Israel Journal of Entomology

Vol. XXIX (1995) pp. 75-83

THE TAXONOMIC RELATIONSHIPS OF THE ERIOCOCCID GENUS *ERIOCHITON* MASKELL, WITH OBSERVATIONS ON THE BIOLOGY OF SOME SPECIES

ROSA C. HENDERSON[1] AND CHRIS J. HODGSON[2]

[1]*Manaaki Whenia — Landcare Research, Private Bag 92 1 70, Auckland, New Zealand*

[2]*Department of Biological Sciences, Wye College, Wye, Ashford, Kent TN25 5AH, England*

ABSTRACT

This paper summarises the features of the adult male and female *Eriochiton* Maskell which justified the transferance of this genus from the family Coccidae to the family Eriococcidae, despite the presence of a pair of anal plates. In addition, with the help of pen and ink drawings, it outlines certain aspects of the ecology of members of this genus.

KEYWORDS: ecology, taxonomic relationships, *Eriochiton,* Eriococcidae, Coccidae.

INTRODUCTION

The scale insect genus *Eriochiton* was proposed by Maskell (1887) to include two species from New Zealand, *Ctenochiton spinosus* Maskell and *Eriochiton hispiclus* Maskell. Because Maskell placed *Eriochiton* in the Lecanidinae (a subgroup of the family Coccidae), Fernald (1903) placed *Eriochiton* in the subfamily Coccinae and designated *E. hispidus* Maskell as the type species. Later, Morrison and Morrison (1922), when redescribing the type species of all Maskell's genera, reviewed *E. hispidus* and left it within the subfamily Coccinae. The presence of paired anal plates at the anterior end of an anal cleft has been widely accepted as a defining feature of the family Coccidae, and their presence in *Eriochiton* is surely the reason that previous authors considered the genus to belong to this family. Despite this feature, Hodgson (1994) transferred it to the family Eriococcidae, revised the genus and placed it (along with *Neoeriochiton)* in the Eriochitonini. This paper summarises the characters of the adult female and also those of the adult male which had not been available at the time of the 1994 revision. In addition, observations are described and illustrated on the life history of several species of this genus.

RESULTS AND DISCUSSION

Taxonomic relationships of the genus *Eriochiton* Maskell within the Coccoidea

The basic structure of the adult female of a species of the Eriochitonini is shown in Fig. 1, whilst Table 1 compares a range of structures in the Eriochitonini with those in typical Eriococcidae and Coccidae. Of the 23 character-states listed, 12 are restricted to the Eriococcidae, 8 are rare to occasional in the Coccidae and 2 (absence of stigmatic spines and

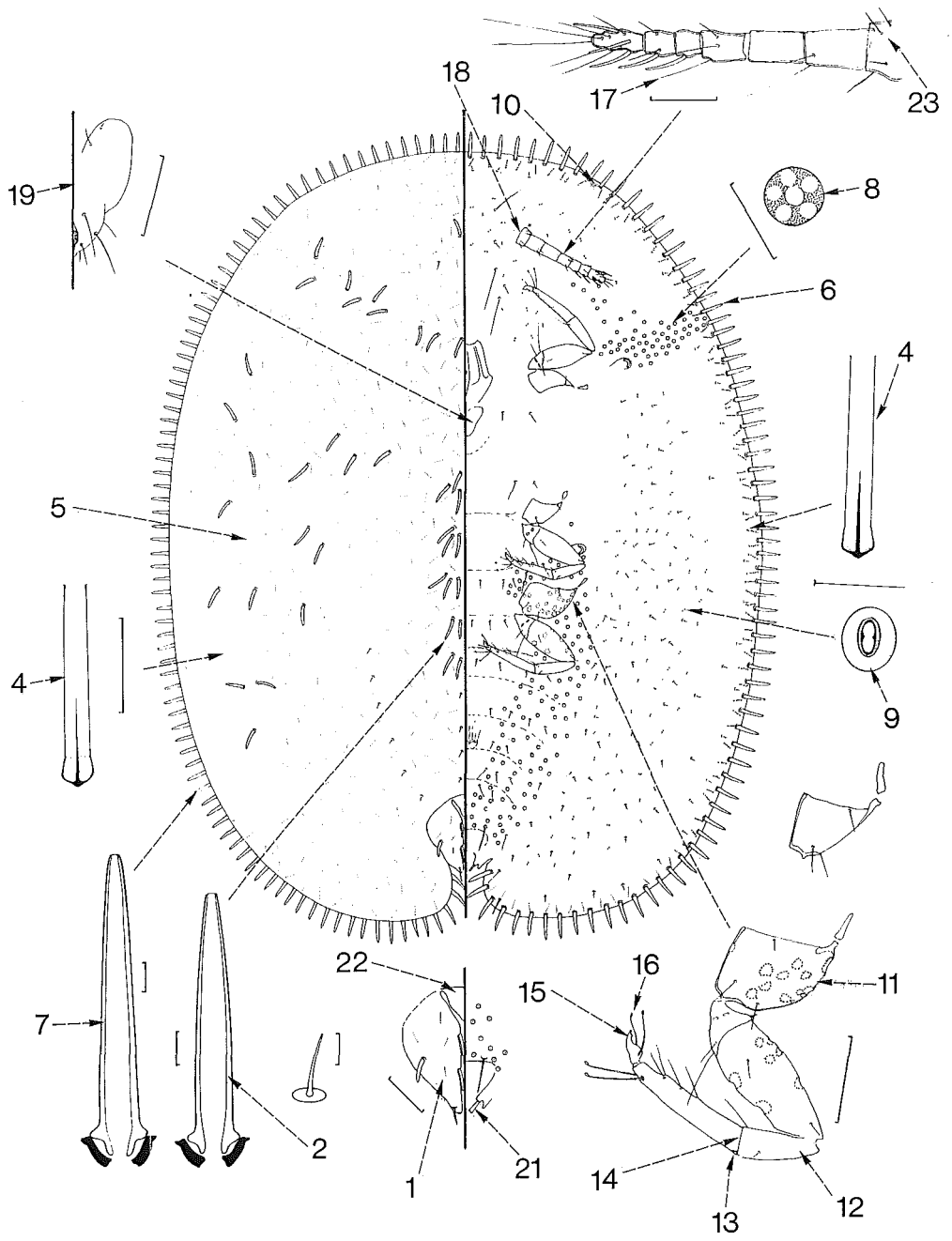

Fig. 1. Adult female of an undescribed species of *Eriochiton*; the numbers refer to the character-states in Table 1.

TABLE 1
A list of 23 character-states found in adult female Eriochitonini, indicating those which are restricted to the Eriococcidae and those which are also shared with one or more genera in the Coccidae

Characters of Eriochitonini	Only found in Eriococcidae	Also shared with Coccidae
1. Two triangular anal plates present overlying anus		Typical
2. Dorsal setae: structure and distribution	+	
3. Tubular ducts: structure and distribution in 2nd-instar male	+	
4. Microtubular ducts: structure and distribution		Rare
5. Dorsal pores absent	+	
6. Stigmatic spines absent		Frequent
7. Structure of marginal setae and setal sockets	+	
8. Ventral disc pores: structure and distribution		Very rare or absent
9. Ventral sessile pores: structure and distribution	+	
10. Eyespots ventral	+	
11. Metacoxae enlarged with coxal pores	+	
12. Tibia distinctly shorter than tarsus	+	
13. Campaniform pore present on each tarsus	+	
14. Tibio-tarsal articulation without articulatory scleroses		Frequent
15. Claws long and thin with small denticle		Occasional
16. Claw digitules both fine		Occasional
17. Antennae 7-segmented, all segments annular		Rare
18. Antennae placed near anterior margin		Rare
19. Labium 2-segmented	+	
20. Anal ring without anal tube		Rare
21. Spinose suranal setae present	+	
22. Triangular plate present anteriorly between anal plates		Rare
23. Scape with 4 setae	+	

absence of a tibio-tarsal articulation) are also frequently present in the Coccidae. Only the presence of the paired anal plates is a typical feature of the Coccidae and is otherwise unknown in the Eriococcidae. It was due to the presence of these plates that Hodgson (1994) established the tribe Eriochitonini. Hodgson (1995) reviewed the evolution of the plate-like structures associated with the anal area in the lecanoid families and concluded that those in the Coccidae and Eriochitonini had evolved in a similar manner from anal lobes.

Figure 2 illustrates the adult male of *E. hoheriae* Hodgson while Table 2 compares the

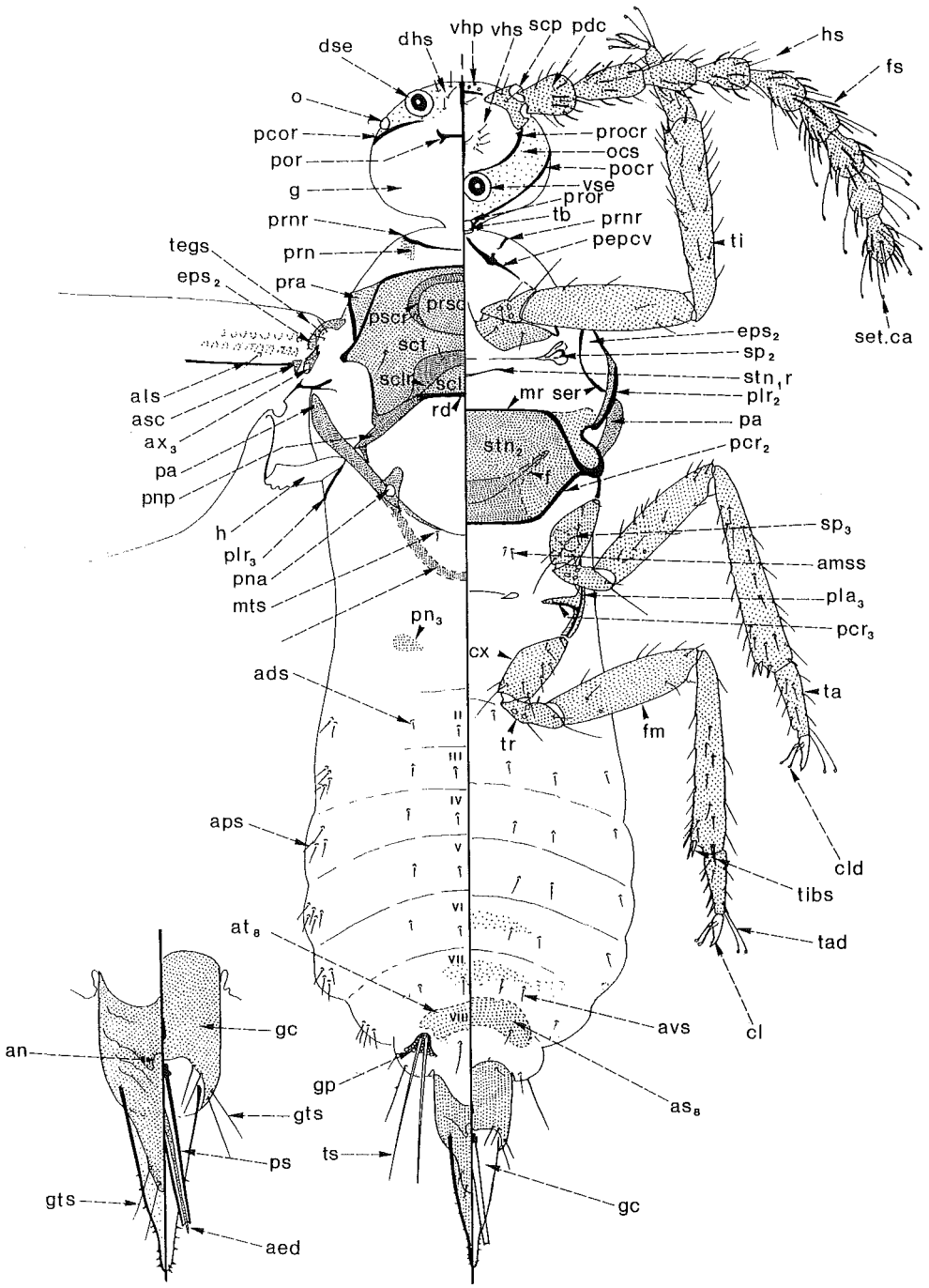

Fig. 2. Adult male of *E. hoheriae* Hodgson.

TABLE 2

A list of 20 character-states found in adult male Eriochitonini, comparing their presence in seven lecanoid families in the Coccoidea, where E-ni, Eriochitonini; Ps, Pseudococcidae; E-ae, Eriococcidae; K, Kermesidae; C, Coccidae; L, Lecanodiaspididae; As, Asterolecaniidae, and Ac, Aclerdidae

Characters (A = absent, B = present, unless otherwise stated)	E-ni	Ps	E-ae	K	C	L	As	Ac
1. Male puparium (A = fluffy wax threads, B = glassy wax plates, C = other)	A	A	A	A	B	B	C	?
2. Fleshy setae on body	A	AB	A	A	AB	A	A	A
3. Disc pores (except in gland pouch)	A	AB	A	A	AB	A	A	B
4. Post-occipital ridge	B	B	B	B	AB	B	B	A
5. No. of simple eyes (A = more than 2 pairs, B = 2 pairs only)	B	B	B	A	AB	B	B	B
6. Genal setae	A	B	B	A	AB	A	A	B
7. 9th antennal segment (A = barrel-shaped, B = cylindrical)	A	B	A	A	B	B	B	B
8. Membranous area of scutum	A	A	A	B	B	B	B	?
9. Mesepimeron	B	B	B	A	AB	B	A	?
10. Median ridge of mesosternum	A	A	A	A	AB	B	A	B
11. Metasternal apophysis	B	B	B	B	A	A	A	A
12. Scutellar setae	B	B	B	B	AB	A	A	A
13. Hamulohalterae	B	B	B	B	AB	B	A	A
14. Apical spurs on tibia (A = 2 present, B = 1 present, C = absent)	A	A	A	A	B	B?	C	B
15. Sternites on abdominal segments II–VII (A = on all segments, B = only on some)	B	B	B	A	AB	B	A	A
16. Glandular pouch or plate	B	B	B	B	AB	A	A	A
17. Penial sheath (width:length A = 1:3 or less, B = 1:4 or more)	A	A	A	B	B	B	B	A
18. Anal opening (A = backward, slit-like, B = rounded and well defined, C = indistinct, upward)	B	A	B	C	C	C	C	B?
19. Dorsal setae on genital capsule (A = more than 2, B = 2 setae, C = 1 seta, D = no setae)	B	A	B	C	D	D	C	D
20. Ventral setae on genital capsule (A = more than 1, B = 1 only, C = none)	A	A	A	A	C	C	B	C
Number of chars. shared with Eriochitonini (total 20)		16	19	13	11	8	6	4?

presence and form of 20 character-states in the Eriochitonini and seven lecanoid families (Aclerdidae, Asterolecaniidae, Coccidae, Eriococcidae, Kermesidae, Lecanodiaspididae and Pseudococcidae). Of the 20 character-states, the Eriochitonini share 19 with the Eriococcidae, 16 with the Pseudococcidae but only 11 with the Coccidae. The one character-state not shared with the Eriococcidae is the absence of setae on the gena in the Eriochitonini. On the basis of these character-states in the adult male, we consider that the members of the Eriochitonini belong to the Eriococcidae.

Biology

Various aspects of the biology of some species of *Eriochiton* are illustrated in Figs. 3–7. Figure 3 shows the adult male of *E. hoheriae* with its pair of long tail filaments. These are made of wax secreted by disc pores in the glandular pouch (gp in Fig. 2), which surround and are supported by the glandular pouch setae (ts in Fig. 2). These filaments are the last structure to develop and indicate that the male is about to emerge. Once emerged, the tip of the abdomen is held up while the insect walks about to keep the filaments off the substrate. The function of the filaments is unknown. The males emerge backwards from the posterior end of the 2nd-instar male sac and are then covered in a powdery wax which gives them an overall grey appearance. The wax on the antennae is then cleaned off using their front legs.

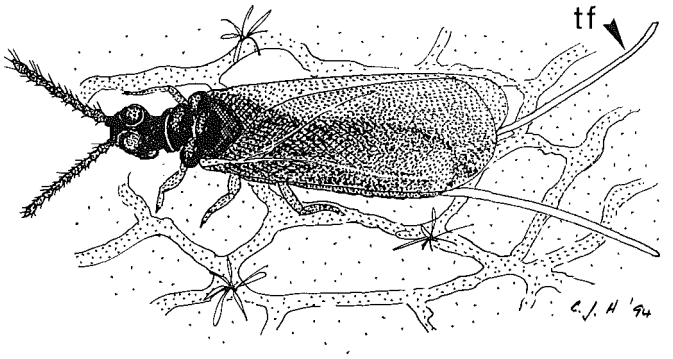

Fig. 3. Adult male of *E. hoheriae* Hodgson on a leaf of its host plant *Hoheria* sp.; tf, tail filaments.

Figures 4 and 5 illustrate the woolly sac or test which is secreted by the 2nd-instar male nymphs and in which the prepupa and pupa live. These tests or sacs are white and some segmentation can be seen in the test over the abdomen in Figs. 4 and 5. In this case, the abdomen of the prepupa can be seen protruding from the posterior end of the sac. In Fig. 5, the tips of the wings of the adult male can be seen protruding from the posterior end. Male stages appear to be mainly restricted to the leaves.

Figure 6 shows a teneral adult female and the cast exuvium of a 2nd-instar female nymph. It appears that the crawlers mainly settle on the leaves and that the nymphal stages of both males and females are generally spent there. At each moult, a split appears in the dorsum and the next stage emerges through it, leaving a shrunken exuvium surrounded by the old, thin, wax test. The teneral female is thought to be mated whilst still on the leaf and that she then disperses to the

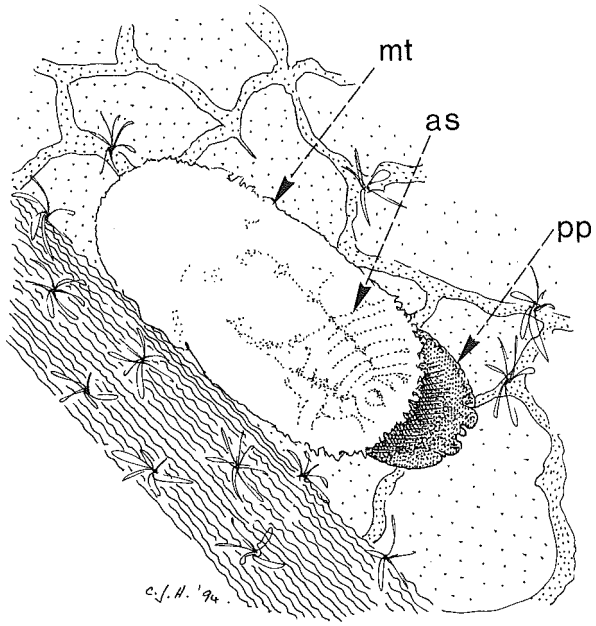

Fig. 4. 2nd-instar male test (mt) of *E. hoheriae* Hodgson on a leaf, with the posterior end of the prepupal abdomen (pp) protruding; as, segmentation on the abdomen of the test.

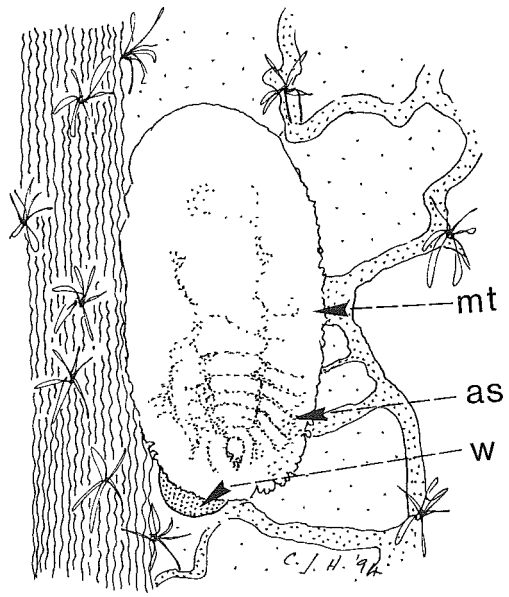

Fig. 5. 2nd-instar male test (mt) of *E. hoheriae* Hodgson with the tips of the wings of the adult male (w) emerging from the posterior end of the test; as, segmentation on the abdomen of the male test.

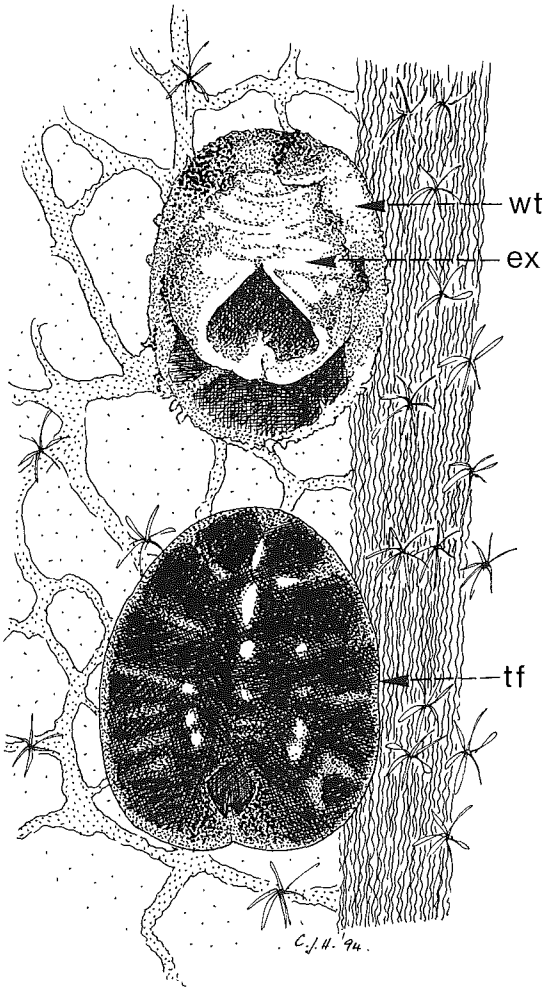

Fig. 6. Young adult female (tf) and cast exuvium (ex) of *E. hoheriae* Hodgson. Note the remnants of the thin wax test (wt) surrounding the exuvium of the 2nd-instar female nymph; and the lack of any wax filaments on the teneral female.

stems of the plant, settles and becomes mature. She probably then never moves again. Two species for which there is sufficient data suggest that they are univoltine; however, it seems likely that some other species are bivoltine.

Figure 7 shows the appearance of the adult females on their host plants. The adult females are viviparous and generally have several neonate nymphs beneath their abdomen. The mature females are mainly found on the stems of the plants, apparently preferring the node sites and sometimes lying at right angles to the stem. Note the waxy filaments around the margin associated with the marginal spinose setae (7 in Fig. 1) and the three lines on the dorsum of the abdomen, associated with the dorsal spinose setae (2 in Fig. 1) and minute dorsal setae.

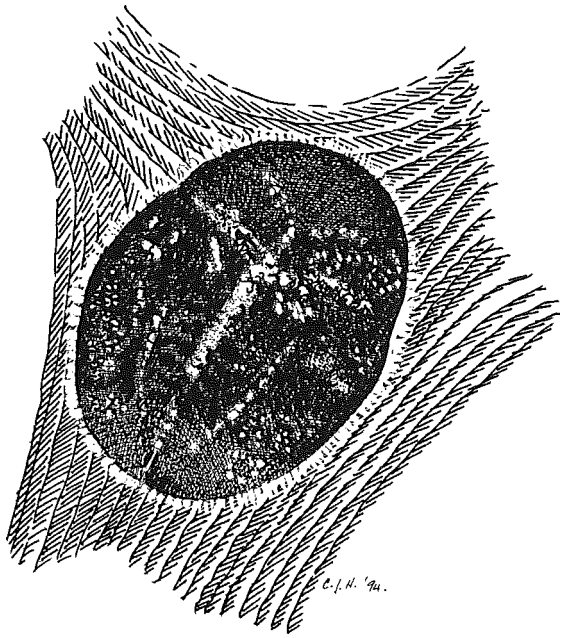

Fig. 7. Mature adult female of the *E. spinosus* complex on the stem of its host. Note the white waxy filaments on the dorsum and around the margin.

These insects produce a large amount of honeydew and are frequently associated with the development of sooty mould.

REFERENCES

Fernald, M.E. 1903. A Catalogue of the Coccidae of the World. *Bulletin of the Hatch Agricultural Experiment Station* 88:1–360.

Hodgson, C.J. 1994. *Eriochiton* and a new genus of the scale insect family Eriococcidae (Homoptera: Coccoidea). *Journal of the Royal Society of New Zealand* 24:171–208.

Hodgson, C.J. 1995. The possible evolution of the plate-like structures associated with the anal area of the lecanoid Coccoidea. *Israel Journal of Entomology* 29:57–65.

Maskell, W.M. 1887. Further notes on New Zealand Coccidae. *Transactions and Proceedings of the New Zealand Institute* (1886) 19:45–49.

Morrison, H. and Morrison, E. 1922. A redescription of the type species of the genera of Coccidae based on the species originally described by Maskell. *Proceedings of the United States National Museum* 60 (Article 12):1–120.