

different shape to those of the preceding form (fig. 325). This widely distributed species is common in our shallow waters and under rocks on beaches. It is very variable in colour, but specimens taken from *Ulva* and

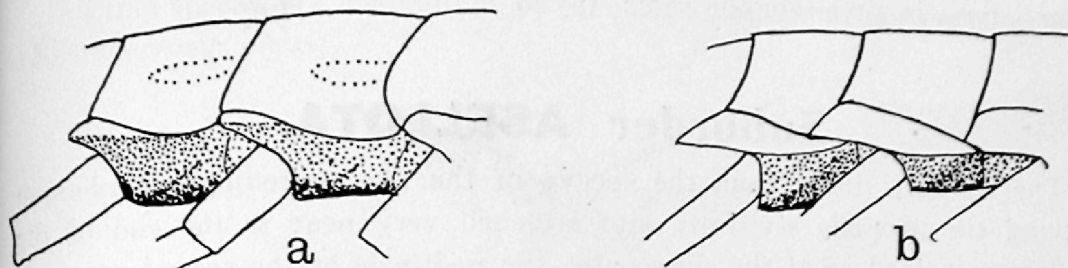


FIG. 325.—Side view of sixth and seventh thoracic segments of (a) *Paridotea munda* and (b) *P. ungulata* (x 8-10).

other green vegetation on our reefs are usually graminaceous in colour. When removed from the water and placed on a moderately smooth surface the animal sometimes progresses by humping the body in the same way as do the looper caterpillars.

ZENOBIANA (Stebbing).

The small sea-centipedes referred to this genus have the flagellum of the second antennae greatly reduced in size and composed of, at most, three joints. Coxal plates are free on the second to seventh thoracic segments.

Tube-dwelling Sea-centipede. *Zenobiana phryganea* (Hale). (a stick—the name of the typical genus of Caddis-flies).

The body is narrow and elongate, sub-cylindrical, with the upper surface shallowly pitted. The flagellum of the stout and short second antennae

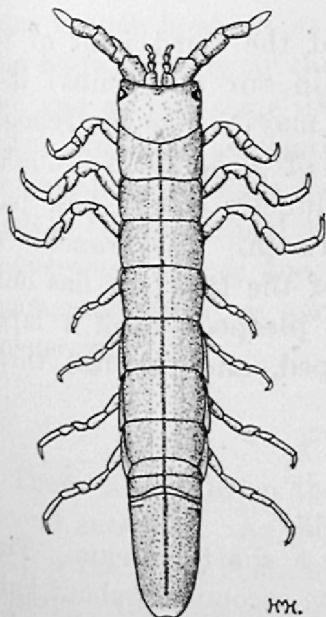


FIG. 326.—*Zenobiana phryganea* (x 5).

consists of but a single joint. There is a notch at the apex of the abdomen, which is divided into four segments, the third being very short; the longest fourth segment is marked with a pair of lateral sutures. A glance at the illustration shows that the last four pairs of legs are considerably less robust than the anterior limbs. The creature is brown, with faint vermiculations and a line down the middle of the thorax and abdomen is black, as are the lateral margins of the thorax. There is a pale stripe on each side of the mid-line of the thorax, and the coxal plates, legs, apex of abdomen, and the flagella of both pairs of antennae, are pale yellow, almost white. Length: 11 mm., or $\frac{7}{16}$ in. (S.A.M.)

This curious species lives in short, hollow pieces of marine plants, broken just below a node so as to form a tube with one end closed. At least two species of Amphipods found on our coast have this habit also, and some of our Caddis-worms, found in the fresh-water creeks, utilise portions of plant-stems in precisely the same way.

Suborder **ASELLOTA.**

The Asellota differ from the species of the two preceding suborders in having the uropods styliform and attached very near to the end of the abdomen instead of at the sides; also, the peduncle of the second antennae is six-jointed. The abdominal somites are solidly fused together in most genera. The coxae of the legs are small, and are movable on the second to seventh thoracic segments. The second pair of pleopods is wanting in the female.

The creatures are fragile, and it is somewhat difficult to secure and preserve perfect examples. Some of the species live in fresh-water; one such form has been recorded from Victoria, and, although so far none has been noticed in our creeks and rivers, careful searching may yet reveal the presence of some tiny member of the group.

Two families are represented:—

- a. First pair of pleopods in male coupled with second pair,
and with peduncles elongate JANIRIDAE.
- aa. First pair of pleopods in male not coupled with second
pair, and with peduncles short STENETRIDAE.

Family JANIRIDAE.

There is usually a small scale on the outside of the third joint of the peduncle of the second antennae; sometimes (as in our one genus) it is absent. The first pair of legs may be prehensile, or may be like the remaining walking limbs. In the male the first two pairs of pleopods are coupled together to form a compound operculum; the peduncles of the first pair are long, fused together, and each has only one branch. The branches of the third and fourth pairs are narrow, and each of the last pair has only a single branch. In the female the first pair of pleopods form a large undivided operculum; the second are not developed, and the last three pairs are as in the male.

IAIS (Bovallius).

Iais pubescens (Dana). (downy).

The head is subquadrate, wider than long, with a short rostrum. The eyes are small. The first antennae are short, and the second are about half as long as the body, with a flagellum considerably longer than the peduncle.

The uropods are somewhat variable in length, small, but distinct. Usually the rami are subequal in length, each about as long as the peduncle, and fringed with stiff hairs. The legs are all much alike. Length: 2.5 mm., or $\frac{1}{10}$ in.

This tiny species is a companion, or commensal, of one of our Sphaeromids (*Exosphaeroma gigas*).

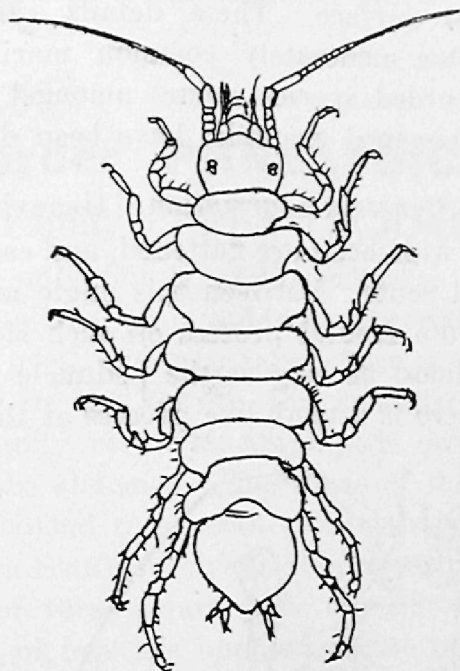


FIG. 327.—*Iais pubescens* (after Stebbing, x 20).

Iais pubescens var. *longistylis* (Chilton). (with long stalk).

This variety differs little from the typical form, but has the uropods longer than is usual (hence the varietal name). They are about half as long as the abdomen, and have the branches longer than the peduncle. The outer branch is about as long as the inner, but is rather more slender, with long hairs, usually at the apex only; the other ramus has long hairs at the end, and also at some distance from the apex. Length: 2.5 mm., or $\frac{1}{10}$ in.

The variety associates with the Burrowing Pill-louse (*Sphaeroma quoyana*), in the same way as the typical form associates with *Exosphaeroma gigas*. "This animal is generally found on the ventral aspect of the *Sphaeroma*, among the bases of the legs, and should rather be called a commensal than a parasite, as it derives no sustenance from the *Sphaeroma*."

Family STENETRIIDAE.

There is a scale on the outside of the third joint of the peduncle of the second antennae. As shown in fig. 328, the first pair of legs is subchelate in both sexes. The remaining legs are similar in structure, and are used for walking; the dactylus of each ambulatory limb terminates in two claws. The pleopods of the first pair are completely fused together in the female

to form a small plate. In the male each of the first abdominal appendages has only one branch, and the bases of these pleopods are fused with each other. Thus, the first pleopods of the male are represented by a short plate, to which are attached two branches, and those of the female are represented by a short plate only. The outer branches of the third pair of pleopods are expanded, and together form a cover for the greater part of the lower abdominal surface. These details can be seen with the appendages *in situ*. One moderately common marine form is recorded below. Another unrecorded species occurs amongst weed in St. Vincent Gulf, but only a few damaged examples have been dredged.

Weed-louse. *Stenetrium armatum* (Haswell). (armed).

The side parts of the wide head are flattened, and each of the front lateral angles is produced and acute. Between this angle and the blunt rostrum is a short and very acute frontal process on each side. The flagellum of the first antennae is almost as long as the peduncle in adult males, much shorter in females. There is a tooth-like process at the antero-lateral angle

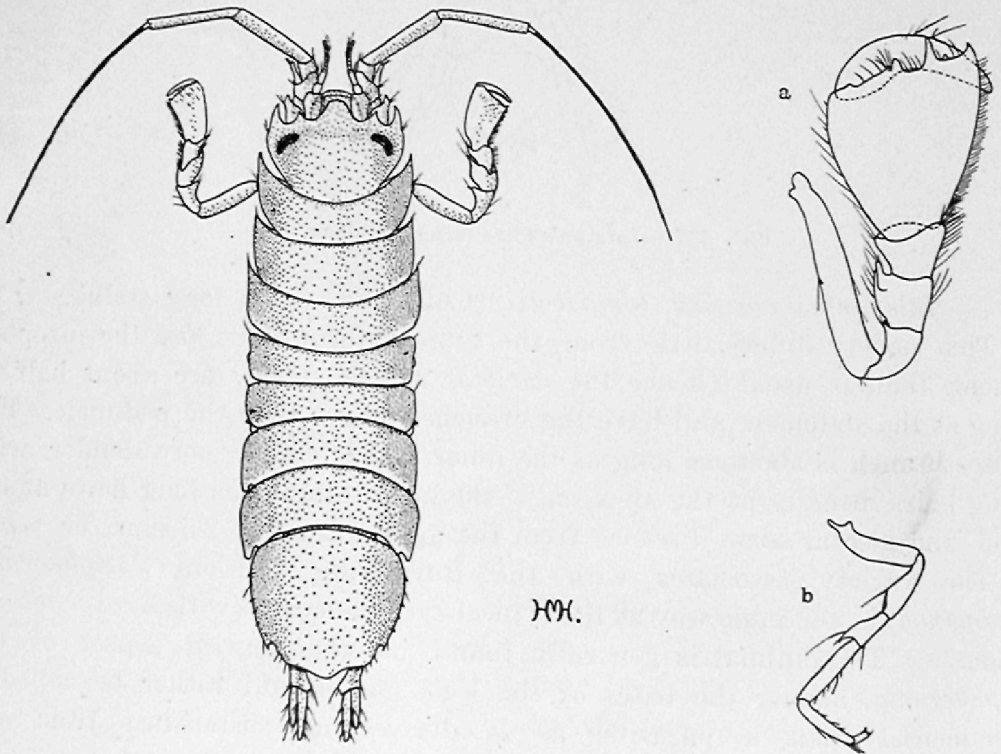


FIG. 328.—*Stenetrium armatum*, female; a, first leg of an adult male; b, one of the six pairs of walking legs (all x 11).

of the first joint of the second antennae. In the female the hand (or propodus) of the first legs is about one and three-fourths times as long as wide, with the edge on which the dactylus, or finger, folds nearly straight. The hand of the adult male is relatively very much larger than in the female, and is not much longer than wide; the edge on which the finger closes is jagged. Length: 13.5 mm., or $\frac{1}{2}$ in. (S.A.M.)

In the illustration of a female the subchelate first legs are shown, but the six pairs of ambulatory limbs are not indicated. The first leg of an adult male, showing the shape, armature, etc., of the hand, is figured at (a), and one of the third pair of legs (second walking limbs) of the same male at (b). The type specimens, which were taken in Port Jackson, New South Wales, are described as being half an inch in length, but the largest of the South Australian examples so far collected barely exceeds three-tenths of an inch.

Suborder PHREATOICIDEA.

Family PHREATOICIDAE.

The species of the only family of the suborder live in "fresh" water, on land in damp situations, or in subterranean waters. The first form to be described has no eyes, and was taken from a pump in New Zealand. As already indicated in the key to the suborders of the Isopods, the Phreatoicids superficially resemble Amphipods owing to the lateral compression of at least the abdomen. The coxae of the legs are usually small and movable on the second to seventh thoracic segments, but in the single species described from South Australia they are all absent, probably owing to complete fusion of these joints with the sides of the body segments. The last three pairs of legs are opposed to the others, as in most of the Amphipoda. The inner branch of the five pairs of pleopods acts as a gill, and the outer ramus is fringed with hairs; there are sexual stylets on the second pair of the male. In this and the succeeding pleopods the outer branch is two-jointed. The abdomen has six distinct segments, the sixth being more or less fused with the telson. The uropods are subterminal, and each has two styliiform, spine-armed branches. The peduncle of the second antennae is five-jointed.

Dr. Chas. Chilton, who first drew attention to these remarkable Isopods, wrote recently:—"The characters and distribution showed that the family must be an ancient one, and in 1918 this was proved by the discovery of a fossil species [*Phreatoicus wianamattensis*] from the Triassic beds of New South Wales. The fossil form is not very different from some of the existing species, and, apparently, members of the family have been living in fresh waters on some part of the Australian continent from Triassic times up to the present" The same author also stated that "it is perhaps worth while calling attention to the fact that in Tasmania species of *Phreatoicus* are found in the same waters as the peculiar fresh-water shrimps *Anaspides tasmaniae* and *Paranaspides lacustris*. These shrimps have been shown by Calman to be nearly related to *Palaeocaris*, *Praeanaspides*, etc., from the Permo-carboniferous of Europe and North America, the whole forming a group, which Calman has named Syncarida. [See pp. 13, 25, and 26 of this handbook.] Another living member of this group, *Koonunga*, was found in

fresh-water near Melbourne by Sayce in 1907; as yet no fossils belonging to the group have been recorded from Australia."

Anaspides, *Paranaspides*, and *Koonunga* are the living representatives of a primitive and generalised group of Crustacea, the Syncarida, and similarly the members of the Phreatoicoidea, a primitive group of the Isopoda, have continued to exist in the fresh waters of Australia, Tasmania, New Zealand, and South Africa from early secondary times."

When describing a species from South Africa, Dr. K. Barnard remarked that its discovery was "of great interest as being one more fact in support of the existence of an ancient land-mass connecting the southern continents (Gondwana land)."

PHREATOICUS (Chilton).

Phreatoicus latipes (Chilton). (with wide legs).

Eyes are rather well developed. The thorax is broad, and not compressed. Its first "free" segment is fused with the head, but the pleural, or lateral, parts are free; the suture is deep and distinct. The remaining thoracic segments are free. The sixth abdominal segment is united with the telson, but the suture between the two is well defined. The first legs are subchelate, and the last three pairs have the posterior part of the basis greatly expanded

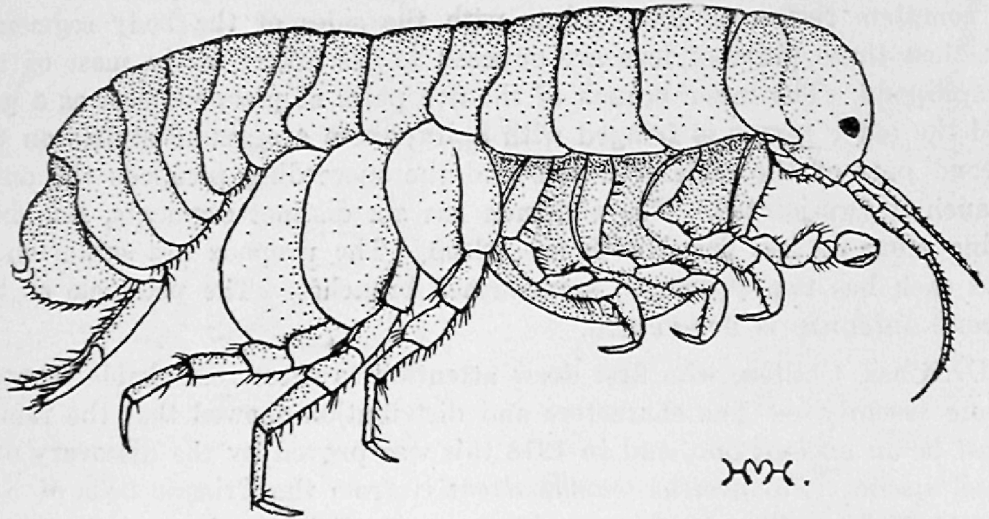


FIG. 329.—*Phreatoicus latipes* (x 8).

--a character referred to in the specific name. As indicated above, only six joints are apparent in the legs, the coxae having disappeared. The body of the adult is dark, slaty-grey, but "in some young specimens the surface of the body is lighter in color, with dark pigmented spots much more widely separated from one another than in the adult." Length: 15 mm., or $\frac{3}{8}$ in. (S.A.M.)

The first recorded examples were taken by Prof. F. Wood Jones from artesian water at Marree, where "the creatures were in thousands swimming in the hot water near the bore head," all swimming against the current.

The temperature of the water was not taken at the time, but steam was rising from it. A female taken by Prof. Wood Jones (one of the paratypes) is here illustrated. The animal has well-marked eyes, and it is evident that it is not a subterranean species which came up the bore from underground. Further, specimens were later collected from natural springs near Coward, to the west of Lake Eyre South. These springs, which range over an area of 30 miles, vary in salinity and temperature.

Suborder EPICARIDEA.

No attention has been paid to our representatives of this suborder. It comprises small Isopods, which, when adult, live as parasites on other crustaceans. Mature females usually become more or less distorted and degraded, but the small males are symmetrical. The last-named are often found associated with the females, but in some cases are free-living. The animals are apparently not abundant off our coasts, and at this stage it is possible to do little more than call attention to the group.

Two pairs of much reduced antennae are usually present; the mouth-parts are reduced, only mandibles and maxillipeds being developed, although rudiments of the maxillae may be present. The legs, if present, are prehensile, and the pleopods of the adult, when developed, are all branchial, none being sexually modified in the male; in some species they are altogether absent in one or both sexes.

The suborder is divided into two tribes. In the first of these (Cryptoniscina)

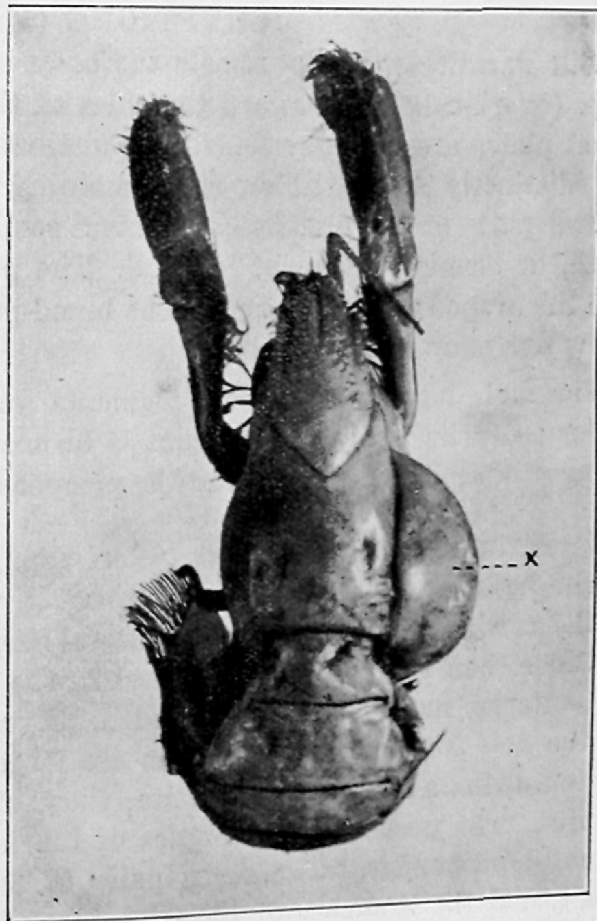


FIG. 330.—Sponge Shrimp, with an Epicarid (*Cryptione bakeri*) beneath right branchiostegite (x 4).

the species are probably all protandrous hermaphrodites, like certain members of the related fish-lice (Cymothoidae) already described. As with other parasitic Crustacea, a relatively enormous mass of eggs is produced. The species of the Cryptoniscina are tiny creatures, which parasitize

Cirripedes (Barnacles), Mysids (Opossum-shrimps), Ostracods (small water-fleas), Amphipods, and other Isopods.

The second tribe, the Bopyrina, comprises species in which the sexes are probably always distinct. The members of this tribe are found lodged in the gill-chamber, or under the abdomen, of crabs and prawn-like crustaceans. Occasionally a prawn or shrimp is collected which has a large swelling on one side of the thorax (fig. 330); this lump is due to the presence of a female Bopyrid which, if the branchiostegite be lifted, will be seen ensconced in the gill-cavity, in company with her small husband.

Tribe **BOPYRINA.**

Family BOPYRIDAE.

The members of this family are parasitic upon Decapod Crustacea.

CRYPTIONE (Hansen).

Gill Parasites. In the female the body is somewhat twisted, with swellings (ovarian bosses) toward the sides of the first four thoracic segments; coxal plates are well developed and distinct on these four somites, but are not distinctly separated on the remaining three thoracic segments. The lateral parts of the first five abdominal somites are well developed, but the sixth, or terminal, segment is small. The pleopods are each two-branched, and the uropods are uniramous. The brood-pouch is almost completely closed in by five pairs of oostegites.

The male has seven distinct segments in the thorax and six in the abdomen. The last pleon segment is bifurcate (the postero-lateral angles being produced backwards) and the pleopods are uniramous.

Shrimp-louse. *Cryptione bakeri* (sp. nov.). (personal name).

The body of the female is asymmetrical, very broadly pear-shaped, five-sixths as wide as long, and has the dorsal surface slightly concave. The head is wider than long, deeply immersed in the first thoracic segment, and has the anterior margin broadly rounded. Eyes are absent. The coxal-plates of the first four thoracic segments are large; those of the third are about three-fourths as long as the somite; those of the fourth are as long as the somite. The postero-lateral angles of the last three thoracic segments are slightly prominent. The seven pairs of legs are small; the uropods are short, and the branches of the five pairs of pleopods are subequal in size, leaf-like, and tapering at the apex. Length: 6.6 mm., or $\frac{1}{4}$ in. (S.A.M.)

The male is relatively much narrower than the female, being only half as wide as long. The head is wide, rounded in front, and is not deeply immersed in the first thoracic segment. The lateral parts of the seven thoracic segments and of the first four abdominal segments are produced, but those of the fifth segment are scarcely produced; the postero-lateral angles of

the sixth abdominal segment are produced backwards, the processes possibly representing the uropods. The seven pairs of prehensile legs are strong and relatively much larger than in the female. The five pairs of pleopods are simple, sac-like, and somewhat pear-shaped. Length: 2.2 mm., or $\frac{1}{10}$ in. (S.A.M.)

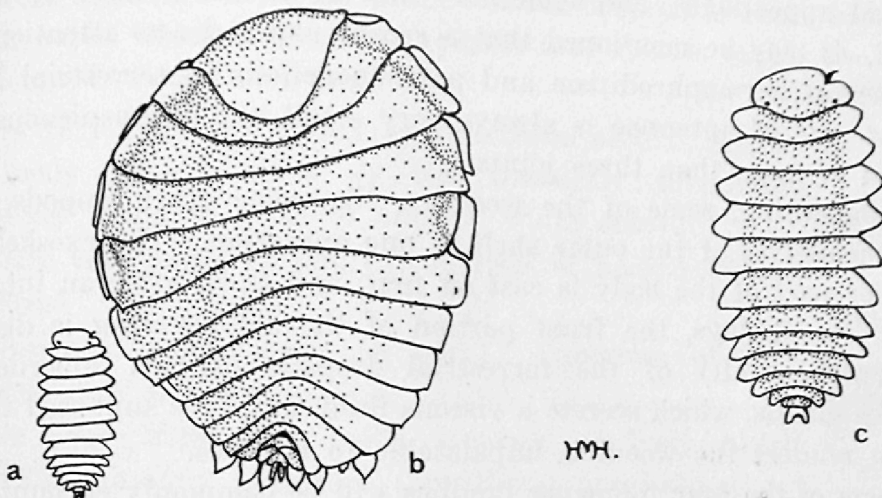


FIG. 331.—*Cryptione bakeri*; a and b, male and female (x 8); c, male (x 18).

The female was taken beneath the branchiostegite of a Sponge-shrimp (*Upogebia bowerbankii*, see p. 85), collected by Mr. Walter H. Baker in St. Vincent Gulf. The parasite was lying with the concave back against the gills, and the brood-pouch, filled with eggs, distended the gill-cover of the shrimp, as shown in the photograph. The tiny male was lodged transversely across the abdomen of his consort, immediately behind the marsupium; the front margin of its head is slightly abnormal. (The types, male and female, are in the Museum, Reg. Nos. C.1780 and C.1781).

Suborder **ONISCOIDEA.** (Woodlice and Pill-bugs.)

With very few exceptions, the Oniscoidea live on the land, and their respiratory organs are adapted for breathing air. Most of the species described below are moderately or very common, but a number of forms more rarely met with have yet to be recorded.

Land Isopods are found almost everywhere, from the centre of the Continent to the shores of the sea. Some species shelter under stones, leaves, and bark of trees, or in caves, while others occur on spray-wet rocks at the margin of the sea and on the white sands of our extensive beaches. One aquatic species has been taken in South Australia, and this, curiously enough, lives in salt-water lagoons. Some of the woodlice live in the nests of ants, and possibly there act as scavengers—at any rate, the insects tolerate the presence of their crustacean guests. In these myrmecophiles the colour is almost or wholly lost, and the eyes are rudimentary, or absent.