STUDIES OF THE COCCOIDEA. 11. NEW GENERA AND SPECIES OF MONOPHLEBIDAE

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SUMMARY

New genera of insects from Queensland described in the family Monophlebidae† are Araucaricoccus **and** Conifericoccus. **New species described in these genera are** A. queenslandicus, C. agathidis, C. invaginatus **and** C. notabilis. C. agathidis **is recorded from southern kauri pine** (Agathis robusta), **the others from hoop pine** (Araucaria cunninghamii).

ARAUCARICOCCUS new genus

Generic type.—Araucaricoccus queenslandicus new species.

Characters.—Adult female large and membranous. Antennae long, 9-segmented, anterior segments irregularly striated. Mouthparts atrophied. Thoracic spiracles plate-like, atrium shallow; abdominal spiracles in seven pairs. Legs well developed, similar, tarsus one-segmented, claw small. Anterior region of abdomen constricted, abdomen becoming invaginated during oviposition. Body dorsally and ventrally with numerous multiocular disk pores and rim ducts. Anal opening atrophied.

Notes.—This genus appears to be related to *Matsucoccus,* but differs markedly in size, in having one-segmented tarsi, in the absence of cicatrices and by inhabiting a large induced gall.

Araucaricoccus queenslandicus new species

(Figure 1)

Locality and host.—Queensland; Yarraman, on *Araucaria cunninghamii* D.Don, Sept. 1936.

Habit.—Occurring on plantation trees adjacent to standing rain-forest containing the host species. Insects sparse on small branches and twigs.

Recognition characters.—Adult female large, membranous, elongate-oval with a constriction about the anterior abdominal region, length of slide specimens up to 22·0 mm, width to 9·0 mm. Antennae well developed, 9-segmented, slightly shorter than combined length of tibia and tarsus, extended length 4·0 mm; segment 1 widest, quadrate, margins anteriorly convergent; 2 shortest; 4 to 6 subequal in length and in width; 7 to 9 progressively longer and narrower; 3 to 8 with margins anteriorly divergent; 9 oval; 3 with light dorsal thickening

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†Based on the group name "Monophlebites" of Signoret, V.; 1875; Ann. Soc. Ent. France (5) 5, p. 350.

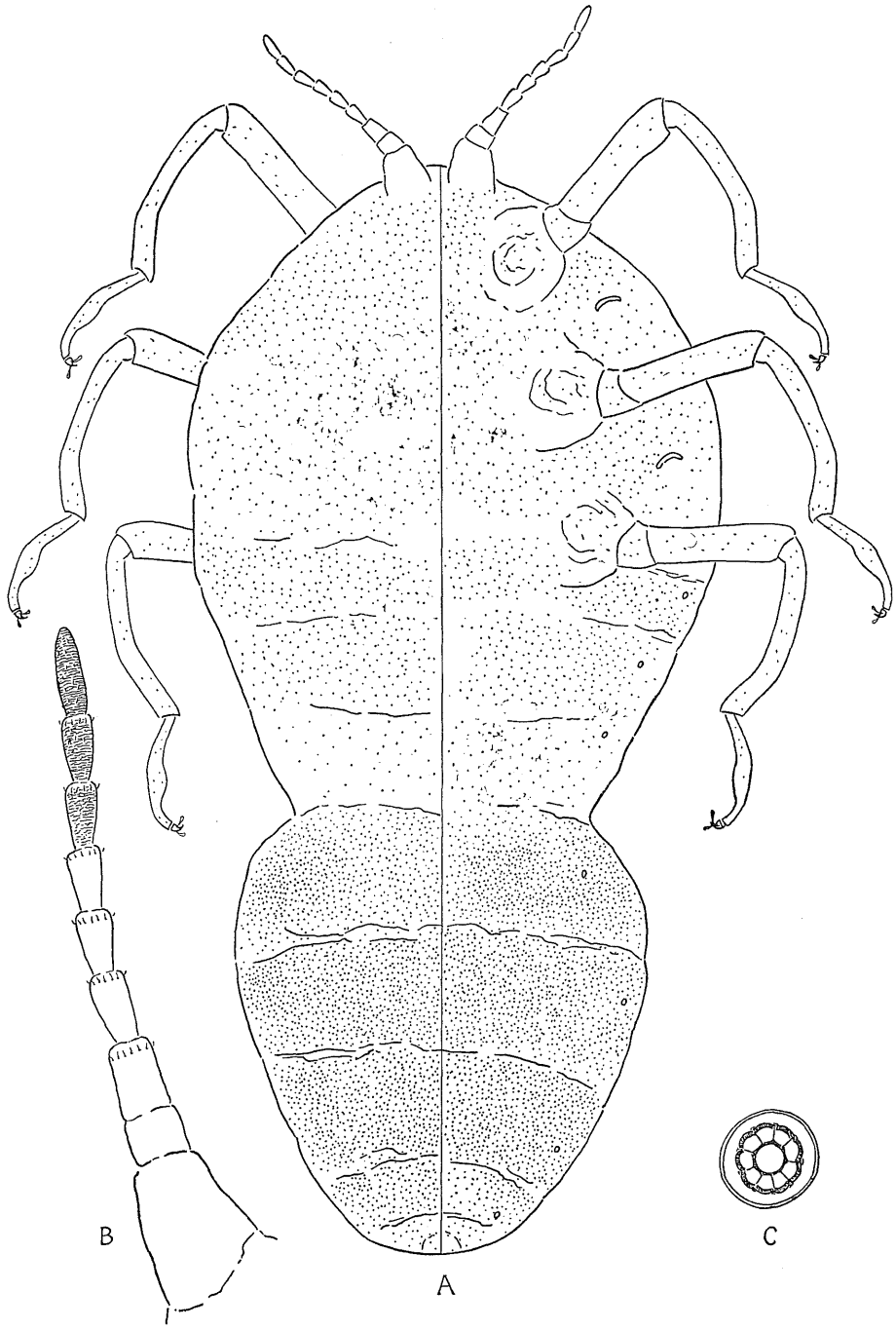

Fig. 1.—*Araucaricoccus queenslandicus*. A, outline of body (× 7·5). B, antenna (× 25). C, multilocular disk pore (× 1055).

progressively more encircling on anterior segments, completely encircling segments 7, 8 and 9; surface of anterior segments irregularly striated; setae fine and short, in an apical ring on segments 3 to 8, scattered on 9, apparently absent on 1 and 2; scattered sensory spots on 9. Eye spots small dome-shaped structures latero-posteriorly to antennal bases. Mouthparts atrophied. Thoracic spiracles plate-like, atrium larger, shallow, without pores. Abdominal spiracles in seven pairs, present on anterior segments. Legs well developed, of similar shape and size. Coxa large and broad with some minute setae. Trochanter small with a transverse row of minute setae. Femur sub-cylindrical, sclerotized dorsally. Tibia sub-cylindrical, longer than femur, slightly sclerotized dorsally, distally inwardly curved, setae minute and scattered. Tarsus one-segmented, slender, widest medianly, inwardly curved distally, slightly longer than half the length of the tibia, with four terminal setae; claw small, with two digitules. Abdomen constricted about anterior segments. Anal opening atrophied. Simple small rim-ducts numerous on dorsal surface, scattered on ventral surface. Multilocular disk pores on dorsal surface more numerous on ventral surface, innumerably crowded on abdominal segments beyond the third, absent on apex. Body generally with a fine areolation.

Notes.—The tibiae may be appreciably curved distally. The tarsi, in addition to the normal distal curving, may at about one-third of their length be further curved to almost 90 degrees. In some specimens the number of pores on the dorsal and ventral surfaces may be subequal and similarly with the rim ducts. Some disk pores have the appearance of small cicatrices.

This insect forms comparatively large fleshy galls on young branches and twigs of the host. From the heavily sclerotized pyriform second stage within the gall the flaccid adult emerges backwards through a small circular opening on the posterior apex from which a neat dome-shaped cap has been forced away. The soft body makes the insect slow and awkward, and movement from the site of emergence is not great. During oviposition the abdomen is invaginated from the posterior end and the whole derm becomes hard and brittle. Males are not known.

Type Reg. No. T 5812 and paratypes T 5813 to T 5815 in the Queensland Museum.

CONIFERICOCCUS new genus

Generic type.—*Conifericoccus invaginatus* new species.

Characters.—Adult female membranous. Antennae and legs well developed. Antennae 9-segmented. Femur and tibia subequal in length. Body with dorsal and ventral segmental bands of large multilocular disk pores, cicatrices absent.

Notes.—The multilocular disk pores have a small simple open centre which sometimes may be eccentrically placed. In some instances the centres are not distinct and the pores may appear like a sieve. Cicatrices are absent although the multilocular interior of the pores on the posterior abdominal segments may be indistinct, thus giving the pores the appearance of small cicatrices.

The genus closely resembles *Matsucoccus,* which is confined to the northern hemisphere on species of *Pinus* as hosts, but differs in that cicatrices are absent, there are no pores within the atrium of the thoracic spiracles and the multilocular disk pores do not have a bilocular centre.

Conifericoccus invaginatus new species

(Figure 2)

Locality and host.—Queensland; Imbil, on *Araucaria cunninghamii* D. Don, Oct. 1936.

Habit.—Occurring on plantation trees in rain-forest areas with adjacent standing rain-forest containing the host species. Insects sparse to numerous under loose bark, in bark crevices and lenticels on trunks and branches. Adults may be accompanied by a slight amount of fine mealy material.

Recognition characters.—Adult female membranous, elongate-oval, slightly constricted about the anterior abdominal segments, length of slide specimens 2·25 to 3·0 mm, width 1·0 to 1·25 mm. Antennae terminal, long, 9-segmented; segment 9 longest, narrowest, oval, almost twice as long as 8, with many setae; 2 to 8 subequal in length, progressively slightly narrower, sometimes slightly sclerotized, margins anteriorly divergent, each with an anterior ring of setae; basal segment longer, always membranous, one-and-a-half times wider than segment 2; segment 9 with irregular transverse striations progressively less noticeable on segments 8, 7 and 6. Mouthparts atrophied, position indicated merely by a faint short longitudinal fold. Legs well developed, shorter than the antennae; coxa broad; trochanter small; femur and tibia subequal in length; femur broad, distally grooved on the inner side to receive the basal portion of the tibia, with a few scattered setae; tibia subcylindrical, less than half the width of the femur, with scattered setae but a definite longitudinal row on the inner distal margin, longer and spaced closer on the distal end of the tibia; tarsus two-segmented, half as long as the tibia, first segment short, second segment with a few setae in a line on the inner edge; claw stout, shorter than the first tarsal segment, with two digitules. Thoracic spiracles small, with an associated sclerotized rod; abdominal spiracles small, in seven pairs. Anterior body ventrally with a central group of five long setae, a group of four long setae submedianly and slightly posterior to the coxa of each foreleg, a similar group of three spines slightly mesal of the coxa of each of the mid and hind legs; a ventral transverse row of four or five long setae near the centre of abdominal segments 2 to 7;

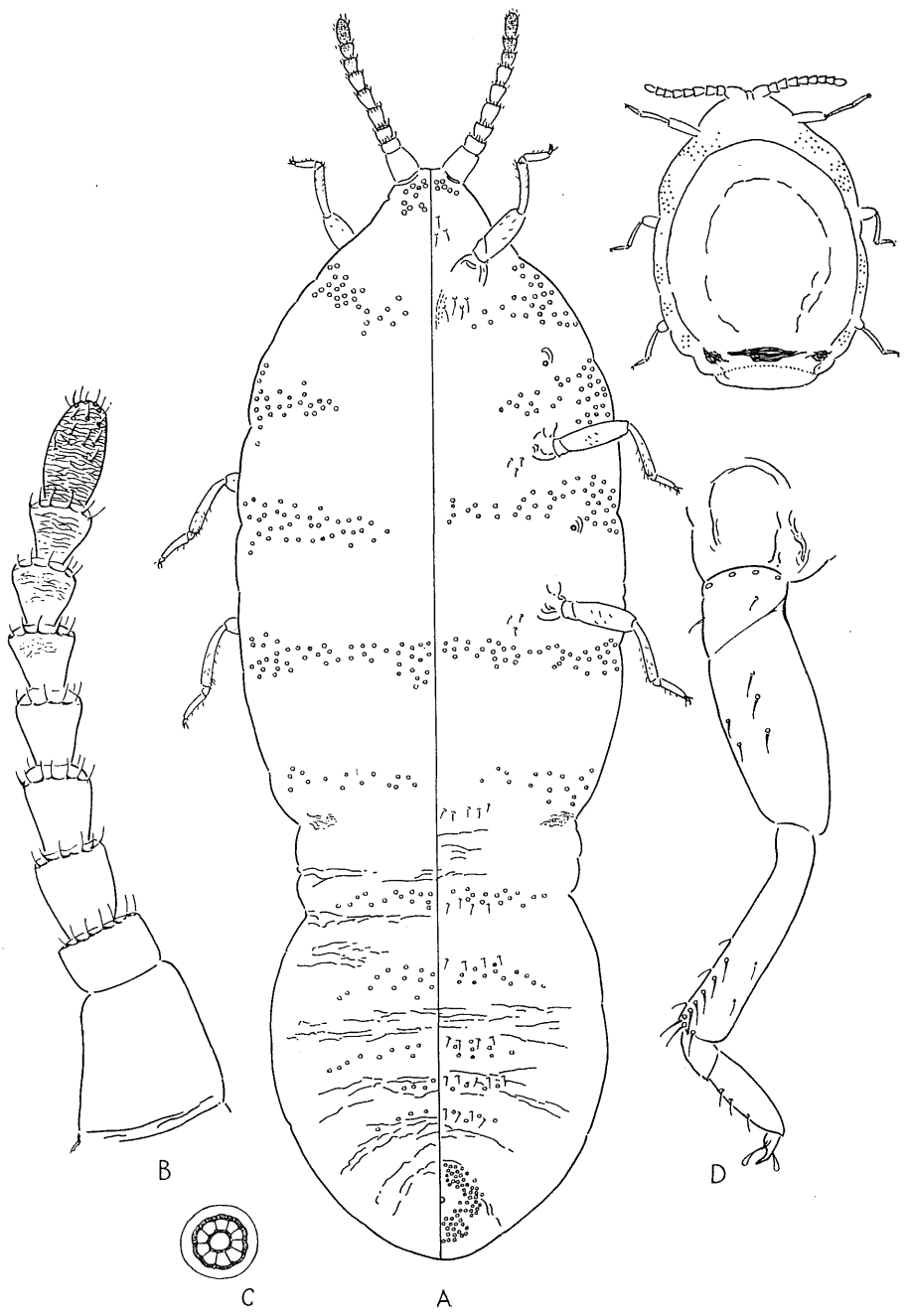

Fig. 2.—*Conifericoccus invaginatus.* A, outline of body (× 49). B, antenna (× 180). C, multilocular disk pore (× 1148). D, leg (× 180). Top right, outline of body with abdomen invaginated (× 38).

other body setae short and scattered. Large multilocular disk pores present both dorsally and ventrally as follows: a small group between the bases of the antennae more or less merging into a transverse band posterior to the antennal bases, a large marginal group narrowing to a transverse band on each thoracic segment, a complete large band on abdominal segments 1 and 2, bands on other abdominal segments with progressively fewer pores but a large ventral group apparently surrounding the vulva. Small simple rim ducts scattered dorsally on abdominal segments posteriorly from the fourth segment. Body posteriorly faintly aereolate. Anal opening atrophied.

Notes.—The abdomen at maturity is invaginated to fill the whole cephalic portion of the body, and the whole becomes hard. Aereolation may be evident on both the dorsal and ventral surfaces and sometimes on other parts of the body. In most instances the pores are less on the ventral surface. Rim ducts are more noticeable on older specimens.

The second stage female has features comparable to species of *Matsucoccus.*

Nymphs are not widely different in general appearance from adult females; the abdomen is proportionately wider and the antennae are 6-segmented. Third stage males are similar in general shape to young adult females but are smaller in size, the multilocular pores are few in number and in single transverse rows. This moults to a "pupal" stage showing wing buds, and this in turn gives rise to the usual winged adult.

Type Reg. No. T 5816 and paratypes Nos. T 5817 to T 5819 in the Queensland Museum.

Conifericoccus notabilis new species

(Figure 3)

Locality and host.—Queensland; Benarkin, on *Araucaria cunninghamii* D. Don, Sept. 1957.

Habit.—On a plantation tree of the host species in a rain-forest area, the encysted second stage occurring in the tissue of a gall of *Araucaricoccus queenslandicus.*

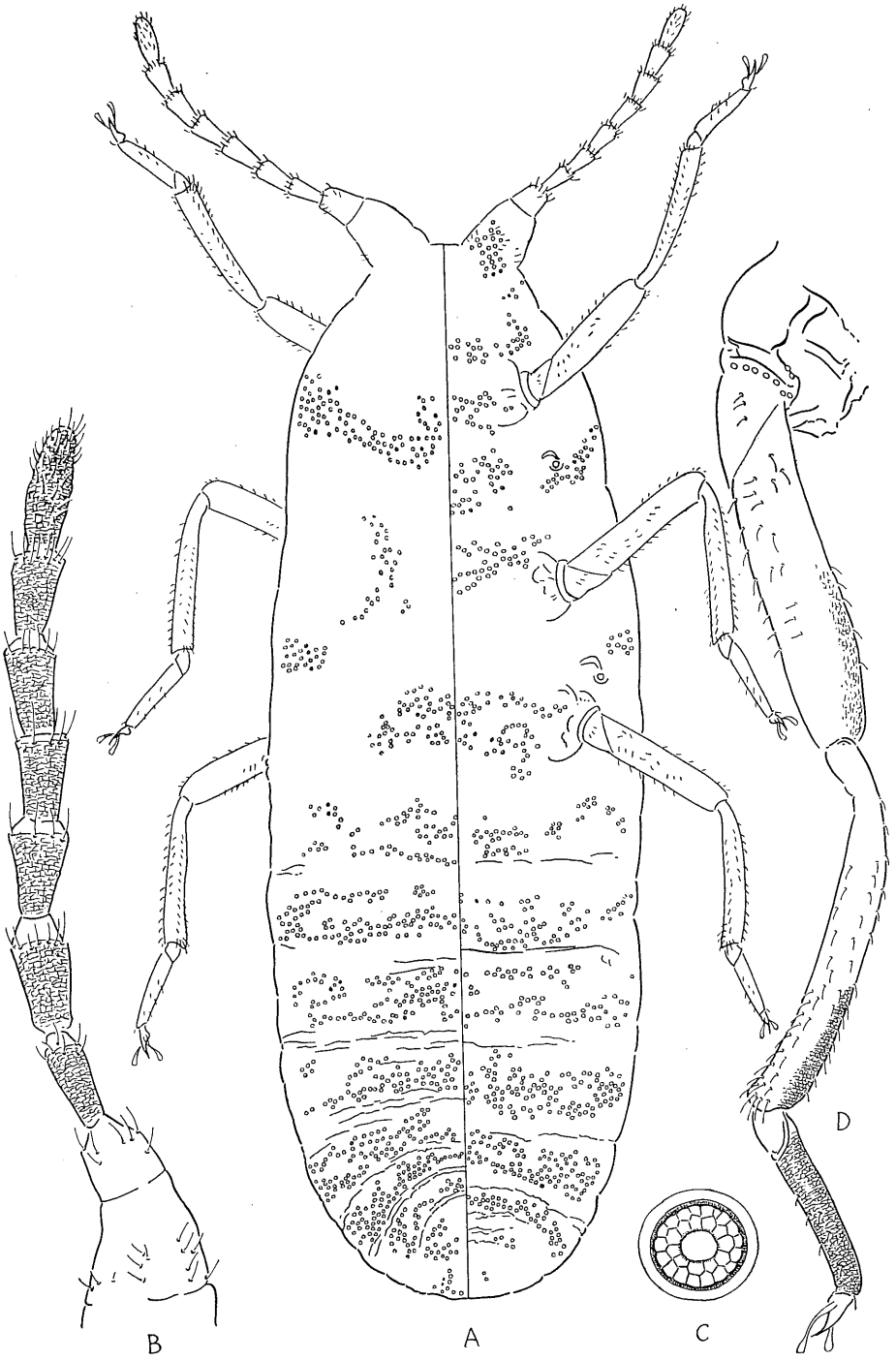

Fig. 3.—*Conifericoccus notabilis.* A, outline of body (× 46). B, antenna (× 110). C, multilocular disc pore (× 1157). D, leg (× 110).

Recognition characters.—Adult female membranous, elongate-oval, length of slide specimen 3·0 mm, width 1·2 mm. Antennae well developed, long, 9-segmented; segment 1 largest; segments 3 to 8 of similar shape and size, each widest anteriorly; segment 9 narrowest, elongate-oval; surface of segments 3 to 9 reticulate, most conspicuous on segment 9; several groups of fine setae on segment 1, similar setae in an apical ring on segments 2 to 8, many scattered setae on segment 9. Mouth parts absent. Legs well developed, slightly longer than antennae; coxa large; trochanter small, with six or seven basal simple pores; femur sub-cylindrical, with some longitudinal and scattered rows of small setae; tibia subequal in length to femur, sub-cylindrical, with many setae; tarsus 2-segmented, segment 1 small, segment 2 subequal to or slightly longer than half the length of the tibia, with a few scattered setae; claw long and slender, with two digitules; surface reticulation pronounced on tarsus, less pronounced on tibia and less still on femur; legs subequal in size, the hind legs being barely the longest. Thoracic spiracles small, accompanied by a sclerotized rod; abdominal spiracles small. Numerous large multilocular pores, with single centres, on both dorsal and ventral surfaces of head region, on each thoracic and abdominal segment but fewer in number on posterior segments. Anal opening atrophied.

Notes.—Two specimens only are available. Although extracted from the second stage cyst they are fully developed. Median ventral segmental setae are present but are obscured by folding of the body in the slide mounts. A few setae occur on the coxae and trochanters and on the body medianly from the coxae.

This species differs from *C. invaginatus* in that the multilocular pores are much more numerous, and these are not obviously arranged in a band around the vulva region, the legs are longer and more elongate, the tarsal claw is linear, reticulation is pronounced on the legs and the second stage individuals are embedded within host tissue.

Type Reg. No. T 5820 and paratype No. T 5821 in the Queensland Museum.

Conifericoccus agathidis new species

(Figure 4)

Locality and host.—Queensland; Amamoor, on *Agathis robusta* (C. Moore) F. M. Baill., Oct. 1959.

Habit.—Insects numerous on young foliage of plantation trees.

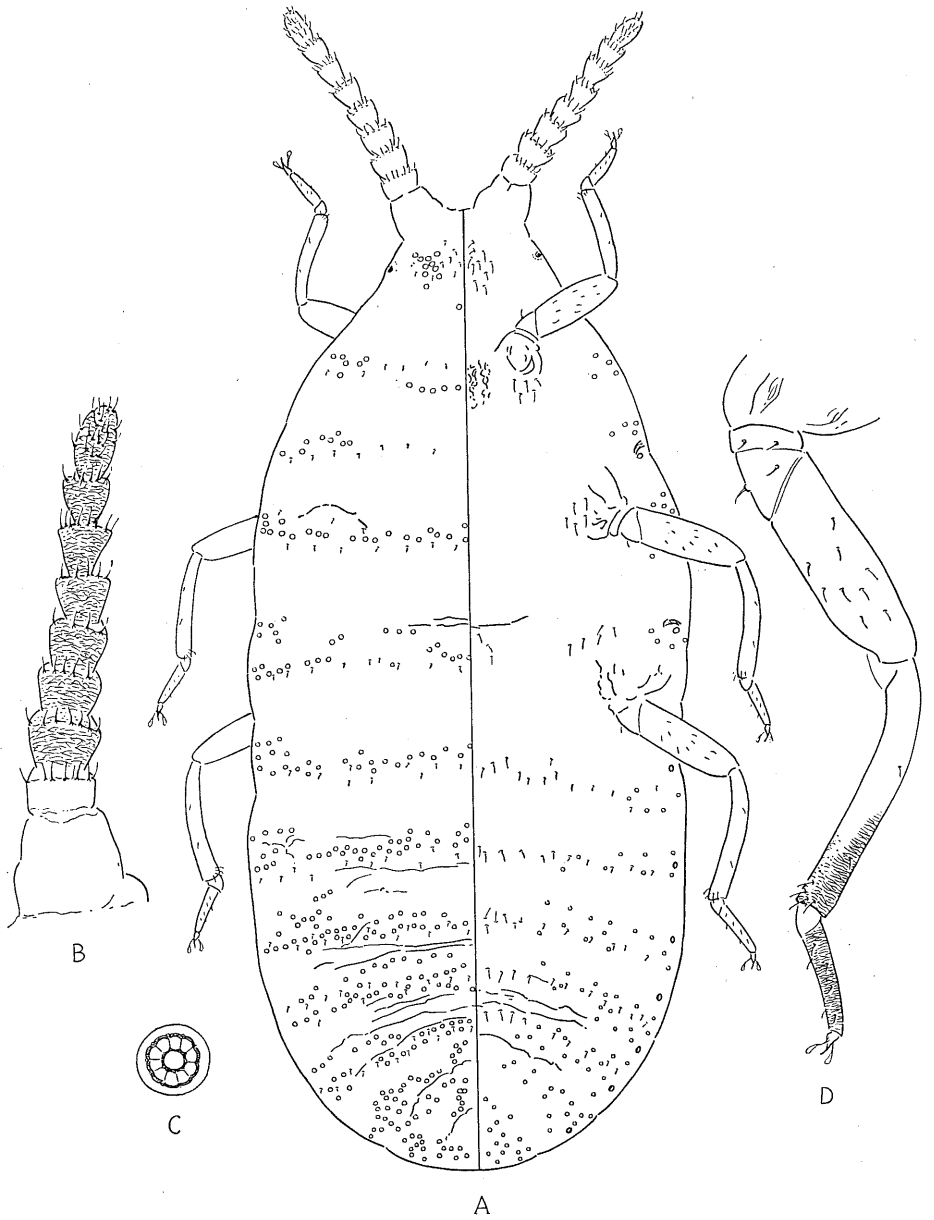

Fig. 4.—*Conifericoccus agathidis.* A, outline of body (× 47). B, antenna (× 89). C, multilocular disk pore (× 1106). D, leg (× 89).

Recognition characters.—Adult female membranous, elongate-oval, body length of slide specimen 3·0 mm, width 1·35 mm. Antennae terminal, well developed, length 0·7 mm; segment 1 longest and widest, lateral margins slightly anteriorly convergent; segment 2 shortest, transversely rectangular; segment 3 subquadrate or with lateral margins slightly anteriorly divergent; segments 4 to 8 subequal in length with lateral margins progressively more divergent; segment 9 narrowest, elongate oval, one-and-a-half times as long as segment 8; segments 3 to 9 with transversely reticulate markings. Antennal setae in a transverse median ring on segment 1, shorter than on segment 2; in an apical ring containing 10 or 11 on segments 2 to 6; similar and containing 11 to 13 on segments 7 and 8; shorter and irregularly placed on anterior two-thirds of segment 9. Eye spots small, latero-posteriorly to bases of antennae. Mouth parts atrophied. Legs well developed, similar in shape and size, total length 0·9 mm. Coxa broad, with two large setae on inner surface, anterior and posterior surfaces each with a few short setae. Trochanter with a large ventral seta. Femur 0·3 mm long, width one-quarter of the length, with some widely spaced fine setae. Tibia 0·3 mm long, width less than half that of femur, cylindrical, basal one-third curved; setae widely spaced, more or less in four longitudinal rows, two on each of the inner and outer margins, distal setae of the inner rows long; surface with irregular transverse to reticulate striations. Tarsi 2-segmented; segment 1 triangular, setae absent; segment 2 with a few scattered fine setae and many irregular transversely reticulate striations. Claw broad basally, narrow, curved and pointed distally, the pair of digitules large and spathulate. Thoracic spiracles simple, orifices round, pores absent, with an associated curved thickened band. Abdominal spiracles in seven pairs, simple and small. Body pores large, multilocular with simple centres; widely spaced on ventral surfaces of head; as an irregular transverse dorsal band on each thoracic segment and continuing latero-ventrally; pores on abdominal segments more numerous in the dorsal bands on segments 1, 2 and 3 than on thorax; bands on other segments anteriorly arched; in transverse bands on ventral surface becoming more numerous on posterior segments. Small rim-ducts widely spaced, in irregular transverse rows dorsally on posterior abdominal segments. Body setae on the head scattered in a transverse row on each thoracic segment and in an irregular transverse row on each abdominal segment; variable though mostly long on ventral surface; an irregular central group of about 20 long setae on the head, four to six near the base of each leg, four medianly on metathorax, five or six in a short transverse median row on abdominal segments these rows continued laterally with short setae. Anal opening atrophied.

Notes.—Antennal segments show slight variations amongst mounted specimens with respect to shape and size of segments 1, 2 and 3. Rudimentary mouthparts are sometimes present. The pores dorsally on the head, though comparatively widely spaced, may appear as a broad longitudinal band merging into a transverse band. The dorsal band on each thoracic segment may appear as an irregular line, the number of pores in the bands vary and may in these and the dorsal abdominal bands sometimes appear to be in two irregular lines. The ventral group of long setae on the head may vary from 12 to 20 in number.

This species resembles *C. invaginatus*. The main differences shown are that the setae are more numerous on the head, the legs are longer than the antennae, the eggs are laid in a mealy sac without the abdomen becoming invaginated and the insects infest young foliage on which they make pimple-like swellings.

Type Reg. No. T 5822 and paratypes Nos. T 5823 to T 5825 in the Queensland Museum.

Acknowledgement

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ADDENDUM to "Studies of the Coccoidea. 10. New Species of Diaspididae," by A. R. Brimblecombe, this Journal, Vol. 16, p. 381.

DORIOPUS new genus

Generic type.—Doriopus bilobus Brimblecombe.

Characters.—Adult female enclosed in the enlarged and heavily sclerotized exuvium of the second stage nymph, subcircular, membranous. Pygidium with median pair of large contiguous lobes. Basal scleroses and paraphyses absent. Gland spines in a continuous row on pygidial and prepygidial segments. Dorsal ducts few and indistinct.

Notes.—This genus has relationship with the other Australian genera *Hybridaspis* and *Hemiaspidis* in having the adult enclosed in the second exuvium but differs from these in that the gland spines on the pygidial margin are in a continuous series and none are broad with a divided apex.