurring in New Zealand, and another possessing well-developed eyes, in two such widely separated localities as Mt. Wellington (4,100ft.), in Tasmania, and Mt. Kosciusko (5,700ft.), in south-eastern Australia. And, again, *Phreatoicus* is a highly generalised Isopod, resembling the *Asellidæ* perhaps more than any other family, but sufficiently distinct to be separated as the type of a new family, the *Phreatoicidæ.*

Probably an examination of other streams and pools at high elevations in Tasmania and Australia will reveal further examples of this interesting archaic fresh-water fauna.