PSOCOPTERA FROM THE WESTERN AUSTRALIAN WHEATBELT

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Summary

Psocoptera collected during a survey of insects from litter in regenerating wheatbelt habitats at Tammin, Western Australia include three new species, *Liposcelis tamminensis* sp n., *Liposcelis australis* sp. n. and *Pachytroctes dayae* sp. n. *Ectopsocus vachoni* Badonnel was collected for the first time from Australia and *Liposcelis decolor* (Pearman) for the first time on the Australian mainland from a habitat other than stored products.

Introduction

In 1993 and 1994 a survey of litter invertebrates was carried out by Miss Christina Day in areas of regenerating native vegetation in wheatlands at Tammin, Western Australia (Day, 1994). This paper deals with five species of Psocoptera collected using Tullgren apparatus. There are three new species, described here, and new records for two others. Type material is in the Western Australian Museum, Perth. The remaining material is held for reference in the Australian Museum, Sydney.

Psocoptera from the Tammin wheatbelt survey

LIPOSCELIDIDAE

Liposcelis tamminensis sp.n.

FEMALE

Coloration. Head, body, femora, tibiae and basal four or five segments of antennae brown. Tarsi and distal segments of antennae paler. First segment of maxillary palp brown, other segments paler. Abdominal tergites darker brown in anterior half than in posterior half.

Morphology. Sculpturation: Vertex with poorly defined areolae enclosing very finely and indistinctly granular cuticle. Width of areolae more than half length. Tergites of abdominal segments 3-7 with indistinct sculpturation in anterior part; posterior part with very distinct sculpturation of narrow, transversely elongated areolae enclosing granular areas (fig. 1) behind which is a very narrow membranous strip without sculpturation, amounting to little more than a narrow line. Vertex sparsely setose, setae short and fine, distance between them much greater than length of setae. Apparently no setae on lateral lobes of prothorax other than SI. Prosternum with two setae only, both in anterior half of sternite; no setae in posterior part of sternite. Mesosternum with four setae at anterior margin. Poststigmal seta 8, Mv9, Md9, Mv10 and Md10 all well developed and about equal in length (fig. 2). Abdominal terga with two rows of fine, small setae, the anterior row near anterior margin the posterior row at zone of change in sculpturation. Five ommatidia visible. No evidence of median epicranial suture. Median suture of pre- and mesothoracic nota obvious but short. Femora very broad and short. Common stem of gonapophyses strongly bifurcated (fig. 3). T-shaped sclerite of subgenital plate (fig. 4) with distally narrowing, slightly curved anterior arms, plate of sclerite broad, narrowing

behind to a posterior extension as narrow as anterior arms. Length of body: 1.08 mm. (on microscope slide). Sc: 0.025 mm.; Ped: 0.035 mm.; f1: 0.028 mm.; f2: 0.035 mm.; F: 0.21 mm.; T: 0.16 mm.; t1: 0.05 mm.; t2: 0.025 mm.; t3: 0.035 mm.; rt: 2:1:1.4. SI: 0.018 mm.

Material examined

1 female (holotype), ex Tullgren funnel, from material collected in regenerating *Banksia* woodland, Tammin, Western Australia, iv. 1994, C. Day. Holotype (on slide) in Western Australian Museum.

Discussion

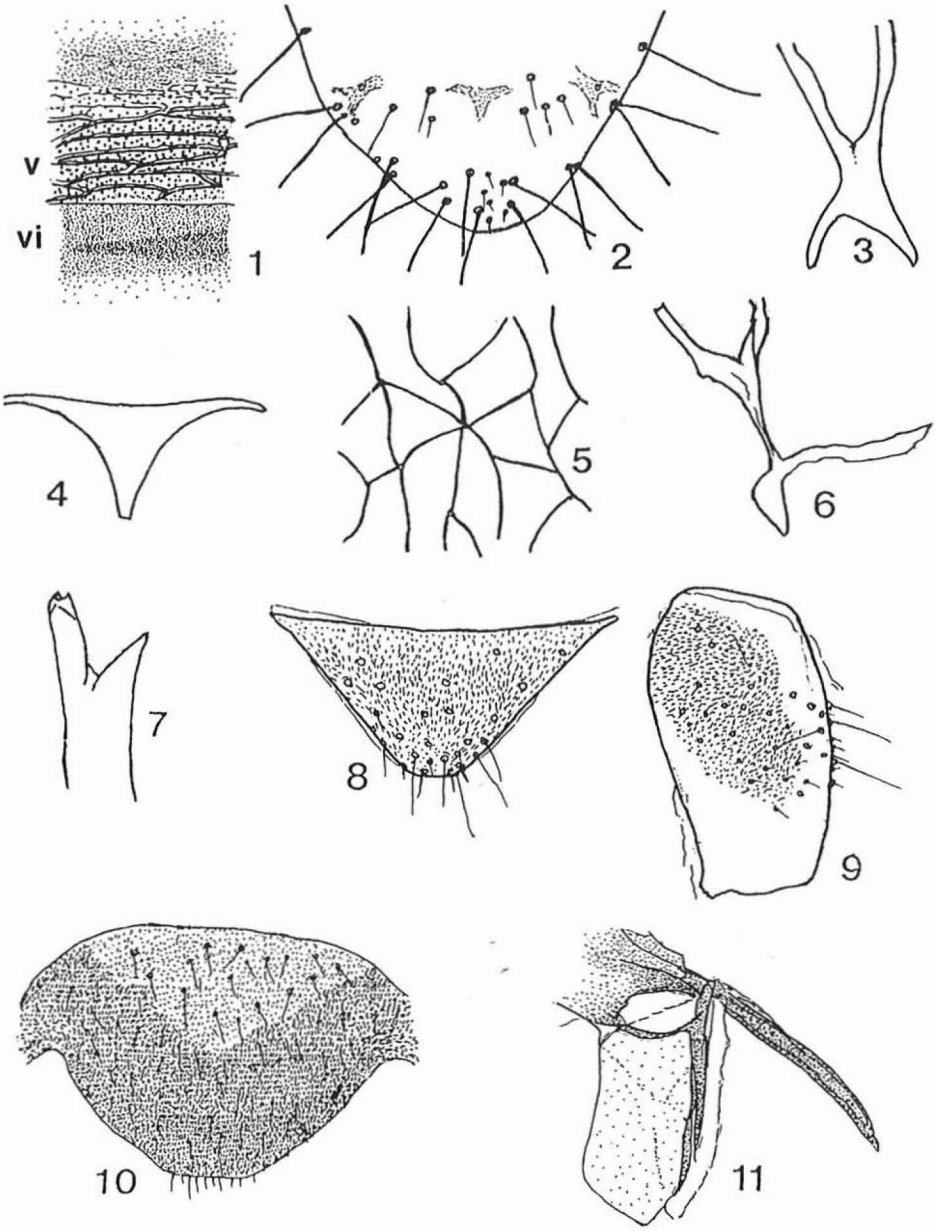
Liposcelis is a particularly difficult genus to deal with taxonomically because of the large number of species and their similarity to one another. Badonnel (1962, 1963, 1967) and Lienhard (1990) have established informal groups of species to facilitate their study. *L. tamminesis* belongs in their group **IIC** in which the sculpturation of the abdominal segments is different in the anterior and posterior parts of the tergite and the prosternal setae are all in the anterior half of the sternite. Species in **IIC** can be grouped into those in which the females have 8 ommatidia and those in which there are 7 or fewer ommatidia. *L. tamminensis* can be distinguished from the other 14 species in this group which have fewer than 8 ommatidia by the following features. *L. bicoloripes* Badonnel lacks areolae on the vertex. *L. lunai* Badonnel, *L. exigua* Badonnel and *L. barrai* Badonnel are all significantly smaller than *L. tamminensis*. *L. mendax* (Pearman) has two to four setae on the lateral lobes of the prothorax. *L. fallax* Badonnel has three prosternal setae. *L. lenkoi* Badonnel has the setae on the vertex closer together than their length. *L. mira* Badonnel and *L. montamargensis* Badonnel have many setae on the prothoracic lobes and three on the anterior part of the prothorax. *L. pacifica* Badonnel has four prosternal setae although it does have only 5 ommatidia. *L. parvula* Badonnel is smaller and paler than *L. tamminensis* and has only two ommatidia. *L. pauliani* Badonnel and *L. pubescens* Broadhead both have several setae on the prothoracic lobes in addition to SI and in the case of *L. pubescens* there are three to five prosternal setae. *L. tetrops* Badonnel is paler and larger and has only four ommatidia. The only other species of this group recorded from Australia (from peanuts in shell at Kingaroy, Queensland) are *L. pubescens* and *L. australis* sp. n., described here.

Liposcelis australis **sp. n.**

FEMALE

Coloration (in alcohol). Of very distinctive colour, the head very dark brown, almost black, in strong contrast to the rest of the insect which is pale straw-coloured.

Morphology. A very small species. Length of body: 0.75 mm. Sculpturation of vertex (fig. 5) in the form of broad alveoli defined by very fine but distinct ridges, the integument within the areas so delimited without appreciable roughness. Sculpturation of tergites of abdominal segments 3-7 consisting of areolae with very fine borders and extremely fine and indistinct granulations. Granulation of areolae much less obvious in posterior part of tergites than in anterior part. Setae: Vertex sparsely setose, setae much further apart than their length. Only one very small seta (SI) on lateral lobe of prothorax. Prosternum with three setae, all in anterior half. Mesosternum with apparently four setae at anterior margin. Abdominal setae of segments 8-10:- Poststigmal seta 8 not differentiated. Mv9, Md9, Mv10, Md10 all short but about equally well developed.



Figs 1-4. *Liposcelis tamminensis* sp. n. 1 Sculpturation of posterior part of tergite V and anterior part of tergite VI. 2. Arrangement of major setae at apex of abdomen. 3. Common stem of gonapophyses. 4. T-shaped sclerite of subgenital plate. Figs 5-6. *Liposcelis australis* sp. n. 5. Sculpturation of vertex. 6. Common stem of gonapophyses. Figs 7-11. *Pachytroctes dayae* sp. n. 7. Tip of lacinia. 8. Epiproct. 9. Left paraproct. 10. Subgenital plate. 11. Right gonapophyses.

Abdominal terga with two rows of setae in addition to more scattered setae of similar size. Anterior row near anterior margin of tergite, posterior row at zone of change of form of sculpturation. Other characters:- 8 ommatidia. No evidence of epicranial suture. Common stem of gonapophyses (fig. 6). T-shaped sclerite of subgenital plate not evident. Sc: 0.025 mm.; Ped: 0,032 mm.; f1: 0.028 mm.; f2: 0.035 mm.; F: 0.133 mm.; T: 0.128 mm.; t1: 0.04 mm.; t2: 0.02 mm.; t3: 0.03 mm.; rt: 2:1:1.5; SI: 0.007 mm.

Material examined

2 females (including holotype), ex Tullgren funnel material, collected in *Banksia* woodland, Tammin, Western Australia, iv. 1994, C.Day. Holotype and paratype (on slides) in Western Australian Museum.

Discussion

Liposcelis australis belongs to Group **IIC**, as does *L. tamminensis*, but is placed with those species having 8 ommatidia. It differs from other species in this group in having strikingly contrasting colour between the head and the rest of the body. It differs from *L. globiceps* Badonnel (1.25 mm.), *L. hirsuta* Badonnel (1.15 mm.) and *L. formicaria* (Hagen) (in excess of 1.11 mm.) in being much smaller (0.75 mm.). *L. perforata* Badonnel is also a small species (0.8 mm.) but has the body only a little paler than the head and has the sculpturation of the abdominal segments more distinct in the posterior half of the segment than in the front part. *L. similis* Badonnel has a striking head pattern, with an obvious transverse band across the front of the head.

Liposcelis decolor **(Pearman)**

Material examined

4 males, 10 females, vii.1993. 4 females, x.1993. 4 females, i.1994. 1 male, 47 females, iv.1994.

Discussion

L. decolor is a worldwide species commonly occurring in stored products and domestic situations. It is also known from leaf litter, bee hives, birds' nests, caves and under bark. In Australia it has previously been recorded from stored products and in Tasmanian rain forest. This is the first record from the Australian mainland from a habitat other than stored products.

PACHYTROCTIDAE

Pachytroctes dayae **sp.n.**

FEMALE

Coloration (in alcohol). Head dark brown, with even darker patch between eye and antenna base on each side. Labrum, maxillary palps and antennae a little paler than head capsule. Thoracic nota and pleura as head. Coxae, femora and tarsi as maxillary palps, tibiae as head capsule. First and second segments of abdomen dorsally dark brown as are fused ninth and tenth terga. Epiproct and paraprocts paler. Abdomen otherwise pale dorsally with segmentally arranged transverse bands of dark brown, these being

subcutaneous pigment bands. Abdomen ventrally pale brown, faintly marked with irregular bands, the hindmost third of the abdomen occupied by a broad U-shaped mark which is a somewhat more heavily sclerotised area of the subgenital plate.

Morphology. Apterous. Length of body: 1.7 mm. Median epicranial suture almost evanescent and just visible on top of vertex only. Vertex steeply rounded, straight between the eyes which are very small and do not reach the level of the vertex when viewed from the side. Antennae 15-segmented. Scape and pedicel well developed and much thicker than flagellar segments which are fine, resulting in an almost filiform antenna. Length of flagellar segments: f1: 0.1 mm.; f2: 0.1 mm. Flagellar segments 1-3 without secondary annulations. Fourth flagellar segment with four or five annulations near middle. Flagellar segments 5-12 with distinct annulations in distal third, thirteenth flagellar segment annulated for whole length. Antennae sparsely setose with finely spiculate integument. IO/D: 3.7; PO: 0.75. Eyes with elongate papillae between ommatidia. Lacinia (fig. 7). Thoracic terga of similar length and width to one another. Pleural sutures of meso- and metathorax well defined. Front femur broad. Near base on inner side the general vestiture of fine spicules in replaced by a smoother area of integument across which run fine, sinuous ridges. Middle femur broad, the smooth area with sinuous ridges occupying a much greater area of the inner surface of the femur. Hind femur not as broad as others but smooth area with ridges occupying almost whole area of the inner surface of femur. Claws with small preapical tooth basad of which the edge of the claw carries a row of very fine teeth. Measurements of hind leg: F: 0.35 mm.; T: 0.46 mm.; t1: 0.21 mm.; t2: 0.05 mm.; t3: 0.07 mm. rt: 4.2:1.0:1.4. Ctenidiobothria absent. Integument of head and body covered in small, raised spicules. Spicules of legs and antennae pointed whereas those on head and body are mostly bar-shaped appearing as tiny, short, raised ridges. Papillae arranged mostly in irregular rows, the bars lying transversely to the row. The bar-shaped papillae along the median epicranial suture are arranged end to end in two rows in line with the suture. The anterior arms of the epicranial suture are absent but the papillae in the position usually occupied by the suture are arranged end to end in a double row. Abdomen with first and second terga well sclerotised, as are the two posterior terga which are fused and on which there are a few, small, symmetrically arranged areas which are devoid of papillae. Third segment has a small lateral, sclerotised area on each side. The remaining terga are lightly sclerotised except for two areas, which are more heavily sclerotised, near the posterior margin of the pre-clunial segment. Epiproct (fig. 8) and paraprocts (fig. 9) well sclerotised, papillate, sparsely setose. Subgenital plate (fig. 10) rounded behind with a less strongly sclerotised basal median area. This shows as a conspicuous U-shaped pattern. Papillae on the plate tend to be arranged in more distinct rows than on most other parts of the integument. Gonapophyses (fig. 11).

Material examined

1 female (holotype), ex Tullgren funnel, material from wheatland revegetated with eucalypts, Tammin, Western Australia, vii. 1993, C. Day. Holotype (dissected, on slide), in Western Australian Museum.

Discussion

There are twenty five known species of *Pachytroctes* Enderlein. The distribution of the genus is discussed by Garcia Aldrete (1993). Only *Pachytroctes rugosus* Smithers has

so far been recorded from Australia (South Australia and New South Wales). *P. dayae* differs from it in having smaller eyes (not reaching the level of the vertex), the spicules of the integument are more pronounced, the gonapophyses differ in proportions and the pattern of sclerotisation of the subgenital plate is distinctive. In *P. rugosus* sclerotisation is uniform over the plate so that it does not present a broad, U-shaped pattern. This feature is obvious in *P. dayae*, even at low magnification (10x).

ECTOPSOCIDAE

Ectopsocus vachoni **Badonnel**

Material examined

5 males, 16 females, vii.1993. 2 males, 1 female, x.1993. 2 females, i.1994. 2 males, 3 females, iv.1994.

Discussion

E. vachoni occurs in the Palaearctic, Nearctic and Neotropical Regions. It usually occurs in leaf litter but is found also on low vegetation. It is polymorphic, with micropterous males and micropterous and macropterous females. Two females from Tammin are macropterous, the other specimens micropterous. The Tammin record is the first for Australia.

Acknowledgements

I would like to thank Jonathan Majer and Christina Day for making the survey material available for study and for permission to retain reference material in the Australian Museum. Miss Day's field work was partly supported by the CSIRO Division of Wildlife and Ecology.

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