

## On some new Australian Apneumonomorphae with Notes on their Respiratory System

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### PLATES I-V

Three families of apneumone spiders are now recognized, namely, the Telemidae, Symphytognathidae, and Caponiidae. Of these, only the Symphytognathidae have been recorded from Australia. There is little doubt, however, that many apneumone species occur in this region. Some genera, formerly regarded as belonging to the Dipneumonomorphae, are now known to lack book-lungs and to have a respiratory system consisting of tracheal tubes only. Dr. L. Fage (1937, p. 97) states that *Chasmocephalon* and several other genera placed in the Theridiidae are apneumone. In the present paper, I have described a new species of *Chasmocephalon* from Tasmania, and am able to confirm Fage's statement in regard to the respiratory system of this genus.

The Victorian genera *Micropholcomma* and *Microlinypheus* are also shown to lack book-lungs and are therefore removed from the Theridiidae and Linyphiidae respectively. Moreover, *Microlinypheus* is regarded as a synonym of *Micropholcomma*. Two new species belonging to this genus are recorded from Tasmania.

In order to accommodate the species of *Micropholcomma* in the sub-order Apneumonomorphae, it is necessary to establish a new family, for which the name Micropholcommatidae is suggested. A definition of the family and descriptions of the species are given below. Brief notes on the respiratory systems of *Chasmocephalon* and *Micropholcomma* are also added.

#### Branch PROTEROTRACHEATAE

#### Family SYMPHYTOGNATHIDAE

#### Genus *Chasmocephalon* Cambridge, 1889

The following is a revised definition of the genus: Carapace high in front and sloping steeply to the posterior margin. Cervical groove in the form of a deep cleft. Eight eyes in two rows. Viewed from in front the anterior row is procurved. AME very small and contiguous. Clypeus very high. Chelicerae with three teeth. Tarsi about twice the length of the metatarsi. Few trichobothria on tibiae. A single trichobothrium on the first and second metatarsi, but none on the third and fourth metatarsi. A tarsal organ or 'drum' on all tarsi. Three

tarsal claws are present. Scopulae and claw-tufts absent. Female with reduced palpi. A dorsal scute is present on the abdomen in the male. Epigastric scute, mammillary ring, six spinnerets and a colulus are present in both sexes. Book-lungs and posterior tracheal spiracles are absent. A pair of anterior tracheal spiracles is present from which tubes are supplied to both cephalothorax and abdomen.

Spiders belonging to the genus are very small. They live among moss and fallen leaves, where they spin orbicular webs like those of the Argiopidae. The webs are suspended horizontally. The egg-sac is made of white silk and has the shape of a small bowl.

*Chasmocephalon minutum*, sp. n.

Male

	mm.
Total length .....	0.6713
Length of cephalothorax .....	0.3699
Width of cephalothorax .....	0.3288
Length of abdomen .....	0.5891
Width of abdomen .....	0.4658

Leg.	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.
1 .....	0.3014	0.1233	0.2329	0.1233	0.2466	1.0275
2 .....	0.2329	0.1096	0.2055	0.1096	0.2397	0.8973
3 .....	0.1918	0.0959	0.1644	0.0959	0.2055	0.7535
4 .....	0.2466	0.1096	0.2055	0.1096	0.2329	0.9042
Palp .....	0.1233	0.0685	0.0685	.....	0.0959	0.3562

*Colour.* Dark brown. Sternum and margin of dorsal scute on abdomen darker than other parts. On the clypeus a pair of dark lines from ALE and a median line from AME extend downwards and meet at the middle of the margin, thus forming a bisected V.

*Carapace.* High and convex. The head region, when viewed from the side, appears rounded and projects slightly over the clypeus. The slope from the head region to the posterior margin of the carapace is very steep. Cervical groove forms a deep cleft on each side. The margins of the clefts are furnished with small tubercles. The dorsal surface of the head region is smooth, but the sides are slightly granulose. Thorax is marked with coarse ridges and tubercles. There is a pair of erect hairs behind the cervical groove and a pair in front. There are also two hairs in a median row behind PME, two on each side between PME and PLE, and two between PME and AME. A single hair is situated immediately in front of AME, and a few short hairs are on the clypeus and at the sides of the head (pl. I, fig. 1).

*Eyes.* The eight eyes form a group which occupies the full width of the head. Viewed from above, both rows of eyes appear recurved. Viewed from in front they appear procurved (pl. I, fig. 2). AME are the smallest of the group and are mounted on a small, black tubercle. Ratio of eyes AME : ALE : PME : PLE = 5 : 12 : 10 : 11. The AME are separated from each other by  $\frac{2}{5}$  and from ALE by  $\frac{9}{5}$  of their diameter. The lateral eyes are contiguous. PME are separated from each other by  $\frac{4}{5}$  and from PLE by  $\frac{14}{5}$  of the diameter of AME. The median ocular quadrangle is twice as wide behind as in front. Its length is greater than its posterior width in ratio 25 : 22. The height of the clypeus in front of AME is about nine times the diameter of AME.

*Chelicerae.* Condyles and stridulating ridges absent. The basal segment is 0.126 mm. long. Fang well curved. Three moderately large teeth are present on the promargin. Of these the tooth farthest from the base of the fang is the largest. Near the base of the fang is a group of four minute teeth. A retro-lateral scopula of five barbed hairs is present (pl. I, fig. 3).

*Maxillae.* Triangular, converging in front of labium, clothed with about seven long hairs. Outer margin rounded. A small apical scopula and a well-developed serrula composed of about twenty teeth are present.

*Labium.* Immobile. Wider than long in ratio 18 : 7. Apex wide and emarginate. Provided with two hairs, one on each side.

*Sternum.* Strongly convex, cordiform, longer than wide in ratio 65 : 58. Produced anteriorly between the bases of the maxillae. Widest between the second coxae. Rounded posteriorly between the fourth coxae, which are widely separated. The surface is coarsely pitted and clothed with a few hairs.

*Legs.* 1.4.2.3. Lightly clothed with simple hairs. The tarsi are twice as long as the metatarsi. Spines are absent, but there is a large, erect bristle at the apex of each patella and 1 - 1 bristles on each tibia. Three trichobothria are situated on the basal half of the first three pairs of tibiae and four on the fourth pair. A single trichobothrium is present near the middle of the first and second metatarsi, but none on the third and fourth metatarsi. Each tarsus has a 'drum' on the dorsal side near the base. Three tarsal claws are present and all are devoid of teeth.

*Palpi.* The genital bulb is large and has the form shown in pl. I, figs 4 and 5. One of its most conspicuous features is a dark, three-pointed apophysis, between two of the prongs of which the embolus passes. The cymbium is spoon-shaped and clothed with a few long hairs. Two or three setae at the apex are sigmoid in shape. On the prolateral side the tibia is produced into a short, blunt apophysis and the patella has a small projection near the apex. Trichobothria and tarsal 'drum' are not present on the palpi.

*Abdomen.* Partly overhangs the carapace. The dorsal surface is covered by a hard chitinous scute clothed with minute hairs. A large epigastric scute covers most of the ventral surface (pl. I, fig. 1). It has a foramen for the petiolus, and on each side of the foramen a round sclerite is incorporated in the scute. About half way between these sclerites and the posterior margin of the scute are the two tracheal spiracles, one on each side (pl. I, fig. 6). Book-lungs and posterior tracheal spiracles are absent. In a median position behind the epigastric scute is a small rectangular sclerite. Six spinnerets and a small colulus are present. They are protected by a partial ring of chitin, which extends round them dorsally and laterally, but is incomplete ventrally. The anterior spinnerets are the largest of the group.

#### Female

mm.

Total length .....	0.7672
Length of cephalothorax .....	0.4110
Width of cephalothorax .....	0.3151
Length of abdomen .....	0.6302
Width of abdomen .....	0.5206

Leg.	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.
1 .....	0.2740	0.1233	0.2329	0.1233	0.2466	1.0001
2 .....	0.2466	0.1096	0.2055	0.1096	0.2329	0.9042
3 .....	0.1918	0.0959	0.1781	0.0959	0.2192	0.7809
4 .....	0.2603	0.1233	0.2192	0.1096	0.2329	0.9453

The female is slightly larger than the male and very dark brown, almost black, in colour. It also differs from the male in lacking a dorsal scute on the abdomen. In other respects there is a close resemblance between the two sexes, and therefore only the following characters need be described.

*Palpi.* As in other members of the genus the palpi are vestigial, being reduced to the coxa and maxillary lobe.

*Abdomen.* Broadly ovate. Dorsal surface tough and leathery, but without a rigid chitinous scute. A number of small, rounded sclerites are arranged in rows at the sides. On the ventral surface there is a large epigastric scute resembling that of the male. In a median position and immediately behind the epigastric scute is a small sclerite having a transverse procurved ridge. In surface view the epigynum consists of a slight median emargination of the posterior edge of the epigastric scute. On each side of the emargination the chitin is thickened. In transparent preparations the epigynum has the form shown in pl. I, fig. 7. The six spinnerets and colulus are protected by a partial ring of chitin, as in the male.

*Locality.* Tasmania: Cascades, 26th June, 1943, two males and two females. Mount Wellington (3000 ft.), 23rd July, 1943, seven males and four females. All the specimens were found amongst moss and fallen leaves.

*Habits, Web, and Egg-sac.* As previously mentioned, *Chasmocephalon minutum* lives amongst moss and fallen leaves on the ground, usually in moist situations. As the spider is little more than half a millimetre in length, its habits had to be studied under laboratory conditions. Specimens were kept in glass tubes and also in small cells made of plaster of Paris. The spiders thrived best in an atmosphere saturated with moisture and soon died under dry conditions. A glass tube only 10 mm. in diameter was wide enough for a complete orbicular web to be constructed within it. A web made among moss in a plaster cell, where its size was not in any way restricted, measured only 10 mm. in diameter. It had ten rays. The meshed hub was 0.6 mm. across and the free space 0.9 mm. The viscid spiral consisted of about 30 turns, adjacent turns being separated by 0.15 mm. In a length of one millimetre there were 430 viscid droplets arranged close together on the spiral. The web was suspended horizontally, with its centre drawn up slightly by means of a vertical thread. The spider rested at the hub on the underside and dropped immediately if disturbed.

Very small Collembola were found to be a suitable food, but were only accepted if caught in the web. On 8th August, 1943, one of the spiders made a white egg-sac, which resembled a small bowl covered with a lid, and was attached to a piece of moss. It measured 1.16 mm. in diameter and 0.87 mm. high, and contained two eggs. An egg-sac made by another specimen on 25th August, 1943, contained four eggs. From this latter sac the young ones emerged on 24th October, 1943. There were two males and two females. Even at this early stage the palpi of the females consisted of nothing more than the coxal segment with its maxillary lobe.

## Family MICROPHOLCOMMATIDAE, nov.

Cribellum and calamistrum wanting. Colulus and six spinnerets present. Book-lungs absent. A pair of anterior tracheal spiracles and a single median posterior tracheal present. A single pair of stout tracheal tubes pass from the anterior spiracles into the cephalothorax, where they branch into small tracheae. The abdomen is supplied with tubes from both the anterior and posterior spiracles. No tubes from the posterior spiracle enter the cephalothorax. Eight eyes are present. Chelicerae without boss. Margins oblique and toothed. Lip immobile. Maxillae converging, with scopula and serrula. Legs prograde. Three claws. Scopulae, onychium and claw tufts wanting. Trichobothria few and present on tibiae only, none elsewhere. A tarsal organ or 'drum' on tarsi. Pedipalp of female vestigial or with less than six segments and without a claw. Abdomen with dorsal and epigastric scutes and a chitinous ring round the spinnerets.

Genus *Micropholcomma* Crosby and Bishop, 1927

With the characters of the family. Anterior median eyes the smallest. Posterior row of eyes longer than front row. Ocular quadrangle wider behind than in front. Prolateral surface of first femora provided with small tubercles or granulations. Tarsi about double the length of the metatarsi. Upper claws similar and pectinate in a single row.

*Genotype.* *Micropholcomma caeligenus* Crosby and Bishop.

## KEY TO SPECIES

*Males*

- |  |       |  |
|--|-------|--|
| 1. First pair of legs with sinuous tarsi         | ..... | <i>M. parmata</i> sp. n.               |
| First pair of legs with normal tarsi             | ..... | 2                                      |
| 2. Second tibiae with one trichobothrium         | ..... | <i>M. mira</i> sp. n.                  |
| Second tibiae with two trichobothria             | ..... | 3                                      |
| 3. AME separated from ALE by 1/3 diameter of AME | ..... | <i>M. caeligenus</i> Crosby and Bishop |
| AME separated from ALE by 1/7 diameter of AME    | ..... | <i>M. bryophila</i> (Butler)           |

*Females*

- |   |       |  |
|---|-------|--|
| 1. Palpi reduced to five segments                 | ..... | <i>M. bryophila</i> (Butler)           |
| Palpi reduced to coxal segment and maxillary lobe | ..... | 2                                      |
| 2. Second tibiae with two trichobothria           | ..... | <i>M. caeligenus</i> Crosby and Bishop |
| Second tibiae with one trichobothrium             | ..... | 3                                      |
| 3. Dorsal scute of abdomen smooth                 | ..... | <i>M. parmata</i> sp. n.               |
| Dorsal scute of abdomen pitted                    | ..... | <i>M. mira</i> sp. n.                  |

*Micropholcomma caeligenus* Crosby and Bishop

Amongst a number of small spiders collected at Lorne, Victoria, by Mr. C. Oke, and sent to me for description, are several specimens which agree very closely with *Micropholcomma caeligenus* Crosby and Bishop. As the female has not been described and some additional characteristics of the male need recording, the following descriptions of both sexes are given.

## Male

	mm.
Total length	0.8905
Length of cephalothorax	0.4384
Width of cephalothorax	0.3425
Length of abdomen	0.6850
Width of abdomen	0.5617

Leg.	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.
1 .....	0.2192	0.1096	0.1781	0.0822	0.1781	0.7672
2 .....	0.2055	0.1096	0.1507	0.0822	0.1644	0.7124
3 .....	0.1918	0.0959	0.1370	0.0822	0.1781	0.6850
4 .....	0.2329	0.1233	0.2055	0.0959	0.2055	0.8631
Palp .....	0.0548	0.0685	0.0420	.....	0.0660	0.2313

*Colour.* The ground colour is golden brown. Carapace mottled with dark markings. A dark rectangular patch on the highest part of carapace. Interocular region black. Chelicerae, palpi and legs yellowish. Sternum golden brown mottled with black. Dorsal and epigastric scutes of abdomen golden brown. Soft integument of abdomen greyish yellow.

*Carapace.* Gently rounded at the sides. Very high, its highest point being above a line between the second coxae. From here it slopes gently downward to the eyes and very steeply to the hind margin. Head region smooth. Thoracic part finely shagreened. A pair of erect, curved bristles situated on the highest part of the carapace, and a single median bristle a short distance in front of them. Several shorter hairs are present on the head and in the eye-region.

*Eyes.* Eight, arranged in two rows. The eye-group occupies almost the full width of the head. Posterior row longer than front row in ratio 13 : 11. Viewed from above the posterior row is straight and the front row recurved. Viewed from in front the anterior row is distinctly procurved, the ALE being nearer the margin of the clypeus than are the AME. Ratio of eyes AME : ALE : PME : PLE = 9 : 14 : 11 : 12. AME are separated from each other by 4/9 and from ALE by 3/9 of their diameter. The lateral eyes are contiguous. PME are separated from each other by a space equal to the diameter of AME and from PLE by 8/9 of the diameter of AME. The median ocular quadrangle is wider behind than in front in ratio 30 : 21. Its length is less than its posterior width in ratio 23 : 30. The height of the clypeus in front of AME is slightly less than four times the diameter of AME.

*Chelicerae.* Strong and stout. Devoid of condyles and stridulating ridges. Fang well curved. Margins oblique. Promargin provided with two stout spines near base of fang and two teeth. Retromargin with one tooth. Behind the retromargin is an oblique row of five barbed hairs forming a light scopula. Front surface clothed with 8 or 9 simple hairs.

*Maxillae.* Triangular. Converging in front of labium. Provided with a small apical scopula and a well developed serrula.

*Labium.* Immobile, much wider than long, slightly emarginate in front and provided with five hairs in a transverse row.

*Sternum.* Smooth, cordiform, convex, as wide as long, widest immediately in front of second coxae, rebordered and squarely truncate behind. Clothed with about 18 hairs on each side. Middle region devoid of hairs. Fourth coxae widely separated.

*Legs.* 4.1.2.3. Tarsi more than twice the length of metatarsi. Spines absent. There are a few small granules on the prolateral side of the first femora. Some of the granules form a group near the base of the segment. Tibiae stout. Patellae with a retrolateral bulge. Two trichobothria on tibiae of first three pairs of legs, three on those of fourth pair. No trichobothria on other segments. A tarsal organ or 'drum' is present on the dorsal side of each tarsus near the base. Scopulae and claw tufts absent. Three tarsal claws present. Upper claws provided with about four small teeth, which are larger on the claws of the front

two pairs of legs than on those of the other legs. The lower claw appears to be bare. Legs are clothed with long hairs, those on the ventral side of all the tarsi being distinctly barbed, but they do not form a 'comb' on the fourth tarsi.

*Palpi.* Very small, not much longer than the femora of first pair of legs. Femur short and stout. Patella longer than femur and produced into a short, pointed apophysis on the retrolateral side. Tibia short and expanded distally. It arises on the prolateral side of the patella. Tarsus spoon-shaped. Embolus rises from the outer surface of the genital bulb and makes one complete turn. Four long hairs are situated along the edge of the cymbium and project over the bulb. Trichobothria and tarsal drum are lacking. See figure of palpus given by Crosby and Bishop (1927, pl. XVI, fig. 19).

*Abdomen.* Dorsal surface covered by a hard shield. The soft integument at the sides of the abdomen forms a fold parallel with the edge of the scute and also two other folds which pass obliquely downwards towards the spinnerets. A great part of the ventral surface is covered by a large epigastric scute which extends forwards round the base of the pedicle. The posterior margin of the scute is produced backwards into two lobes, one on each side. Book-lungs are absent. A pair of anterior tracheal spiracles is situated in the notches formed between the epigastric scute and its posterior lobes. A single median tracheal spiracle opens immediately in front of the colulus and is partly hidden by the posterior margin of the chitinous ring that surrounds the spinnerets. Six spinnerets are present, the anterior pair being the largest. The small colulus is pyriform and provided with two hairs on its ventral surface. The abdomen is clothed with hairs. A number of small rounded sclerites is incorporated in the dorsal scute and form a sub-marginal row readily seen in cleared specimens.

#### Female

							mm.
Total length	.....	.....	.....	.....	.....	.....	0.9864
Length of cephalothorax	.....	.....	.....	.....	.....	.....	0.4384
Width of cephalothorax	.....	.....	.....	.....	.....	.....	0.3562
Length of abdomen	.....	.....	.....	.....	.....	.....	0.7809
Width of abdomen	.....	.....	.....	.....	.....	.....	0.6439

Leg.	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.
1	0.2329	0.1096	0.1644	0.1027	0.1781	0.7877
2	0.2192	0.1233	0.1507	0.0959	0.1781	0.7672
3	0.2055	0.1096	0.1370	0.0891	0.1781	0.7193
4	0.2603	0.1096	0.2055	0.1027	0.2055	0.8836

The female closely resembles the male in colouration and general appearance. Hence only the following characters need be described.

*Palpi.* Vestigial, being reduced to the coxa, maxillary lobe and a small tubercle-like projection on the outer side of the coxal segment near the base (pl. II, fig. 8).

*Abdomen.* Dorsal scute, epigastric scute and tracheal spiracles as in the male. A pair of spermathecal apertures open on the epigastric scute just in front of its posterior margin. They are between and almost in line with the notches formed between the scute and its posterior lobes (pl. II, fig. 9). The form of the epigynum viewed as a transparent object is shown in pl. II, fig. 10.

*Locality.* Victoria: Lorne. Four males and four females collected from moss by Mr. C. Oke.

***Micropholcomma bryophila* (S. Butler)**

This small spider was described under the name of *Microtynypheus bryophilus* by Mr. S. Butler (1932, p. 104). The type specimens were collected at Lorne, Victoria, by Mr. C. Oke, who has been good enough to send me several examples of the same species from the same locality. These agree very closely with Mr. Butler's description, but, in my opinion, the spider belongs to the genus *Micropholcomma*. The following revised description of both sexes is therefore given:—

						mm.
<b>Male</b>						
Total length						0.7672
Length of cephalothorax						0.3836
Width of cephalothorax						0.3014
Length of abdomen						0.5754
Width of abdomen						0.4795
	Leg.	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.
1	.....	0.1918	0.0959	0.1644	0.0959	0.1644
2	.....	0.1781	0.0959	0.1507	0.0822	0.1575
3	.....	0.1644	0.0822	0.1507	0.0822	0.1507
4	.....	0.2055	0.0959	0.1918	0.0959	0.1781
Palp	.....	0.0506	0.0655	0.0447	.....	0.0745
						0.2353

*Colour.* Golden brown. Carapace and sternum mottled with black.

*Carapace.* Gently rounded at the sides. Somewhat narrowed and bluntly rounded in front. Viewed from the side it rises very steeply from the posterior margin, reaching its highest point above a line between the second coxae. It then slopes gently downwards to the eyes. Head-part smooth. Thoracic part finely granular. A pair of erect, curved bristles on the highest part of the carapace and a single median bristle a short distance in front of them. A few shorter hairs at the sides of the head and in the eye-region.

*Eyes.* Eight, arranged in two rows, the posterior row being longer than the front row in ratio 8 : 5. The eye-group occupies the full width of the head. Viewed from above both rows appear very slightly recurved, almost straight. Viewed from in front the anterior row is distinctly procurved, the lateral eyes being nearer the edge of the clypeus than are the median eyes. Ratio of eyes ALE : PME : PLE = 7 : 11 : 11. AME are separated from each other by  $\frac{2}{7}$  and from ALE by  $\frac{1}{7}$  of their diameter. The lateral eyes are contiguous. PME are separated from each other by  $\frac{6}{7}$  and from PLE by  $\frac{5}{7}$  of the diameter of AME. The median ocular quadrangle is wider behind than in front in ratio 26 : 16. Its length is shorter than its posterior width in ratio 20 : 26. The height of clypeus in front of AME is  $\frac{25}{7}$  of the diameter of AME.

*Chelicerae.* Strong, stout, and very slightly diverging. Lateral condyles and stridulating ridges absent. Fang strong and curved. Margins oblique. Promargin with two stout spines near base of fang and two small teeth. Retromargin with one tooth. Behind the retromargin is an oblique row of five barbed hairs forming a light scopula. Front surface with a few long hairs.



*Maxillae.* Converging in front of labium. Provided with a light scopula at the apex and a serrula of about 21 teeth on the anterior margin.

*Labium.* Immobile, much wider than long, slightly emarginate in front and provided with a transverse row of five hairs.

*Sternum.* Convex, cordiform, longer than wide in ratio 17 : 16. Widest between the second coxae. Margin rebordered. Truncate between the fourth coxae, which are widely separated. Clothed with a few long hairs.

*Legs.* 4.1.2.3. Tarsi almost twice the length of the metatarsi. Spines absent. First femora with a few small granules on the prolateral surface near the base. Two trichobothria on the tibiae of the first three pairs of legs and three on those of the fourth pair. No trichobothria on other segments. Tarsal organ or 'drum' on the dorsal side of each tarsus near the base. Scopulae and claw tufts absent. Three tarsal claws present. The upper claws appear to have a few very small teeth, but the number could not be seen clearly. The lower claw has one tooth. Legs clothed with long hairs, those on the ventral side of the tarsi being barbed. There is no 'comb' on the fourth tarsi.

*Palpi.* Very small, slightly longer than the first femora. Femur short and stout. Patella longer than femur and produced into a blunt-pointed apical apophysis on the retrolateral side. Tibia short and expanded distally. It is attached to the prolateral side of the patella. Tarsus spoon-shaped and clothed with about seven long hairs. Embolus makes one complete turn on the surface of the bulb (pl. II, fig. 11). The palpi closely resemble those of the other three species in the genus.

*Abdomen.* Dorsal surface covered by a hard chitinous shield lightly clothed with short hairs. The soft integument at the sides of the abdomen forms a series of folds as in the preceding species. Ventral surface is provided with a large epigastric scute which extends forward round the base of the pedicle. The posterior margin of the scute is produced backwards into two lobes, one on each side. Book-lungs are absent. A pair of anterior tracheal spiracles is situated, one on each side, in the notches formed between the scute and its posterior lobes. A single median posterior tracheal spiracle is situated immediately in front of the spinnerets and on the posterior margin of the chitinous ring which surrounds them. Six spinnerets and a colulus are present. The colulus is provided with two hairs. The anterior spinnerets are the largest of the group.

#### Female

	mm.
Total length .....	0.8220
Length of cephalothorax .....	0.3836
Width of cephalothorax .....	0.3014
Length of abdomen .....	0.6850
Width of abdomen .....	0.5480

Leg.	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.
1 .....	0.2055	0.0959	0.1644	0.0822	0.1781	0.7261
2 .....	0.1918	0.0959	0.1644	0.0822	0.1644	0.6987
3 .....	0.1644	0.0959	0.1370	0.0822	0.1644	0.6439
4 .....	0.2329	0.0959	0.1918	0.0959	0.1644	0.7809

The female resembles the male in colour and general appearance. Hence only the following characters need be described.

*Eyes.* The eye-group occupies the full width of the head. AME are somewhat smaller than in the male. Ratio of eyes AME : ALE : PME : PLE = 6 : 11 : 11 : 11. The AME are separated from each other by half their diameter and are almost contiguous with ALE. The PME are separated from each other by a space equal to once the diameter of AME, and by the same distance from the PLE. The lateral eyes are contiguous. The median ocular quadrangle is wider behind than in front in ratio 26 : 15. Its length is less than its posterior width in ratio 20 : 26. The height of the clypeus in front of AME equals  $25/6$  times the diameter of AME.

*Chelicerae, maxillae, labium, sternum and legs* as in the male.

*Palpi.* Very small, being only 0.153 mm. long and consisting of only five segments. This interesting feature was recorded by Mr. Butler (1932, p. 106), who considered that the patella was lacking. In my opinion, however, the patella is present and the apparent loss of a segment is due to the fusion of the tibia with the tarsus. There is a slight constriction where one would expect the joint between the tibia and tarsus to be, but no actual joint is present (pl. II, fig. 12). The measurements of the separate segments of the palp are as follows. Trochanter 0.021 mm., femur 0.045 mm., patella 0.033 mm., tibiotarsus 0.054 mm. The appendage is provided with a few long hairs, but trichobothria, tarsal 'drum' and claw are lacking.

*Abdomen.* Dorsal surface completely covered by a hard scute. Integument at the sides of the abdomen forms a series of folds as in preceding species. A large epigastric scute covers more than half of the ventral surface and extends round the pedicle so that the foramen for the pedicle is near the centre of the scute. Posteriorly the scute is produced backwards into two lobes, one on each side, as in other members of the genus. Book-lungs are wanting. Tracheal apertures as in male. A pair of spermathecal openings are situated on the scute a short distance in front of the posterior margin (pl. II, fig. 13). The form of the epigynum as seen in transparent preparations is shown in pl. II, fig. 14.

Six spinnerets and a colulus are present and resemble those of the male. They are surrounded by the usual chitinous ring.

*Locality.* Victoria: Lorne. Three males and three females collected by Mr. C. Oke.

#### *Micropholcomma parmata*, sp. n.

Male		mm.					
Total length		1.0001					
Length of cephalothorax		0.4795					
Width of cephalothorax		0.3699					
Length of abdomen		0.7535					
Width of abdomen		0.6028					
Leg.	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.	
1	0.2740	0.1096	0.2055	0.0959	0.2329	0.9179	
2	0.2466	0.1096	0.1644	0.0822	0.2192	0.8220	
3	0.2192	0.1096	0.1507	0.0959	0.2055	0.7809	
4	0.2740	0.1096	0.2192	0.1096	0.2192	0.9316	
Palp	0.0626	0.0387	0.0447	.....	0.0894	0.2354	

*Colour.* Carapace and dorsal scute of abdomen chestnut-brown. A dark rectangular patch on posterior part of head. Margin of carapace suffused

with black. Interocular space black. A dark median line behind PME and a similar dark line on each side behind PLE extend backwards to the dark rectangular patch on the posterior part of the head. Sternum brown, suffused with black. Legs and ventral surface of abdomen light brown.

*Carapace.* Viewed from above its outline is broadly pyriform. Rounded in front and at the sides. Viewed from the side it appears very high, its highest point being above a line between the second coxae. From here it slopes gently downwards to the eye-region and very steeply downwards to the posterior margin (pl. III, fig. 18). The thoracic part is finely granular, the head part smooth. From the highest part arises a pair of long, erect bristles, which curve forward. A similar median bristle is situated a short distance in front of them. Several short hairs are also present on the head.

*Eyes.* Eight, arranged in two rows. The posterior row is longer than the front row in ratio 13 : 11. The eye-group occupies almost the full width of the head region in front. Viewed from above the posterior row is straight and the anterior row slightly recurved. Viewed from in front the anterior row is procurved, the ALE being nearer the margin of the clypeus than are the AME. Ratio of eyes AME : ALE : PME : PLE = 11 : 16 : 12 : 14. AME are separated from each other by  $4/11$  and from ALE by  $2/11$  of their diameter. The lateral eyes are contiguous. PME are separated from each other by a space equal to the diameter of AME and from PLE by  $8/11$  of the diameter of AME. The height of the clypeus in front of AME is about  $37/11$  of the diameter of AME. There is a median hair in front of AME and two hairs on each side in front of ALE (pl. III, fig. 15).

*Chelicerae.* Stout and strong. Devoid of lateral condyles and stridulating ridges. Fang strong and well curved. Margins oblique. Promargin provided with two short spines near base of fang and two teeth. Retromargin with one small tooth. Behind the retromargin is an oblique row of five barbed hairs forming a light scopula. Front surface furnished with about eight long hairs (pl. III, fig. 15).

*Maxillae.* Converging in front of labium. Somewhat triangular in shape. Provided with an apical scopula and a well developed serrula.

*Labium.* Immobile, much wider than long, slightly emarginate in front and provided with five hairs in a transverse row.

*Sternum.* Convex, cordiform, as wide as long, widest immediately in front of second coxae, margin rebordered, squarely truncate between the fourth coxae, which are separated by about  $8/5$  of their diameter. Surface of sternum shagreened and furnished with a few long hairs.

*Legs.* 4.1.2.3. Tarsi more than twice the length of the metatarsi. The first tarsi sinuous and somewhat narrowed towards the base (pl. III, fig. 16). They are provided with three short, stout spines on the prolateral surface, the largest spine being near the middle of the segment. There are no other spines present on any of the legs. The first femora have a group of small granules near the base on the prolateral surface and a few similar granules on the ventral surface. There are two trichobothria on the first tibiae, one on the second, two on the third, and three on the fourth. Elsewhere there are none. All the patellae have a distinct bulge on the retrolateral side. A tarsal organ or 'drum' is situated on the dorsal side of each tarsus near the base. Three tarsal claws are present. The upper claws are similar and provided with a few small teeth. The lower claw is without teeth. Scopulae and claw-tufts are absent. The legs are

clothed with long hairs, those of the ventral surface of the second, third, and fourth tarsi being distinctly barbed. There is no 'comb' however on the fourth tarsi.

*Palpi.* Very small, not as long as the first femora. The tibia is short and broad, articulating with the prolateral side of the patella. The patella is somewhat ovoid and produced into a short, black point on the retrolateral side at the apex. Near the base on the retrolateral side it is provided with a series of fine longitudinal ridges (pl. III, fig. 17). The femur is short and stout. The genital bulb resembles that of the other species in the genus. The embolus arises on its surface and makes one complete turn. Four long hairs on the retrolateral edge of the cymbium project over the bulb.

*Abdomen.* Dorsal surface covered by a smooth, chitinous scute, which is clothed with moderately long hairs. It is marked with a row of round, submarginal spots, due to the presence of small sclerites incorporated in the scute. Near the middle of the scute are two pairs of muscle spots. The soft integument at the side of the abdomen forms a fold just below and in contact with the edge of the dorsal scute. Beneath this fold and parallel with it is a second fold, which divides into two above the spinnerets. Connected with this second fold are two oblique folds, as shown in the figure of the female (pl. III, fig. 18). The ventral surface of the abdomen is partly covered by a large epigastric scute, which extends forward round the pedicle. The posterior margin of the scute is produced backward into two lobes, one on each side. Book-lungs are wanting. A pair of anterior tracheal spiracles are situated in the notches formed between the scute and its posterior lobes. A posterior median tracheal spiracle is also present and is situated immediately in front of the colulus, being partly concealed by the posterior margin of the chitinous ring, which surrounds the spinnerets. Behind the posterior lobes of the epigastric scute are two rounded sclerites, one on each side. A short distance in front of the mamillary ring is a transverse row of four small sclerites. In addition to these there are numerous small setigerous sclerites in the soft integument at the sides and on the ventral surface. Six spinnerets are present and a small colulus in front of them. The colulus is provided with two hairs.

#### Female

							mm.
	Total length						1.0960
	Length of cephalothorax						0.4795
	Width of cephalothorax						0.3699
	Length of abdomen						0.7809
	Width of abdomen						0.6987
Leg.	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.	
1	0.2877	0.1233	0.2055	0.1096	0.2466	0.9727	
2	0.2603	0.1233	0.1781	0.0959	0.2192	0.8768	
3	0.2329	0.1096	0.1507	0.0959	0.2192	0.8083	
4	0.3014	0.1233	0.2466	0.1027	0.2329	1.0069	

The female closely resembles the male. Only the following characters need be described.

*Legs.* The tarsi of the first pair of legs differ from those of the male in being straight and of normal shape. They are also without spines.

*Palpi.* Vestigial, being reduced to the coxa, maxillary lobe and a small tubercle-like projection on the outer surface of the coxa (pl. III, fig. 19).

*Abdomen.* The dorsal and epigastric scutes resemble those of the male. The spermathecal apertures have the form of a pair of circular openings a short distance in front of the posterior margin of the epigastric scute. Between the posterior lobes of the scute and immediately behind its posterior margin is a slender and slightly procurved sclerite (pl. III, fig. 20.) The form of the epigynum as seen in transparent preparations is shown in pl. III, fig. 21. Tracheal spiracles, colulus and spinnerets as in the male.

*Locality.* Tasmania: Mt. Wellington (3000 ft.). Six males and 12 females collected in moss during July and August, 1943.

*Habits, Web, and Egg-sac.* *Micropholcomma parmata* lives amongst moss growing on the surface of large rocks on the slopes of Mount Wellington. Both male and female specimens were collected under cold and damp conditions, when the mountain was partly covered with snow. Specimens kept amongst damp moss in small glass tubes in the laboratory and fed on minute Collembola lived for several months. They made small, irregular webs like those of the Theridiidae. Early in October two of the specimens made egg-sacs. These were formed of closely woven white silk and attached to the leaflets of the moss. They had the shape of a shallow pill-box the lid of which was slightly raised in the centre and produced into a flange round the margin (pl. III, fig. 22). One of the sacs measured 1.233 mm. in diameter and 0.550 mm. in height. From an egg-sac made on 11th October, 1943, two young spiders emerged on 7th December. One was a female and had vestigial palps no more developed than in the adult.

#### *Micropholcomma mira*, sp. n.

##### Male

							mm.
Total length	.....	.....	.....	.....	.....	.....	1.1919
Length of cephalothorax	.....	.....	.....	.....	.....	.....	0.4521
Width of cephalothorax	.....	.....	.....	.....	.....	.....	0.3973
Length of abdomen	.....	.....	.....	.....	.....	.....	0.8220
Width of abdomen	.....	.....	.....	.....	.....	.....	0.7124
Leg.	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.	
1	0.3425	0.1370	0.2192	0.1233	0.2466	1.0686	
2	0.3014	0.1370	0.1918	0.1096	0.2329	0.9727	
3	0.2877	0.1301	0.1781	0.1233	0.2192	0.9384	
4	0.3562	0.1370	0.2808	0.1370	0.2466	1.1576	
Palp	0.0715	0.0924	0.0477	.....	0.0805	0.2921	

*Colour.* The ground colour is chestnut-brown. Carapace speckled with black and marked with a rectangular black pattern on its highest part. Faint, radiating lines in the position of the radial grooves. Sternum mottled with black and marked with triangular black patches pointing inwards from the margin. Labium suffused with black. Dorsal shield of abdomen finely speckled with black.

*Carapace.* Viewed from above, somewhat pyriform, narrowed and rounded in front, and with slightly sinuous lateral margins. Viewed from the side, high, steeply ascending from posterior margin and gently curved over the head region to the eyes. Its highest point lies above a line between the second coxae and is furnished with a pair of long, erect, stiff hairs, which curve forwards. In front of these hairs is a median longitudinal row of three shorter hairs. Radial grooves are faintly marked. Dorsal surface of head-region smooth, rest of the carapace finely granular (pl. IV, fig. 23).

*Eyes.* Eight, arranged in two rows. The posterior row is slightly longer than the anterior row. The eye-group occupies almost the full width of the head region. Viewed from above the posterior row appears straight and the front row recurved. Viewed from in front both rows appear procurved. The ratio of the eyes  $AME : ALE : PME : PLE = 9 : 14 : 11 : 14$ . The AME are separated from each other by  $3/9$  and from ALE by  $2/9$  of their diameter. The lateral eyes are contiguous. The PME are separated from each other by  $8/9$  and from PLE by  $6/9$  of the diameter of AME. The median ocular quadrangle is wider behind than in front in ratio  $31 : 22$ . Its length is shorter than its posterior width in ratio  $28 : 31$ . The height of the clypeus in front of AME is equal to  $30/9$  of the diameter of AME. A single hair below AME and a pair of hairs on each side below ALE.

*Chelicerae.* Stout and strong. Lateral condyles and stridulating ridges lacking. Inner margins oblique. Two small teeth on promargin, one on retromargin. A long bristle and two short spines in a row in front of promargin. A light scopula consisting of five barbed hairs in an oblique row is situated behind the retromargin. Fang moderately long and curved. There are a few long hairs on the front of the chelicerae.

*Maxillae.* Triangular, converging in front of labium. Provided with a light apical scopula and a well developed serrula.

*Labium.* Immobile. Much wider than long. Slightly emarginate in front. Provided with five hairs in a transverse row.

*Sternum.* Convex, cordiform, and truncate behind. Margin rebordered. Wider than long in ratio  $22 : 20$ . Clothed with a few long hairs. Fourth coxae widely separated (pl. IV, fig. 24).

*Legs.* 4.1.2.3. Tarsi about twice the length of the metatarsi. Hairs simple, except on the ventral side of the tarsi, where they are barbed. Spines are wanting. Two trichobothria on the first tibiae, one on the second, two on the third, and three on the fourth. No trichobothria on other segments. The prolateral surface of the first femora is furnished with a group of small denticles or granules near the base (pl. IV, fig. 25). The granules extend along about  $1/3$  of the length of the segment. All the patellae have a distinct bulge on the retrolateral side. Scopulae and claw-tufts absent. Three tarsal claws are present. In the first and second tarsi the upper claws have four teeth and in the third and fourth tarsi three teeth. The lower claw has a single tooth.

*Palpi.* Very small. Not as long as the first femora. The patella is the longest segment and has a curved, pointed apophysis on the retrolateral side at the apex. The tibia is short and expanded distally. It is inserted on the prolateral side of the patella. Tarsus rounded and spoon-shaped. The genital bulb is rounded and the embolus arises on its surface and makes one complete turn (pl. IV, fig. 26). The retrolateral edge of the cymbium is furnished with about four long hairs, which project over the bulb. Two similar hairs are present on the retrolateral side of the tibia.

*Abdomen.* Cordiform and somewhat sharply narrowed behind. Dorsal surface, except the narrowed posterior part and a small lateral margin, is covered by a hard scute. The surface of the scute is smooth and clothed with fine hairs. The integument below the lateral and posterior margins of the scute forms a continuous horizontal fold, which, round the posterior end, is reinforced by a long, narrow sclerite. On each side near the front of the abdomen the horizontal fold gives rise to two oblique folds which pass downwards towards the spinnerets. The grooves between the folds are occupied by small sclerites in a row. On the

ventral surface there is a large epigastric scute, which extends forward round the pedicle and is produced backwards into two lobes as in the preceding species. On each side of the epigastric scute is a longitudinal row of small sclerites, which extends backwards to join a transverse row of four sclerites in front of the large chitinous ring surrounding the spinnerets. Book-lungs are absent. A pair of anterior tracheal spiracles open in the notches formed between the epigastric scute and its posterior lobes. A single median posterior tracheal spiracle opens in front of the spinnerets on the posterior margin of the chitinous ring. Six spinnerets and a colulus are present. The anterior spinnerets are the largest of the group. Each is provided with four long conical spinning tubes. The middle spinnerets are small and hidden by the others. The posterior spinnerets are provided with peculiar, coarse, black, sinuous setae. These setae are minutely barbed (pl. IV, fig. 27).

**Female**

	mm.					
Total length	.....	1.2741				
Length of cephalothorax	.....	0.4932				
Width of cephalothorax	.....	0.4247				
Length of abdomen	.....	1.0275				
Width of abdomen	.....	0.7946				

Leg.	Femur.	Patella.	Tibia.	Metatarsus.	Tarsus.	Total.
1	0.3014	0.1370	0.2055	0.1233	0.2466	1.0138
2	0.2603	0.1370	0.1918	0.1096	0.2329	0.9316
3	0.2466	0.1370	0.1918	0.0959	0.2329	0.9042
4	0.3425	0.1507	0.2877	0.1370	0.2603	1.1782

The female resembles the male in coloration but differs somewhat in shape. The cephalothorax is wider in front. The abdomen is more oval and not so strongly narrowed behind. The dorsal scute, instead of being smooth, is coarsely pitted. It is also more extensive than in the male (pl. IV, fig. 28).

*Eyes.* Arranged as in the male. Ratio of eyes AME : ALE : PME : PLE = 10 : 15 : 13 : 15. AME separated from each other by 3/10 and from ALE by 2/10 of their diameter. The lateral eyes are contiguous. PME separated from each other by a space equal to the diameter of AME, and by half this distance from PLE. The median ocular quadrangle is wider behind than in front in ratio 36 : 23. Its length is less than its posterior width in ratio 28 : 36. Height of clypeus in front of AME is three times the diameter of AME.

*Chelicerae, maxillae, labium, sternum and legs* resemble those of the male.

*Palpi.* Vestigial, consisting of the coxa, maxillary lobe, and a small conical projection on the outer side of the coxa. The projection carries two or three hairs (pl. IV, fig. 29).

*Abdomen.* Broadly ovoid. Dorsal surface almost completely covered by a leathery chitinous scute. Incorporated in the scute are several submarginal sclerites as shown in pl. IV, fig. 28. The scute is clothed with fine hairs and has a coarsely pitted appearance. The integument at the sides of the abdomen is folded as in the male, but there is no narrow sclerite in the posterior portion of the horizontal fold. The epigastric scute has the same form as in the male but is perforated by the two spermathecal apertures, one on each side, slightly in front of the posterior margin of the scute (pl. IV, fig. 30). The tracheal spiracles are situated as in the male. A colulus and six spinnerets are present. They are surrounded by a chitinous ring, which is not as large as in the male. The coarse

barbed setae on the posterior spinnerets of the male are represented by more slender setae in the female. The form of the epigynum as seen in transparent preparations is shown in pl. IV, fig. 31.

*Locality.* Tasmania: New Town. 10 males and 14 females collected from moss in a garden lawn, 23rd December, 1943.

## APPENDIX

### THE RESPIRATORY SYSTEMS OF CHASMOCEPHALON AND MICROPHOLCOMMA

The respiratory systems of *Chasmocephalon minutum* sp. n. and of the four species of *Micropholcomma* described above were examined both in serial sections and in specimens treated with caustic potash solution.

In *Chasmocephalon minutum*, as in the undescribed species examined by Dr. Fage (1937, p. 97), book-lungs are absent. In place of book-lungs there is a pair of anterior tracheal spiracles, each of which opens into a short atrium. The two atria are quite independent, there being no transverse connecting tube between them. Each atrium supplies a number of tracheal tubes to both the cephalothorax and the abdomen (pl. V, fig. 32). About sixteen tubules pass through the petiolus into the cephalothorax and one tube enters each appendage. In transverse sections of the petiolus the tracheal tubules are seen to lie immediately below the mid-gut (pl. V, fig. 33). Posterior tracheal spiracles are absent. The heart has two pairs of ostia.

In the four species of *Micropholcomma* book-lungs are also absent. As previously mentioned there is a pair of anterior tracheal spiracles and also a single median posterior tracheal spiracle. Each anterior spiracle opens into a short atrium. The left and right atria are connected by a wide transverse tube situated immediately above the posterior margin of the epigastric scute. In front, each atrium gives rise to two pairs of stout tracheal tubes which curve forwards and upwards. The inner pair of tubes, on reaching the level of the petiolus, bend sharply towards the front and pass through the petiolus into the cephalothorax. The outer pair pass upwards and backwards, one on each side of the heart (pl. V, fig. 34). The pair of tubes which enter the cephalothorax are situated immediately above the mid-gut in the petiolus (pl. V, fig. 35). They pass forwards and lie one on each side of the sucking-stomach. Here each gives rise to a large number of smaller tubes supplying various parts of the cephalothorax. In addition to the two pairs of stout tracheal tubes given off anteriorly from the atria there are also numerous smaller tubes that arise laterally and supply parts of the abdomen.

The single median posterior tracheal spiracle in front of the colulus leads into a short atrium which gives rise to two pairs of small slender tubules. These are confined to the abdomen and do not enter the cephalothorax. The heart is quadrostiate.

Acknowledgments are made to the Trustees of the John Ralston Bequest under whose auspices the above work was carried out. I am also indebted to Mr. C. Oke for specimens and to Mr. S. Butler for literature.



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PLATE I

*Chasmocephalon minutum*, sp. n.

- FIG. 1.—Lateral view of male. Legs and palpi omitted.
- FIG. 2.—Front view of eyes and clypeus of male.
- FIG. 3.—Front view of right chelicera of male.
- FIG. 4.—Retrolateral view of right palpus of male.
- FIG. 5.—Prolateral view of right palpus of male.
- FIG. 6.—Ventral view of abdomen of male. *t.s.* right tracheal spiracle.
- FIG. 7.—Posterior half of epigastric scute of female showing epigynum as seen in transparent preparations. *t.s.* right tracheal spiracle.

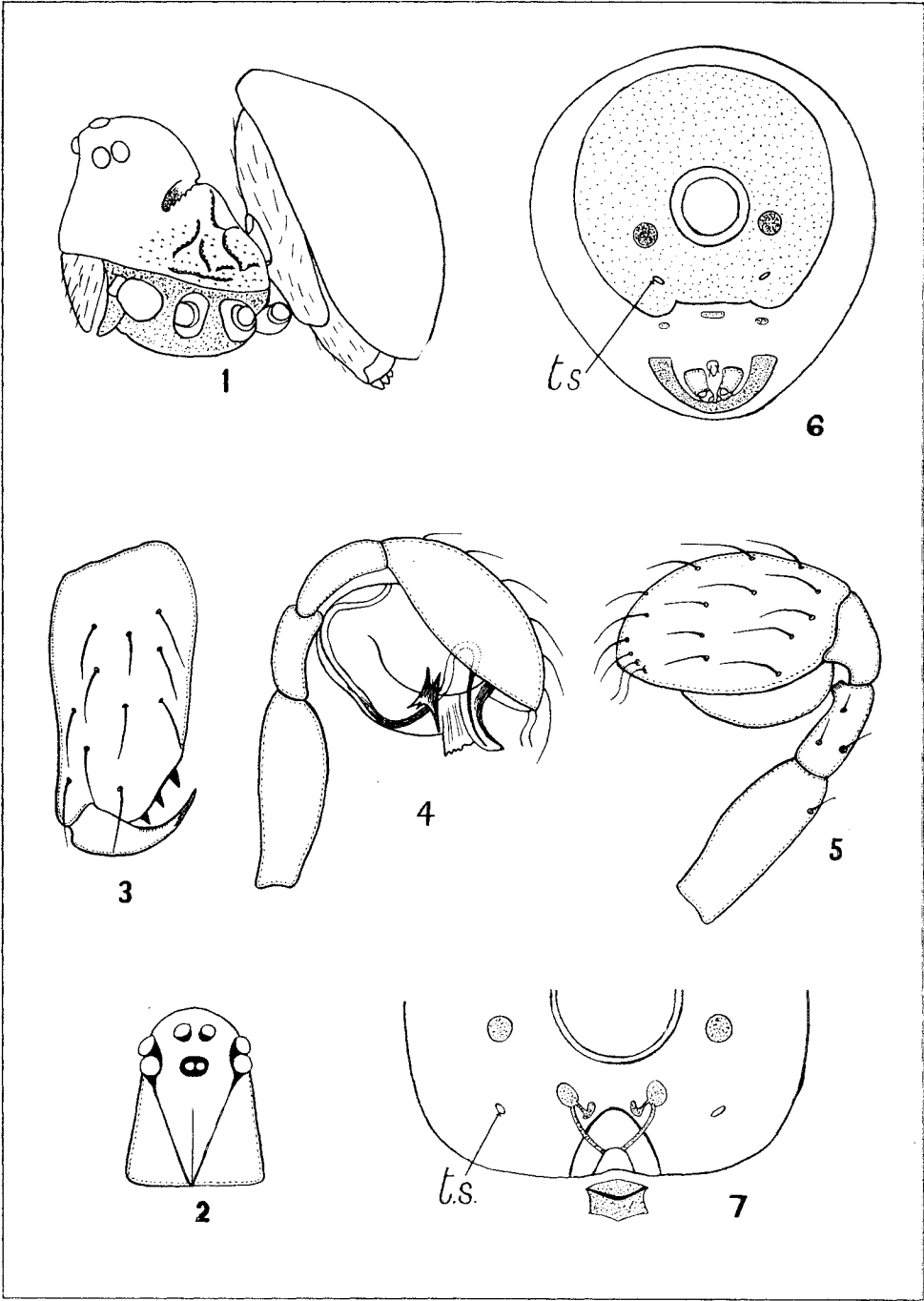


PLATE II

*Micropholcomma caeligenus* Crosby and Bishop

FIG. 8.—Front view of left maxilla of female showing the vestigial palpus. Hairs omitted.

FIG. 9.—Ventral view of abdomen of female.

FIG. 10.—Posterior part of epigastric scute of female showing epigynum as seen in transparent preparations.

*Micropholcomma bryophila* (Butler)

FIG. 11.—Retrolateral view of right palpus of male.

FIG. 12.—Retrolateral view of left palpus of female showing reduction in number of segments.

FIG. 13.—Ventral view of abdomen of female.

FIG. 14.—Posterior part of epigastric scute of female showing epigynum as seen in transparent preparations.

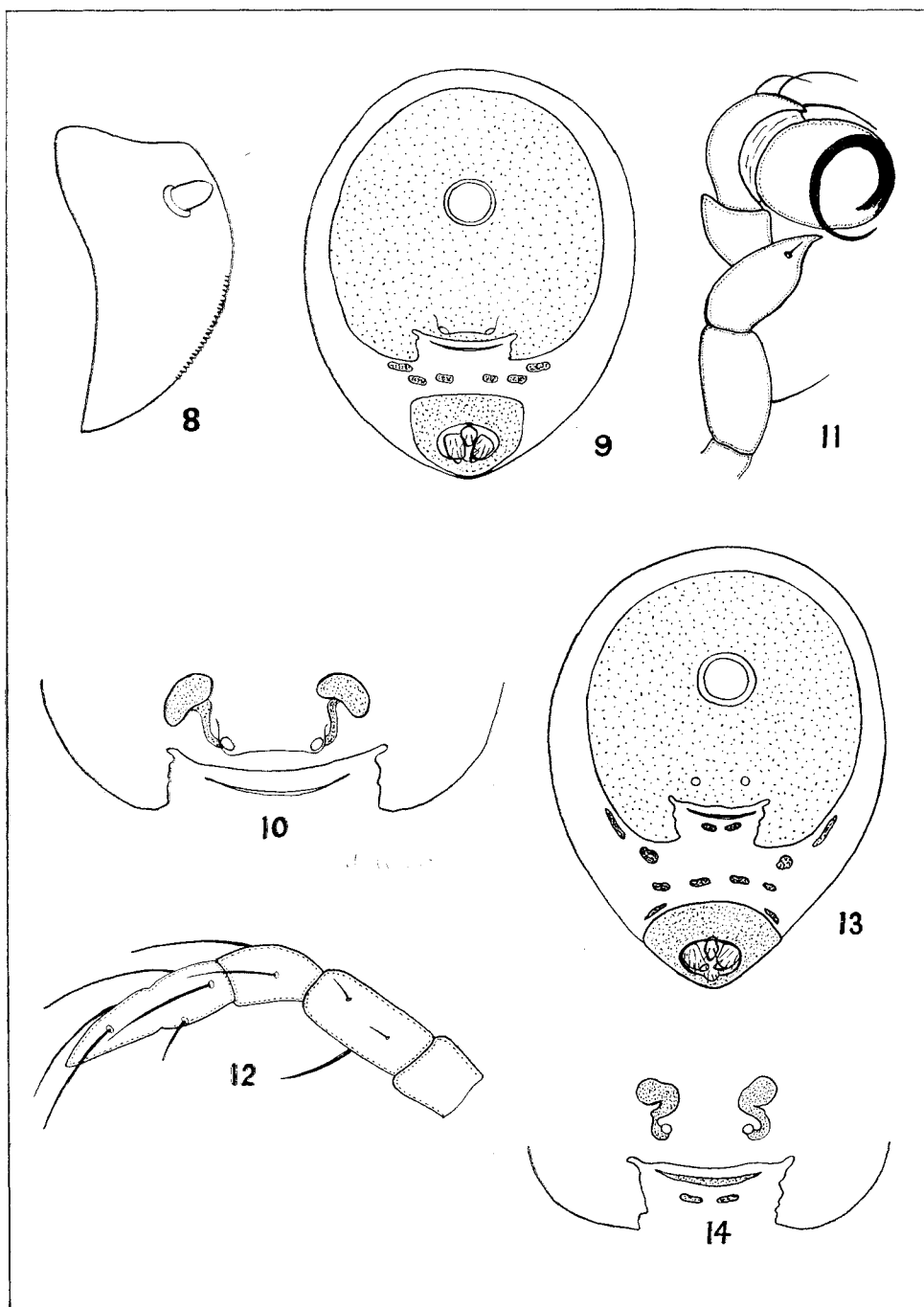


PLATE III

*Micropholcomma parmata*, sp. n.

FIG. 15.—Front view of eyes and chelicerae of male.

FIG. 16.—Prolateral view of left front leg of male showing the sinuous tarsus.

FIG. 17.—Retrolateral view of left palpus of male.

FIG. 18.—Lateral view of female. Legs omitted.

FIG. 19.—Front view of left maxilla of female showing vestigial palpus.

FIG. 20.—Ventral view of abdomen of female.

FIG. 21.—Posterior part of epigastric scute of female showing epigynum as seen in transparent preparations.

FIG. 22.—Egg-sac attached to a piece of moss.

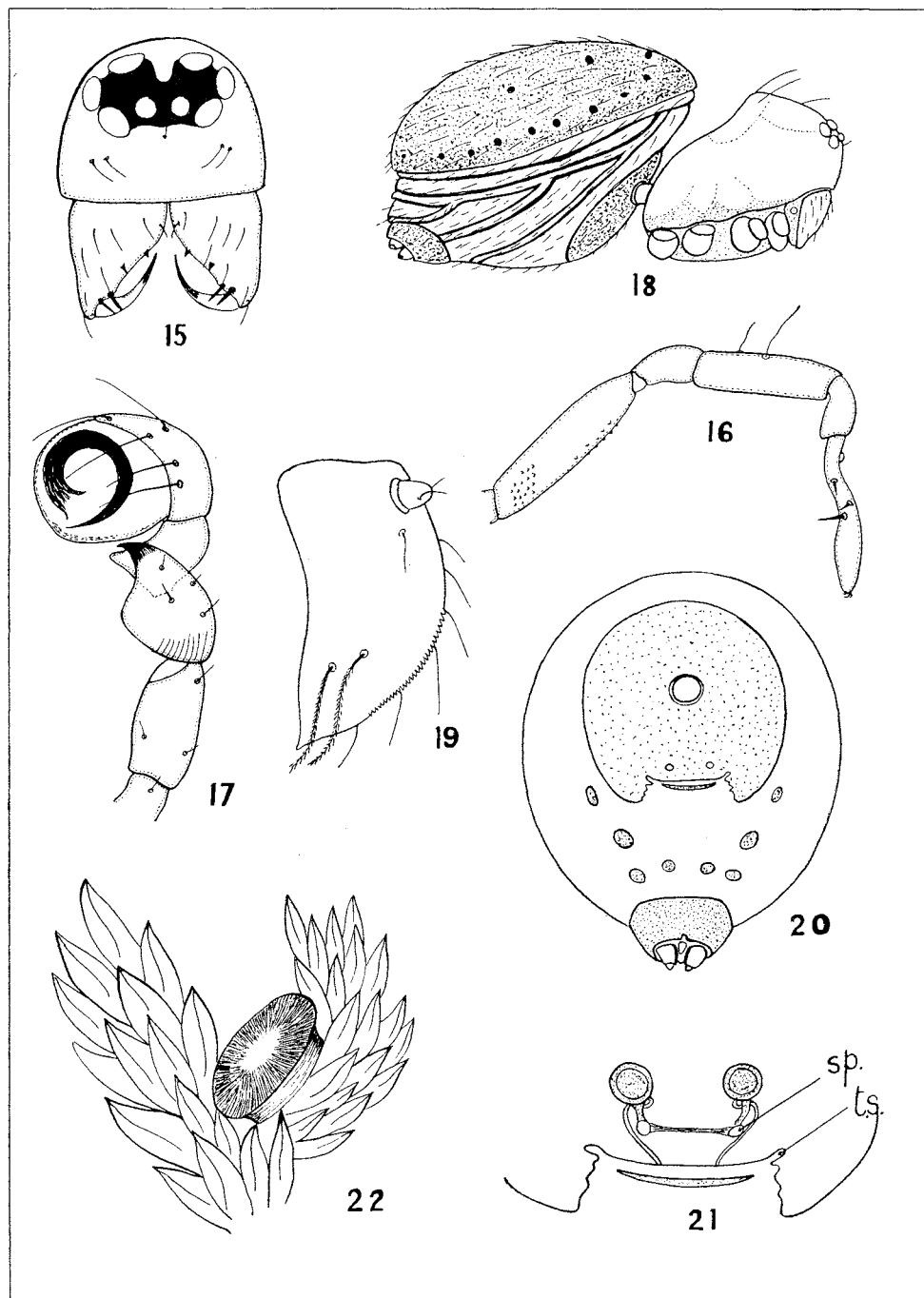


PLATE IV

*Micropholcomma mira*, sp. n.

- FIG. 23.—Dorsal view of male. Left legs omitted.
- FIG. 24.—Ventral view of sternum and abdomen of male.
- FIG. 25.—Prolateral view of left front leg of male.
- FIG. 26.—Retrolateral view of left palpus of male.
- FIG. 27.—Ventral view of posterior spinnerets showing the large sinuous spines.
- FIG. 28.—Dorsal view of female. Legs omitted.
- FIG. 29.—Front view of left maxilla of female showing vestigial palpus.
- FIG. 30.—Ventral view of abdomen of female.
- FIG. 31.—Posterior part of epigastric scute of female showing epigynum as seen in transparent preparations.



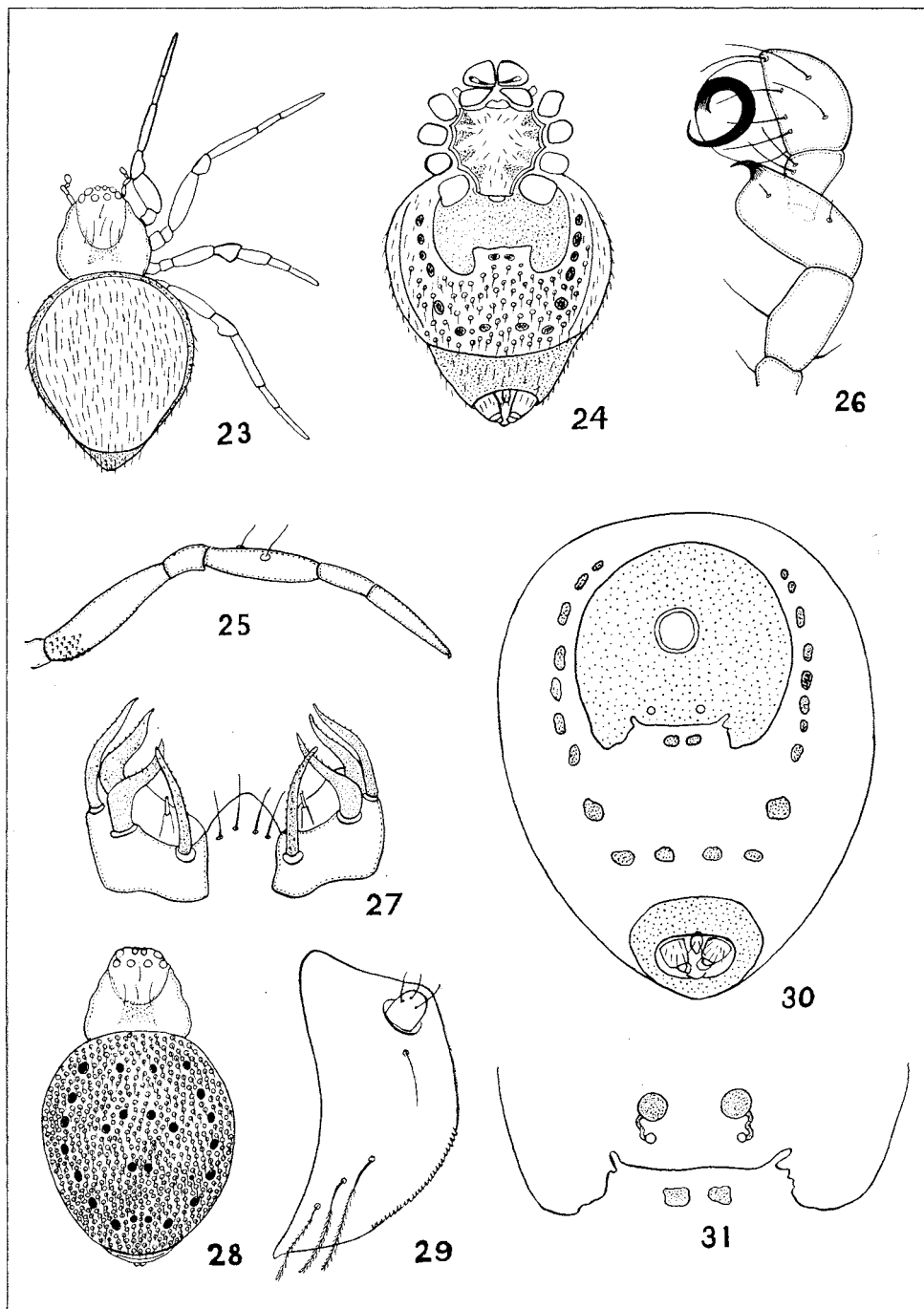


PLATE V

*Chasmocephalon*

FIG. 32.—Diagram to illustrate the tracheal system in the abdomen. *p.* foramen in epigastric scute for petiolus.

FIG. 33.—Part of a transverse section through the petiolus showing the tracheal tubes situated below the gut.

*Micropholcomma*

FIG. 34.—Diagram to illustrate the tracheal system in the abdomen. *p.* foramen in epigastric scute for petiolus.

FIG. 35.—Part of a transverse section through the petiolus showing the two stout tracheal tubes situated above the gut.

