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ALEX FAIN AND ROBERT DOMROW

THE SUBGENUS *METACYTOSTETHUM* FAIN
(ACARI : ATOPOMELIDAE) :
PARASITES OF MACROPODID MARSUPIALS

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THE SUBGENUS *METACYTOSTETHUM* FAIN
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PARASITES OF MACROPODID MARSUPIALS

BY

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ABSTRACT.

The atopomelid subgenus *Metacytostethum*, genus *Cytostethum*, is restricted to potoroine and macropodine members of the kangaroo family (Marsupialia : Macropodidae), and the species from the former subfamily are seen as ancestral to those from the latter. A key is provided for the 13 known species, of which 10 are figured and described as new : *C. tasmaniense* and *C. intermedium* from *Bettongia gaimardi cuniculus* (Potoroinae), *C. prosquamatum* and *C. mediosquamatum* from *Thylogale brunii* (Macropodinae), *C. postsquamatum*, *C. maydenense*, and *C. inerme* from *T. billardieri*, *C. euphallus* from *T. stigmatica*, *C. thetis* from *T. thetis*, and *C. wallabia* from *Wallabia bicolor* (Macropodinae).

RÉSUMÉ.

Le sous-genre *Metacytostethum*, genre *Cytostethum* est confiné aux kangourous des sous-familles Potoroinae et Macropodinae (Marsupialia : Macropodidae). Il apparaît en outre que les espèces de la première sous-famille sont les ancêtres de celles de la seconde.

Les auteurs donnent une clé des 13 espèces connues. Parmi celles-ci 10 sont nouvelles pour la Science et sont décrites et figurées dans le présent travail : *C. tasmaniense* et *C. intermedium* de *Bettongia gaimardi cuniculus* (Potoroinae), *C. prosquamatum* et *C. mediosquamatum* de *Thylogale brunii*, *C. postsquamatum*, *C. maydenense* et *C. inerme* de *T. billardieri*, *C. euphallus* de *T. stigmatica*, *C. thetis* de *T. thetis* et *C. wallabia* de *Wallabia bicolor* (Macropodinae).

This is the second of two papers on *Cytostethum*, a genus of atopomelid fur-mites restricted to the kangaroo family (Macropodidae). The first (FAIN and DOMROW, 1974) details the 22 species of the typical subgenus. Of these, 21 are known from *Potorous tridactylus* (Kerr) (Potoroinae). The host of the 22nd is uncertain, the only known specimen having been found in alcohol poured from a dasyurid marsupial (FAIN, 1972).

The second instalment treats the 13 species now known in the subgenus *Metacytostethum* ; of these, 10 are described as new to science. This subgenus parasitizes both potoroines (other than *Potorous*) and macropodines.

The key and taxonomic sequence adopted below again assume the most primitive species are those with most fully developed body shields. The first couplet of the key shows that the four

stout, strongly sclerotized species from potoroines (*C. clibanarius*, *C. tasmaniense*, *C. thylogale*, and *C. intermedium*) form a group distinct from the nine from macropodines. Of the latter, seven retain a frank opisthonotal shield. In *C. prosquamatum*, *C. mediosquamatum*, and *C. postsquamatum* this shield is complete and ornamented with scales; in *C. longitarsus* and *C. euphallus*, it is still scaly, but strongly incised posteriorly to form a horseshoe. In *C. maydenense*, the shield is of moderate size and with entire margins, but not scaly, while in *C. thetis* it is very small. Finally, in *C. wallabia* and *C. inerme*, the shield is completely lacking.

The taxonomic conventions used are those of FAIN and DOMROW (1974), and synonymies for known species are available in FAIN (1972). As in *Cytostethum* s.s., the male terminalia and the notice of an elongate ovum in all species (except *C. clibanarius* and *C. thylogale*) support full specific status. In most, the shell is textureless. In *C. mediosquamatum*, *C. thetis* *, and *C. inerme*, it is minutely papilliform. In *C. postsquamatum*, it is so scaly that care is needed to distinguish it from the scaly opisthonotal shield.

Nomenclaturally, three new specific names are nouns in apposition to the generic name (*euphallus*, *thetis*, and *wallabia*); the other seven are adjectives.

The 10 holotypes and five allotypes of the new species are deposited in the Australian National Insect Collection, Division of Entomology, C.S.I.R.O., Canberra; the paratypes are divided between the authors' collections.

Genus *Cytostethum* Domrow

Subgenus *Metacytostethum* Fain

Key to species of the subgenus *Metacytostethum* **

- 1. Stout species from Potoroinae. Females with opisthonotal shield present, covering posteromedian half of opisthosoma. Males with opisthosoma short, not reaching articulations of tibiotarsi IV. Opisthonotal shield accordingly wider than long, and anus adjacent to genitalia. Apex of opisthosoma with simple setae and two short, widely separated lobes. 2
- Slender species from Macropodinae. Females with opisthonotal shield (if present) scaly or covering terminal third at most of opisthosoma; otherwise absent. Males with opisthosoma long, sometimes reaching beyond articulations of tibiotarsi IV. Opisthonotal shield accordingly longer than wide, and anus widely separate from genitalia. Apex of opisthosoma with expanded setae and outline otherwise. 5
- 2. Females with opisthonotal shield (even if divided) reaching apex of opisthosoma. Males with prescapular shield uniformly sclerotized. Weakly sclerotized area between coxae IV and aedeagus extensive and elongate 3
- Female with opisthonotal shield not reaching apex of opisthosoma. Males with sclerotization on prescapular shield stronger over bib-shaped area. Weakly sclerotized area between coxae IV and aedeagus restricted and subcircular 4
- 3. Female with prescapular shield uniformly sclerotized. Opisthonotal shield entire, but with posterior portion marked off by transverse suture. Opisthogastric shield absent. Male with partial hysteronotal shield. *clibanarius*
- Female with sclerotization on prescapular shield stronger laterally. Opisthonotal shield frankly divided. Opisthogastric shield present. Male without hysteronotal shield *tasmaniense*

* In one specimen, the ovum, presumably young, is textureless.

** The female of *C. intermedium* and the males of *C. prosquamatum*, *C. maydenense*, *C. wallabia*, and *C. inerme* are unknown.

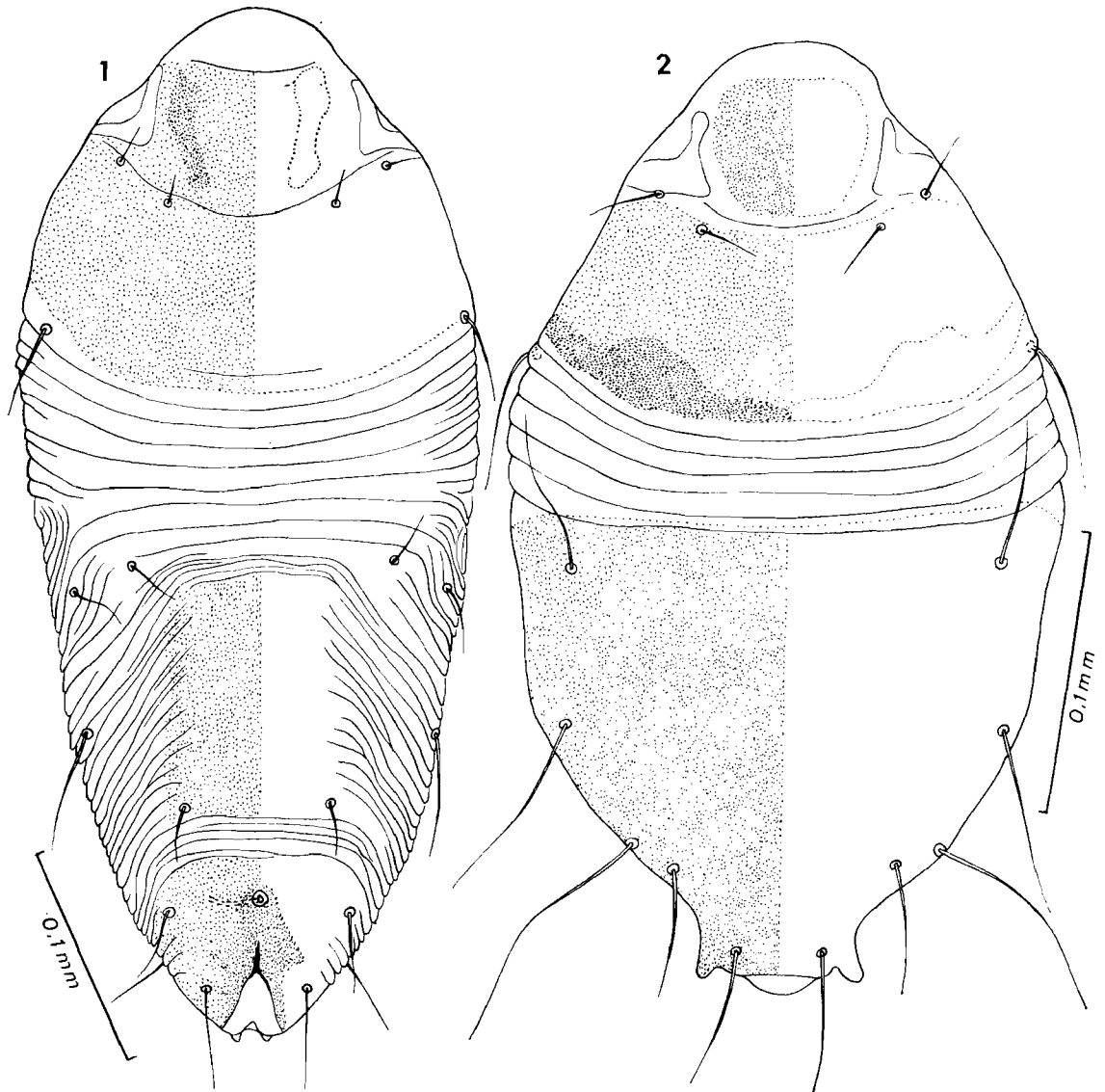
4. Female with sclerotization on prescapular shield stronger over U-shaped area. Opisthonotal shield widest anteriorly. Opisthogastric shield absent. Male with anterior margin of opisthonotal shield entire. Weakly sclerotized area in front of aedeagus only reaching posterior end of longitudinal element of coxal apodemes IV. *thylogale*
 Male with anterior margin of opisthonotal shield deeply incised medially. Weakly sclerotized area in front of aedeagus reaching transverse element of coxal apodemes IV *intermedium*
5. Opisthonotal shield present 6
 Opisthonotal shield absent 12
6. Females with scales on opisthonotal shield. Males with apex of opisthosoma lacking two strong bicuspid processes, or with exaggeratedly long aedeagus 7
 Females without scales on opisthonotal shield. Male with apex of opisthosoma armed with two strong bicuspid processes. 11
7. Females with opisthonotal shield entire posteriorly. Males with complex attachment organ incorporating anal discs, four retrorse hooks, and six spinose setae 8
 Females with opisthonotal shield deeply incised posteriorly, horseshoe-shaped. Males otherwise.. 10
8. Female with anterior margin of postscapular shield entire. Scales present on anterior half of opisthonotal shield..... *prosquamatum*
 Females with anterior margin of postscapular shield incised medially. Scales present on posterior half of opisthonotal shield.. 9
9. Female with prescapular shield less strongly sclerotized discally, and postscapular shield narrowly incised anteromedially. Scales on opisthonotal shield concentrated in front of opening of bursa copulatrix. Legs IV reaching apex of opisthosoma. Male with postscapular shield narrowly incised anteromedially. Two terminal lobes of attachment organ well marked *mediosquamatum*
 Female with prescapular shield uniformly sclerotized, and postscapular shield broadly incised anteromedially. Scales on opisthonotal shield almost surrounding opening of bursa copulatrix. Legs IV falling well short of apex of opisthosoma. Male with postscapular shield entire anteromedially. Two terminal lobes of attachment organ shallow *postsquamatum*
10. Female with postscapular shield entire. Legs IV almost reaching apex of opisthosoma. Male with short aedeagus and distinct anal discs..... *longitarsus*
 Female with postscapular shield divided. Legs IV falling far short of apex of opisthosoma. Male with exaggeratedly long aedeagus and lacking anal discs..... *euphallus*
11. Female with postscapular shield entire, but weakly sclerotized except for lateral angles. Opisthonotal shield covering terminal third of opisthosoma *maydenense*
 Female with postscapular shield almost divided medially. Opisthonotal shield covering terminal sixth of opisthosoma. *thetis*
12. Female with postscapular shield entire, but weakly sclerotized anteromedially. Opisthonotal setae of normal length. Opisthogastric annulations scaled posteriorly. Bursa copulatrix long and straight *wallabia*
 Female with postscapular shield divided. Opisthonotal setae very short. Opisthogastric annulations simple. Bursa copulatrix short and bent..... *inermis*

Cytostethum (Metacytostethum) clibanarius Domrow.

Material examined : Type-series, rufous rat-kangaroo, *Aepyprymnus rufescens* (Gray), near Herberton, N.Q. Ten males, *A. rufescens*, Highvale, S.E.Q., no date, E.H. Derrick.

Cytostethum (Metacytostethum) tasmaniense Fain & Domrow, sp. n.

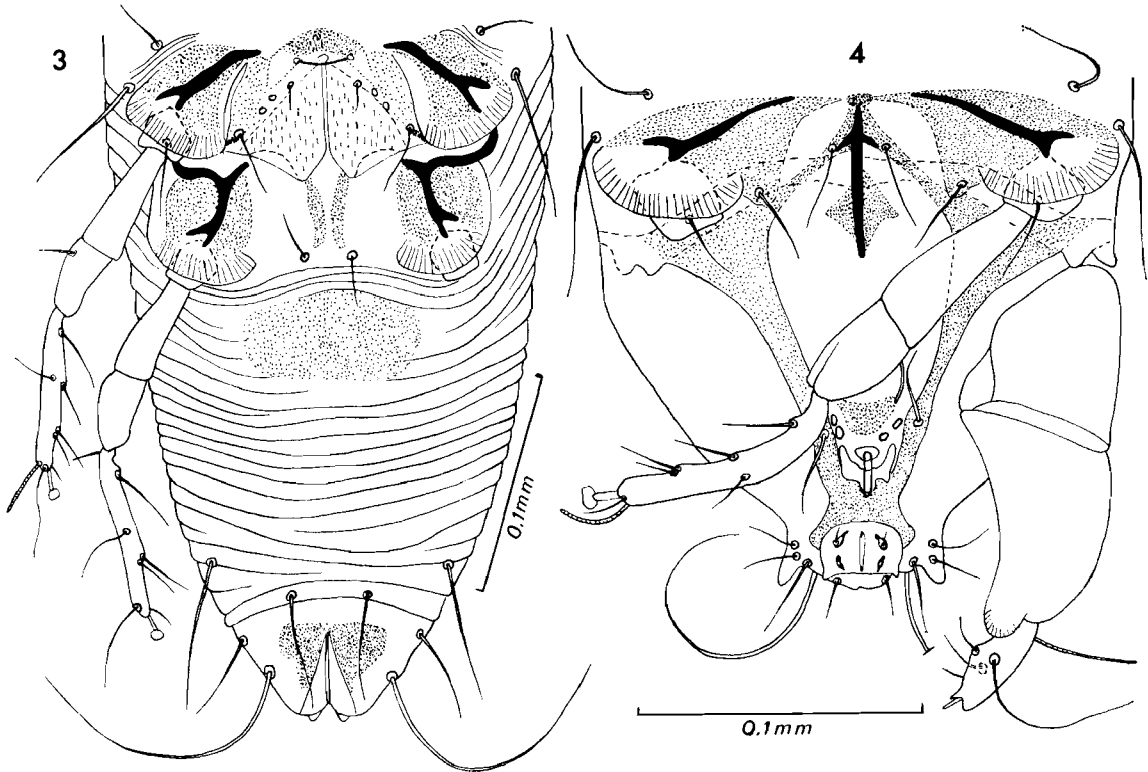
Material examined : Holotype female, allotype male, and eight pairs of paratypes, eastern bettong, *Bettongia gaimardi* (Desmarest) (subspecies *cuniculus* (Ogilby)), Green's Beach, Tas., 6.IV.1964, R.H. Green.



FIGS. 1-2. — **C.(M.) tasmaniense**, sp. n. : 1, female (holotype) and 2, male (allotype) dorsally.

Female (holotype) (Figs. 1, 3) : A much smaller species than *C. clibanarius*, length 441 μ , width 180 μ . Prescapular shield more heavily sclerotized latero-obliquely. Postscapular shield rather deep (75 μ), but weakly sclerotized. Opisthotal shield more extended anteromedially than in *C. clibanarius*, but frankly divided into two parts by about five cuticular annulations ;

posterior portion smaller, but with heavier saggitiform sclerotization discally, and bearing opening of bursa copulatrix anteriorly. Venter as in *C. clibanarius*, but with distinct transverse opisthogastric shield behind coxae IV.



FIGS. 3-4. — *C. (M.) tasmaniense*, sp. n. : 3, female (holotype) and 4, male (allotype) ventrally.

Male (allotype) (Figs. 2, 4) : Length 369 μ , width 202 μ . Prescapular shield uniformly sclerotized. Postscapular shield much deeper and more rounded posteriorly than in *C. clibanarius* ; with irregular transverse zone on posterior margin more heavily sclerotized. Hysteronotal annulations about six in number, not in form of incipient shield medially as in *C. clibanarius*. Opisthonotal shield as in *C. clibanarius*. Venter as in *C. clibanarius*, but coxae III hardly touching, rather than broadly joined, medially. Longitudinal element of coxal apodemes IV flared posteriorly.

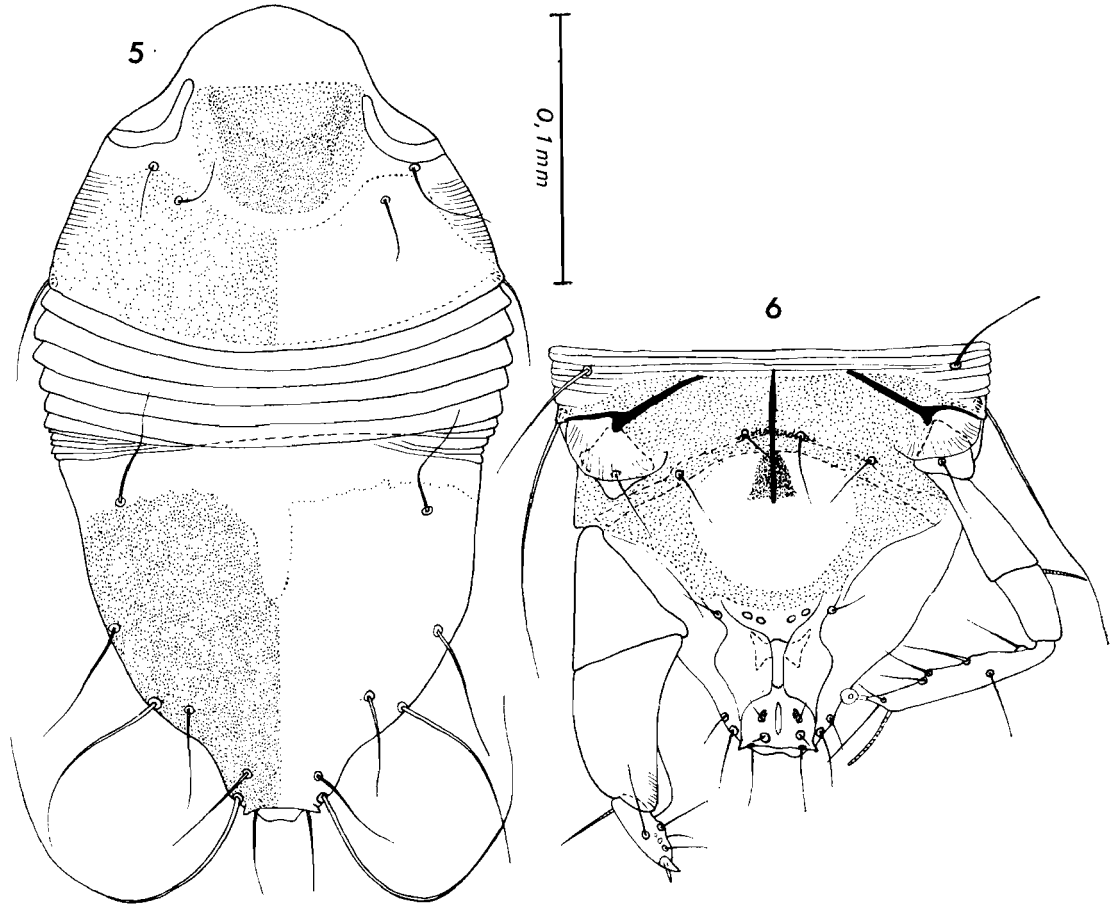
Cytostethum (*Metacytostethum*) *thylogale* Fain.

Material examined : Type-series, pademelon, *Thylogale* sp., Australia (probably contaminant). Several specimens of both sexes, *Bettongia gaimardi cuniculus*, Green's Beach, Tas., 6.IV. 1964, R. H. Green *.

* Since writing this, A.F. has re-examined in London the actual pademelon from which the type-series was obtained, and found additional specimens of *C. thylogale* attached to its hairs. This host record is therefore now confirmed, and will necessitate slight alteration to the host preference clauses in the first couplet of the key above.

Cytostethum (Metaeytostethum) intermedium Fain & Domrow, sp. n.

Material examined : Holotype and one paratype male, *Bettongia gaimardi cuniculus*, Green's Beach, Tas., 6.IV.1964, R. H. Green.



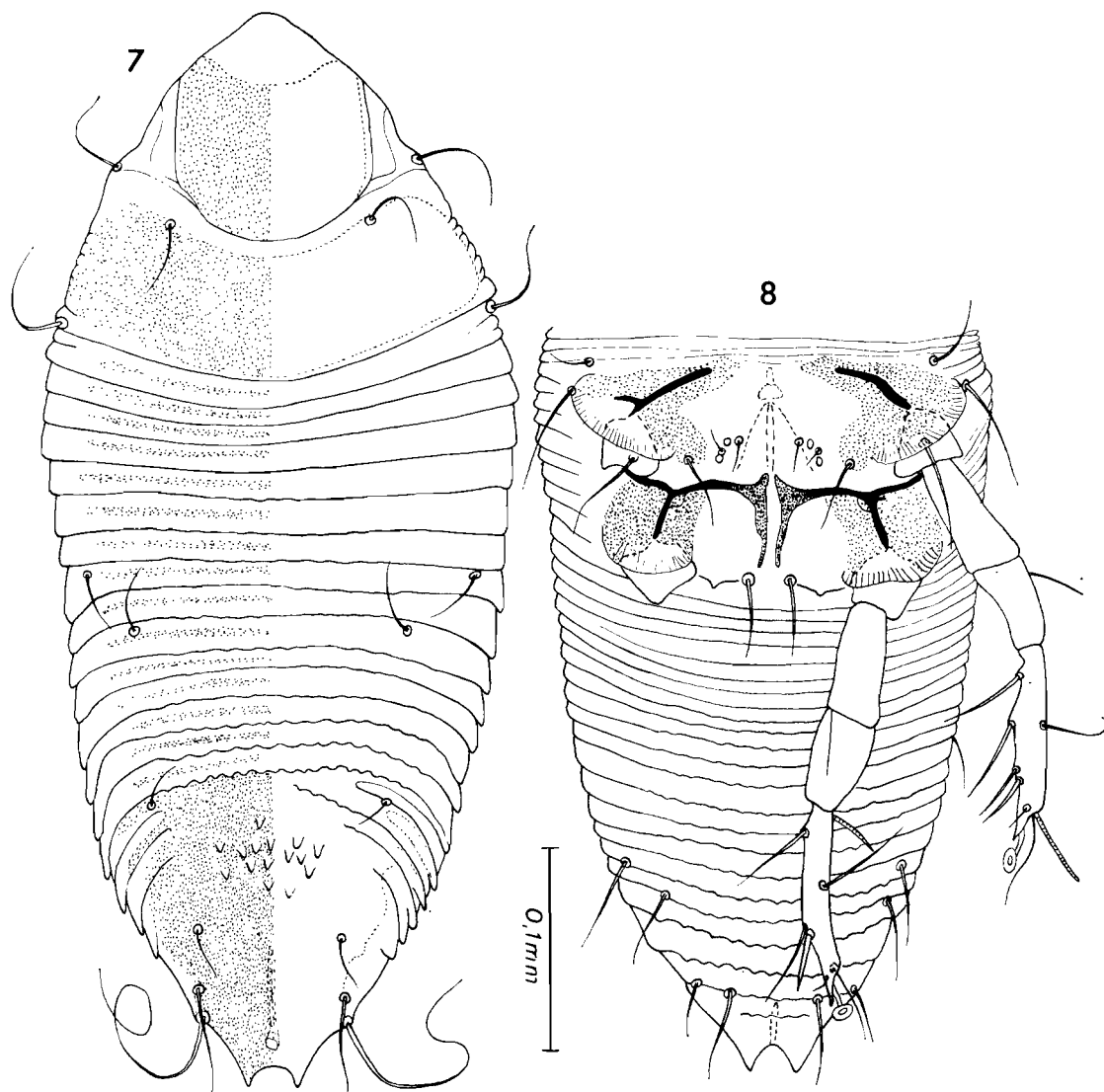
FIGS. 5-6. — **C. (M.) intermedium**, sp. n. : Male (holotype) dorsally (5) and ventrally (6).

Male (holotype) (Figs. 5, 6) : Only slightly smaller than *C. thylogale*, length 310 μ , width 168 μ . Prescapular shield with bib-shaped area of heavier sclerotization as in *C. thylogale*. Postscapular shield uniformly sclerotized. Opisthonotal shield irregular anteriorly and deeply incised antero-medially ; rather more slender posteriorly than in *C. clibanarius*, *C. tasmaniense*, and *C. thylogale*. Coxae III broadly fused medially. Weakly sclerotized area in front of aedeagus subcircular (51 μ long, 60 μ wide), rather more extensive than in *C. thylogale*, and reaching forward to transverse element of coxal apodemes IV.

Female unknown.

Cytostethum (Metaeytostethum) prosquamatum Fain & Domrow, sp. n.

Material examined : Holotype and four paratype females, pademelon, *Thylogale brunii* (Schreber), Kaminibus, 3 miles west of Maprik, P. New-Guinea, 21.V.1968, K. Keith.



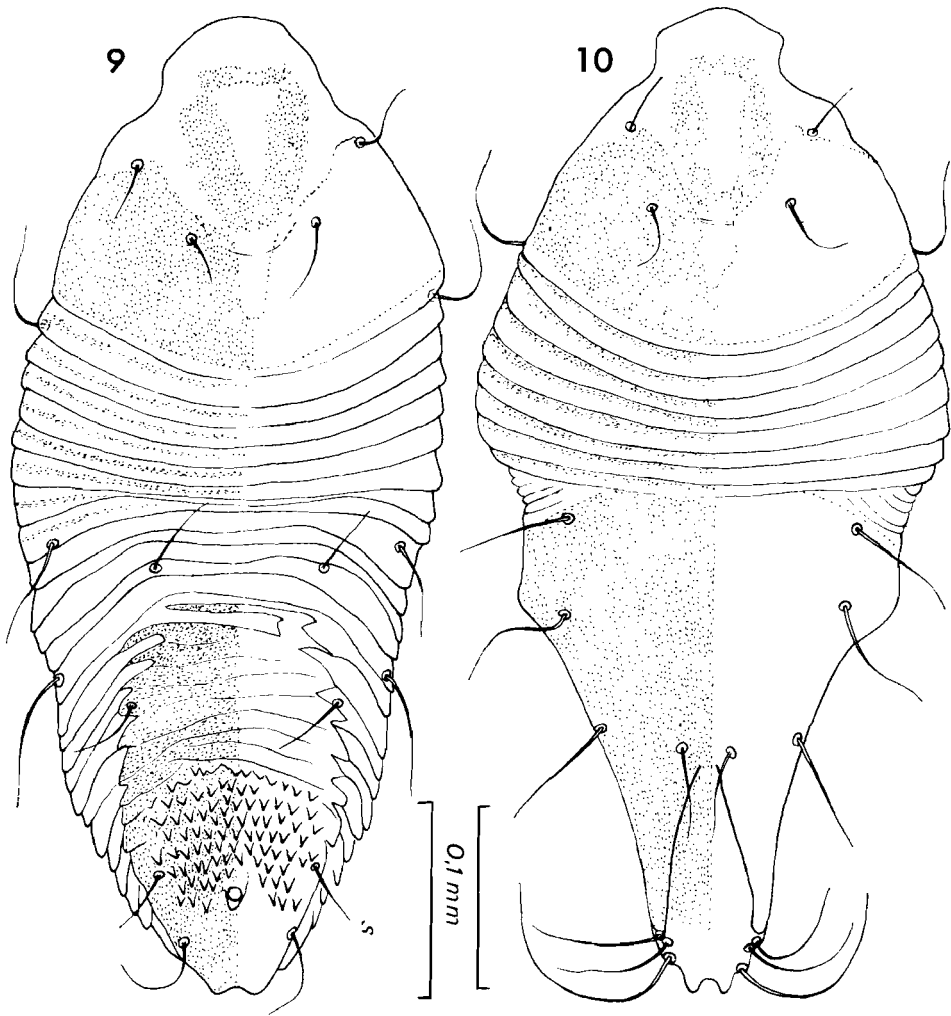
FIGS. 7-8. — *C. (M.) prosquamatum*, sp. n. : Female (holotype) dorsally (7) and ventrally (8).

Female (holotype) (Figs. 7, 8) : Length 534 μ , width 225 μ . Prescapular and postscapular shields uniformly sclerotized ; latter not incised anteromedially. Hysteronotal and opisthogastric annulations scaled posteriorly. Opisthonotal shield strongly sclerotized, but with irregular margins and less extended anteromedially than in *C. mediosquamatum* and *C. postsquamatum* ; with patch of about 15 scales anteriorly and sharply emarginate posteriorly. Opening of bursa copulatrix subterminal. Legs IV almost reaching apex of opisthosoma.

Male unknown.

Cystostethum (Metacytostethum) mediosquamatum Fain & Domrow, sp. n.

Material examined : Holotype and eight paratype females, allotype and seven paratype males *Thylogale brunii*, Kaminibus, 3 miles west of Maprik, P. New-Guinea, 21.v.1968, K. Keith.



FIGS. 9-10. — *C. (M.) mediosquamatum*, sp. n. : 9, female (holotype) and 10, male (allotype) dorsally.

Female (holotype) (Figs. 9, 11) : Length 543 μ , width 225 μ . Prescapular shield not sclerotized discally. Postscapular shield narrowly incised anteromedially. Opisthonotal shield irregular in outline as in *C. prosquamatum*, but more extended anteromedially ; scales more numerous than in *C. prosquamatum*, on posterior half of shield just in front of opening of bursa copulatrix. Apex of opisthosoma only weakly emarginate. All opisthogastric annulations scaly. Legs IV reaching apex of opisthosoma.

Male (allotype) (Figs. 10, 12) : Length 549 μ , width 240 μ . Prescapular and postscapular shields as in female. Opisthonotal shield markedly longer than wide, and distinctly narrowed posteriorly. Apex of opisthosoma distinctly bilobed. Coxae III and IV broadly united medially. Aedeagus short, set in anterior angle of chiasmatic sclerotization. Attachment organ complex, incorporating two anal discs, four retrorse hooks and six spinose setae in addition to four simple setae.



FIG. 11. — *C. (M.) mediosquamatum*, sp. n. : female (holotype) ventrally.

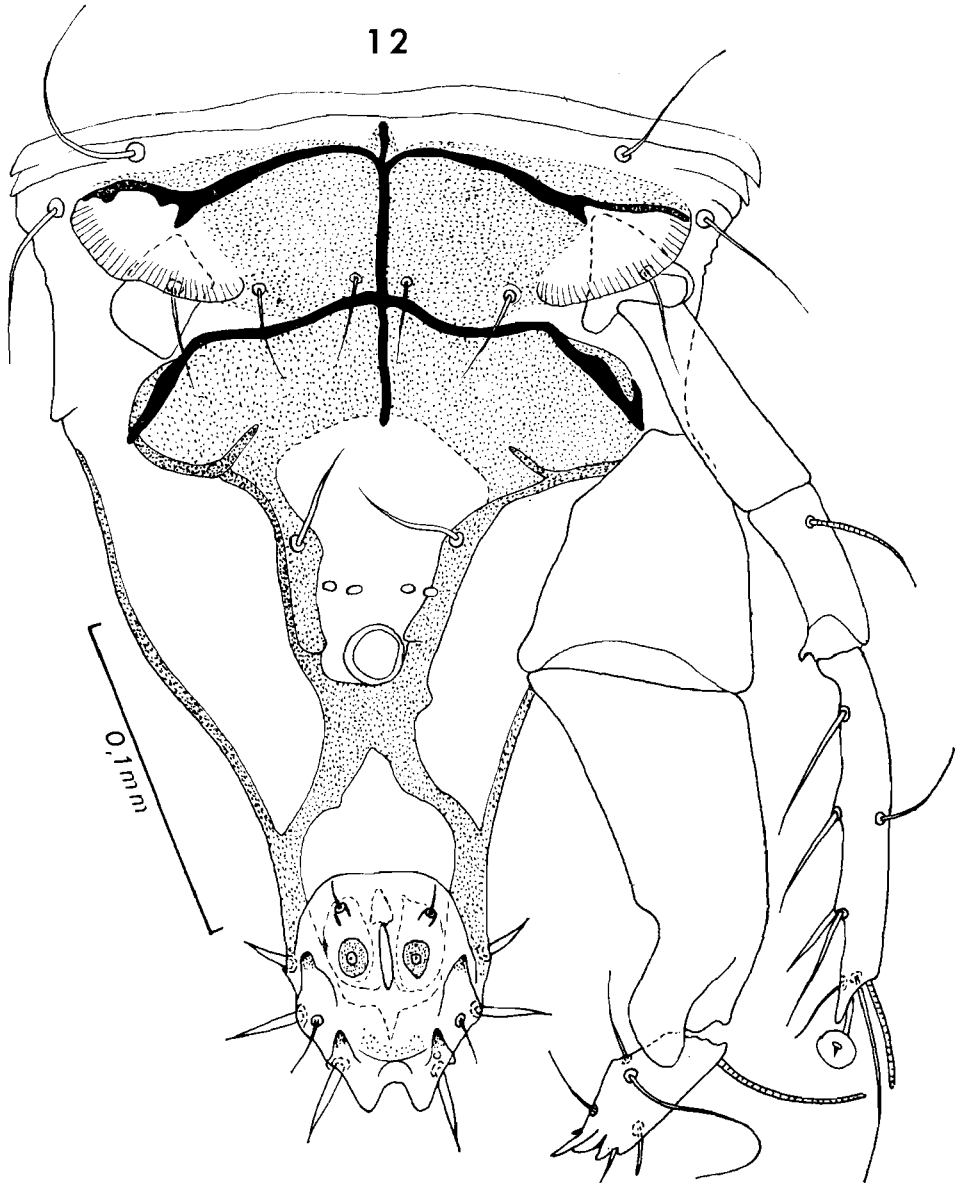
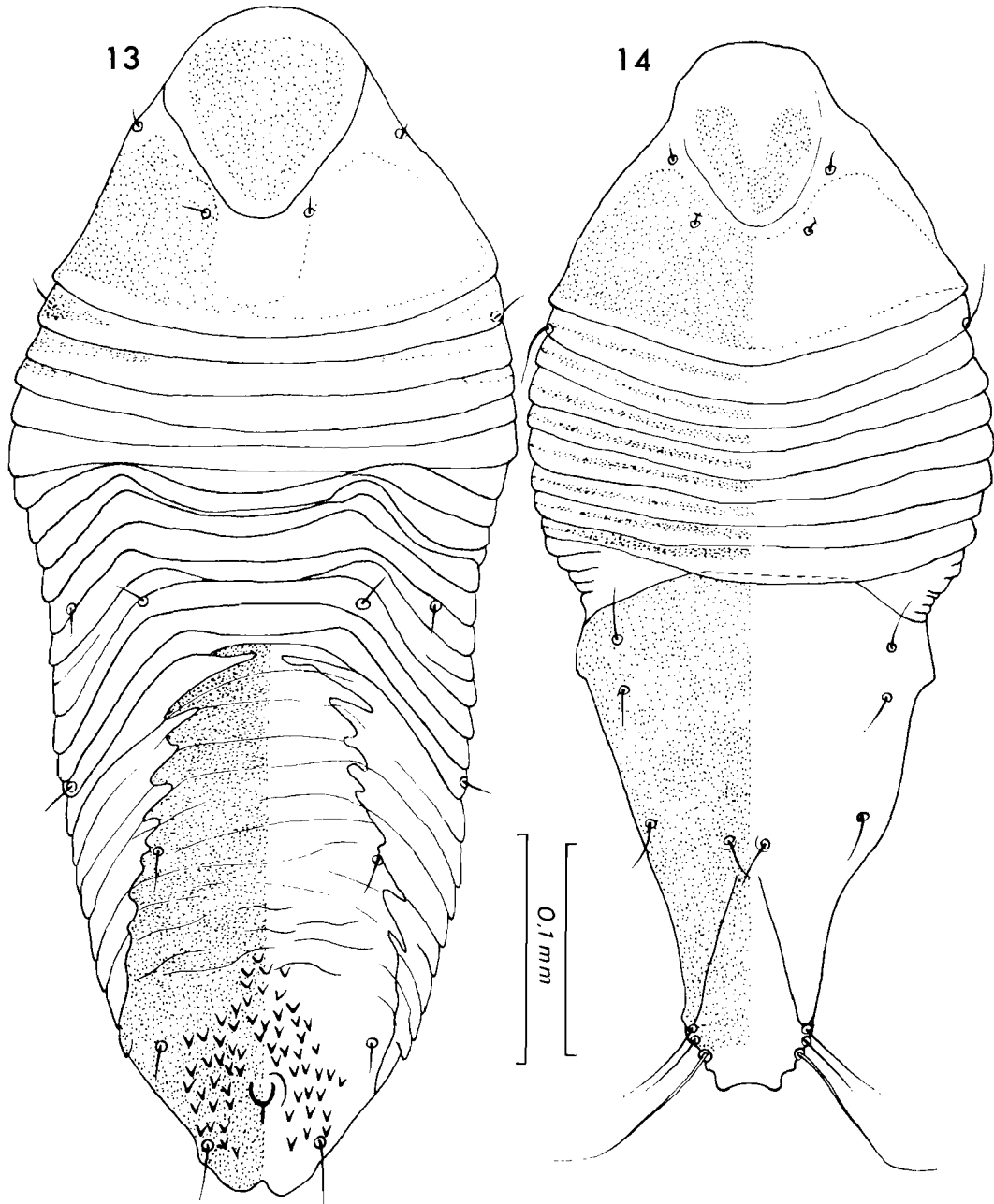


FIG. 12. — *C. (M.) mediosquamatum*, sp. n. : male (allotype) ventrally.

Cytostethum (Metacytostethum) postsquamatum Fain & Domrow, sp. n.

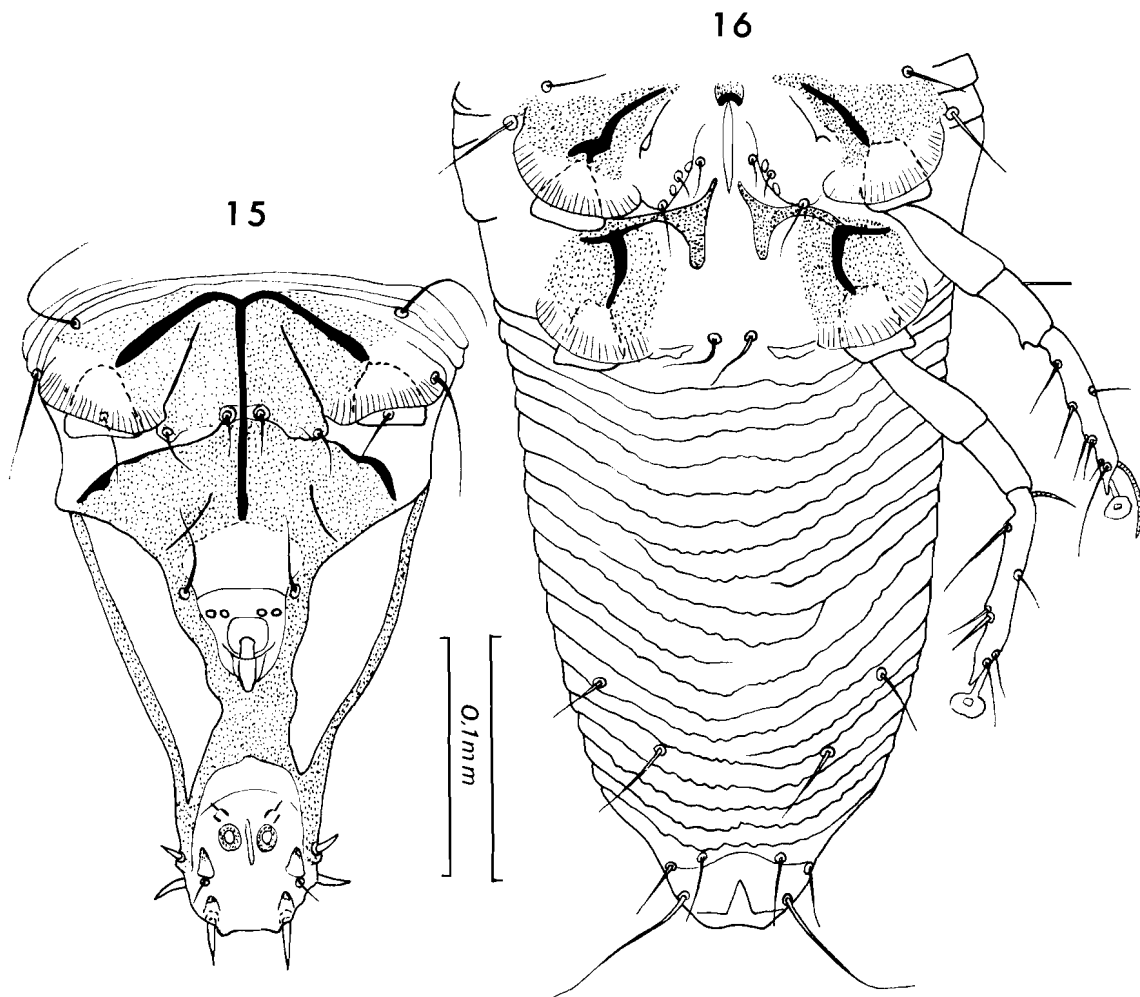
Material examined : Holotype and 12 paratype females, allotype and ten paratype males, Tasmanian pademelon, *Thylogale billardierii* (Desmarest), Maydena, Tas., 4.IX.1961, B.C. Mollison.



FIGS. 13-14. — **C. (M.) postsquamatum**, sp. n. : 13, female (holotype) and 14, male (allotype) dorsally.

Female (holotype) (Figs. 13, 16) : Length 540 μ , width 219 μ . Prescapular shield uniformly sclerotized. Postscapular shield broadly incised anteromedially. Opisthonotal shield as in *C. mediosquamatum*, but scales irregularly arranged and almost encircling opening of bursa copulatrix. Apex of opisthosoma only weakly bilobed. All opisthogastric annulations with indications of scales. Legs IV falling well short of apex of opisthosoma.

Male (allotype) (Figs. 14, 15) : Length 495 μ , width 204 μ . Prescapular shield not sclerotized anteromedially. Postscapular shield uniformly sclerotized. Otherwise differing from *C. mediosquamatum* only in shape of coxae III-IV and chiasmatic sclerotization behind aedeagus.



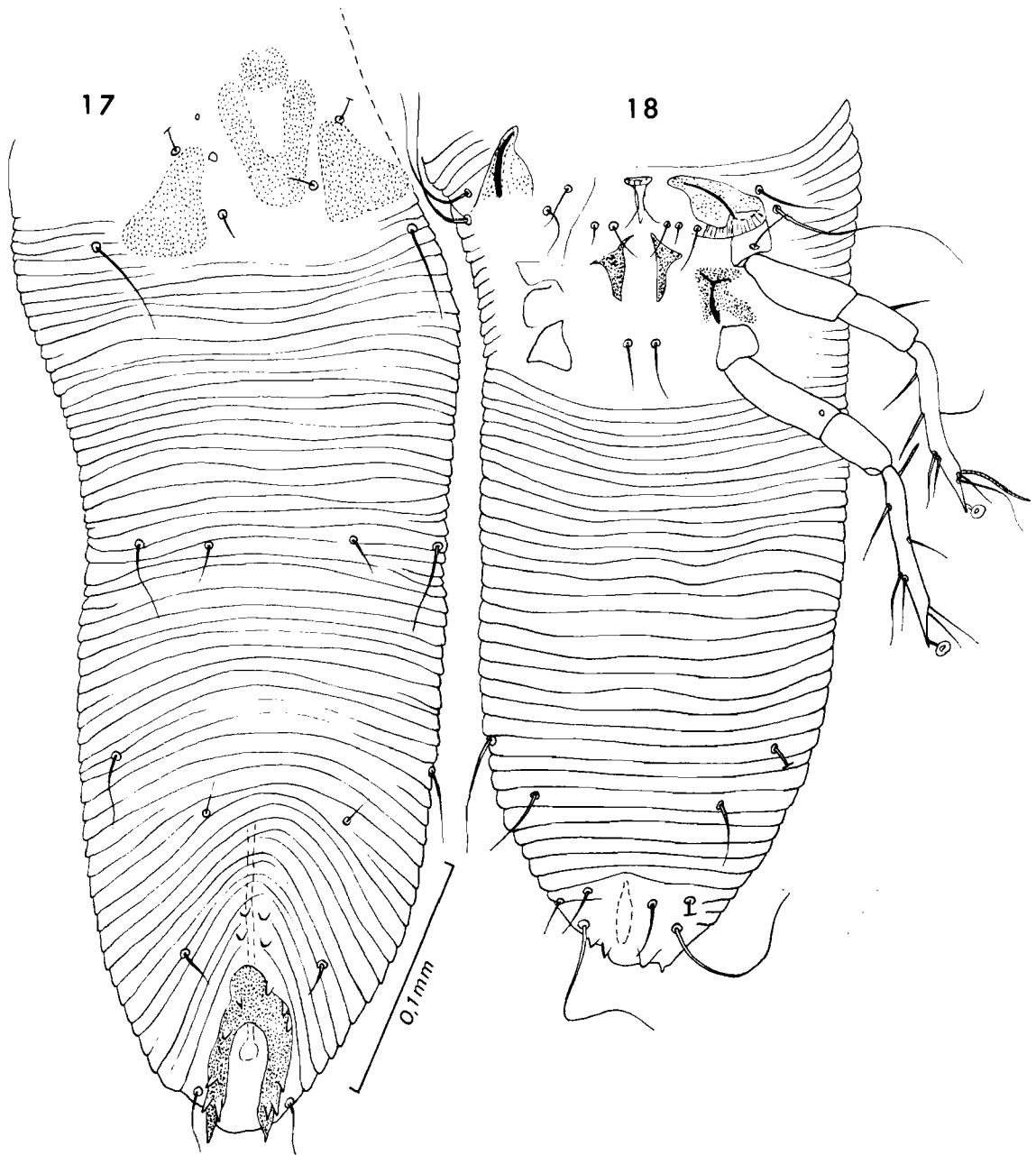
FIGS. 15-16. — *C. (M.) postsquamatum*, sp. n. : 15, male (allotype) and 16, female (holotype) ventrally.

Cytostethum (Metacytostethum) longitarsus Fain.

Material examined : Type-series, bandicoot, *Echymipera kalubu* (Lesson) (= *Perameles cockerelli* Ramsay), Haveri, P.N.G. (probably contaminant).

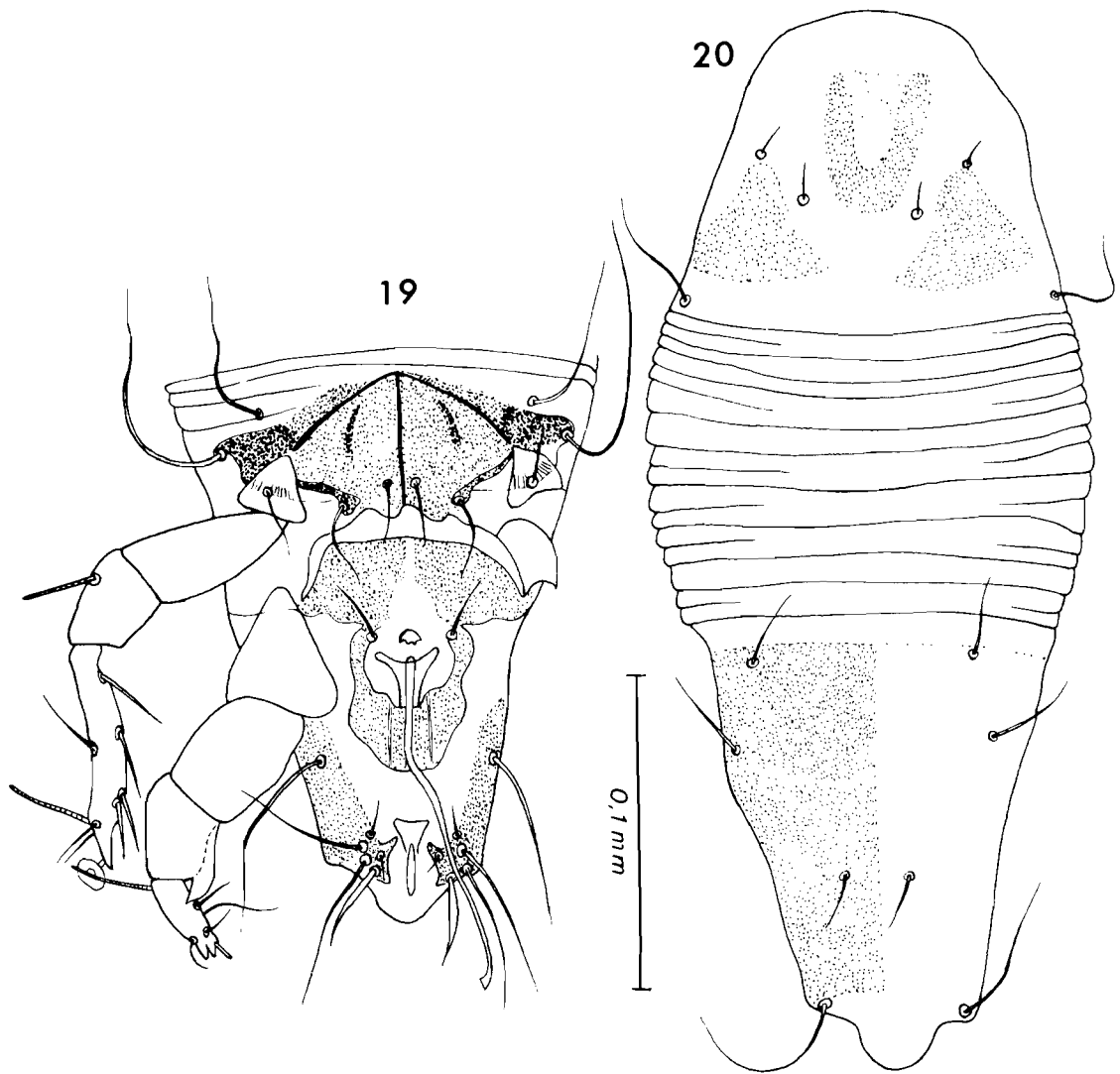
Cytostethum (Metacytostethum) euphallus Fain & Domrow, sp. n.

Material examined : Holotype female, allotype male, and three pairs of paratypes, red-legged pademelon, *Thylogale stigmatica* Gould, ETTY Bay, N.Q., iv.1960, J. L. Harrison.



FIGS. 17-18. — **C. (M.) euphallus**, sp. n. : female (holotype) dorsally (17) and ventrally (18).

Female (holotype, crushed anteriorly) (Figs. 17, 18) : Length 465 μ , width 180 μ . Prescapular shield not sclerotized discally. Postscapular shield broadly divided into two uniformly sclerotized subtriangular halves. Opisthonotal shield reduced and similar to that of *C. longitarsus*, i.e. horseshoe-shaped and scaly. Opening of bursa copulatrix in cuticle inside curve of shield. Legs IV falling far short of apex of opisthosoma.

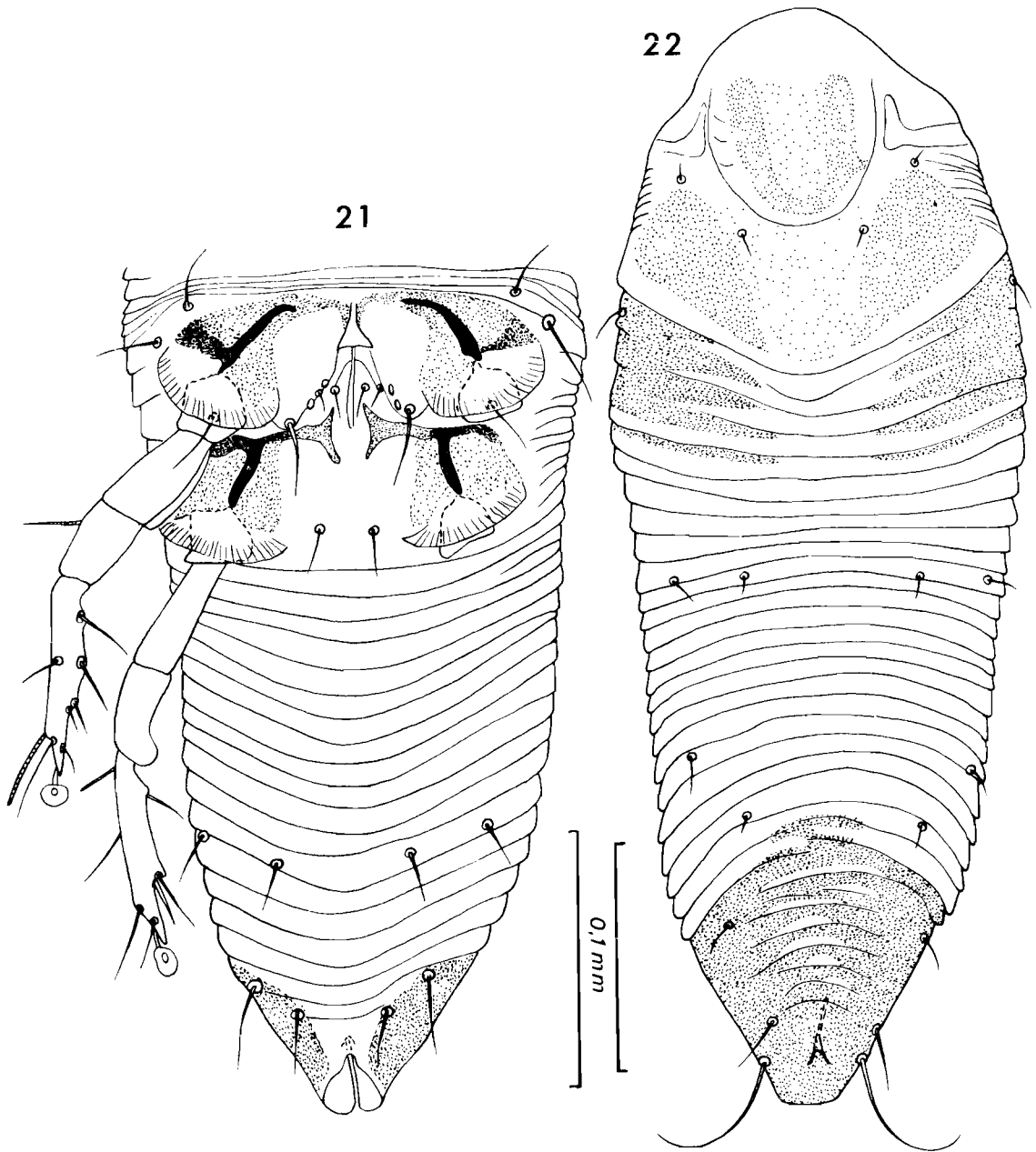


FIGS. 19-20. — *C. (M.) euphallus*, sp. n. : male (allotype) ventrally (19) and dorsally (20).

Male (allotype) (Figs. 19, 20) : Length 375 μ , width 145 μ . Prescapular and postscapular shields as in female. Opisthonotal shield uniformly sclerotized; longer than wide, but not as narrowed posteriorly as in *C. mediosquamatum* and *C. postsquamatum*. Coxae III broadly united medially, but coxae IV only barely touching. Aedeagus flagelliform as in no other species of *Metacytostethum*, 105 μ long; surrounding sclerotized support correspondingly strong.

Notes : These are eight of the 10 north Queensland specimens tentatively assigned by DOMROW (1962) to the genus *Neolabidocarpus* Gunther. The other two males, though too badly crushed

for specific determination, belong in the recently described genus *Petrogalochirus* Fain (see FAIN, 1972). The only species in *Neolabidocarpus* is *N. buloloensis* Gunther, briefly described from the same host — *T. coxeni* (Gray) = *T. stigmatica* — in Papua New Guinea, and of which only a single nymph is extant (DOMROW, 1958). Since the north Queensland series is now seen to be composite, the workable specimens are better assigned to a new species than arbitrarily identified with Gunther's *species inquirenda*.



FIGS. 21-22. — *C. (M.) maydenense*, sp. n. : female (holotype) ventrally (21) and dorsally (22).

Cytostethum (Metacytostethum) maydenense Fain & Domrow, sp. n.

Material examined : Holotype and seven paratype females, *Thylogale billardierii*, Maydena, Tas., 18-19.X.1960, B. C. Mollison.

Female (holotype) (Figs. 21, 22) : Length 510 μ , width 183 μ . Prescapular shield weakly sclerotized except for U-shaped submarginal strip. Postscapular shield entire, but weakly sclerotized except for lateral angles. Hysteronotal annulations distinctly sclerotized anterolaterally. Opisthonotal shield almost as extensive as in *C. prosquamatum*, but lacking scales and with indications of fenestrations. Opening of bursa copulatrix subterminal.

Male unknown.

Cytostethum (Metacytostethum) thetis Fain & Domrow, sp. n.

Material examined : Holotype and five paratype females, allotype and three paratype males, red-necked pademelon, *Thylogale thetis* (Lesson), foothills of Mount Lindesay, S.E.Q., 24.IV.1960, K. Keith.

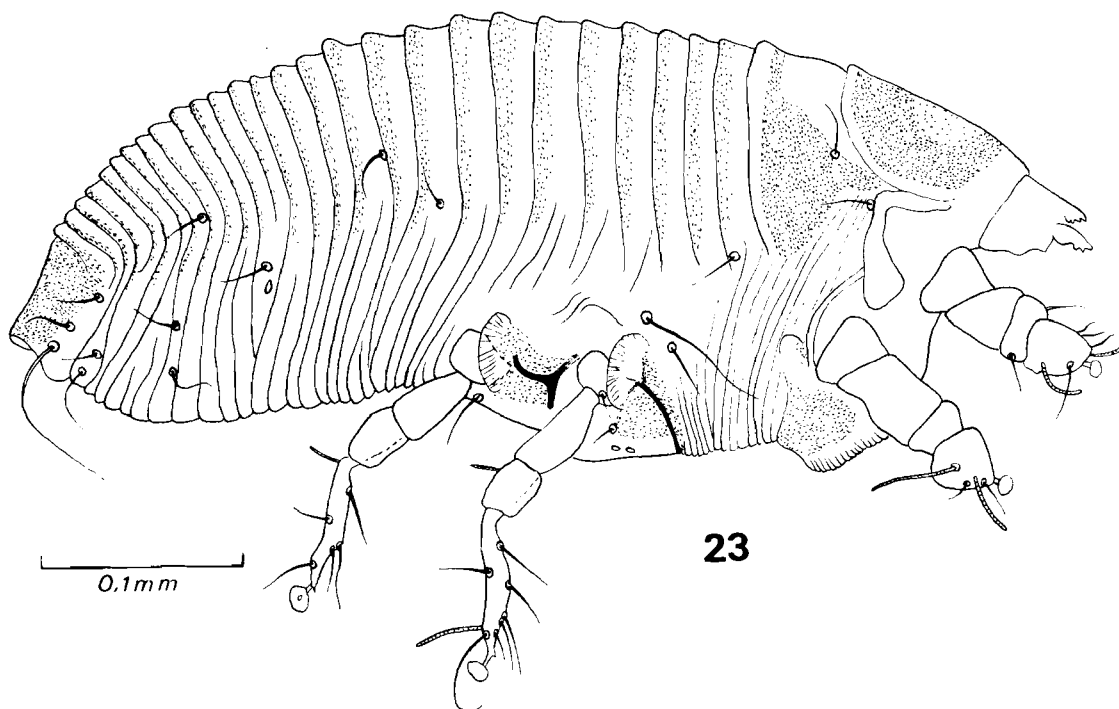
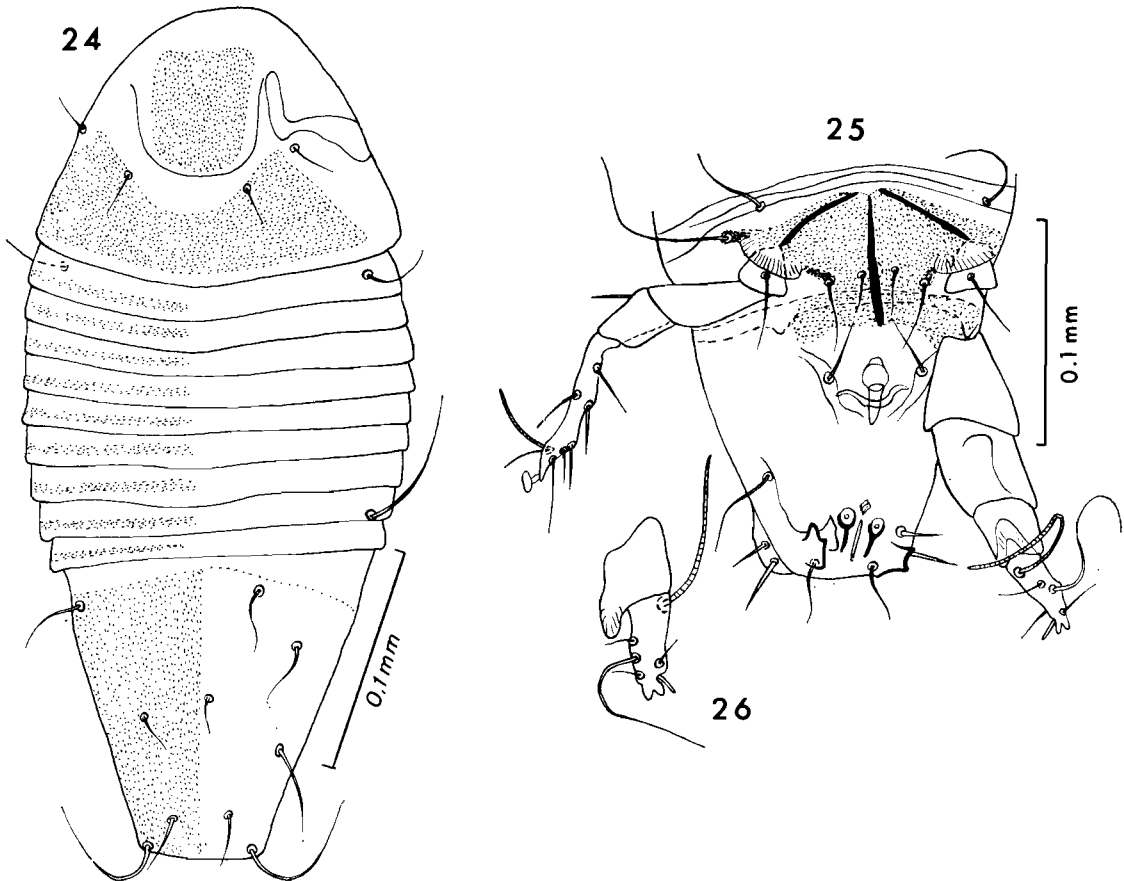


FIG. 23. — *C. (M.) thetis*, sp. n. : female (holotype) laterally.

Female (holotype) (Fig. 23) : Length (in lateral view) 510 μ . Prescapular shield less strongly sclerotized discally. Postscapular shield almost completely divided by extensive non-sclerotized anteromedian region. Opisthonotal shield even more reduced than in *C. longitarsus* and *C. euphal-*

lus, barely covering terminal sixth of opisthosoma ; subquadrate and without scales. Opening of bursa copulatrix apparently just behind opisthonotal shield. Legs IV falling well short of apex of opisthosoma.



Figs. 24-26. — *C. (M.) thetis*, sp. n. : male (allotype) dorsally (24) and ventrally (25), with another view of genu-tibiotarsus IV (26).

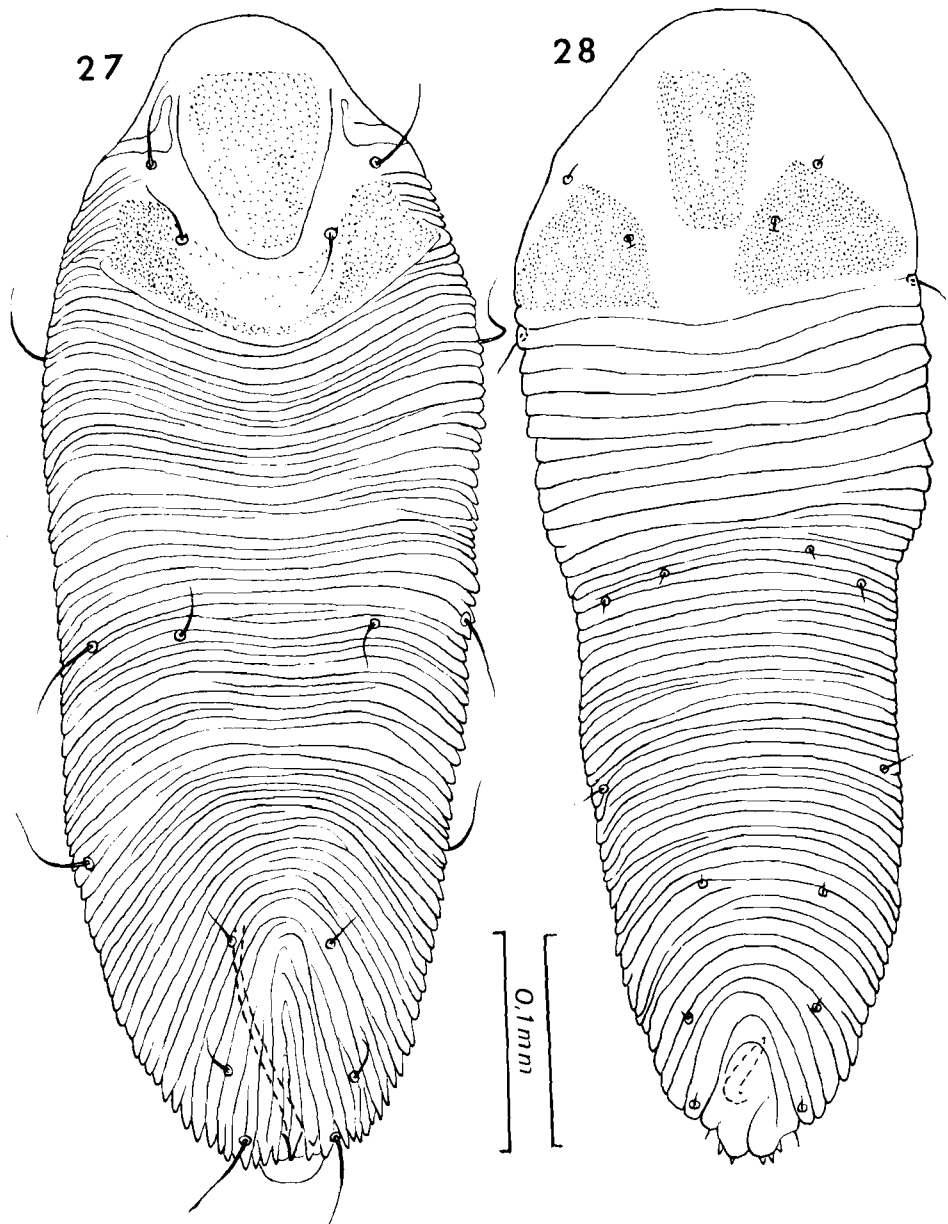
Male (allotype) (Figs. 24-26) : Length 375 μ , width 165 μ . Prescapular shield with indication of anteromedian weakness. Postscapular shield entire. Opisthonotal shield as in *C. euphallus*. Coxae III and IV meeting broadly in midline. Aedeagus short. Small anal discs present. Apex of opisthosoma truncate, with two heavy bicuspid processes and several short subspinose setae ventrally.

Notes : As this series is not in good condition, Fig. 25 (opisthogaster of male) may not be completely accurate.

***Cytostethum (Metaacytostethum) wallabia* Fain & Domrow, sp. n.**

Material examined : Holotype and two paratype females, swamp wallaby, *Wallabia bicolor* (Desmarest), Bemm River, Orbost, Vic., 11.v.1972, P. L. Stevens.

Also four females (not types), *W. bicolor*, Bellbird, Vic., 9.iv.1974, I. Beveridge.



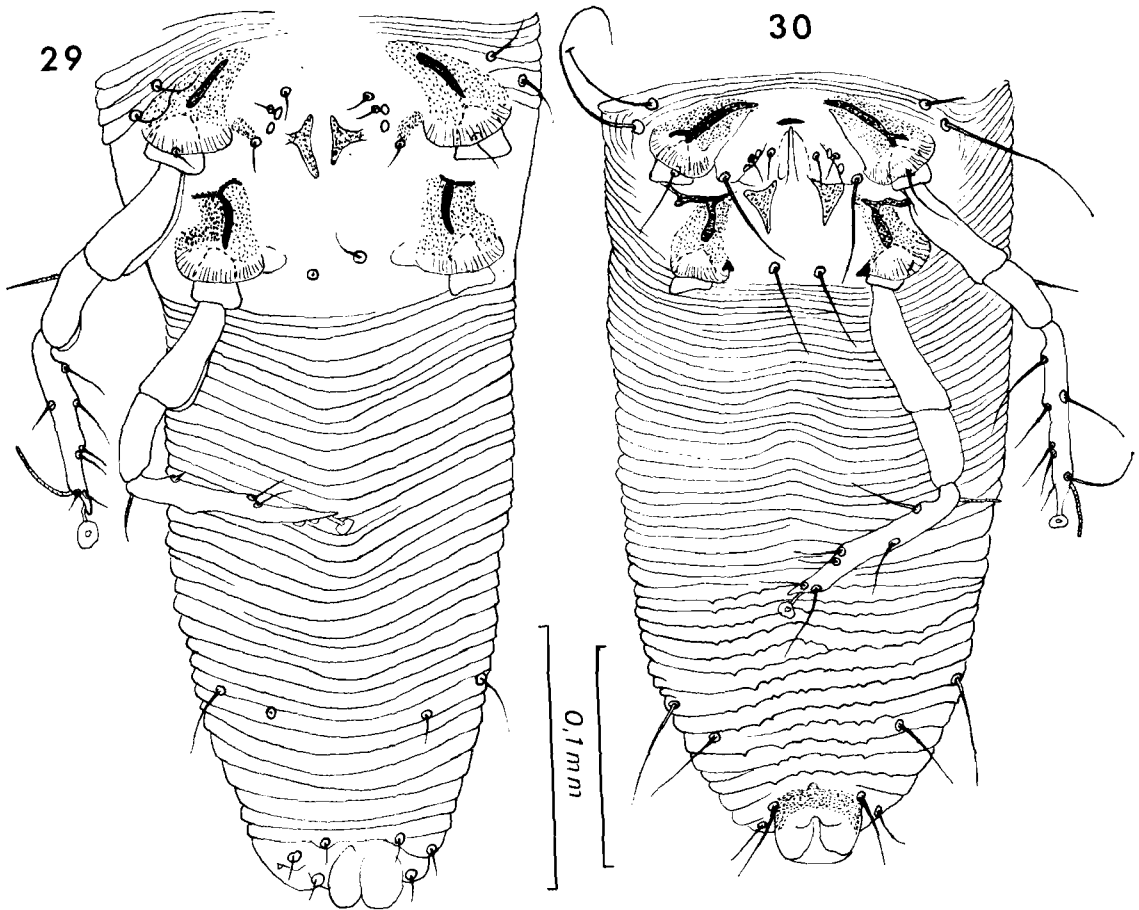
FIGS. 27-28. — 27) *C. (M.) wallabia*, sp. n. : female (holotype) dorsally ;
28) *C. (M.) inerme*, sp. n. : female (holotype) dorsally.

Female (holotype) (Figs. 27, 30) : Length 543 μ , width 195 μ . Prescapular shield uniformly sclerotized. Postscapular shield almost reduced to state noted in *C. thetis*. Opisthonotal shield absent. Opisthonotal setation of normal strength. Opening of bursa copulatrix subterminal ; duct long and straight. Opisthogastric annulations with small scales posteriorly. Anus borne on short, basally sclerotized prominence. Legs IV hardly reaching anus.

Male unknown.

Cytostethum (Metacytostethum) inerme Fain & Domrow, sp. n.

Material examined : Holotype and one paratype female, *Thylogale billardierii*, Maydena, Tas., 19.X.1960, B.C. Mollison.



FIGS. 29-30. — 29) **C. (M.) inerme**, sp. n. : female (holotype) ventrally ;
30) **C. (M.) wallabia**, sp. n. : female (holotype) ventrally.

Female (holotype) (Figs. 28, 29) : Length 555 μ , width 185 μ . Prescapular shield weakly sclerotized anteromedially, and not at all discally. Postscapular shield widely divided medially. Opisthonotal shield absent. Opisthonotal setation decidedly weaker than in *C. wallabia* and other species of *Metacytostethum*. Opening of bursa copulatrix subterminal ; duct short and bent. Opisthogastric annulations simple. Anal prominence incipient. Legs IV falling well short of anus.

Male unknown.

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