

THE GENUS GUNTHERANA (Acarina, Trombiculidae)

By Robert Domrow

QUEENSLAND INSTITUTE OF MEDICAL RESEARCH, BRISBANE

ABSTRACT

The genus *Guntherana* is enlarged to include the chiggers from Australia and New Guinea previously assigned to *Euschöngastia* s.l. (except those of the subgenus *Walchiella*, which should be restored to generic rank). Two subgenera, *Eerrickiella* and *Guntherana* s.s., are recognized on both nymphal and larval characters, and each contains 2 species groups recognizable on larval characters alone. The subgeneric division by larval characters parallels that by nymphal characters.

Twenty-six species have been transferred, and 4 new species described, bringing the total to 33, including the 3 species already in the genus (*kallipygos*, *tindalei*, *translucens*). Keys are given to the larval subgenera, species groups and species, but the nymphs are too alike morphologically to be profitably keyed, except at a subgeneric level.

The following 26 larval names are combined for the first time with *Guntherana*: *andromeda* Womersley, *antipodiana* Hirst, *cassiope* Wom., *coorongensis* Hirst, *dasycerci* Hirst, *derricki* Wom., *dumosa* Wom., *echymipera* Wom. & Kohls, *foliata* Gunther, *heaslipi* Wom. & Heaslip, *innisfailensis* Wom. & Heas., *mackerrasae* Wom., *mccullochi* Wom., *parva* Wom., *perameles* Wom., *peregrina* Wom., *petrogale* Wom., *pseudomys* Wom., *queenslandica* Wom., *shieldsi* Gun., *similis* Wom. & Heas., *smithi* Wom., *trichosuri* Wom., *newmani* Wom., *womersleyi* Gun., & *wongabelensis* Wom. Four new larval species are described from Queensland—*G. (D.) petulans* from *Rattus assimilis*, *Melomys cervinipes* and *Hypsi-prymnodon moschatus*; *G. (D.) rex* from *R. assimilis*; *G. (G.) emphylla* from *Isoodon macrourus*, *Perameles nasuta* and *M. cervinipes*; and *G. (G.) pannosa* from *R. assimilis*. The following 18 names have also been applied to the species above, but are rejected for various reasons—*bipygalis* Gunther, *bushlandi* Philip, *cairnsensis* Womersley & Heaslip, *callipygea* Gun., *crinita* Wom., *gateri* Wom. & Heas., *guntheri* Wom. & Heas., *hirsti* Wom. & Heas., *lappacea* Wom., *lawrencei* Wom., *melomys* Wom. & Heas., *mohri* Wom., *westraliensis* Wom., *parana* Wom., *phascogale* Wom. & Heas., *popei* Wom., *procana* Wom., *uromys* Wom. & Kohls.

A note is given on the intradermal feeding habits of the larvae of the genotype, *G. kallipygos*.

INTRODUCTION

A glance at any of the checklists of trombiculid mites published since 1952 (the chief ones will be found listed in Audy, 1957), will show the amount of taxonomic indecision that has attended the trombiculine species with expanded sensillae. The importance of the larvae as possible vectors of mite typhus, and the ease with which they may be col-

Table 1. Larval characters in

| Species | Caudal Plate/s | Dorsal Platelets | Setae in First Dorsal Row | Body Setae Foliolate | Cuticle | AL & PL approx. | AL > AM | Genualae I |
|--------------------------|----------------|------------------|---------------------------|----------------------|---------|-----------------|---------|------------|
| 1 <i>petulans</i> | — | — | 4 | — | A | — | — | 3 |
| 2 <i>wongabelensis</i> | — | — | 6 | — | A | — | — | 3 |
| 3 <i>coorongensis</i> | — | — | 6 | — | A | — | — | 3 |
| 4 <i>trichosuri</i> | — | — | 8 | — | A | — | — | 3 |
| 5 <i>peregrina</i> | — | — | 8 | — | A | — | — | 3 |
| 6 <i>newmani</i> | — | — | 8 | — | A | — | — | 3 |
| 7 <i>dumosa</i> | — | — | 10 | — | A | — | — | 3 |
| 8 <i>petrogale</i> | — | — | 14—16 | — | A | — | — | 3 |
| 9 <i>smithi</i> | — | — | 6—12 | — | C | — | — | 3 |
| 10 <i>heaslipi</i> | — | + | 6 | — | C | — | — | 3 |
| 11 <i>dasyercici</i> | — | — | 8 | — | A | + | — | 2 |
| 12 <i>shieldsi</i> | — | — | 8 | — | A | + | — | 2 |
| 13 <i>pseudomys</i> | — | — | 8 | + | A | + | — | 2 |
| 14 <i>similis</i> | — | — | 4 | — | C | + | — | 2 |
| 15 <i>derricki</i> | — | — | 6 | — | C | + | — | 2 |
| 16 <i>rex</i> | — | — | 8 | — | C | + | — | 2 |
| 17 <i>perameles</i> | — | — | 10—14 | — | C | + | — | 3 |
| 18 <i>mackerrasae</i> | — | — | 12—14 | — | C | + | — | 3 |
| 19 <i>emphyla</i> | — | — | 6 | — | A | — | + | 3 |
| 20 <i>innisfailensis</i> | — | — | 6 | — | A | — | + | 2/3 |
| 21 <i>parva</i> | — | — | 6 | — | A | — | + | 2 |
| 22 <i>andromeda</i> | — | — | 8 | — | A | — | + | 2 |
| 23 <i>echymipera</i> | — | — | 8 | — | A | — | + | 2 |
| 24 <i>queenslandica</i> | — | — | 4+6 | — | A | — | + | 2 |
| 25 <i>antipodiana</i> | — | — | 6+8 | — | A | — | + | 2 |
| 26 <i>cassiope</i> | — | — | 6 | — | A | — | + | 2 |
| 27 <i>womersleyi</i> | — | — | 6 | — | A | — | + | 2 |
| 28 <i>foliata</i> | — | — | 6 | + | A | — | + | 2 |
| 29 <i>mccullochi</i> | — | — | 6 | + | A | — | + | 2 |
| 30 <i>pannosa</i> | + | — | 6 | — | A | — | + | 1 |
| 31 <i>kallipygos</i> | + | — | 6 | — | A | — | + | 1 |

A=annulate; C=crenulate. In the palpal formulae, b=weakly barbed, B=strongly barbed, n=nude, P=plumose. I have been able to check all the characters in the above table, except the lateral palpal tibial seta in *parva*, and the dorsal and lateral palpal tibial setae*

the genus *Guntherana*.

| Tibiala III | Mastisetæ III | Setæ on Coxæ III | Coxæ Closely Punctate | Galeals | Palpal Formula | Palpal Subterminala |
|-------------|---------------|------------------|-----------------------|---------|-----------------|---------------------|
| 1 | — | 1 | — | n | b. b. nnn. B+4b | + |
| 1 | — | 1 | — | n | b. b. nnn. B+4b | + |
| 1 | — | 1 | — | n | b. b. nnn. B+4b | + |
| 1 | — | 1 | — | n | b. b. nnn. B+4b | — |
| 1 | — | 1 | — | n | B. b. nnb. B+4b | + |
| 1 | — | 1 | — | B | B. b. nnb. B+4b | + |
| 1 | — | 1 | — | n | b. b. nnb. B+4b | — |
| 1 | — | 2 | — | n | b. b. nnb. B+4b | — |
| <hr/> | | | | | | |
| 1 | — | 1 | + | n/b | B. b. nnn. B+4b | + |
| 1 | — | 1 | + | n | b. b. nnn. B+4b | + |
| 1 | — | 1 | — | B | P. b. bbb. B+4b | — |
| 1 | — | 1 | — | B | P. b. bbb. B+4b | — |
| 1 | — | 1 | — | B | P. b. bbb. B+4b | — |
| 1 | — | 1 | + | B | P. b. nbb. B+4b | — |
| 1 | — | 1 | + | B | P. b. nnb. B+4b | — |
| 1 | — | 1 | + | B | P. b. nbb. B+4b | — |
| 1 | — | 1 | + | n | B. b. bbb. B+4b | — |
| 1 | — | 1 | + | n | P. b. nnn. B+4b | — |
| <hr/> | | | | | | |
| 0 | — | 1 | — | n | b. b. nbb. B+4b | — |
| 1 | — | 1 | — | n | b. b. nnn. B+4b | — |
| 1 | + | 1 | — | n | b. b. nnb. B+4b | — |
| 1 | + | 2 | — | n | b. b. nnb. B+4b | — |
| 1 | — | 1 | — | n | B. b. nnb. B+4b | + |
| 1 | — | 1 | — | n | b. b. nnn. B+4b | + |
| 1 | — | 1 | — | n | b. b. bbb. B+4b | + |
| 1 | — | 1 | — | n | B. b. nnn. B+4b | — |
| 1 | — | 1 | — | n | b. b. nnb. B+4b | — |
| 1 | — | 1 | — | n | b. b. nnb. B+4b | — |
| 1 | — | 1 | — | n | b. b. nnn. B+4b | — |
| <hr/> | | | | | | |
| 1 | — | 1 | — | n | b. b. nnb. B+4b | — |
| 1 | — | 1 | — | n | B. b. nnn. B+4b | — |

*in *peregrina*, which have been taken from the original descriptions. In *coorongensis* and *wongabelensis*, the palpal genual seta may be so weakly barbed as to appear nude. In *pseudomys*, a suggestion of cuticular crenulation is to be seen.

lected, have resulted in an almost exclusively larval classification. Many of the large genera of this system have been broadly conceived, a result both of our lack of knowledge of the postlarval stages, and of the appearance of polyphyletic characters in the larvae.

It was not until Wharton (1946) recognized an *akamushi* group within *Trombicula* s. l., Brennan and Wharton (1950) three groups within *Neotrombicula*, and the preliminary paper of Audy (1954), that the importance of defining species groups within the many large heterogeneous genera was fully realised. Many of these groups have since been raised to subgeneric or generic rank, while others, although clearly defined, must still be left in the large genera until their type species have been re-examined.

Recent years have also seen an advance in our knowledge of the postlarval (particularly the nymphal) stages. This has been a direct result of improved rearing techniques (Sasa & Miura, 1953, 1955; Audy & Nadchatram, 1954). Although it is usually impossible to identify nymphs specifically, (and occasionally even generically, e. g. *Ascoshöngastia* Ewing and *Microtrombicula* Ewing, *Schoutedenicha* Jadin and Vercammen-Grandjean and *Gahrlietpia* Oudemans), without their correlated larval pelts, the nymphs are generally of great value at a supraspecific level. In many cases they have confirmed the validity of groups previously recognized on larval characters alone, e. g., *Schoutedenichia*, *Walchiella*, *Leptotrombidium* and *Trombiculindus*. Thus, while the present classification of the Trombiculidae must be based on the larvae, the postlarval stages may be used as a guide, and will be essential in a final natural classification (see Gordon, 1955).

The species concerned in the present paper are those from Australia and New Guinea which, having passed through various "—*schöngastia*" genera, come at length to *Euschöngastia* s. l. Audy and Domrow (1957) were able to recognize several compact groups among these species, and gave them subgeneric or group rank. The arrangement was preliminary, and the desire to recognize groups of related species lead to an over-classification at the supraspecific level. Thus, some of their "groups" represented nothing more than trends within larger, more natural groups. The number of species groups recognized below has been reduced to four.

Until 1955, nymphs of only two of these groups were adequately known, but representatives of all four have since been reared or more closely studied. Dr. J. M. Brennan has kindly given me some nymphs of *Euschöngastia* s. s. from the New World, and these confirm Crossley's (1960) statements that true *Euschöngastia* nymphs have four pairs of galeal setae and no precoxal plates. The nymphs described below show neither of these two essential characters, but conform in every way to the genotype of a monotypic Australasian genus, *Guntherana*. The remaining¹, compact group of 26 Australian and New Guinea species of "*Euschöngastia* s. l." is therefore removed to *Guntherana*, which is divided into two subgenera, each containing two species groups. A further 18 names are held invalid for various reasons, while four new species are described. Some of the numerous extra-Australasian species of *Euschöngastia* s. l. may also belong here, but my lack of familiarity with them precludes their consideration in the present paper.

I have tried to keep the following keys as natural as possible, and they accordingly

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1. *Walchiella* Fuller, 1952 was also included in *Euschöngastia* s. l. by Audy and Domrow (1957). Their figures show that both the nymphs and larvae are distinct from those of *Guntherana* and *Euschöngastia*, and *Walchiella* is now considered a full genus.

reflect much of the classification used. Characters which vary only in degree have been avoided, while those chosen are readily visible under high power, although oil-immersion is occasionally necessary. It is necessary to stress here that the larvae one usually encounters are those collected at least half engorged from their hosts, and their mounting frequently introduces distortion, especially foreshortening.

There are two characters which I have avoided as far as possible. The first is the setation of the palpal tarsus or tentaculum, in spite of its undoubted taxonomic importance. This has been done partly because it varies little in this compact group, but particularly because it is a character very difficult to see in the usual specimen. Certainly, all the species here considered have five barbed setae and a striate tarsala. The subterminala, however, may or may not be present, but this is a most difficult character to observe. As it happens, however, in this particular group, the presence or absence of the subterminala does not seem to be of much diagnostic value, for nymphs reared from larvae with a palpal tarsal formula either B + 4b (e. g. *perameles*) or B + 4b. S (e. g. *smithi*) are scarcely separable at specific level.

The second is the specialized leg setation, which, as will be seen from the table below, varies within three of the four species groups. That this setation is not basically important in *Guntherana* is further indicated by a slide containing six specimens of *G. (G.) cassiope* and four of *G. (G.) innisfailensis* collected free-living at Mudcod Creek, Bramston Beach, north Queensland, 18 Sept. 1949, I. M. Mackerras. Five of the six *cassiope* larvae have two genualae I on both genua I, while the sixth has two genualae I on one leg, but only one on the other. Likewise, the variation in genualae I in the four specimens of *innisfailensis* is as follows—3.3 once, 3.2 twice, and 2.2 once. The figures given in the table below are the normal values. As with the palpal subterminala, differences in this larval character, e. g. in *G. (D.) shieldsi* and *G. (D.) smithi*, are not reflected in the nymphal stage.

Abbreviations: QIMR —Queensland Institute of Medical Research, Brisbane
 QM —Queensland Museum, Brisbane
 SAM —South Australian Museum, Adelaide
 SPHTM—School of Public Health and Tropical Medicine, Sydney
 USNM —United States National Museum, Washington, D. C.

Genus *Guntherana* Womersley and Heaslip, 1943

Guntherana Wom. & Heas., 1943. *Nomen novum* for *Guntheria* Wom., 1939, *nec* Bleeker, 1862 (Pisces). Type species *Neoschöngastia kallipygos* Gunther, by monotypy.

Diagnosis: Trombiculine larvae from Australia and New Guinea with the following characters. Legs 7.7.7, with 1–3 genualae I; tibiala III present, except in *emphyla*. Palpi with femoral and genual setae barbed; palpal tarsus with one dorsal and 4 ventral barbed setae, tarsala, and often a subterminala; palpal claw 3-pronged. Galeal setae nude or branched. Scutum transversely rectangular, with clavate to globose sensillae, and 5 setae, of which PL are usually the longest; shoulders never present as in *Laurentella* Audy, 1956, so that AL setae are always inserted at a level in front of AM seta. Body setae usually cylindrical, but foliate in 3 species. Dorsocaudal plate/s present only in *kallipygos*

group. Intercoxal setae 2.2, except in particularly hairy species; coxal setae 1.1.1, except in *andromeda* and *petrogale*. Hosts in all cases mammals, although in one species (*innisfailensis*) a bird has been recorded as a casual host.

The nymphs show rather less variation, and may be recognized by the following combination of characters. Sensillae filamentous, ciliated on distal 1/2 or 1/3; tectum not dentate; one short tectal seta present; all paracristal setae subequal; eyes absent. Galeal setae 20-24 in number, in contrast with usual 8. Precoxal plates present between coxae I. Body setae uniform.

The above characters, particularly those of the nymphs, will separate *Guntherana* from any of the groups discussed by Crossley (1960), particularly *Pseudoschöngastia* Lipovsky, *Euschöngastia* Ewing, and *Euschöngastoides* Loomis.

LIST OF SPECIES INCLUDED IN GENUS GUNTHERANA

| Subgenus <i>Derrickiella</i> | | Subgenus <i>Guntherana</i> | |
|------------------------------|--------------|----------------------------|---------------------|
| dumosa group | smithi group | cassiope group | kallipygos group |
| coorongensis | dasycerci | andromeda | kallipygos |
| dumosa | derricki | antipodiana | pannosa |
| peregrina | heaslipi | cassiope | |
| petrogale | mackerrasae | echymipera | |
| petulans | perameles | emphyla | |
| trichosuri | pseudomys | foliata | Species inquirendae |
| newmani | rex | innisfailensis | tindalei |
| wongabelensis | shieldsi | mccullochi | translucens |
| | similis | parva | |
| | smithi | queenslandica | |
| | | womersleyi | |

KEY TO SUBGENERA OF GUNTHERANA

Nymphs with narrow intersensillary space, ratio ASL/SB 1.5-2.3. Larvae with AL setae shorter than AM seta; sensillae clavate, occasionally broadly so ... **Derrickiella**
 Nymphs with wide intersensillary space, ratio ASL/SB 0.8-1.1. Larvae with AL setae much longer than AM seta; sensillae always distinctly globose **Guntherana**

Subgenus *Derrickiella* Audy and Domrow, 1957

(Subgenotype *Neoschöngastia smithi* Womersley, 1939)

In separating groups like *Microtrombicula* (see Audy and Vercammen-Grandjean, in press) and *Ascoshöngastia* (in the sense of Domrow, 1957, and 1960 *b*), even the old primary character for dividing the larval genera into 2 major groups seems to be breaking down, namely whether filamentous or expanded sensillae are present. Similarly in Australian species, the old division at couplet 18 (Womersley, 1952, p. 231) to give 2 larval groups within his broad *Ascoshöngastia* is now believed to be artificial.

The known nymphs of this subgenus are all from larvae with clavate sensillae, and are identical in all characters except one of degree (the scutal ratio ASL/SB) with those of the subgenus *Guntherana*, whose larvae all have globose sensillae. In addition, some larval species with quite broadly clavate sensillae are now known to belong to both the species groups defined below, e. g., *mackerrasae* belongs in the *smithi* group, while the *dumosa* group is based on a species with very broadly clavate sensillae.

The *smithi* group and the *dumosa* group are here recognized on larval characters; they comprise the subgenus *Derrickiella*.

Diagnosis: Nymphal scutal ratio ASL/SB high (1.5–2.3) because of narrow intersensillary space. Larvae with AL setae never longer than AM. Sensillae clavate, occasionally broadly so.

KEY TO SPECIES GROUPS AND SPECIES OF SUBGENUS DERRICKIELLA (LARVAE ONLY)

- 1. Body cuticle annulate and coxae sparsely punctate; always with 3 genualae I *dumosa* species group 2
- Body cuticle crenulate and coxae closely punctate; if not, with 2 genualae I *smithi* species group 9
- 2 (1). Ten or more setae in first dorsal row 3
- Eight or less setae in first dorsal row 4
- 3 (2). At least first 2 rows of 10 dorsal setae clearly defined; anterodorsal setae slender and ciliated, merging into shorter, stouter caudal setae with blunt barbules; coxae III with usual single seta 7. *dumosa*
- Dorsal setae very numerous, irregularly spaced, short and very thick, with strong blunt barbs; coxae III with 2 setae 8. *petrogale*
- 4 (2). With 8 setae in first dorsal row 5
- With less than 8 setae in first dorsal row 7
- 5 (4). Ventral palpal tibial seta nude; subterminala absent 4. *trichosuri*
- Ventral palpal tibial seta branched; subterminala present 6
- 6 (5). Galeal seta nude 5. *peregrina*
- Galeal seta branched 6. *newmani*
- 7 (4). Posterior scutal margin shallowly biconvex; with 6 setae in first dorsal row 3. *coorongensis*
- Posterior scutal margin deeply convex; with 4 or 6 setae in first dorsal row 8
- 8 (7). With 6 setae in first dorsal row; PL reaching beyond posterior scutal margin 2. *wongabelensis*
- With 4 setae in first dorsal row; PL not reaching posterior scutal margin ... 1. *petulans*
- 9 (1). AL and PL scutal setae not approximated, so that SB lies in front of PL; palpal subterminala present 10
- AL and PL scutal setae approximated, so that SB lies behind PL; palpal subterminala absent..... 11
- 10 (9). Dorsal setae set on distinct platelets 10. *heaslipi*
- Dorsal setae not set on platelets 9. *smithi*

- 11 (9). Cuticle crenulate 12
 Cuticle annulate 16
- 12 (11). First dorsal row with no more than 8 setae; both pairs of intercoxal setae distinct (except, perhaps, in *rex*); galeal setae barbed 13
 First dorsal row with 10–14 setae; posterior pair of intercoxal setae mingled with ventral setae; galeal setae nude 15
- 13 (12). With 8 setae in first dorsal row **16. rex**
 With less than 8 setae in first dorsal row 14
- 14 (13). With 6 setae in first dorsal row **15. derricki**
 With 4 setae in first dorsal row **14. similis**
- 15 (12). Dorsal setae slightly thickened, with extremely strong, blunt barbs; all 3 setae on palpal tibia nude **18. mackerrasae**
 Dorsal setae slender, with weak, sharp barbules; all 3 setae on palpal tibia branched **17. perameles**
- 16 (11). Dorsal setae foliate **13. pseudomys**
 Dorsal setae cylindrical 17
- 17 (16). Posterior scutal margin deep, and evenly rounded **11. dasycerci**
 Posterior scutal margin noticeably flattened, or even slightly concave medially **12. shieldsi**

The *dumosa* species group

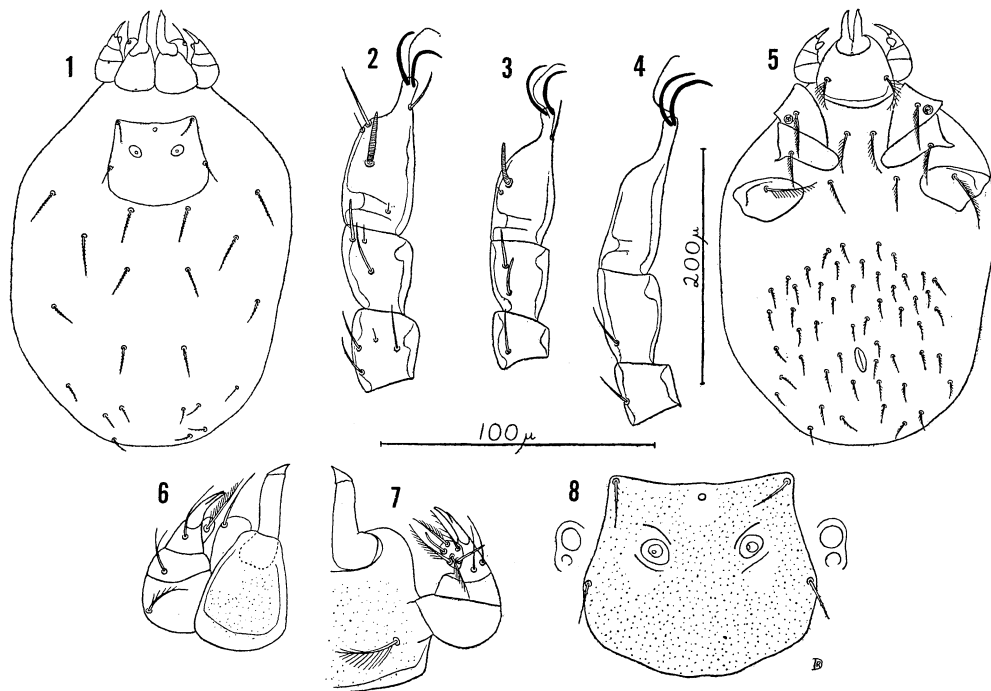
Diagnosis: Larvae with annulate cuticle and sparsely punctate coxae; always with 3 genualae I. Nymphs undistinguished².

1. *Guntherana* (*Derrickiella*) *petulans* Domrow, n. sp. Figs. 1–8

Types: Holotype larva in Queensland Mus., Brisbane, from the anogenital region of an allied rat, *Rattus assimilis* (Gould), collected in savannah country, Etty Bay Road, near Innisfail, N. Queensland, 25 July 1958, J. L. Harrison. The type series also includes 30 paratypes as follows—one from foot, and 23 from around anus of *R. assimilis*, in ti-tree swamp, Etty Bay, 30 July 1958, J. L. H.; 3 from a scale-tailed rat, *Melomys cervinipes* (Gould), in rain forest, Etty Bay, 7 Aug. 1958, J. L. H.; 3 from a musk rat-kangaroo, *Hypsiprymnodon moschatus* Ramsay, in rain forest on hills (altitude less than 300 m) immediately behind Etty Bay, 6 Aug. 1958, J. L. H.³

2. *Ascoschöngastia* (*Oculicola*) *scaevola* Domrow, 1960b may also fit here, but is excluded for the present because of its simple palpal setae.
3. Where possible, paratypes of the 4 new larval species described in this paper have been deposited in the Queensland Institute of Medical Research, Brisbane (QIMR); South Australian Museum, Adelaide (SAM); British Museum (Natural History), London; Rocky Mountain Laboratory, Hamilton; United States National Museum, Washington (USNM); Institute for Medical Research, Kuala Lumpur; Bishop Museum, Honolulu.

Larva: Idiosoma $248 \times 165 \mu$ in unengorged specimens, and $417 \times 288 \mu$ in fully fed larvae. Cuticle annulate. *Body setation*: Dorsal setae cylindrical, arranged 2. 4. 4. 6, those in second row being $22-25 \mu$ long, while terminal setae are $14-15 \mu$ long. Humeral setae $36-39 \mu$ long. Ventral setae about 51 in number, those adjacent to anus $16-17 \mu$ long, and tapering. Coxal setae arranged 1. 1. 1; sternal setae 2. 2; all fine and tapering. *Gnathosoma*: Cheliceral bases of usual shape, punctate in posterior 1/2, cheliceral blades large, $36-39 \mu$ long, without teeth, but with usual tricuspid cap. Galeal setae nude. Palpal coxal setae strongly ciliated. In addition to the usual ventroexternal tarsala, the palpal formula is b. b. nnn. B + 4b. S, *i. e.*, subterminala present. Palpal claw 3-pronged. *Scutum* subquadrate, evenly punctate except for small zones behind AM seta and sensillary bases. Anterior and lateral margins slightly concave, except for faint convexity around AM setal base. Posterior margin markedly convex, and slightly irregular in outline. Only AL setae on corners. Shoulders absent, AM thus being behind level of AL. AL setae slightly longer than PL, but both very short. AM seta lacking in all specimens. Sensillary bases fairly wide apart, set nearer to level of PL setae, yet still nearer anterior margin than posterior. Brows weakly developed. Sensillae lacking in all specimens. The scutal standard data are given in Table 2. Eyes double, on ocular plate $29-31 \mu$ long; diameter of anterior lens $8-9 \mu$. *Legs* stout, seven-segmented. All tarsi with basal bar. The special sensory setation is as follows: *Tarsus I* with pretarsala, subterminala, parasubterminala, tarsala 19μ long, and microtarsala. *Tibia I* with 2 tibialae and



Figs. 1-8. *Guntherana (Derrickiella) petulans*, n. sp. Larva. 1, dorsum; 2, 3 and 4, specialized setation of legs I, II and III; 5, venter; 6 and 7, dorsal and ventral views of gnathosoma; 8, scutum.

microtibiala. *Genu I* with 3 genualae and microgenuala. *Tarsus II* with pretarsala, tarsala 16 μ long, and microtarsala. *Tibia II* with two tibialae. *Genu II* with one genuala. *Leg III* with one tibiala and genuala.

Table 2

Standard data in micra of larval scutum of *G. (D.) petulans*, n. sp.

| AW | PW | SB | ASB | PSB | SD | AP | AM | AL | PL | Sens | |
|-------|----|----|-----|-----|----|----|----|----|----|------|---|
| 60 | 80 | 36 | 26 | 42 | 68 | 36 | — | 17 | 14 | — | |
| 60 | 81 | 37 | 25 | 43 | 68 | 37 | — | 16 | 14 | — | |
| 60 | 81 | 37 | 26 | 45 | 71 | 37 | — | 16 | 14 | — | |
| 62 | 81 | 37 | 27 | 45 | 72 | 37 | — | 19 | 16 | — | |
| 62 | 83 | 37 | 25 | 43 | 68 | 36 | — | — | — | — | |
| 62 | 83 | 39 | 25 | 45 | 70 | 36 | — | 16 | 14 | — | |
| 64 | 84 | 39 | 27 | 46 | 73 | 39 | — | 17 | 15 | — | |
| Means | 61 | 82 | 37 | 26 | 44 | 70 | 37 | — | 17 | 15 | — |

Notes: All 31 specimens of this species unfortunately lack sensillae and the AM scutal seta. I feel, nevertheless, that the species is correctly placed here. It may be recognized by the small number of dorsal setae, the extremely deep scutum, and the minute PL setae. In these latter respects it is closely similar to *G. (D.) wongabelensis*, the following species.

2. *Guntherana (Derrickiella) wongabelensis* (Womersley), NEW COMBINATION.

Schöngastia (Ascoshöngastia) wongabelensis Wom., 1952, S. Aust. Mus., Rec. 10: 224 (Type larvae from a water rat, *Hydromys* sp., Wongabel, N. Q., in SAM⁴).

Apart from the type series, I have also seen 2 specimens of this species from SE Queensland, from *Rattus assimilis*, Mt. Glorious, 6 Aug. 1951, E. H. Derrick, and 5 from various hosts in N. Queensland. In all specimens there are 6 setae in the first dorsal row, while the scutal setae are strongly barbed. The PL scutal setae project well beyond the posterior scutal margin, which is flatly convex, rather than slightly concave medially as figured by Womersley (1952).

3. *Guntherana (Derrickiella) coorongensis* (Hirst), NEW COMBINATION.

Schöngastia coorongensis Hirst, 1929a, Ann. Mag. Nat. Hist. ser. 10, 3: 565 (Type larval series from a swamp rat, *Rattus lutreolus* (Gray), Robe, S. A., in SAM).

Neoschöngastia cairnsensis Womersley & Heaslip, 1943, R. Soc. S. Aust., Trans. 67: 128 (Type larval series from a short-nosed bandicoot, *Isoodon macrourus* (Gould),⁵ Brisbane, in SAM). **New Synonymy.**

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- The documentation of the species of this genus as here understood is readily available (Womersley, 1952; Gunther, 1952; Wharton & Fuller, 1952; Audy, 1957). In this paper I have therefore only given the original reference to each species and synonym.
 - In my previous papers, this bandicoot has been referred to as *Isoodon* or *Thylacis obesulus* (Shaw & Nodder).

Neoschöngastia cairnsensis var. *gateri* Wom. & Heas., 1943, R. Soc. S. Aust., Trans. 67: 129 (Type larval series from rats, Cairns, N. Q., in SAM). **New Synonymy.**

Euschöngastia popei Wom., 1954, R. Soc. S. Aust., Trans. 77: 76 (Type larval series from *Rattus assimilis*, Mt. Glorious, SE Q., in SAM). **New Synonymy.**

All the above forms, including the variety of *popei* listed by Mykytowycz (1957), with dorsal setae in rows of 6, and nude galeal setae, key out readily to the same place in the above key, and I am unable to find tangible characters to divide them further. Variability in the 2 *cairnsensis* forms has already been considered (Womersley, 1952), and I feel it is better to accept the existence of a single, broadly recognizable species, than several less tangible entities. The nymph has been described by Domrow (1956).

4. **Guntherana (Derrickiella) trichosuri** (Womersley), **NEW COMBINATION.**

Neoschöngastia westraliense var. *trichosuri* Wom., 1939, R. Soc. S. Aust., Trans. 63: 160 (Type larval series from a brush-tailed possum, *Trichosurus vulpecula* (Kerr), Nambour, Q., in SAM).

This and the next 2 species are characterized by having 8 setae in the first dorsal row, but *trichosuri* and *peregrina* have nude galeal setae, while *newmani* has barbed galeals. *G. (D.) shieldsi* is distinct from this species, its galeal setae being branched.

5. **Guntherana (Derrickiella) peregrina** (Womersley), **NEW COMBINATION.**

Schöngastia (Ascoshöngastia) peregrina Wom., 1952, S. Aust. Mus., Rec. 10: 220 (Type larval series collected free-living, Wongabel, N. Q., in SAM).

6. **Guntherana (Derrickiella) newmani** (Womersley), **NEW COMBINATION.**

Schöngastia westraliense Wom., 1934, S. Aust. Mus., Rec. 5: 215 (Type larval series from domestic cat, Greenbushes, W. A., in SAM).

Schöngastia (Ascoshöngastia) newmani Wom., 1952, S. Aust. Mus., Rec. 10: 219 (*nomen novum*).

In the paper in which these larvae were originally described, there was also a description of an adult species, *Microtrombidium westraliense* (p. 188). However, in his 1952 monograph, Womersley placed these 2 species both in *Schöngastia*, hence the new name for the larval species, over which the adult has page precedence. I have not been able to see the original adult specimen, but, as the description reads "Eyes two on each side, almost sessile", the adult species may be excluded from *Guntherana*. Nevertheless, the first available name for the larval species is *newmani*, since rejected homonyms can never be used again (Art. 36). This species is the only one in the *dumosa* group with barbed galeal setae in the larvae.

7. **Guntherana (Derrickiella) dumosa** (Womersley), **NEW COMBINATION.**

Schöngastia (Ascoshöngastia) dumosa Wom., 1952, S. Aust. Mus., Rec. 10: 189 (Type larval series collected free-living, Atherton, Q., in SAM).

Euschöngastia procana Wom., 1954, R. Soc. S. Aust., Trans. 77: 77 (Type larval series collected free-living, Mt. Jukes, Q., in SAM).

G. (D.) dumosa was originally described from a single specimen, which has been badly damaged. Only one broken palp, a few crushed leg segments, and numerous characteristic body setae are now clear on the slide. These, however, agree quite well with the type of *procana*, as do the descriptions. The cuticle is not crenulate as in the *smithi* group.

8. *Guntherana* (*Derrickiella*) *petrogale* (Womersley), NEW COMBINATION.

Neoschöngastia petrogale Wom., 1934, S. Aust. Mus., Rec., 5: 215 (Type larval series from wallaby, Musgrave Range, S. A., in SAM).

This species is easily recognized by the short, heavily spined dorsal setae, and the presence of 2 setae on coxae III.

The *smithi* species group

Diagnosis: Larvae with crenulate cuticle and closely punctate coxae; if not, with 2 genualae I. Nymphs undistinguished.

9. *Guntherana* (*Derrickiella*) *smithi* (Womersley), NEW COMBINATION. Figs. 9–18.

Neoschöngastia smithi Wom., 1939, R. Soc. S. Aust., Trans. 63: 164 (Type larval series from *Rattus assimilis*, Imbil, Q., in SAM).

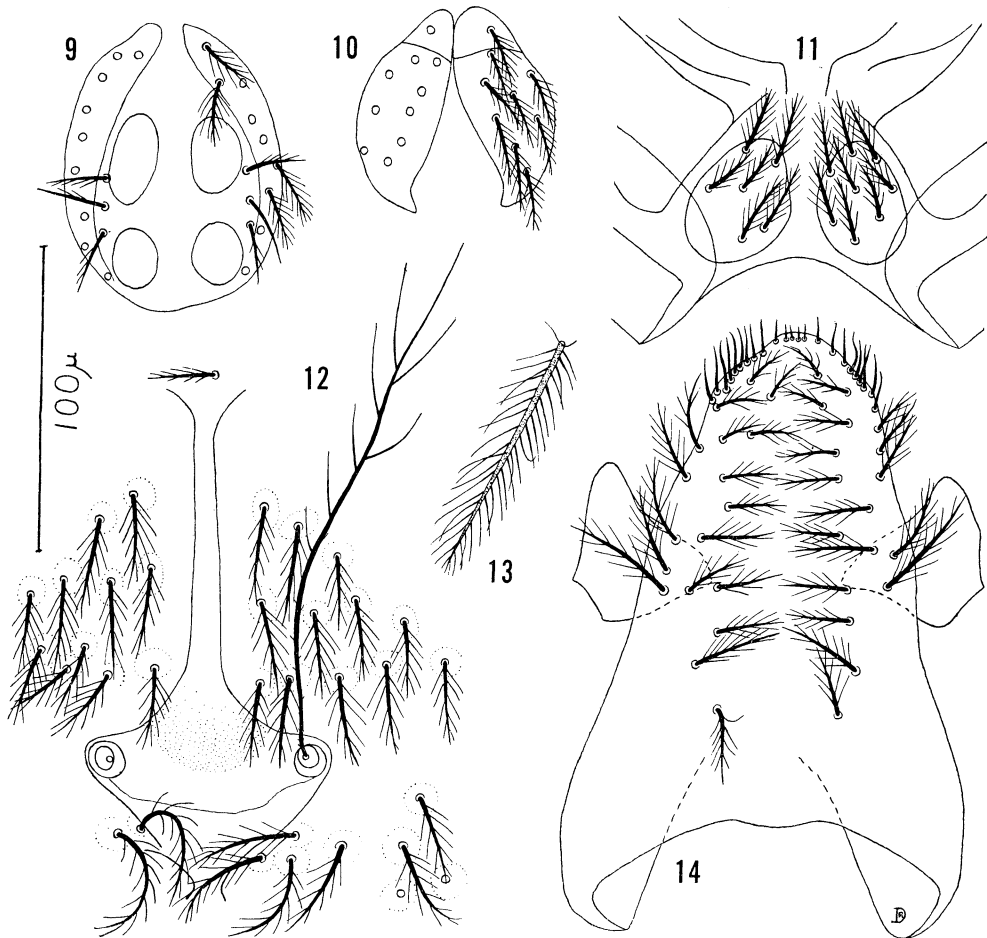
Neoschöngastia phascogale Wom. & Heas., 1943, R. Soc. S. Aust., Trans. 67: 127 (Type larval series from a variety of marsupials from SEQ., in SAM). **New Synonymy.**

Schöngastia (*Ascoshöngastia*) *lawrencei* Wom., 1952, S. Aust. Mus., Rec. 10: 223 *Nomen novum* for *Neoschöngastia guntheri* Wom. & Heas., 1943, R. Soc. S. Aust., Trans. 67: 126, *nec* Radford, 1942, Parasitology 34: 76. (Type larval series from rats, Cairns, in SAM). **New Synonymy.**

In SE Queensland, this species has 6–9 setae in the first dorsal row. An examination of 33 specimens showed 6 setae 10 times, eight 22 times, and 9 once. In N. Queensland, the range is somewhat greater. I have counted 300 specimens with the following results—6 (22), 7(3), 8(71), 9(69), 10(68), 11(41), 12(19), 13(6), 14(once). This unimodal distribution indicates that only one species is involved. In addition, these forms all show a decided preference for the extreme ear edge as an attachment site. The smaller forms with 6 and 8 setae in the first dorsal row were originally described as *phascogale* and *smithi*, and the larger forms as *lawrencei*. They are now considered to be the same species. Nymphs of both forms have been reared, and are similar, but a description of the *lawrencei* form is added to supplement an earlier description of the *smithi* form (Domrow, 1955*b*).

In the larval stage, *G. (D.) smithi* and the following species (*heaslipi*) are characterized by having AL and PL not approximated, so that SB lies in front of PL. A strong palpal subterminala is present. The galeal setae are nude or weakly barbed.

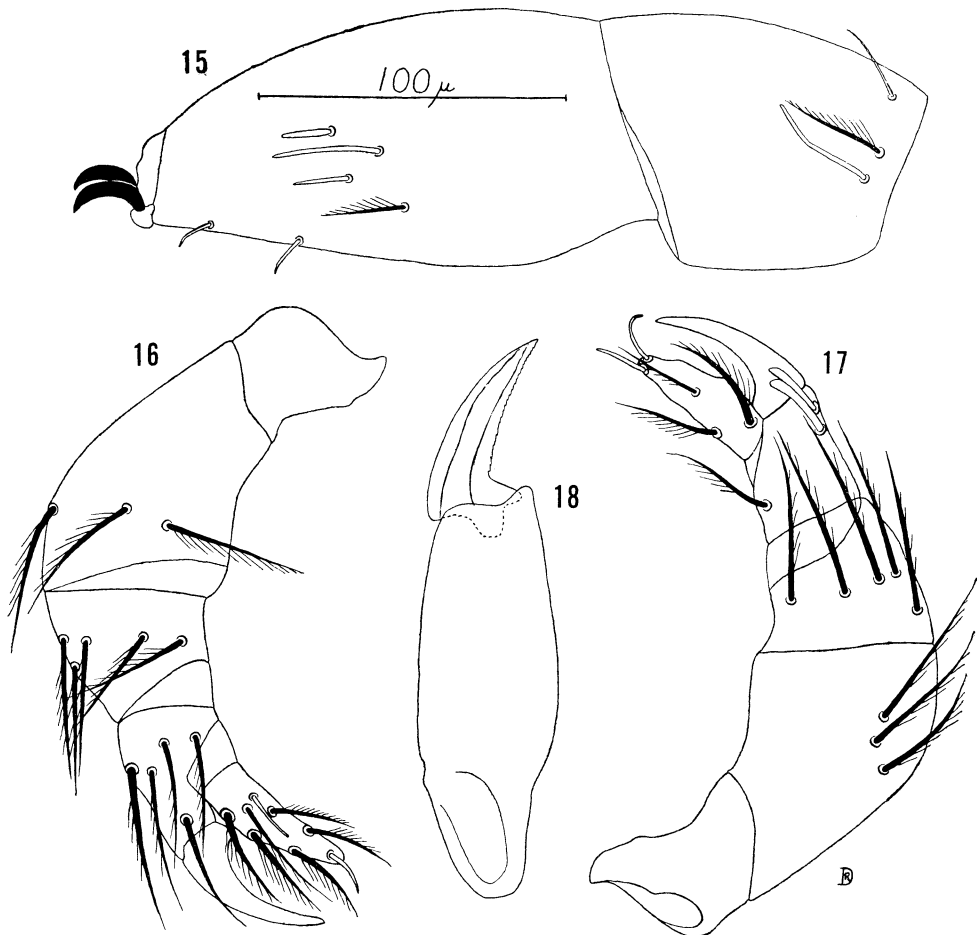
Nymph. A large cream-coloured species, idiosomal length averaging 950 μ in compressed specimens. Genital area oval, 90–116 μ (av. 99) long, with 2 pairs of genital discs;



Figs. 9–14. *Guntherana* (*Derrickiella*) *smithi* (Womersley). Nymph. 9, genitalia; 10, anal plates; 11, precoxal plates; 12, scutum; 13, terminal body seta; 14, ventral view of gnathosoma.

anterior discs $19\text{--}30\ \mu$ (av. 26) long, slightly larger than posterior discs, which are $19\text{--}25\ \mu$ (av. 22) long. Genital plates weakly defined, with 8–11 branched setae each. Inner genital setae arranged 3.3, bbb or bnb, the median pair being less strongly branched than the other 2 pairs, or nude (all 3 pairs are never as strongly branched as the adjacent body setae). Anal plates $70\text{--}85\ \mu$ (av. 76) long, more heavily sclerotized anteriorly, with 8–10 branched setae each.

Gnathosoma: Chelicerae typical, $171\text{--}186\ \mu$ (av. 181) long; blade slightly serrate on concave dorsal edge, $62\text{--}70\ \mu$ (av. 66) long. Hypostome blunt, with about 12 pairs of nude galeal setae to $22\ \mu$ long. Basis capituli with about 18 pairs of branched setae ventrally. *Palpi* with usual 5 segments; femur usually with 5 or 6 branched setae (but occasionally 4 or 7, and even 2 on one side of one specimen); genu usually with 10 or 11 branched setae (but occasionally 8 or 9 on one side); tibia with single (2 on one side of one spe-



Figs. 15-18. *Guntherana (Derrickiella) smithi* (Womersley). Nymph. 15, lateral view of tarsus and tibia I; 16 and 17, external and internal views of palp; 18, chelicera.

cimen) internal branched seta near insertion of tarsus, 2 inner accessory combs, an external nude seta near base of claw, and 4 (5 on one side of one specimen) external branched setae; tarsus fairly slender, with tarsala, 3 subterminalae, and 9 (11 on one side of one specimen) branched setae. Length of palpal claw 47-51 μ (av. 49). *Legs* typical, 7-segmented. Coxae I with typical precoxal plates, each with 4-9 branched setae, but usually 7 or 8. Tarsus I not elongate, 152-170 μ (av. 160) long and 73-85 μ (av. 78) high. Length tibia I 96-113 μ (av. 103). Ratio LTI/HTI in most specimens apparently 2.04-2.12. However, most of the tarsi are not quite flat, and the specimen illustrated has this ratio 1.84, which is probably a better figure. Ratio LTI/LtI 1.45-1.66. No preapical dorsal process on tarsus I. *Scutum*: Area sensilligera about as wide as long, punctate anteriorly, and with posterior apodeme well developed. Crista longer than distance between sensillary bases, terminating in apparently non-dentate tectum. Tectal seta shorter than paracristal

setae, which are tapering and subequal in length. Sensillae long and quite slender, with barbules on basal 1/2, merging into 8 or 9 long branches on distal 1/2. Eyes absent. The standard data are given in Table 3. *Setation*: Anterodorsal setae branched and tapering, 28–37 μ (av. 34) long, posterior body setae evenly branched, from 76–85 μ (av. 81) long. Leg setation as usual; solenidia to 31 μ long.

Table 3

| Standard data in micra of nymphal scutum of <i>G. (D.) smithi</i> (Wom.) | | | | | | | | | |
|--|-----|-----|-----------|------|-----|----|----|------|-----|
| CTL | ASL | SB | ASL SB | PSL | PAD | TS | SS | SENS | |
| 81 | 102 | 54 | 1.89 | — | 36 | 23 | 25 | 171 | |
| 81 | 102 | 56 | 1.82 | — | 39 | 16 | 28 | 166 | |
| 84 | 109 | 59 | 1.85 | — | 39 | — | 34 | — | |
| 85 | 109 | 57 | 1.91 | 14 | 40 | 17 | 28 | 164 | |
| 90 | 113 | 60 | 1.88 | — | 40 | 19 | 31 | 167 | |
| 98 | 121 | 62 | 1.95 | 14 | 39 | 17 | 25 | 178 | |
| 99 | 122 | 62 | 1.97 | 16 | 43 | 20 | 28 | 178 | |
| 101 | 124 | 67 | 1.85 | 18 | 43 | 23 | 36 | 171 | |
| Means | 90 | 113 | 60 | 1.89 | 16 | 40 | 19 | 29 | 171 |

Material examined: 11 morphotype nymphs in QIMR, all bred from engorged larvae removed from the extreme ear margins of *Rattus assimilis*, collected in farmland, Mena Creek, near Innisfail, 2 July 1958, J. L. Harrison. Correlated larval pelts accompany 10 of the 11 specimens.

10. *Guntherana* (*Derrickiella*) *heaslipi* (Womersley and Heaslip), NEW COMBINATION.

Neoschöngastia heaslipi Wom. & Heas., 1943, R. Soc. S. Aust., Trans. 67: 120 (Type larval series from rats from Cairns, in SAM).

This species is characterized by the possession of distinct dorsal plates, on each of which is set a dorsal seta. Similar platelets have arisen quite independently in *Walchiella traubi* (Womersley, 1952). The insertions of the dorsal setae are strongly sclerotized in some species, e. g., the preceding and *G. (G.) pannosa*, but never approach these platelets in size.

11. *Guntherana* (*Derrickiella*) *dasycerci* (Hirst), NEW COMBINATION

Schöngastia dasycerci Hirst, 1929 c, Zool. Soc., Lond., Proc. 1929: 174 (Type larval series from a marsupial mouse, *Dasyercus cristicauda* (Kreff), Ooidea, S. A., in SAM).

This species, and the remainder of the *smithi* group which follow, may be distinguished from the preceding 2 species (*heaslipi* and *smithi*) by having AL and PL approximated so that SB lies behind PL. The palpal subterminala is absent. This species is extremely close to the following species, *G. (D.) shieldsi*, but may best be separated by the outline of the posterior scutal margin. The palpal tarsus is not clear in any of the available specimens, but I believe the subterminala to be absent.

12. *Guntherana* (*Derrickiella*) *shieldsi* (Gunther), NEW COMBINATION. Figs. 19–28.

Neoschöngastia shieldsi Gun., 1941b, Linn. Soc. N. S. W., Proc. 66: 158 (Type larval series from a scale-tailed rat, *Melomys rubex* Thomas, Bulolo, N. G. in SPHTM).

Neoschöngastia hirsti Wom. & Heas., 1943. R. Soc. S. Aust., Trans. 67: 123 (Type larval series from rats, Cairns and Imbil, in SAM). **New synonymy.**

The very close similarity between these 2 forms has already been mentioned by Audy and Domrow (1957). The synonymy is here confirmed.

Nymph: As in *G. (D.) smithi* except where noted. Idiosomal length not exceeding 550 μ in compressed specimens. Genital area 65 μ long, anterior discs 18 μ long, slightly larger than posterior discs, which are 14 μ long. Genital plates with 6–8 branched setae each. Inner genital setae bbb. Anal plates 51 μ long, with about 6 branched setae each.

Gnathosoma: Chelicerae 108 μ long, blade 40 μ long. Hypostome with about 12 pairs of short nude galeal setae to 14 μ long. Basis capituli with 20 to 24 branched setae ventrally. *Palpi*: Femur with 6–9 branched setae, the external ones being branched on both sides; genu with 10 or 11 branched setae; tibia with single internal branched seta near insertion of tarsus, 2 inner accessory combs, an external nude seta near base of claw, and 4 external branched setae; tarsus fairly slender, with tarsala, 2 subterminalae, and 8 branched setae. Length of palpal claw 25 μ . *Legs*: Precoxal plates each with 4 or 5 (but apparently 8 on one side of one specimen) branched setae. Tarsus I quite elongate, 140–169 μ long, to 59 μ high. Tibia I 81–101 μ long. Ratio LTI/HTI 2.86, ratio LTI/LtI 1.67. *Scutum*: Sensillae very long and slender, with barbules on basal 2/3, which merge into numerous quite short branches on distal 1/3. The standard data are given in Table 4. *Setation*: Anterodorsal setae to 26 μ long. Posterior body setae to 54 μ long, with branches on basal 4/5 stronger than those on apical 1/5. Leg setation as in *G. (G.) cassiope*, but no microsetae seen. Solenidia to 23 μ long

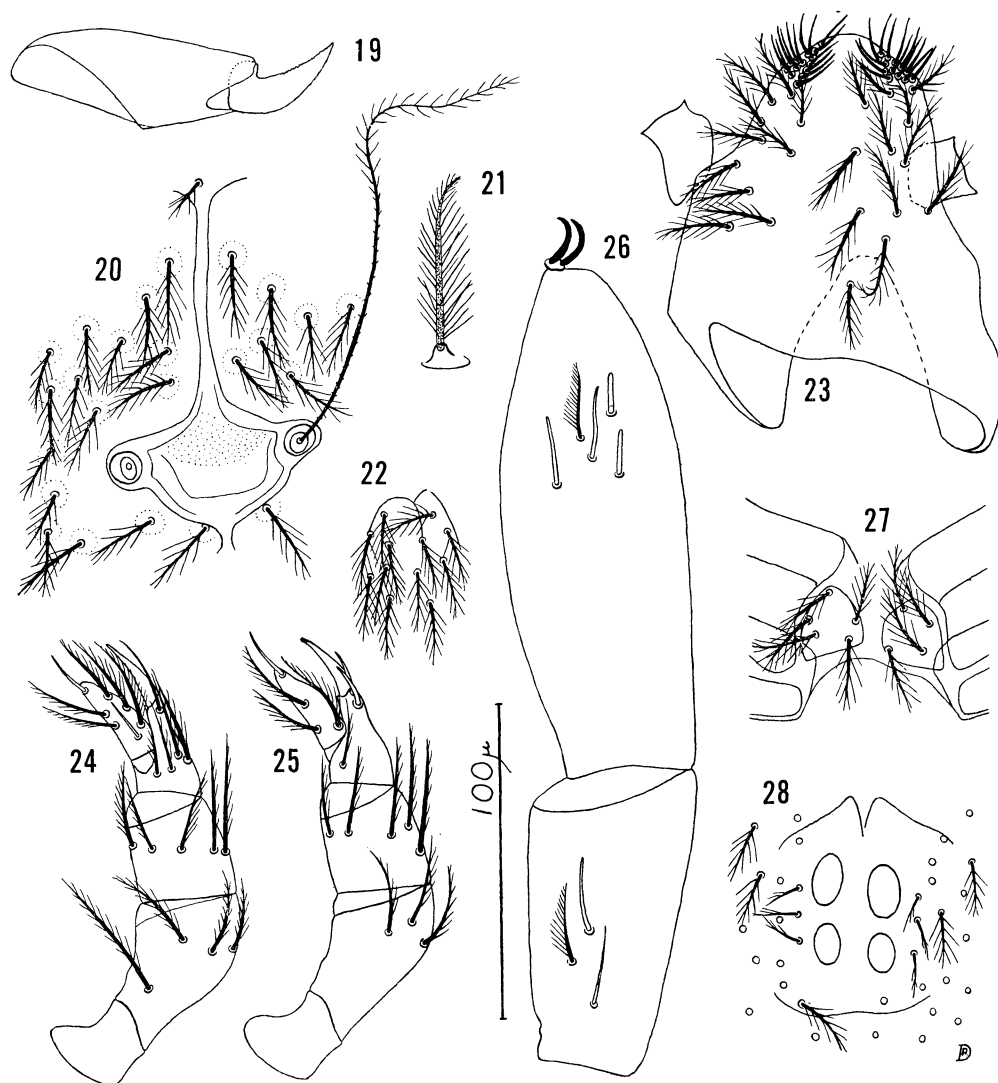
Table 4

| Standard data in micra of nymphal scutum of <i>G. (D.) shieldsi</i> (W. & H.) | | | | | | | | |
|---|-----|----|------------------|-----|-----|----|----|------|
| CTL | ASL | SB | $\frac{ASL}{SB}$ | PSL | PAD | TS | SS | SENS |
| 70 | 85 | 56 | 1.52 | 11 | 17 | 12 | 26 | 156 |
| — | — | — | — | — | — | 12 | 28 | — |

Material examined: 2 morphotype nymphs (together with correlated larval pelts) in QIMR; bred from engorged larvae collected in the ears of *Melomys cervinipes* (Gould), in rain forest on hills, Etty Bay, near Innisfail, 21 July 1958, J. L. Harrison.

Notes: This is the seventh *Guntherana* nymph to be correlated with its larva. It differs from all other known *Derrickiella* nymphs in having numerous, quite short branches on the sensillae, rather than a few long ciliations, and in the elongate front tarsi, the ratio LTI/HTI being 2.86 as against 1.7–2.4.

In the nymphal descriptions in this paper, I have used the term "subterminalae" for the setae on the palpal tarsus which I had previously called "nude apical setae." This usage stems from the following observation, which indicates the homology of these setae. The 5 species (*cassiope*, *kallipygos*, *perameles*, *shieldsi* and *womersleyi*), whose nymphs have only 2 nude apical setae, have no subterminala in the larval stage, while the 2 species (*corongensis* and *smithi*), whose nymphs have 3 nude apical setae, have a subterminala in



Figs. 19-28. *Guntherana* (*Derrickiella*) *shieldsi* (Gunther). Nymph. 19, chelicera; 20, scutum; 21, terminal body seta; 22, anal plates; 23, ventral view of gnathosoma; 24 and 25, external and internal views of palp; 26, lateral view of tarsus and tibia I; 27, precoxal plates; 28, genitalia.

the larval stage. Likewise the "baso-external rod" of the nymph has been homologized with the "tarsala" of the larva.

I have already (1960*a*) noted the constancy of the armature of the palpal tibia and tarsus in the 2 subgenera of *Leptotrombidium* Nagayo *et al.* (*Leptotrombidium* s. s. and *Trombiculindus* Radford). The pattern in *Guntherana* is similar, and as follows.

Tibia with a simple terminal claw, which has an outer nude seta and 2 inner acces-

sory combs near its base; with an inner branched seta near the insertion of the tarsus, and a variable number of branched setae externally.

Tarsus with external tarsala, 2 or 3 subterminalae, and about 9 branched setae.

The correlation between the number of subterminalae in the nymph and larva has been discussed above, but some intraspecific variation does occur. In *G. (D.) perameles*, only one subterminala was present in one out of 16 palpi where this character was clear, while the number of branched setae on 22 palpi was as follows – 11 (once), 9 (10 times), 8 (9), 6 (1), and 5 (once). The palp with 5 branched setae was also the one with only a single subterminala.

In the one apparently normal *G. (D.) shieldsi* nymph, 8 branched setae are present on both tarsi. The second specimen is abnormal. It lacks the tarsala on both palpi, and on one tarsus 8 branched setae and one normal subterminala are present, while on the other are 7 branched setae and one normal subterminala, in addition to a second stunted subterminala about 1/2 the normal size.

13. *Guntherana (Derrickiella) pseudomys* (Womersley), NEW COMBINATION.

Schöngastia (Ascoshöngastia) pseudomys Wom., 1952, S. Aust. Mus., Rec. 10: 171 (Type larval series from *Trichosurus vulpecula* (Kerr), Wongabel, Q., in SAM).

It has been suggested (Audy & Domrow, 1957; Womersley & Audy, 1957) that this species might belong to the subgenus *Trombiculindus* Radford (genus *Leptotrombidium* Nagayo *et al.*). I have, however, been able to examine the entire type series, and, even in the absence of sensillae, would now amend this. These last 3 species are closely related in a number of characters to other species of this group, e. g. *derricki*. These characters include the plumose palpal femoral seta, the hyaline basoexternal process of the cheliceral base, and all scutal characters.

14. *Guntherana (Derrickiella) similis* (Womersley and Heaslip), NEW COMBINATION.

Neoschöngastia similis Wom. & Heas., 1943, R. Soc. S. Aust., Trans. 67: 124 (Type larval series from rats, Cairns, in SAM).

A series of 39 specimens from N. Queensland show 4 setae in the first dorsal row in all cases except one, where 5 are present.

15. *Guntherana (Derrickiella) derricki* (Womersley), NEW COMBINATION.

Neoschöngastia derricki Wom., 1939, R. Soc. S. Aust., Trans. 63: 162 (Type series from *Rattus* spp., Imbil, Q., in SAM).

I have been able to examine 8 specimens of this species. Seven have 6 setae in the first dorsal row, the eighth has 7.

16. *Guntherana (Derrickiella) rex* Domrow, n. sp. Figs. 29–36.

Types: Holotype larva in Queensland Mus., Brisbane, from *Rattus assimilis*, collected in farmland, Mena Creek, near Innisfail, 8 July 1958, J. L. Harrison. The type series also includes 55 paratypes as follows – one with same data as holotype; 12 from anogenital

region of *R. assimilis*, savannah land, Etty Bay Road, near Innisfail, 25 July 1958, J. L. H.; 42 from *R. assimilis*, ti-tree swamp, Etty Bay, 29–30 July 1958, J. L. H.

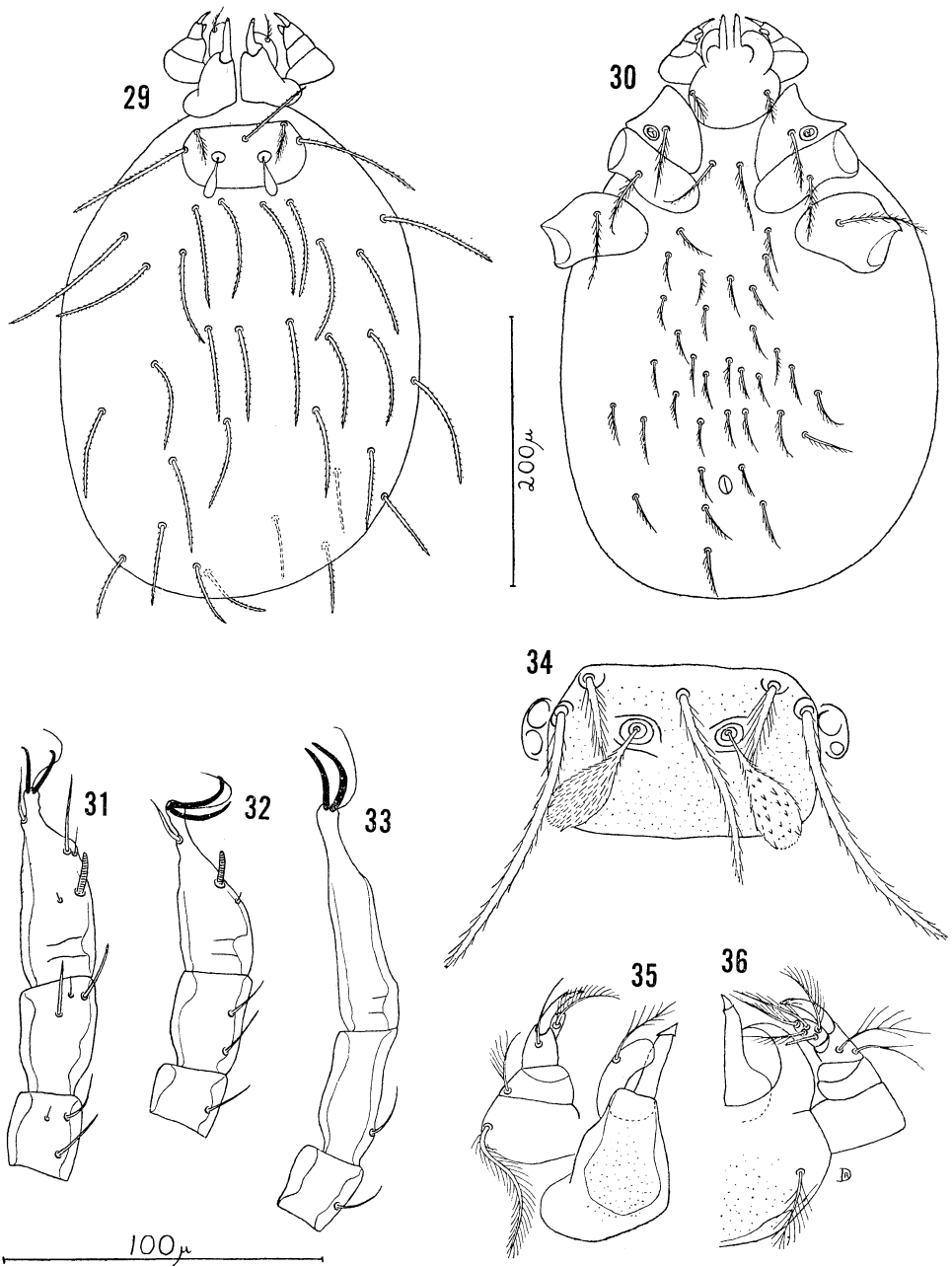
Larva: Idiosoma 263–281 μ long, 162–184 μ wide in unengorged specimens, but 414 \times 270 μ when fully fed. Cuticle crenulate. *Body setation*: Dorsal setae cylindrical and well barbed, commencing 2.8.6–8, those in second row being 71–86 μ long. Humeral setae 92–104 μ , caudal setae 45–51 μ long. Ventral setae irregularly arranged, about 32 in number, those immediately in front of anus 28 μ long, and tapering. Coxal setae arranged 1.1.1; sternal setae 2.2, with posterior pair close to ventral setae; all fine and tapering. *Gnathosoma*: Cheliceral bases stout, with posterolateral angles expanded and hyaline; punctate dorsally; cheliceral blade 35 μ long, without teeth except for tricuspid cap. Galeal setae with several branches. Palpal coxal seta well branched. In addition to the usual ventroexternal tarsala, the palpal formula is P. b. nb/nb. B + 4b. Subterminala absent. Palpal claw with 3 weakly defined prongs. *Scutum* transverse, subrectangular, fairly evenly punctate. Anterior margin almost straight, but with very slight convexity around AM setal base. Lateral margins very short due to movement of PL setae forward. Posterior margin 3-sided, the posterolateral angles being approx. 90°. Scutal setae not set on corners, but with well marked insertions; AL not on shoulders, and thus in front of level of AM. PL longer than AM, which in turn is longer than AL, which are very short. Sensillary bases behind level of PL, with weakly marked brows. Sensillae clavate, with numerous fine barbs on one side, and fewer, stouter barbs on the other. The scutal standard data are given in Table 5. Eyes double, on ocular plate 19–20 μ long, adjacent to PL setae; diameter of anterior lens 8–9 μ . *Legs*: 7-segmented; all tarsi with basal bar. The special sensory setation is as follows: *Tarsus I* with pretarsala, subterminala, parasubterminala, tarsala 15–16 μ long, and microtarsala. *Tibia I* with 2 tibialae and microtibiala. *Genu I* with 2 genualae and microgenuala. *Tarsus II* with pretarsala, tarsala 14–15 μ long, and microtarsala. *Tibia II* with 2 tibialae. *Genu II* with one genuala. *Leg III* with single tibiala and genuala.

Table 5

Standard data in micra of larval scutum of *G. (D.) rex*, n. sp.

| AW | PW | SB | ASB | PSB | SD | AP | AM | AL | PL | Sens |
|----------|----|----|-----|-----|----|----|----|----|-----|----------------|
| 59 | 78 | 28 | 22 | 25 | 47 | 14 | 62 | 31 | 90 | 42 \times 15 |
| 61 | 80 | 29 | 23 | 25 | 48 | 14 | 65 | 31 | 94 | — |
| 62 | 81 | 29 | 23 | 23 | 46 | 14 | — | — | 95 | — |
| 62 | 83 | 30 | 23 | 23 | 46 | 16 | 68 | 33 | 101 | — |
| 64 | 83 | 31 | 23 | 23 | 46 | 15 | 64 | 33 | 89 | — |
| 65 | 84 | 30 | 23 | 23 | 46 | 16 | 62 | — | 97 | — |
| Means 62 | 82 | 30 | 23 | 24 | 47 | 15 | 64 | 32 | 94 | 42 \times 15 |

Notes: This species is a typical member of the *smithi* species group, being closely related to *derricki* and *similis*. These 2 species have their dorsal setae in rows of 6 and 4, respectively, while *rex* has them in rows of 8. In 110 specimens, 6 setae were present in the first dorsal row once, 7 twice, eight 106 times, and 9 once. The second row varies commonly from 6 to 8 (six 33 times, seven and eight 38 times). The more posterior setae are exceedingly variable.



Figs. 29-36. *Guntherana (Derrickiella) rex*, n. sp. Larva. 29, dorsum; 30, venter; 31, 32 and 33, specialized setation of legs I, II and III; 34, scutum; 35 and 36, dorsal and ventral views of gnathosoma.

17. *Guntherana* (*Derrickiella*) *perameles* (Womersley), NEW COMBINATION.

Neoschöngastia perameles Wom., 1939, R. Soc. S. Aust., Trans. 63: 160 (Type larval series from a bandicoot from Kiamba, Q., in SAM).

Schöngastia (*Ascoschöngastia*) *mohri* Wom., 1952, S. Aust. Mus., Rec. 10: 184 (Type larval series from a bandicoot, *Echymipera kalubu kalubu* (Lesson), Sansapor, Dutch N. G. in SAM). **New Synonymy.**

Schöngastia (*Ascoschöngastia*) *crinita* Wom., 1952, S. Aust. Mus., Rec. 10: 185 (Type larval series from *Echymipera kalubu kalubu*, Sansapor, in SAM). **New Synonymy.**

These 3 very similar forms were all described from bandicoots (except a single specimen of *mohri* on a rat), and were differentiated by having 10, 12, or 14 setae in the first dorsal row. However, around Brisbane, the number in *perameles* varies from 11–15 (certainly 13, if one grants it is hard to decide whether the extreme outer pair belong to the first row or the second). I have examined all 7 of the original series of *mohri*, and the range is 10–11. In the one specimen of *crinita* I have seen, 15 are present. Clearly only one species is involved. It is common, and apparently restricted to bandicoots, in coastal Queensland and New Guinea. The nymph was described by Domrow (1955a).

Correlated with the general hairiness of this and the following species (*mackerrasae*), the posterior pair of intercoxal setae are mingled with the ventrals, while in the 3 less hairy species preceding, both pairs of intercoxals are distinct.

Abnormalities involving the absence of normal, or presence of additional scutal setae are uncommon, and the following specimen is therefore of interest. It was taken from *Isoodon macrourus*, at Indooroopilly, Brisbane, 20 Nov. 1951, E. H. Derrick coll. The antero- and posterolateral scutal setae are normal, but in the place of the usual single antero-median scutal seta there are 3 subequal setae set in the form of a flat isosceles triangle, with the apex to the rear.

18. *Guntherana* (*Derrickiella*) *mackerrasae* (Womersley), NEW COMBINATION.

Schöngastia (*Ascoschöngastia*) *mackerrasae* Wom., 1952, S. Aust. Mus., Rec. 10: 182 (Type larval series found free-living, Bramston Beach, N. Q., in SAM).

This species was originally described from a single specimen, but I have since seen a further 2 larvae from *Rattus assimilis*, rain forest, ETTY Bay, near Innisfail, 7 Aug. 1958, J. L. Harrison coll. Additional descriptive notes were given by Audy and Domrow (1957).

Subgenus *Guntherana* Womersley and Heaslip, 1943

(Subgenotype *Neoschöngastia kallipygos* Gunther, 1939)

In spite of the extensive synonymy attending it, *G. kallipygos* has always been considered a species apart, even to the extent of having had a separate subfamily Guntheraninae erected for it (Gunther, 1952). In addition to the larva, the nymph and adult have been known since World War II.

However, apart from its characteristic caudal plate/s (which were the cause of its continued seclusion, and which are here considered of group value only), there is a close

resemblance between the larva of *kallipygos* and those of the species placed in the *cassiope* group. In addition, the newly reared nymphs of the *cassiope* group are indistinguishable at group level from that of *G. kallipygos*.

The *kallipygos* group and the *cassiope* group are here recognized on larval characters; they comprise the subgenus *Guntherana*.

Diagnosis: Nymphal scutal ratio ASL/SB low (0.8–1.1) because of wide intersensillary space. Larvae with AL scutal setae much longer than AM seta. Sensillae always distinctly globose.

KEY TO SPECIES GROUPS AND SPECIES OF SUBGENUS GUNTHERANA (LARVAE)

1. Caudal plate/s absent; 2 or 3 genualae I *cassiope* species group 2
- Caudal plate/s present; one genuala I *kallipygos* species group 12
2. (1) Posterior scutal margin clearly emarginate, the concavity reaching beyond the line of PL; tibiala III absent **19. emphylla**
- Posterior scutal margin convex or biconvex, the median concavity in the latter case never reaching the level of PL; tibiala III present 3
- 3 (2). Dorsal setae foliate 4
- Dorsal setae cylindrical 5
- 4 (3). Only PL scutal setae foliate **28. foliata**
- Both PL and AL scutal setae foliate **29. mccullochi**
- 5 (3). At least one exceedingly long, basally barbed mastiseta on leg III 6
- Setae on leg III normal 7
- 6 (5). Only telofemur III with mastiseta; dorsal setae in rows of 8 **22. andromeda**
- All 4 terminal segments (except genu) of leg III with mastisetae; dorsal setae in rows of 6 **21. parva**
- 7 (5). Six setae in first dorsal row; palpal subterminala absent 8
- Eight or more setae in first dorsal row; palpal subterminala present 10
- 8 (7). Posterior scutal margin deeply convex **20. innisfailensis**
- Posterior scutal margin shallowly biconvex 9
- 9 (8). PL and PW subequal **26. cassiope**
- PL about twice as long as PW **27. womersleyi**
- 10 (7). All 8 setae in first dorsal row set in an even curve, the pattern commencing 2.8 **23. echymipera**
- Some setae of first dorsal row moved forward to form a false row with the humeral setae 11
- 11 (10). Medial pair of first row of 8 dorsal setae moved forward, so that their bases and those of the submedial pair are at the corners of a square, resulting in a setal pattern commencing 4.6, and not 2.8. Scutum trapezoidal, with PW at least 15 μ longer than AW **24. queenslandica**
- Medial 4 of first row of 12 dorsal setae moved forward to form a row of 6 with the 2 humerals, resulting in a setal pattern commencing 6.8, and not 2.12. Scutum quadrate, with PW only about 10 μ wider than AW **25. antipodiana**

- 12 (1). Dorsal setal pattern 2. 6. 4. 6. 2; caudal plate/s with 3 weak setae each 31. *kallipygos*

 Dorsal setal pattern 2. 6. 6. 2. 2; caudal plates with 4 very strong setae each
 30. *pannosa*

The *cassiope* species group

Diagnosis: Larvae without dorsocaudal plate/s. Two or 3 genualae I. Nymphs undistinguished.

19. *Guntherana* (*Guntherana*) *emphyla* Domrow, n. sp. Figs. 37–44.

Types: Holotype larva in Queensland Mus., Brisbane, from ear of *Isoodon macrourus*, Innisfail, 29 Aug. 1958, J. L. Harrison coll. The type series also includes 9 paratypes as follows—one with same data as holotype; 2 from a long-nosed bandicoot, *Perameles nasuta* Geoffroy, Innisfail, 15 Sep. 1958, J. L. H.; 6 from *Melomys cervinipes*, Innisfail, 6 Oct. 1958, J. L. H.

Larva: Idiosoma $324 \times 172 \mu$ in unengorged specimens, and $547 \times 270 \mu$ in fully fed specimens. Cuticle annulate.

Body setation: Dorsal setae cylindrical and well barbed, arranged 2. 6. 6 (5). 6. 6. 4. 2, those in second row being $31\text{--}36 \mu$ long, while terminal setae are $26\text{--}31 \mu$ long. Humeral setae $42\text{--}48 \mu$ long. Ventral setae about 43 in number, those adjacent to anus being $29\text{--}31 \mu$ long, and tapering. Coxal setae arranged 1. 1. 1; sternal setae arranged 2.2; all fine and tapering.

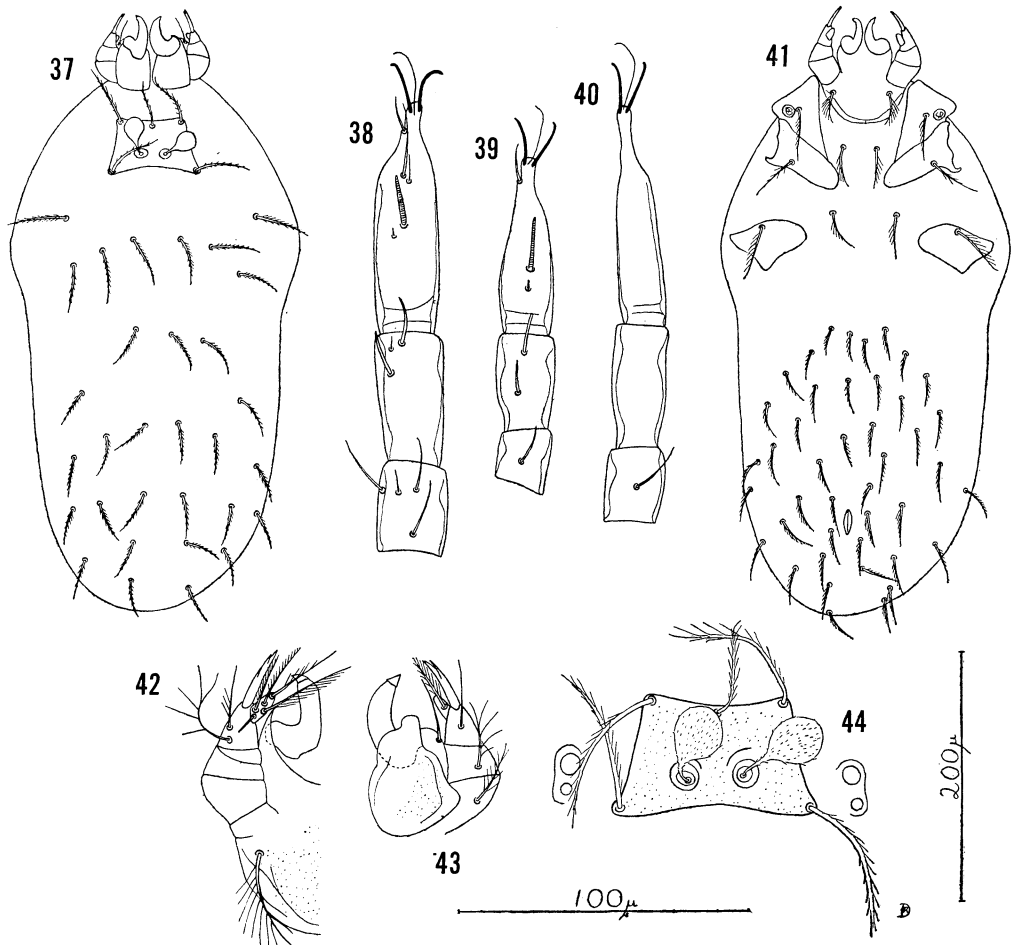
Gnathosoma: Cheliceral bases stout, punctate dorso-laterally; cheliceral blade $29\text{--}34 \mu$ long, without teeth, but with usual tricuspid cap. Galeal setae nude. Palpal coxal seta strongly ciliated. In addition to the usual ventroexternal tarsala, the palpal formula is b. b. nbb. B+4b. Subterminala absent. Palpal claw with 3 strong prongs, the central prong being the strongest. *Scutum* transverse, subrectangular, evenly punctate except for 2 small areas behind sensillary bases. Anterior and lateral margins slightly concave. Posterior margin markedly concave. Only PL setae set on noticeable corners. AL setae not on shoulders, and therefore in front of AM seta. AL slightly longer than PL, and AM shorter than both AL and PL. Sensillary bases fairly close together, and much closer to level of PL than to AL; with weakly defined brows. Sensillae globose, with weak barbules scattered over surface. The scutal standard data are given in Table 6. Eyes double, on ocular plate $17\text{--}22 \mu$ long; diameter of anterior lens $6\text{--}8 \mu$. *Legs* 7-segmented. All tarsi with basal bar. The special sensory setation is as follows: *Tarsus I* with pretarsala, subterminala, parasubterminala, tarsala $18\text{--}20 \mu$ long, and microtarsala. *Tibia I* with 2 tibialae and microtibiala. *Genu I* with 3 genualae and microgenuala. *Tarsus II* with pretarsala, tarsala $17\text{--}19 \mu$ long, and microtarsala. *Tibia II* with 2 tibialae. *Genu II* with one genuala. *Leg III* with one genuala only.

Notes: This species has 2 characters which set it apart from the other species of the *cassiope* group—the completely concave posterior scutal margin, and the absence of tibiala III. These 2 characters also occur in the basically African genus *Schoutedenichia* Jadin and Vercammen-Grandjean, 1954. However, that *emphyla* fits quite naturally in the genus *Gun-*

Table 6

Standard data in micra of larval scutum of *G. (G.) emphylla*, n. sp.

| AW | PW | SB | ASB | PSB | SD | AP | AM | AL | PL | Sens |
|-------|----|----|-----|-----|----|----|----|----|----|-------|
| 43 | 67 | 20 | 29 | 16 | 45 | 37 | 42 | 59 | 50 | 33×19 |
| 45 | 64 | 17 | — | — | — | — | 42 | 54 | 48 | 31×17 |
| 45 | 65 | 19 | 29 | 14 | 43 | 36 | — | 62 | 48 | 29×19 |
| 45 | 67 | 19 | 28 | 16 | 44 | 36 | 39 | 54 | 54 | 33×17 |
| 47 | 68 | 22 | — | — | — | 37 | 40 | — | 50 | 34×19 |
| 48 | 65 | 19 | 28 | 19 | 47 | 39 | 40 | 56 | 53 | 34×17 |
| 48 | 70 | 17 | 27 | 19 | 46 | 36 | — | — | 53 | 31×17 |
| 50 | 68 | 19 | 28 | 17 | 45 | 39 | 42 | 59 | 53 | 31×17 |
| Means | 46 | 67 | 19 | 28 | 17 | 45 | 37 | 41 | 57 | 32×18 |



Figs. 37-44. *Guntherana (Guntherana) emphylla*, n. sp. Larva. 37, dorsum; 38, 39 and 40, specialized setation of legs I, II and III; 41, venter; 42 and 43, ventral and dorsal views of gnathosoma; 44, scutum.

therana as here defined, rather than *Schoutedenichia*, is shown by the following combination of characters—palpal tarsal formula 5B, 3 genualae I present, sensillae globose, AL setae much longer than AM seta. However, within the subgenus *Guntherana*, *innisfailensis* is the only other species in which more than 2 genualae I may be present.

20. *Guntherana* (*Guntherana*) *innisfailensis* (Womersley and Heaslip), NEW COMBINATION.

Neoschöngastia innisfailensis Wom. & Heas., 1943, R. Soc. S. Aust., Trans. 67: 108 (Type larval series from a scale-tailed rat, *Melomys lutillus littoralis* (Lönnberg), Innisfail, in SAM).

Neoschöngastia melomys Wom. & Heas., 1943, R. Soc. S. Aust., Trans. 67: 110, in part, holotype larva only (From *Melomys lutillus littoralis*, Innisfail, in SAM).

Ascoshöngastia bushlandi Philip, 1947, Jour. Parasitol. 33: 387 (Type larval series from *Megapodius* sp., Owi Is., D. N. G., in USNM).

This species is common on a variety of rats and bandicoots in N. Queensland, while it is also known to occur on a ground bird in New Guinea. The type larva of *bushlandi* is the only one of the approximately 40 types of this genus not in an Australian collection. I was able to examine it and 2 paratypes in Washington recently, and can confirm the synonymy used by Womersley (1952) and Audy and Domrow (1957), which was based on paratypes only. Variations in the specialized leg setation of this species are discussed in the introductory comments on the keys above. The type of *bushlandi* has 3 genualae I.

21. *Guntherana* (*Guntherana*) *parva* (Womersley), NEW COMBINATION.

Euschöngastia parva Wom., 1954, R. Soc. S. Aust., Trans. 77: 74 (Type larval series collected freelifving, Mt. Jukes, Q., in SAM).

This and the following species are characterized by possessing elongate, attenuated, and basally finely ciliated setae on at least one of the 4 distal segments of leg III. In this species, the mastisetae are arranged as follows, one on telofemur, 2 on tibia, and at least 2 on tarsus, while in *andromeda*, only one mastiseta is present, that on the telofemur. I therefore believe that in Womersley (1954) figure 8G represents *parva*, rather than *andromeda*.

The two species were accorded group rank by Audy and Domrow (1957), but they are here returned to the *cassiope* group, pending the rearing of their nymphs, which should confirm the importance, if any, of these mastisetae.⁶

22. *Guntherana* (*Guntherana*) *andromeda* (Womersley), NEW COMBINATION.

Euschöngastia andromeda Wom., 1954, R. Soc. S. Aust., Trans. 77: 80 (Type larval series found free-living, Mt. Tamborine, SE Q., in SAM).

6. *E. philippensis* (Philip & Woodward, 1946a) also possesses similar mastisetae III. However, the scutum of this species shows distinct anterolateral excavations, into which the sensillae may be withdrawn (Philip & Woodward, 1946b), and in this respect resembles some of the American species of *Euschöngastia* (see Farrell, 1956). This species has been recorded from Australia (Womersley, 1952) but these specimens are in bad condition, and I would prefer to see fresh material before adding it to the Australasian genus *Guntherana*.

Apart from *G. (D.) petrogale*, this is the only other species of *Guntherana* with more than one seta on coxae III.

23. *Guntherana (Guntherana) echymipera* (Womersley and Kohls). NEW COMBINATION.

Ascoshöngastia echymipera Wom. & Kohls, 1947, R. Soc. S. Aust., Trans. 71: 11 (Type larval series from *Echymipera kalubu kalubu*, Dobadura, N. G., in SAM).

This and the following two species are the only 3 of the 13 included in the subgenus *Guntherana* which have a palpal tarsal subterminala.

24. *Guntherana (Guntherana) queenslandica* (Womersley), NEW COMBINATION.

Neoschöngastia queenslandica Wom., 1939, R. Soc. S. Aust., Trans. 63: 162 (Type larval series from various native rats, SE Q., in SAM).

In addition to having a palpal tarsal subterminala, this and the following species are further characterized by the fact that some central setae of the first dorsal row have moved forward to form a false row with the humerals.

This chigger is common on a variety of rats and marsupials in N. and NE Australia. I have also seen specimens from the eyelids of rabbits, Colo Vale, New South Wales, Aug. 1959, A. L. Dyce coll. There are also further specimens from rabbits in the South Australian Museum. These are mounted with, and labelled, as, *antipodiana*, "Bargibel," near Bundarra, N. S. W., E. J. Waterhouse.

25. *Guntherana (Guntherana) antipodiana* (Hirst), NEW COMBINATION.

Schöngastia antipodianum Hirst, 1929c, Zool. Soc., Lond., Proc. 1929: 175 (Type larval series from *Rattus greyii* (Gray), Kangaroo Is., S. A., in SAM).

In addition to the original series, this species has also been recorded from rabbits from New South Wales (Mykytowycz, 1957). The specimens referred to this species by Domrow and Smith (1956) are no longer available, but almost certainly should have been referred to *G. (G.) queenslandica*.

26. *Guntherana (Guntherana) cassiope* (Womersley), NEW COMBINATION. Figs. 45-54.

Schöngastia (Ascoshöngastia) cassiope Wom., 1952, S. Aust. Mus., Rec. 10: 187 (Type larval series collected free-living, Wondecla, N. Q., in SAM).

Schöngastia (Ascoshöngastia) lappacea Wom., 1952, S. Aust. Mus., Rec. 10: 190 (Type larval series from rat, Cairns, N. Q., in SAM). New synonymy.

The holotype of *melomys* Wom. & Heaslip is a specimen of *innisfailensis* Wom. & Heaslip (see above), but the paratypes are *cassiope*. The identity of *cassiope* and *lappacea* was suggested by Audy and Domrow (1957), and a subsequent examination of some hundreds of larvae from a variety of native rats and marsupials from coastal Queensland has confirmed this synonymy. The *cassiope* form was originally characterised by possessing strong, thick dorsal setae, but the gradation to the slightly thinner (and more usual) shape in the *lappacea* form is complete. In other respects the larvae are inseparable.

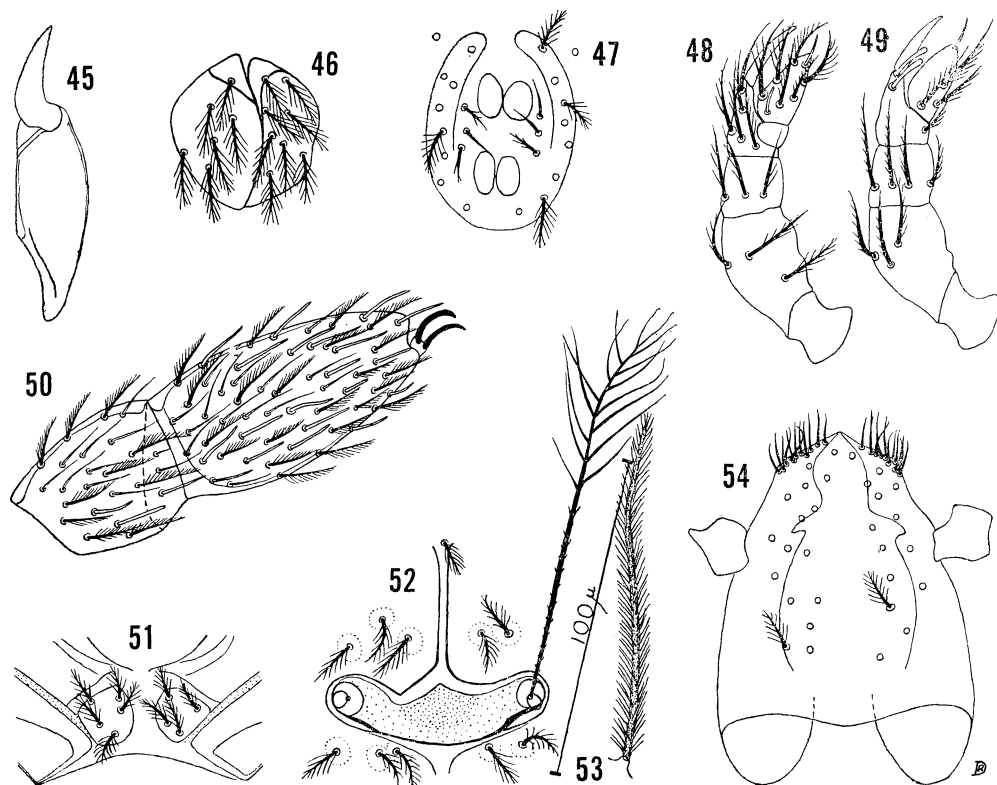
In addition to numerous specimens from N. Queensland, I have also seen material collected free-living from Mt. Jukes, near Mackay, 6 Sep. 1951, E. H. Derrick; and Brookfield, Brisbane, 21 Feb. 1951, E. H. D. A further 2 specimens from New South Wales have recently come to hand. These were collected with about 30 *Acomatacarus* sp. larvae on the edges and inside the ears of a black-striped wallaby, *Protemnodon dorsalis* (Gray), Gorge Creek, Bonalbo, 20 Feb. 1960, J. H. Calaby.

An interesting scutal abnormality has been noted in a larva of this species from *Melomys cervinipes*, Innisfail, 2 Oct. 1958, J. L. Harrison coll. Unlike the abnormality reported above for *G. (D.) perameles*, the 5 scutal setae in this specimen are normal. However, although the left sensilla is quite normal, there is no trace of the right one, nor of the involucre in which it should have been set. The texture of the scutum in the right half is uniformly punctate. Variation in the specialized sensory setation of genu I of this species has been discussed in the introductory comments to the keys above.

Nymph: A very pale yellow species, with idiosomal length not exceeding 612 μ in compressed specimens. Genital area oval, averaging 59 μ in length, with 2 pairs of subequal, oval genital discs. Anterior discs 11–17 μ long (av. 14 μ); posterior discs 11–15 μ long (av. 13 μ). Genital plates not well defined, with about 8 branched setae each. Inner genital setae arranged 3.3 in 3 specimens; nnb or bnb. In fourth specimen 2.2, bn and bb. Anal plates elongate, 46 μ long, with 4–6 setae each. *Gnathosoma*: Chelicerae typical, 83 μ long; blade slightly serrate dorsally, 33 μ long. Hypostome blunt, with about 12 pairs of short nude galeal setae to 12 μ long. Basis capituli with about 15 pairs of branched setae. *Palpi* rather slender, with usual 5 segments; femur with 5 or 6 branched setae (some of which are branched on both sides); genu with 7 or 8 branched setae; tibia with single internal branched seta near insertion of tarsus, 2 inner accessory combs, an external nude seta near base of claw, and 2–5 (average 3.6) external branched setae; tarsus fairly stout, with tarsala, 2 subterminalae and 9 branched setae arranged as figured. Length of palpal claw 26 μ . *Legs* typical, 7-segmented. Coxae I with inner angle cut off by transverse strut to form typical precoxal plates; each plate with 4 or 5 branched setae. Tarsus I of usual shape, 87 μ long; tibia I 54 μ long; ratio LTI/LtI 1.61. No preapical dorsal process on tarsus I. *Scutum*: Area sensilligera very broad, being wider than length of crista, and not produced far behind level of sensillary bases. Crista short, terminating in non-dentate tectum. Tectal seta much shorter than crista. Sensillae very long and filamentous, with barbules on basal half, which merge rapidly into about 15 long and very slender branches distally. Eyes absent. Paracristal seta about 6 in number, and subequal. The standard data are given in Table 7. *Setation*: Setae on anterior part of dorsum short and tapering, to 19 μ long. Posterior body setae very long and sinuous, form-

Table 7

| Standard data in micra of nymphal scutum of <i>G. (G.) cassiope</i> (Wom.) | | | | | | | | |
|--|-----|----|-----------|-----|-----|----|----|------|
| CTL | ASL | SB | ASL SB | PSL | PAD | TS | SS | SENS |
| 39 | 51 | 56 | 0.91 | 12 | 22 | 12 | 21 | 134 |
| 40 | 53 | 57 | 0.93 | 14 | 25 | 12 | 19 | 134 |
| 37 | 50 | 56 | 0.89 | — | — | 10 | — | — |
| 40 | 53 | 62 | 0.85 | 12 | — | 12 | 19 | 126 |
| Means | 39 | 52 | 0.90 | 13 | 24 | 12 | 20 | 131 |



Figs. 45-54. *Guntherana (Guntherana) cassiope* (Womersley). Nymph. 45, chelicera; 46, anal plates; 47, genitalia; 48 and 49, external and internal views of palp; 50, lateral view of tarsus and tibia I; 51, precoxal plates; 52, scutum; 53, terminal body seta; 54, ventral view of gnathosoma.

ing a fringe around opisthosoma to 116μ long, and evenly branched along their entire length. Leg setation typical, *i. e.*, in addition to usual branched setae there are present both finger-like solenidia of varying length and thickness, and nude tapering setae. These 2 types of sensory setae are, as usual, more numerous on the distal segments of anterior legs. Solenidia to 17μ , branched setae to 22μ long. A microseta is occasionally present on tibia I.

Material examined: Four morphotype nymphs in QIMR; 2 bred from larvae from a giant scale-tailed rat, *Uromys caudimaculatus* (Krefft), Palmerston, N. Queensland, 8 May 1958, M. L. Emanuel coll., and 2 obtained in the same way from *Rattus assimilis*, Palmerston, 20 May 1958, M. L. E. Correlated larval pelts accompany 3 of the 4 specimens.

Method: In these 2 breeding experiments, the ear conchae of the hosts were air-freighted south from Innisfail, N. Queensland, to Brisbane (1360 km), and were received one or 2 days after dispatch. A few engorged larvae detached during transit, and other swollen specimens were removed with a needle. These larvae were then placed on moist, sterile aluminium oxide (alundum) in a small sealed container, so that condensed droplets

of moisture were always present inside the container. The temperature range was 18–28°C. (64–83°F.) The larvae are small, even when engorged, and very pale yellow in colour, readily visible on the dark alundum.

The larvae from *U. caudimaculatus* were set up on 8 May 1958. Two nymphochrysalises were noted 22 days later (30 May), but these failed to moult. Finally on 19 June, the larval pelts were dissected away to yield 2 pale yellow, but dead nymphs. These were of small size, but the posterior circlet of long hairs was noted before they were mounted. These 2 nymphs had probably died in the first week of June soon after the completion of metamorphosis within the larval pelt.

A few larvae were also obtained from *R. assimilis* in the same way on 20 May 1958. One nymphochrysalis was noted 30 days later (19 June), and was seen in the process of moulting on 23 June. Moulting, however, was not successful, and the nymph and pelt were mounted on a single slide. A second nymphochrysalis still seemed alive on 27 June, but had died by 3 July, and was also mounted together with its larval pelt. These nymphochrysalises showed a distinct forwardly directed anterodorsal spine as figured by Jones (1951) for *Neotrombicula autumnalis* (Shaw), and noted by Domrow (1956) for *N. antechinus* (Wom.). The opisthosoma was quite pointed posteriorly prior to moulting.

The nymphs of *Guntherana (Derrickiella) smithi* and *G. (D.) shieldsi* described above were also reared by this method.

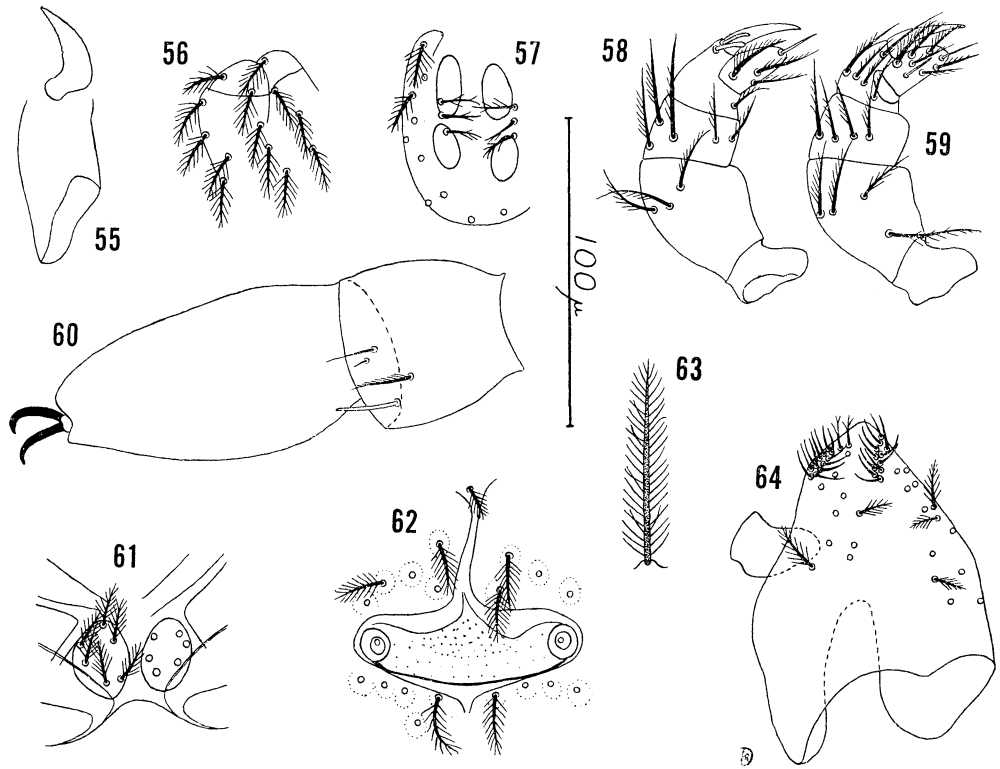
27. *Guntherana (Guntherana) womersleyi* (Gunther), NEW COMBINATION. Figs. 55–64.

Neoschöngastia womersleyi Gun., 1940, Linn. Soc. N. S. W., Proc. 65: 254 (Type larval series from a pademelon, *Thylogale coxeni* (Gray), Bulolo, N. G., in SPHTM).

This species is very close to *G. (G.) cassiope* in both the larval and nymphal stages. The similarity of the dorsal setal pattern and scutal shape in the larvae is striking, and the only real difference appears to be in the relative lengths of the PL scutal setae.

In addition to the type series, this species has also been collected on "rats" in New Guinea. The nymph described below was reared from this latter material.

Nymph: As in *G. (G.) cassiope* except where noted. Colour in life unknown. Idiosomal length not measurable in specimen at hand, but the scutal standard data are almost identical with those given for *G. (G.) cassiope* above. Genital area oval, 64 μ long, anterior discs 17 μ long, posterior discs 14 μ long. Genital plates with about 9 branched setae each. Inner genital setae bbb. Anal plates 47 μ long, with 6 or 7 branched setae each. *Gnathosoma*: Chelicerae 82 μ long, blade 31 μ long. Hypostome with about 12 pairs of nude galeal setae to 12 μ long. Basis capituli with about 25 branched setae. *Palpi* a little stout; femur with 7 or 8 branched setae; genu with 9 or 10 branched setae; tibia with single internal branched seta near insertion of tarsus, 2 inner accessory combs, an external nude seta near base of claw, and 4 external branched setae; tarsus fairly stout, with tarsala, 2 subterminalae, and 8 branched setae on one palp and 9 on the other. Length of palpal claw 25 μ . *Legs*: Precoxal plates with 6 branched setae each. Tarsus I 96 μ long, of usual shape, but tarsal ratio unavailable because height of tarsus I unmeasurable. *Scutum*: Sensillae lacking in available specimen. Paracristal setae about 9 in number, subequal. The standard data are given in Table 8. *Setation*: Anterodorsal body setae 17 μ long; posterior body setae long and slender, 59 μ long. Leg solenidia to 20 μ long.



Figs. 55-64. *Guntherana (Guntherana) womersleyi* (Gunther). Nymph. 55, chelicera; 56, anal plates; 57, genitalia; 58 and 59, internal and external views of palpi; 60, lateral view of tarsus and tibia I; 61, precoxal plates; 62, scutum; 63, terminal body seta; 64, ventral view of gnathosoma.

Table 8

Standard data in micra of nymphal scutum of *G. (G.) womersleyi* (Gun.)

| CTL | ASL | SB | $\frac{ASL}{SB}$ | PSL | PAD | TS | SS | SENS |
|-----|-----|----|------------------|-----|-----|----|----|------|
| 39 | 51 | 60 | 0.85 | 12 | 20 | 10 | 20 | — |

Material examined: One nymph labelled "*Neoschöngastia womersleyi* Gunth. Nymph ex larvae from rat, Dobadura, N. G., 11. 5. 44, G. M. K. #294 (nec 293). This is probably *Guntherana bipygalis* [= *G. (G.) kallipygos*]."

Notes: The nymph before me is one of 2 identified by Kohls as *womersleyi*, but later described under *Guntherana kallipygos* by Womersley (1952). As both *G. (G.) womersleyi* and *G. (G.) kallipygos* are characteristic species in the larval stage, Kohls' identification is accepted. *G. (G.) cassiope* and *G. (G.) womersleyi* are very closely related in the larvae; likewise in the nymphs the only difference seems to be in the length of the terminal body setae.

28. *Guntherana* (*Guntherana*) *foliata* (Gunther), NEW COMBINATION.

Neoschöngastia foliata Gun., 1940, Linn. Soc. N. S. W., Proc. 65: 255 (Type larval series from *Thylogale coxeni*, Bulolo, N. G., in SPHTM).

This and the following species comprise, in essence, the *foliata* group of Audy (1954). However, as the resemblance between the *foliata* series and *G. (G.) cassiope* is quite close, and the gradation from *cassiope* to *mccullochi* complete, the 2 species are here returned to the *cassiope* group. All these species have a palpal formula b. b. nnn/b. B+4b (the formulae given by Womersley and Audy, 1957, are in error).

Two New World genera with globose sensillae and foliate dorsal setae should be considered here, if only to exclude them. These are *Cordiseta* Hoffmann, 1954 and *Trombewingia* da Fonseca, 1955. Womersley and Audy (1957) confirm da Fonseca's statement that *Trombewingia* has only 4 setae on the palpal tarsus, while *Cordiseta* does not agree with *Guntherana* in scutal pattern. Both are antedated by *Guntherana*.

29. *Guntherana* (*Guntherana*) *mccullochi* (Womersley), NEW COMBINATION.

Neoschöngastia mccullochi Wom., 1944, R. Soc. S. Aust., Trans. 68: 100 (Type larval series collected free-living, Adibari, N. G., in SAM).

Ascoshöngastia uromys Womersley and Kohls, 1947, R. Soc. S. Aust., Trans. 71: 10 (Type larval series from *Uromys caudimaculatus aruensis* Gray, Dobadura, N. G., in SAM).

New synonymy.

I have examined both the type series above, and find that the structure of the dorsal setae is identical in all specimens. They are foliate, and apparently smooth on the ventral surface. The flattened lateral margins are very strongly dentate as in Womersley's fig. 7E (1944), while dorsally there is a second row of several much weaker barbules along either side of the shaft proper.

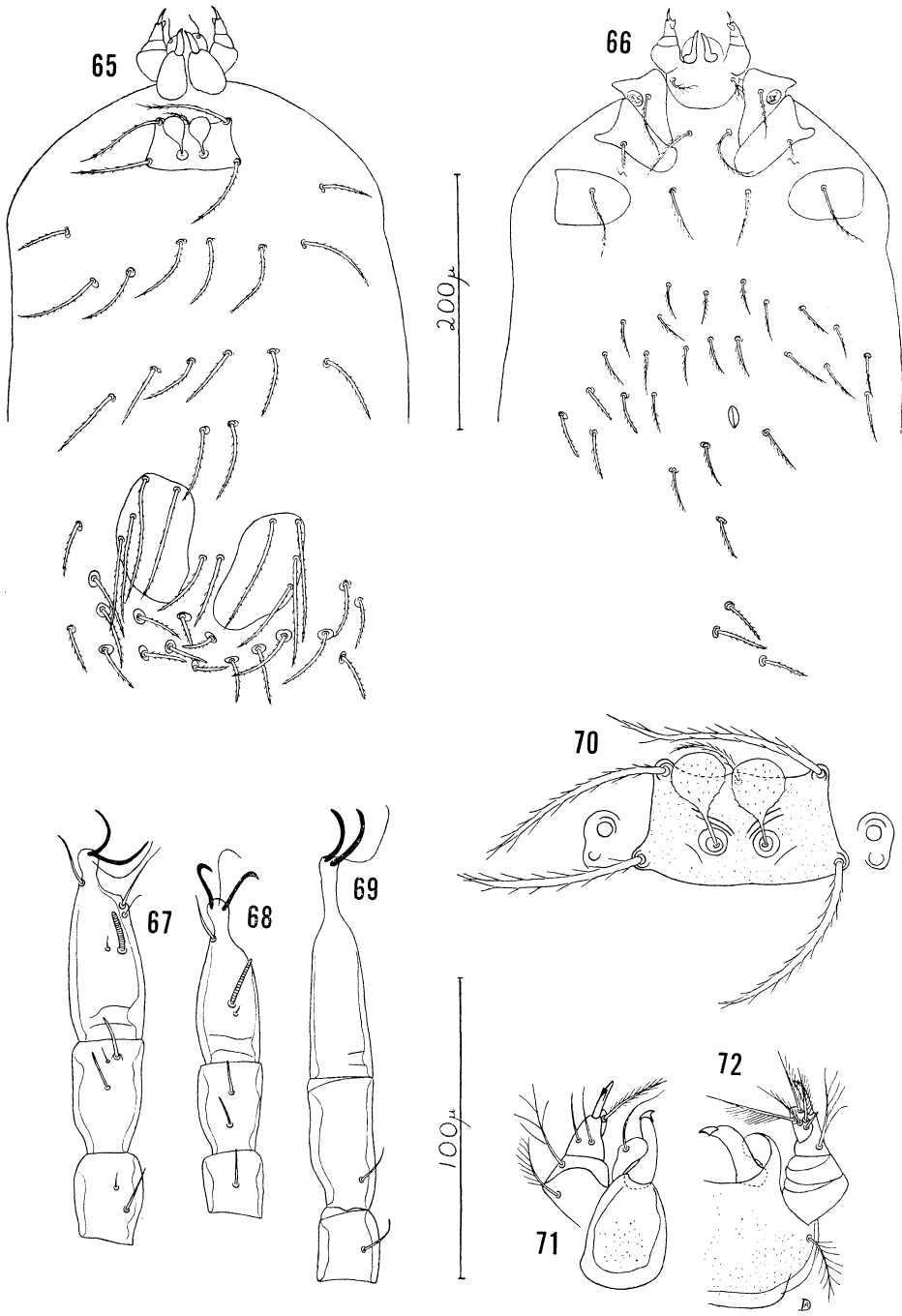
The *kallipygos* species group

Diagnosis: Larvae with dorsocaudal plate/s present. One genuala I. Nymphs undistinguished.

30. *Guntherana* (*Guntherana*) *pannosa* Domrow, n. sp. Figs. 65-72, 76.

Types: Holotype larva in Queensland Mus., Brisbane, from *Rattus assimilis*, collected in farmland, Coorumba, near Innisfail, 15 July 1958, J. L. Harrison.

Larva: Idiosomal measurements unavailable because of fracture during mounting procedure. Cuticle annulate. *Body setation*: Dorsal setae cylindrical and strongly barbed, arranged 2. 6. 6. 2. 2. 18, those in second row being 56 μ long, while terminal setae are as short as 28 μ . Humeral setae 43 μ long. Caudal setae set on minute basal platelets. Dorsum posteriorly with 2 elongate, non-punctate, caudal plates, which are 104 μ long and 62 μ wide. These bear 4 setae each, one on the inner margin 95 μ long, and 3 on outer margin 99, 87 and 78 μ long (from front to back). Ventral setae 29 in number, those immediately in front of anus 29 μ long. The more anterior setae are fine and tapering, while the posterolateral setae are coarse, and resemble the caudal setae. Coxal setae arranged



Figs. 65-72. *Guntherana (Guntherana) pannosa*, n. sp. Larva. 65, dorsum; 66, venter; 67, 68 and 69, specialized setation of legs I, II and III; 70, scutum; 71 and 72, dorsal and ventral views of gnathosoma.

1. 1. 1; sternal setae arranged 2.2; all fine and tapering. *Gnathosoma*: Cheliceral bases stout, punctate dorsally; cheliceral blade $29\ \mu$ long, without teeth, but with usual tricuspid cap. Galeal setae nude. Palpal coxal seta with several ciliations. In addition to the usual ventro-external tarsala, the palpal formula is b. b. nnb. B+4b. Subterminala absent. Palpal claw with 3 weak prongs, of which the middle one is strongest. *Scutum* transverse, rectangular, evenly punctate except for small area behind each sensillary base, and a more extensive zone behind AM seta. Anterior margin concave, but with slight convexity around base of AM seta. Posterior margin slightly convex, but with very weak medial emargination. AL and PL setae set on distinct corners, AL not being on "shoulders", and consequently slightly in front of AM setal base. Both PL and AL setae much longer than AM, but PL somewhat shorter than AL. Sensillary bases fairly close together, much nearer posterior than anterior margin; flanked anteriorly by well marked brows, and posteriorly by weakly sclerotized line. Sensillae globose, with several weak barbules on surface. The scutal standard data are given in Table 9. Eyes double, on ocular plate $18\ \mu$ long near bases of PL setae; diameter of anterior lens $5\ \mu$; posterior lens very weakly developed. *Legs* 7-segmented, but femur III only divided ventrally, the ventral seta being accordingly normally developed and barbed. All tarsi with basal bar, although weak in leg III. The special sensory setation is as follows: *Tarsus I* with pretarsala, subterminala, parasubterminala, tarsala $14\ \mu$ long, and microtarsala. *Tibia I* with 2 tibialae and microtibiala. *Genu I* with one genuala and microgenuala. *Tarsus II* with pretarsala, tarsala $17\ \mu$ long, and microtarsala. *Tibia II* with 2 tibialae. *Genu II* with one genuala. *Leg III* with single tibiala and genuala.

Table 9

Standard data in micra of larval scutum of *G. (G.) pannosa*, n. sp.

| AW | PW | SB | ASB | PSB | SD | AP | AM | AL | PL | Sens |
|----|----|----|-----|-----|----|----|----|----|----|----------------|
| 53 | 67 | 16 | 29 | 14 | 43 | 31 | 29 | 79 | 66 | 31×18 |

Notes: That this form is a *Guntherana* in the strictest sense is certain, but, as it conforms neither in the characteristic dorsal setation nor in the caudal plate/s with *G. kallipygos*, it is described as a new species. It may be recognized by the following 3 characters – dorsal setal pattern (omitting caudal setae) 2.6.6.2.2, caudal plates with 4 pairs of very long setae, 2 strong setae set between the caudal plates.

31. *Guntherana (Guntherana) kallipygos* (Gunther) Figs. 73–75, 77–87.

Neoschöngastia kallipygos Gun., 1939a, Linn. Soc. N. S. W., Proc. 64: 83 (Type larval series from rats and bandicoots, N. G., in SPHTM).

Neoschöngastia callipygea Gun., 1938, Med. Jour. Aust. 2: 204 *nomen nudum*.

Neoschöngastia bipygalis Gun., 1939b, Linn. Soc. N. S. W., Proc. 64: 471 (*nomen novum*. This action was unnecessary, as the preoccupying name *kallipygos* Derrick *et al.* 1939 was a *nomen nudum*).

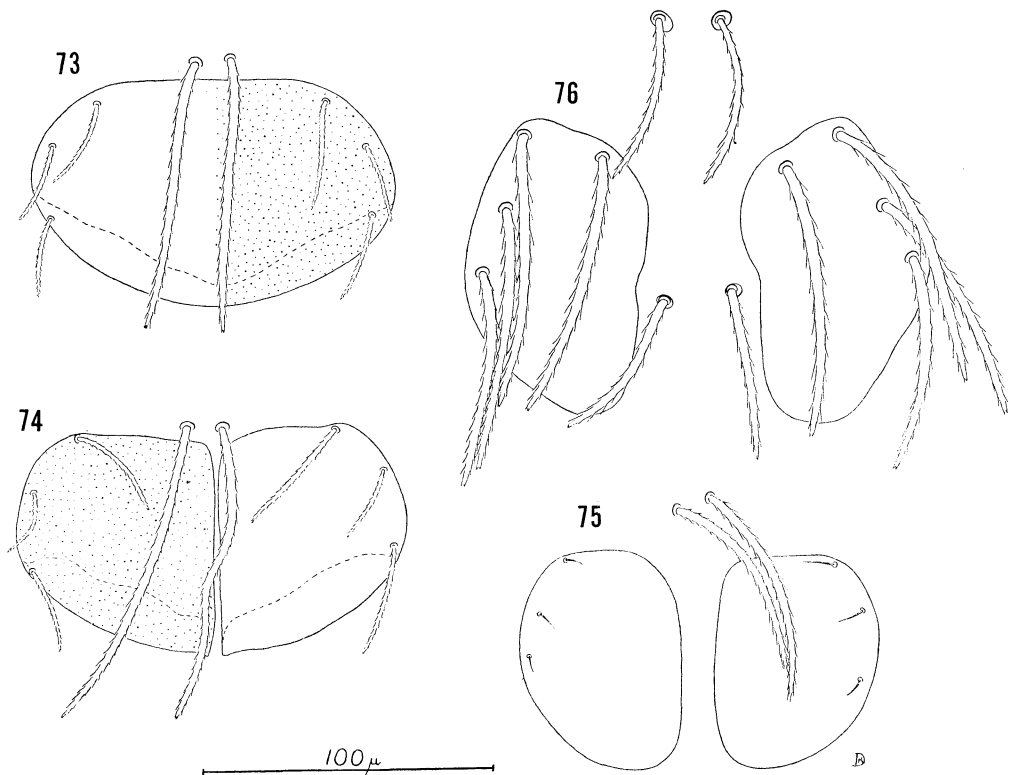
Guntherana parana Wom., 1944, R. Soc. S. Aust., Trans. 68: 100 (Type larval series collected free-living, Adibari, N. G.).

The larvae of this interesting species occur on a variety of rats and bandicoots from New Guinea (Bulolo) to SE Queensland. A note on their feeding habits is given below.

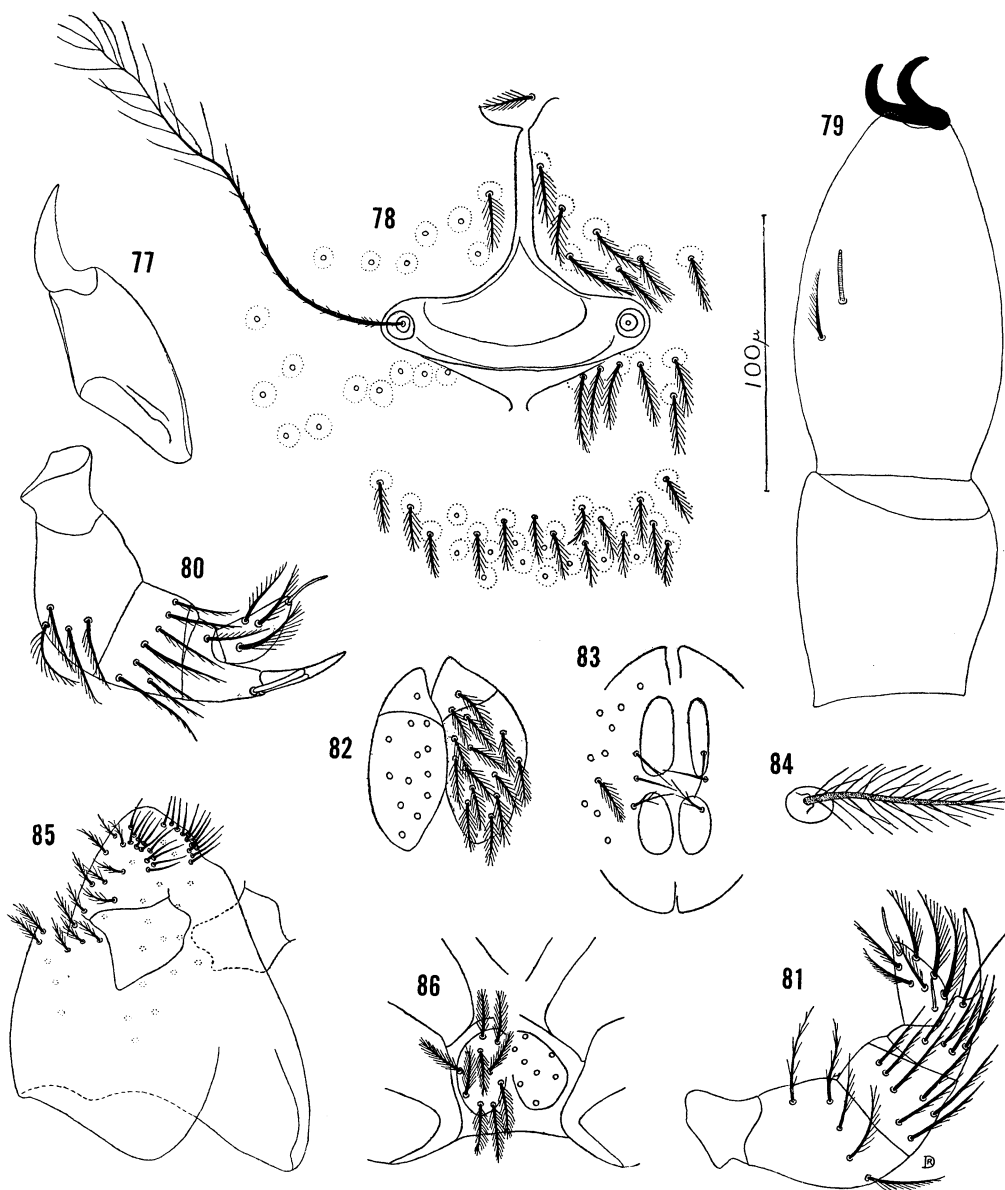
Morphologically, this is a variable species, and I agree with Womersley (1952) that *G. parana* Wom., 1944 is a synonym. The least variable, and most useful character in identifying this species, apart from the caudal plate/s, is the peculiar arrangement of dorsal setae, 2.6.4.6.2. Two points are of note here, the short third row of 4 setae, which lies closely about a median line, and the fifth row of 2 very long setae set close together immediately in front of the caudal plate/s.

This caudal sclerotization takes the form of one or 2 plates of variable structure. The 3 forms illustrated below all occur in the Bramston Beach-Innisfail area of north Queensland. In the extreme form, the 2 plates are completely fused to form a transverse oval, punctate shield – this is the form described as *G. parana*. In the intermediate condition, the plates are divided medially, but still strongly punctate. The 3 pairs of setae on the anterolateral margins are somewhat variable in length, ranging from 25 to 42 μ long. The extreme in the other direction is reached in the type of *kallipygos*. Here we find 2 widely separated plates, a lack of punctae, and 3 pairs of minute setae barely 10 μ long. The caudal sclerotization in all 3 forms, then, has a basic pattern, and as they also possess the same characteristic dorsal setation, I consider them one species.

In the same year as Gunther (1939b) described the larva of this species, he also



Figs. 73–76. *Guntherana* species. Caudal plates of larvae. 73, 74, 75, *G. (G.) kallipygos* (Gunther); 76, *G. (G.) pannosa*, n. sp.



Figs. 77-86. *Guntherana* (*Guntherana*) *kallipygos* (Gunther). Nymph. 77, chelicera; 78, scutum; 79, lateral view of tarsus and tibia I; 80 and 81, internal and external views of palpi; 82, anal plates; 83, genitalia; 84, terminal body seta; 85, ventral view of gnathosoma; 86, pre-coxal plates.

published a note on some transparent structures found "cemented" to the hairs of the host. Each contained a dark mass or a single larva, and he concluded that they were

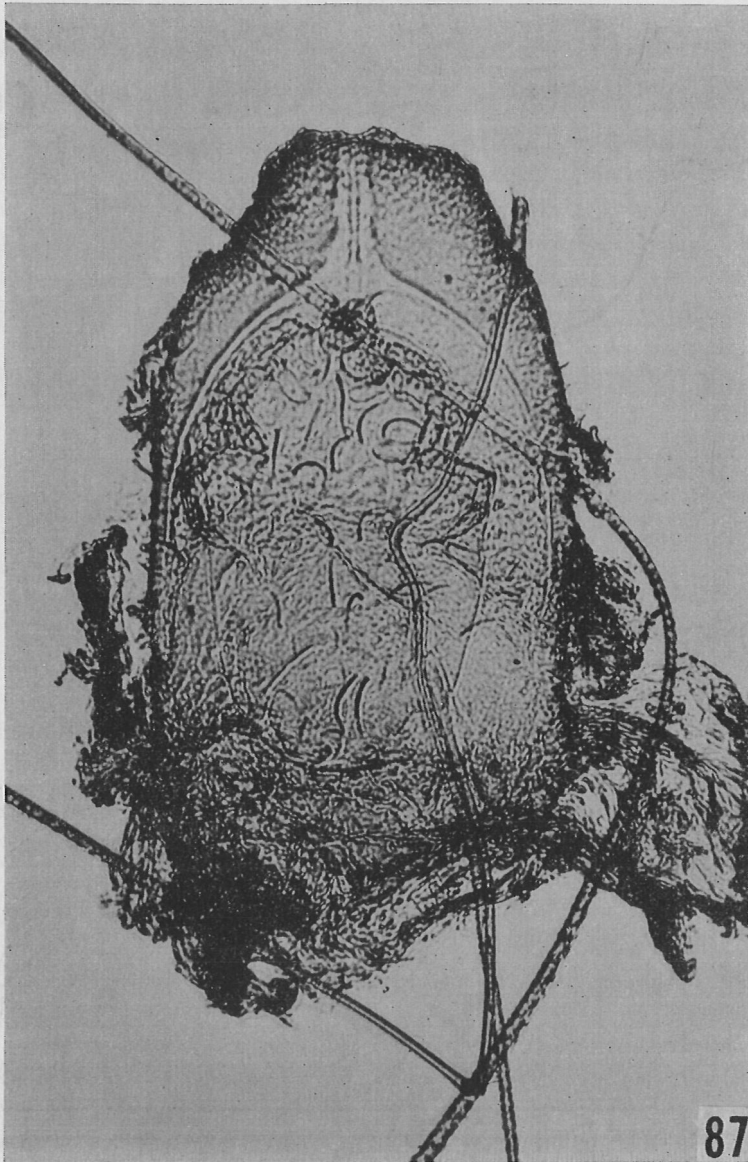


Fig. 87. *Guntherana (Guntherana) kallipygos* (Gunther). Larva enclosed in modified sucking tube. The following structures of the mite, which is displaced to the right, are also visible — the left half of the scutum with sensilla and PL seta, the left humeral seta, the left 4 of the first row of 6 dorsal setae, at least 3 of the second row of 4 setae, all 6 setae in the third row, the 2 elongate setae at the anterior end of the cleft between the 2 caudal plates, most of the 6 legs, and at least 4 coxae. Four hairs are embedded in the capsule.

undifferentiated or late stage ova, respectively. He was unable to decide whether the adult mites lived in the nest of the host, or whether, like the larvae, the adults in this

one case were also true parasites. He later (1952) raised a new subfamily Guntheraninae for this one species on the basis of these findings, and on a distinctive larval morphological character, the presence of 2 dorsocaudal plates. Doubt was later cast (Womersley, 1952; Audy, 1954) on the belief that these structures were eggs.

Capsules similar to those described by Gunther have since been taken on 3 occasions. I have drawn freely on ms notes made by Dr. E. H. Derrick in 1953 in recording the first of these 3 findings. The belief that these structures were eggs was not abandoned in these notes, while the typical histosiphons were called "pseudo-sucking tubes." I have had accordingly to alter the wording slightly in one or 2 places.

A female bandicoot (*Isoodon macrourus*) was captured at Mt. Nebo, 23 km NW of Brisbane, and brought to this Institute on 16 Apr. 1953. While its ectoparasites were being removed by Dr. Derrick, some finely granular, scaly areas were noticed on the anterior aspect of its hind limbs. This scaly material was scraped off, and placed in polyvinyl alcohol medium. It separated into a number of individual oval granules rather less than 1 mm in length (4 specimens measured 720×660 , 816×684 , 840×600 and $1140 \times 600 \mu$). When these were examined with the microscope, several were seen to consist of an engorged mite surrounded by a mass of tough, finely fibrillary substance. The encapsulation of the mite was incomplete posteriorly, and on applying pressure to the coverslip, the mite tended to extrude here.

Projecting forward from the chelicerae of the mite, a hyaline sucking tube was clearly visible. Like the mite itself, this tube was also surrounded by the fibrillary substance, and its anterior end just reached the exterior of the capsule. Continuous with the wall of the sucking tube, and consisting of the same material, was a hyaline layer that extended backwards around the body of the mite. Towards the posterior end, it thinned and disappeared. Its hyaline nature distinguished it readily from the fibrillary substance, to which it was closely applied.

In most of the capsules the mite was missing, but a cavity indicated where one had been. A sucking tube, usually shorter than the one illustrated, was also present in these specimens, as well as the hyaline layer continuous with it that bounded the cavity.

I have since taken another series of capsules from *Perameles nasuta*, Mt. Nebo Road, 1 Dec. 1958, E. H. Derrick. The capsules were first noted attached to the shafts of hairs well out from the skin about the rump of the host. Soon some specimens were found attached to the hair quite close to, and almost touching, the skin. These were examined under a dissecting microscope to see which end of the capsule was nearer the skin, and it was found that the pointed, nipple-like end was. Then many minute holes, of a size to admit the point of a small pin, were noted in the skin. The edge of one of these holes was grasped with very fine forceps, and at a slight pull, a complete capsule was extracted from the skin. This process was repeated many times, and each of the holes proved to be the open end of a capsule. The capsules were completely embedded in the skin, their apertures being at skin level. Very little, if any, swelling or inflammation surrounded the holes.

On mounting, these empty capsules also showed typical histosiphons penetrating their pointed anterior ends, and occasionally traces of larval structures were seen in their cavities, as well as opaque deposits. These deposits therefore appear black in specimens examined by the compound microscope, but in unmounted material and using reflected light,

they are white, and much resemble excretory material. These deserted capsules undoubtedly correspond to Gunther's "undifferentiated ova." It now seems certain that these capsules are not eggs, but merely modified feeding tubes, which, in addition to forming the usual narrow channel directed forwardly from the chelicerae of the larvae into the host tissue, also grow backwardly in a much more exaggerated fashion to form a capsule, which remains open posteriorly, and in which the whole body of the larva is enclosed as penetration of the skin and engorgement take place.

A third record is 5 capsules (one containing an engorged larva) found attached to the hair around the anus of a marsupial mouse, *Antechinus flavipes godmani* (Thomas)⁷, in rainforest at 360 m, Palmerston National Park, N. Q., 18 Mar. 1959, R. D.

The formation by trombiculid mites of a sucking tube or histosiphon is a phenomenon known for over 80 years. The tube is formed by the reaction of a secretion of the mite with tissue from the host. Its purpose is to allow the mite to obtain tissue juices for ingestion from levels deeper than its mouthparts could reach. It is progressively lengthened during the attachment of the mite, and its length may eventually much exceed that of the mite itself. When the mite disengages, the tube remains in the host tissue. Normally only the chelicerae of the attached larva are inserted into the skin, but *G. kallipygos* is entirely intradermal. Perhaps the sclerotized caudal plate/s serve to protect the posterior aperture of the capsule. It would seem from da Fonseca's illustrations (1955), that rather similar capsules are formed by the quill-inhabiting chigger, *Apolonia tigipioensis* Torres and Braga.

The varied position of the capsules along the hairs and in the skin may be explained as follows. In specimens totally embedded in the skin, the wall of the capsule occasionally entraps the tips of one or more hairs about to emerge from the skin. As these hairs grow, the capsule is slowly withdrawn from the skin, until it is many times its own length free of the skin's surface, yet still attached to the hairs. Thus a larva may be pulled out of the skin prematurely, as in Gunther's material, but normally the larva in each capsule has time to engorge fully. Whether metamorphosis takes place in the capsules or in the soil is unknown. Larval fragments have been seen within some capsules, but these may be the remains of larvae that have died.

Nymph: Colour in life unknown; length of idiosoma 680 μ in mounted specimens. Genital area oval, 94 μ long, with 2 pairs of genital discs; anterior discs 24 μ long, posterior discs 22 μ long. Genital plates weakly defined, with about 10 branched setae each. Inner genital setae arranged 3.3, the posterior pair, and occasionally at least one of the anterior pair, being weakly barbed. Anal plates 69 μ long, more heavily sclerotized anteriorly, with 13 or 14 branched setae each. *Gnathosoma*: Chelicerae of usual facies, 111 μ long; blade slightly serrate on concave dorsal edge, 40 μ long. Hypostome blunt anteriorly, with about 12 pairs of nude galeal setae to 15 μ long. Basis capituli with about 35 branched setae ventrally. Palpi with usual 5 segments; femur with 9 branched setae; genu with 13 or 14 branched setae; tibia with single internal branched seta near insertion of tarsus, 2 inner accessory combs, an external nude seta near base of claw, and 4 external branched setae; tarsus with tarsala, 2 subterminalae, and 9 branched setae. Length of palpal claw 33 μ . *Legs* typical, 7-segmented. Coxae I with usual precoxal plates, each with 8 or 9 branched

7. In listing the host names, I have found the following useful, and have tried to strike a balance between them—Laurie and Hill, 1954; Tate, 1947–1952; Troughton, 1954.

setae. Tarsus I not elongate, $138\ \mu$ long, $78\ \mu$ high. Tibia I $87\ \mu$ long. Ratio LTI/HTI 1.77; ratio LTI/LtI 1.59. No preapical dorsal process on tarsus I. *Scutum*: Area sensilligera wider than long, with fairly well developed posterior apodeme. Crista shorter than area sensilligera, terminating in usual tectum bearing single tectal seta. Paracristal setae subequal. Sensillae very slender, especially distally, with barbules on basal half, which merge into about 16 very fine ciliations apically. Eyes absent. The standard data are given in Table 10. *Setation*: Middorsal body setae tapering and branched, $19\ \mu$ long; terminal body setae similar, but larger, $65\text{--}73\ \mu$ long. Leg solenidia to $23\ \mu$ long.

Table 10

| Standard data in micra of nymphal scutum of <i>G. (G.) kallipygos</i> (Gun.) | | | | | | | | |
|--|-----|----|------------------|-----|-----|----|----|------|
| CTL | ASL | SB | $\frac{ASL}{SB}$ | PSL | PAD | TS | SS | SENS |
| 57 | 86 | 84 | 1.02 | 16 | 29 | 19 | 23 | 175 |
| 57 | 80 | 86 | 0.93 | 20 | 29 | 19 | 26 | 165 |

Female: Very similar to nymph, but consistently larger and more hairy. Idiosomal length unavailable because of fracture. Genital area oval, $187\ \mu$ long, with 3 pairs of genital discs; anterior discs $35\ \mu$ long, middle discs $32\ \mu$ long, posterior discs $29\ \mu$ long. Inner genital setae weakly barbed, in about 15 pairs. Anal plates $118\ \mu$ long, with about 35 setae each. *Gnathosoma*: Chelicerae $165\ \mu$ long; blade $57\ \mu$ long. At least 12 pairs of nude galeal setae present. Basis capituli with about 100 setae ventrally. *Palpi*: Femur and genu with about 30 branched setae each; tibia with single internal branched seta near insertion of tarsus, 3 inner accessory combs near claw and a fourth additional comb set half way along the dorsal margin, an external nude seta near base of claw, and 5-7 branched external setae; tarsus with tarsala, an unknown number of subterminalae, and about 14 branched setae. Length of tibial claw $50\ \mu$. *Legs*: Precoxal plates with about 20 setae each. Tarsus I more elongate than in the nymph, $230\ \mu$ long, $113\ \mu$ high. Tibia I $144\ \mu$ long. Ratio LTI/HTI 2.04; ratio LTI/LtI 1.60. No preapical dorsal process on tarsus I. Scutum as in nymph, but paracristal setae more numerous. Eyes absent. The standard data are given in Table 11. *Setation*: Middorsal body setae $39\ \mu$ long; terminal body setae $86\ \mu$ long. Leg solenidia to $22\ \mu$ long.

Table 11

| Standard data in micra of adult scutum of <i>G. (G.) kallipygos</i> (Gun.) | | | | | | | | |
|--|-----|-----|------------------|-----|-----|----|----|------|
| CTL | ASL | SB | $\frac{ASL}{SB}$ | PSL | PAD | TS | SS | Sens |
| 93 | 126 | 122 | 1.03 | 25 | 43 | — | 39 | 234 |

Material examined: Two nymphs on separate slides, both labelled "*Guntherana bipygalis* (Gunth.) reared nymph #253, N. Guinea, G. M. K., 1944." Four nymphs on one slide labelled "*Guntherana bipygalis* (Gunth.) nymphs ex larvae on rat, Dobadura, N. G., G. M. K., 6. 6. 44, #385." One ♀ with one larva hatched from an egg it laid, labelled "*Guntherana parana* Wom., adult and larva #83, G. M. Kohls. Syn. of *bipygalis*." The larva has divided caudal plates, without punctae, and with very short setae.

32. *Guntherana tindalei* (Womersley)

Trombicula tindalei Wom., 1936, Linn. Soc. Lond. (Zool.), Jour. 40: 110. (Type nymph

collected free-living, Kangaroo Island, S. A., in SAM).

This species and the following are 2 of the least known Australian trombiculids, yet, paradoxically enough, they are the only 2 species (apart from the genotype) which have previously been assigned to *Guntherana* (see Womersley, 1952). The available material consists of 2 adults of *translucens* and one nymph of *tindalei*. Unfortunately, they are in a condition that precludes rehabilitation, and until similar material can be reared from larvae from suitable localities, I can do no more than place them as *species inquirendae*.

Both species have the 2 characteristic clumps of galeal setae, but the precoxal area is indistinct. *G. tindalei* is rather larger in the nymphal stage (ASL 81μ , SB 76μ , ASL/SB 1.07) than the adult of *translucens* (ASL 74μ , SB 51μ , ASL/SB 1.45). The ratio ASL/SB indicates that *tindalei* is a *Guntherana* s. s., and *translucens* a *Derrickiella*. Both subgenera occur as larvae in South Australia.

33. *Guntherana translucens* (Womersley)

Trombicula translucens Wom., 1944, R. Soc. S. Aust., Trans. 68: 83 (2 ♀ syntypes collected free-living at Mt. Arden, S. A., in SAM).

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From September 1960 to June 1961 the editor's address will be c/o Entomology Dept., University of Queensland, Brisbane, Australia. Inquiries regarding proposed manuscripts should be addressed to him there. Manuscripts on Diptera, Hemiptera and Hymenoptera should be addressed to Honolulu, and those on other groups to Brisbane.