A REVIEW OF *GLABER*-GROUP (s. str.) SPECIES OF THE GENUS *MACROCHELES* (ACARI : MACROCHELIDAE), AND A DISCUSSION OF SPECIES COMPLEXES [1]

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TAXONOMY

ABSTRACT : The *Macrocheles glaber* species group (Acari : Macrochelidae) is a species-rich cosmopolitan assemblage of mites, some of which are predaceous on eggs and larvae of synanthropic flies. Seven new species are described in the *glaber* group *s. str.* from Africa and Asia, and five species complexes complexes within the *glaber* species group are proposed. Phoretic associations and distributions of all known species in the complexes are given. Keys to species complexes are included.

TAXONOMIE

RÉSUMÉ : Les acariens du groupe *Macrocheles glaber* (Acari : Macrochelidae) forment un assemblage cosmopolite riche en espèces, dont certaines sont prédatrices d'œufs et de larves de mouches synanthropes. Sept nouvelles espèces sont décrites dans le groupe *glaber* sensu stricto d'Afrique et d'Asie, et cinq complexes d'espèces dans le groupe *glaber* sont proposés. Les associations phorétiques et les distributions de toutes les espèces connues dans les complexes sont décrites. Les clés pour les complexes d'espèces sont incluses.

INTRODUCTION

The *glaber* species group of the genus *Macrocheles* was established by FILIPPONI and PEGAZZANO (1962) to accommodate three species : *M. glaber* (Müller), *M. perglaber* F. and P. and *M. scutatus* (Berlese). These species were found to share a suite of morphological characteristics, including several which deal with sternal shield ornamentation. BERLESE (1918) had earlier observed the distinctive shield lines, punctations and depressions characteristic of *Macrocheles* and had established a number of " phalanxes " based on these patterns. FILIPPONI and PEGAZZANO's *glaber* group concept, along with their later designation of the *subbadius* species group (1963), had its origins in BERLESE's pioneer work. A broader definition of the *glaber* group based on arthrodial brush, genual and dorsal setal attributes,

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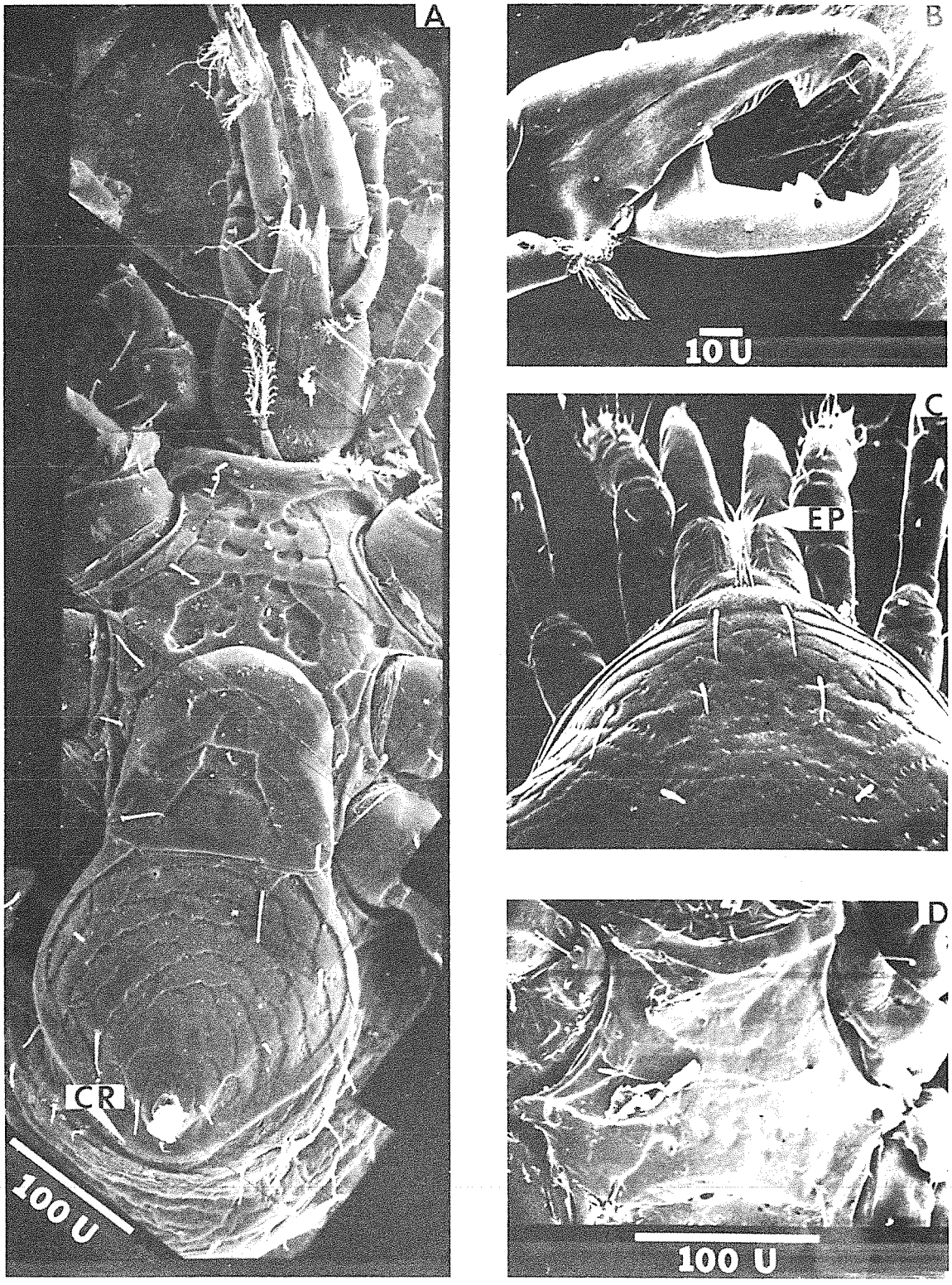

FIG. 1 : Structural details in the *glaber* group *s. str.*

a. — *Venter of M. peregrinus* Krantz ; b. — Paraxial view of chelicera of *M. hallidayi* Walter and Krantz ; c. — Anterodorsal aspect of *M. perglaber* ; d. — Sternal shield of *M. friggi* Walter and Krantz. (cr = cribrum, ep = epistome).

was utilized by EVANS and HYATT (1963) and followed by MACHADO-ALLISON (1964) and MENDEZ OLIVO (1968). Work in progress on species group phyletics (KRANTZ and WALTER, in preparation) suggests that the *glaber* group sensu FILIPPONI and PEGAZZANO is a natural assemblage with cohesive morphological and ecological characteristics not shared with other *Macrocheles* species included in the broader grouping of EVANS and HYATT.

The 30 species presently recognized by the authors as members of the *glaber* group form two " assemblages ", one of which posseses the robust characteristics of *M. glaber* and it's sibling species, *M. perglaber*, and the other of which displays the somewhat reduced features of *M. scutatus*. Among the more robust *glaber*-like species, the authors have identified a series of five subgroups, or complexes, which are based on secondary sternal and dorsal characteristics, and which tend to occur in particular zoogeographic realms (Fig. 2).

The object of this paper is to characterize the *glaber* group, distinguish the five complexes which include the more robust *glaber* group species (referred to hereafter as the *glaber* group *s. str.*), and present descriptions of new species. The *scutatus*-like members of the *glaber* group will be described elsewhere (WALTER and KRANTZ, in preparation).

SYSTEMATICS

Species included in the *glaber* group of the genus *Macrocheles* have a strongly sclerotized dorsal shield with a well developed procurved line, 28 pairs of setae, and 22 pairs of pores. Setae *j*1

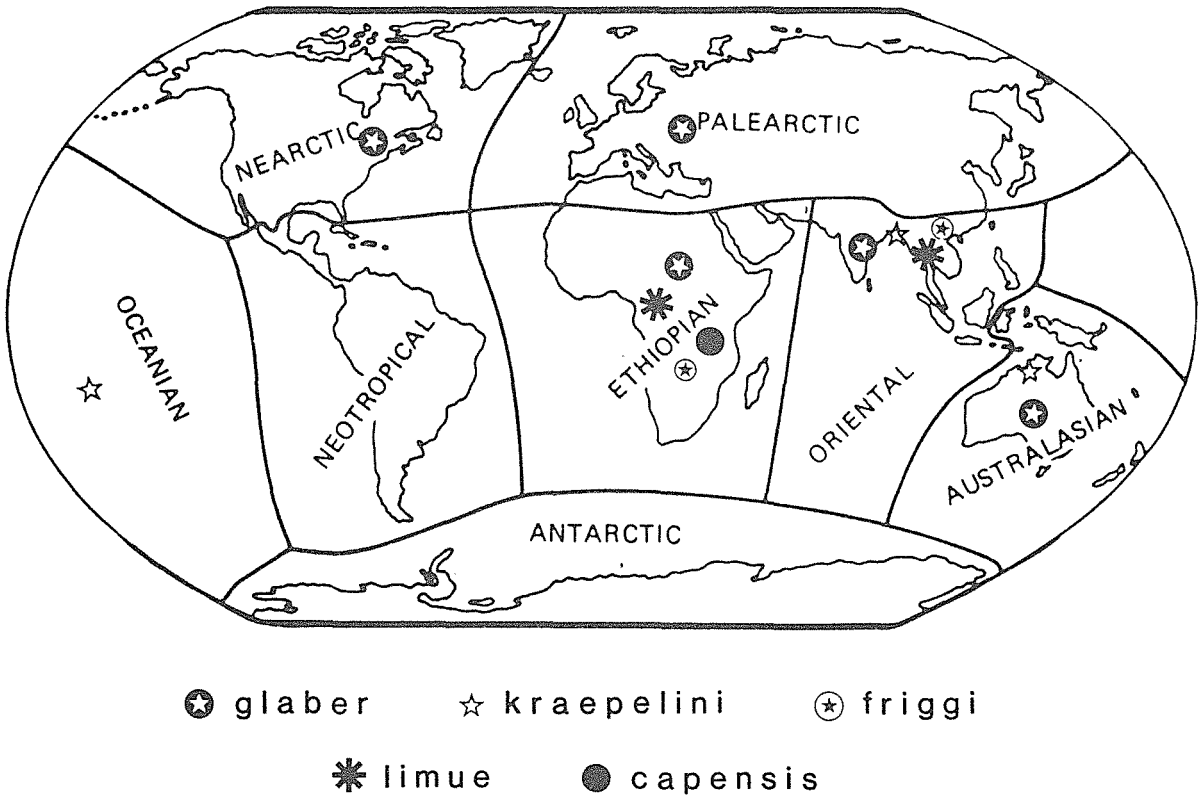

FIG. 2 : World distribution of complexes comprising the *glaber* group *s. str.*

(the vertical setae) are parallel, ornamented with small spicules and oriented anteriorly over the gnathosoma. Setae *J5* (the clunal setae) are inserted close to each other in a shallow declivity at the posterior end of the dorsal shield and are ornamented with two rows of serrations.

The epistome (Fig. 1c) is tripartite, with two well developed lateral flags which extend over the chelicerae, and a median bifurcate element. The chelicerae each bear a simple dorsal seta on the fixed digit and a bidentate tooth on the movable digit (Fig. 1b). Other gnathosomatic characters are typical for the genus.

The sternal shield of the female (Fig. 3) has three pairs of setae (*st* 1-3) and two pairs of pores (*stp* 1-2). A pair of converging ridges form the anterior linea angulata (*l. ang.*), in which sternal pores 1 arise. A short, medial transverse punctate line, the linea arcuata (*l. arc.*), usually is present posterior to *l. ang.* A second linea arcuata may occur anterior to the first. A strongly developed ridge, the linea media transversa (*l. m. t.*), joins sternal setae 2. The depressed area posterior to the *l. m. t.* is bordered laterally by the linea oblique posteriores (*l. o. p.*), a forked fold which includes sternal pores 2 and which extends to the area punctatae laterales (*a. p. l.*). The ramus of *l. o. p.* runs to sternal setae 3. Within the depression posterior to *l. m. t.* are a pair of elliptical punctate areas, the area punctatae posteriores (*a. p. p.*) and the remnants of another pair of more median punctate fields, the area puncti-

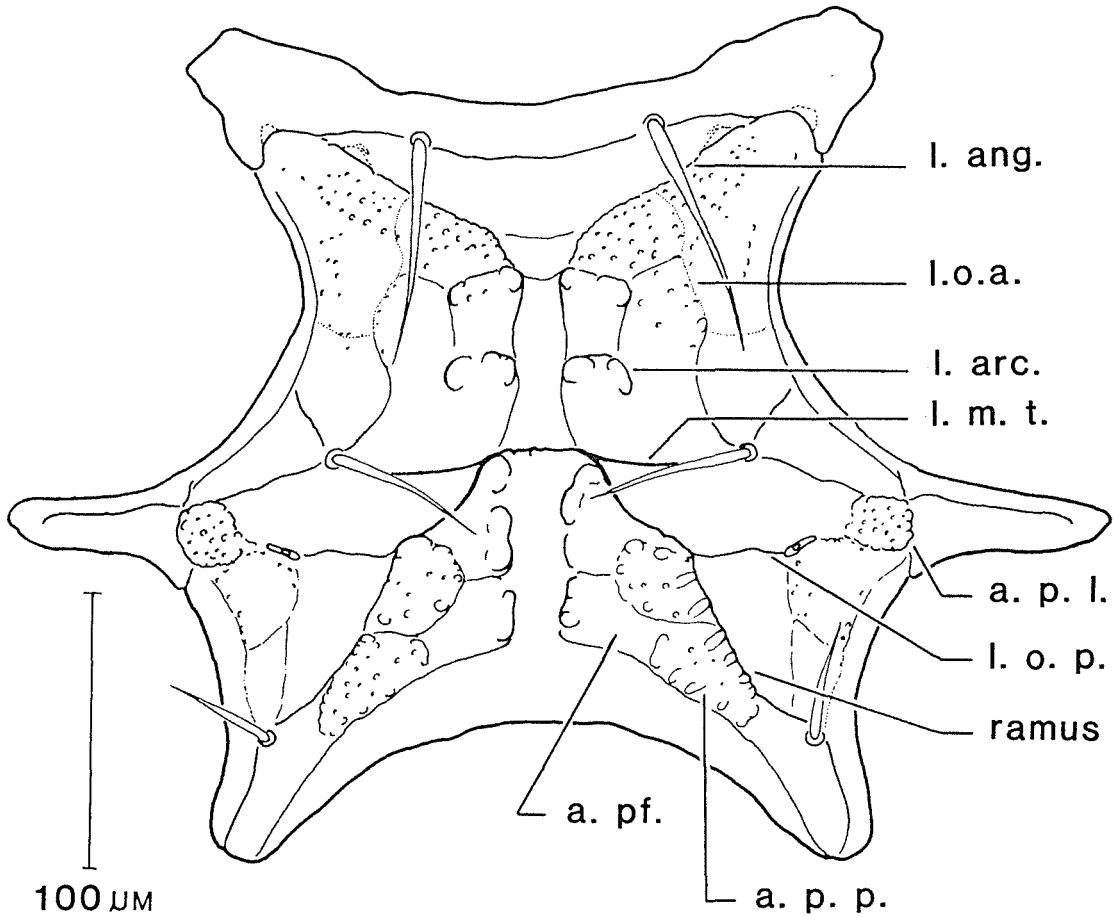

FIG. 3 : Sternal shield of Macrocheles limue Samsinak (Bogor, Indonesia) : *l. ang.* = linea angulata, *l. arc.* = linea arcuata, *l. m. t.* = linea media transversa, *l. o. p.* = linea oblique posteriores, *a. p. l.* = area punctata laterales, *a. p. p.* = area punctata posteriores, *a. pf.* = area punctiformes, *l. o. a.* = linea oblique anteriores.

formes (*a. pf.*). The linea oblique anteriores (*l. o. a.*) are poorly developed in this group. The ventrianal shield cribrum is entirely postanal (Fig. 1a). Other ventral features are typical for the genus.

Where known, males of the *glaber* group have dorsal shield setae with ornamentation similar to the females, although usually more setae are ornamented. The sternitigenital shield is free from the ventrianal shield, which is either subcordate and bears three pairs of setae, or trapezoidal and bears four or five pairs of setae. Paranal cribral extensions may be present. Legs II and IV are armed with spurs.

The developmental chaetotaxy of immatures is presented in KRANTZ (1981).

Types will be deposited in the collection of the Central African Museum, Tervuren, Belgium (KMMA, Tervuren) ; the United States National Museum, Washington, D. C. (USNM, Washington) ; the British Museum (Natural History), London, U. K. (BM(NH), London) ; the National Acari Collection, Plant Protection Research Institute, Pretoria, South Africa (PPRI, Pretoria) ; and Oregon State University, Corvallis, Oregon (OSU, Corvallis).

KEY TO COMPLEXES IN THE *Glaber* GROUP *s. str.*

1. Portion of sternal shield anterior to *l. m. t.* reduced, width ≥ length ; *l. arc.*, *l. o.p.*, and *a. p. p.* obsolescent to obsolete (Figs. 13, 15). Africa and southeast Asia..... *friggi* complex
1′. Sternal shield longer than wide, ornamentation not reduced..... 2
2. At least some dorsal shield setae bipectinate for their entire length (Figs. 16, 18)..... 3
2′. Dorsal shield setae smooth or distally pilose..... 4
3. Dorsal shield narrowing over opisthosoma (Figs. 16, 18), posteroventral carina of basifemur IV developed into a distinct spur. Ethiopia... *capensis* complex
3′. Dorsal shield broad posteriorly, carina of basifemur IV a simple ridge. Orient, Australasia, Oceania..... *Kraepelini* complex
4. *L. ang.* strongly convergent medially (Figs. 3, 7, 9) ; ventrianal shield expanded with strongly dimpled reticulations (Figs. 7, 9) ; postcoxal pore heavily sclerotized. Africa and southeast Asia..... *limue* complex
4′. Not as above (Fig. 5). Cosmopolitan..... *glaber* complex

THE *Glaber* COMPLEX

DIAGNOSIS : With the characteristics of the *glaber* group *s. str.*, dorsal shield longer than wide, not reduced ; ventrianal shield subtriangular, not greatly expanded laterally, without strongly dimpled reticulations.

The *glaber* complex is the largest in the *glaber* group and, with the exception of the neotropics, is worldwide in distribution. Included here are *Macrocheles glaber* (Müller), *glaber tsaii* Samsinak, *caligynus* (Berlese), *perglaber* Filipponi and Pegazzano, *peregrinus* Krantz, *medialis* Berlese, *hyatti* Krantz and Filipponi, *helenaensis* van Driel, and a new species which is described below.

Macrocheles oigru, new species

(Figs. 4, 5)

DIAGNOSIS : The extremely long dorsal shield setae (Fig. 4) distinguish this species from others in the *glaber* group. The sternal shield is strongly ornamented and the ventrianal shield is rounded.

FEMALE : Dorsal shield (Fig. 4) 675 to 774 μm long ($\bar{x}$ = 714.7 ± 30.4 μm, n = 11), broadly elliptical and strongly punctate-reticulate, with a well developed procurved line ; setae *j*1 appressed, thickened and distally plumose ; setae *z*1 short and smooth, setae *j*4 thickened and distally plumose, setae *S*5 and *Z*5 curved and pectinate, setae *J*5 biserrate ; other dorsal shield setae elongate, smooth and acicular, most surpassing the insertions of setae directly behind them. Sternal shield (Fig. 5) strongly ornamented along the *l. ang.*, *l. arc.* deeply punctate, *l. o. p.* bifurcate, *a. p. p.* acinous, *a. pf.* deeply punctate. Metasternal sclerites rounded ; epigynial shield strongly

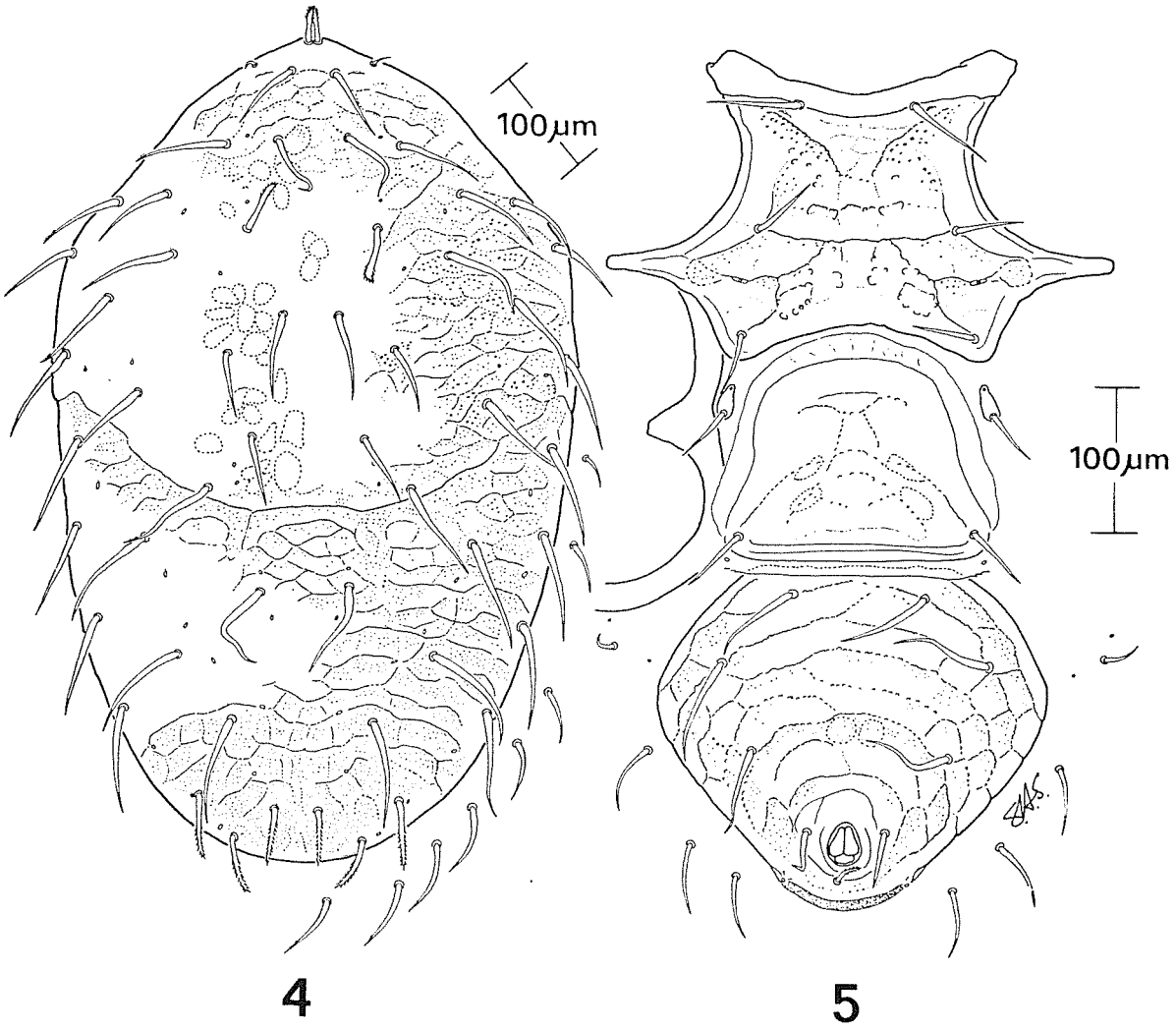

FIG. 4-5 : *Macrocheles oigru*, n. sp., female ; 4. — Dorsal shield ; 5. — Ventral shields.

ornamented. Ventrianal shield somewath wider than long, rounded and strongly punctate-reticulate.

MALE : Unknown.

DISTRIBUTION : The holotype female and three paratype females *ex Onitis philemon* F., Coimbatore (430 m), Madras State, India, 1977 (T. R. S. NATHAN, coll.). Additional paratype material *ex* unidentified scarab beetle collected at Pulney Hills (2000 m), Kodaikamal, India, November, 1953 (P. S. NATHAN, coll.) and *ex Onitis falcatus* Wulfen collected in Croisiere du " Nirvana ", Palaboen Ratoe E. Corier, Java, 31 May, 1908 (C. DE BEARN, coll.).

TYPE DEPOSITION : The holotype and a paratype female will be deposited with USNM, Washington. Paratypes females will be placed in the following collections : KMMA, Tervuren ; USNM ; OSU, Corvallis.

THE *Limue* COMPLEX

DIAGNOSIS : Sternal shield longer than wide, with distinctive ornamentation ; *l. ang.* is produced medially as a narrow tongue. The ventrianal

shield has strong dimpled reticulations and is broadly expanded laterally, extending to the levels of coxae IV. The postcoxal pores are appressed to the parapodal plates and usually are enlarged. Members of the *limue* group are found in subsaharan Africa and southeast Asia.

KEY TO THE SPECIES IN THE *Limue* COMPLEX

1. *L. arc.* straight, ventrianal shield with smoothly dimpled, rectangular cells..... 2
1′. *L. arc.* procurved, ventrianal shield coarsely punctate-reticulate, Africa..... *caelatus* Berlese
2. Dorsal setae smooth. Africa and Asia..... ..... *limue* Samsinak
2′. Marginal dorsal setae distally pilose. Africa..... ..... *witcoskyanus* n. sp.

Macrocheles limue Samsinak 1962
(Fig. 3)

Macrocheles limue SAMSINAK, K. 1962 ; Acta Soc. Ent. Cechoslov. 59 : 202-203.

Macrocheles eurygaster KRANTZ, 1981 ; Internat. J. Acarol., 7 : 3-7, *new synonomy.*

Macrocheles limue is a robust mite that is phoretic on a large number of dung beetle species in tropical Africa, southeast Asia and the Philippines. The African populations have been described as *M. eurygaster* by KRANTZ (1981). However, although the holotype of *eurygaster* is somewhat more punctate in the region of *l. ang.* than is the holotype of *limue* [1], the two are otherwise morphologically identical. Size ratios between African and Asian populations also showed only minor interpopulational variations. For example, dorsal shield length in a collection of *M. limue* females from Indonesia ranged in length from 863-1008 μm ($\bar{x}$ = 937.0 ± 53.9, n = 7), while a collection of nine females from South Africa had dorsal shields which ranged in length from 891-1026 μm ($\bar{x}$ = 969.0 ± 46.9, n = 9).

Males of *M. limue* reared from females collected in Bogor, Java were found to be indistinguishable from males described from Africa.

DISTRIBUTION : *M. limue* is the most commonly collected African *glaber* group species in the Oregon State University (OSU) acarology collection. At least 56 species of the scarab beetle genera *Aphodius, Onitis, Allonitis, Heteronitis, Oniticellus, Liatongus, Copris, Heliocopris, Catharsius, Onthophagus, Scarabaeus,* and *Garreta* have been found to carry *M. limue* in subsaharan Africa and southeast Asia. Collections on hand are from Ethiopia, Chad, the Cameroons, Guinea, Zaire, Rwanda, Zambezi, Burundi, Kenya, Uganda, South Africa, India, Java, Sumatra, Bali and Luzon Island in the Philippines.

Macrocheles caelatus Berlese 1918
(Figs. 6, 7)

M. caelatus is represented in the OSU Acarology Collection by a few specimens in two collections from central Africa. It is placed in the *limue* complex on the basis of the narrow *l. ang.* (clearly visible in the BERLESE drawing of the species, notebook p. 123) and the expanded and strongly dimpled ventrianal shield. The following diagnosis is based on specimens in the OSU acarology collection and on earlier examination of BERLESE's type specimen by GWK.

DIAGNOSIS : Dorsal shields (Fig. 6) 753.6 μm in length (± 82.8, range = 623-855 μm, n = 7), broadly produced posteriorly and evenly reticulate, procurved line distinct. Dorsal shield setae *j*1, *j*4 and *z*4 distally pilose, *J*5 bipectinate ; other dorsal setae smooth or nearly so. Ventral shields (Fig. 7) strongly ornamented, with a narrow *l. ang.* deeply punctate and reflexed *l. arc.*, and a strongly punctate-reticulate ventrianal shield.

1. The authors acknowledge the assistance of Dr. K. SAMSINAK, who kindly provided the holotype slide of *M. limue* for this study.

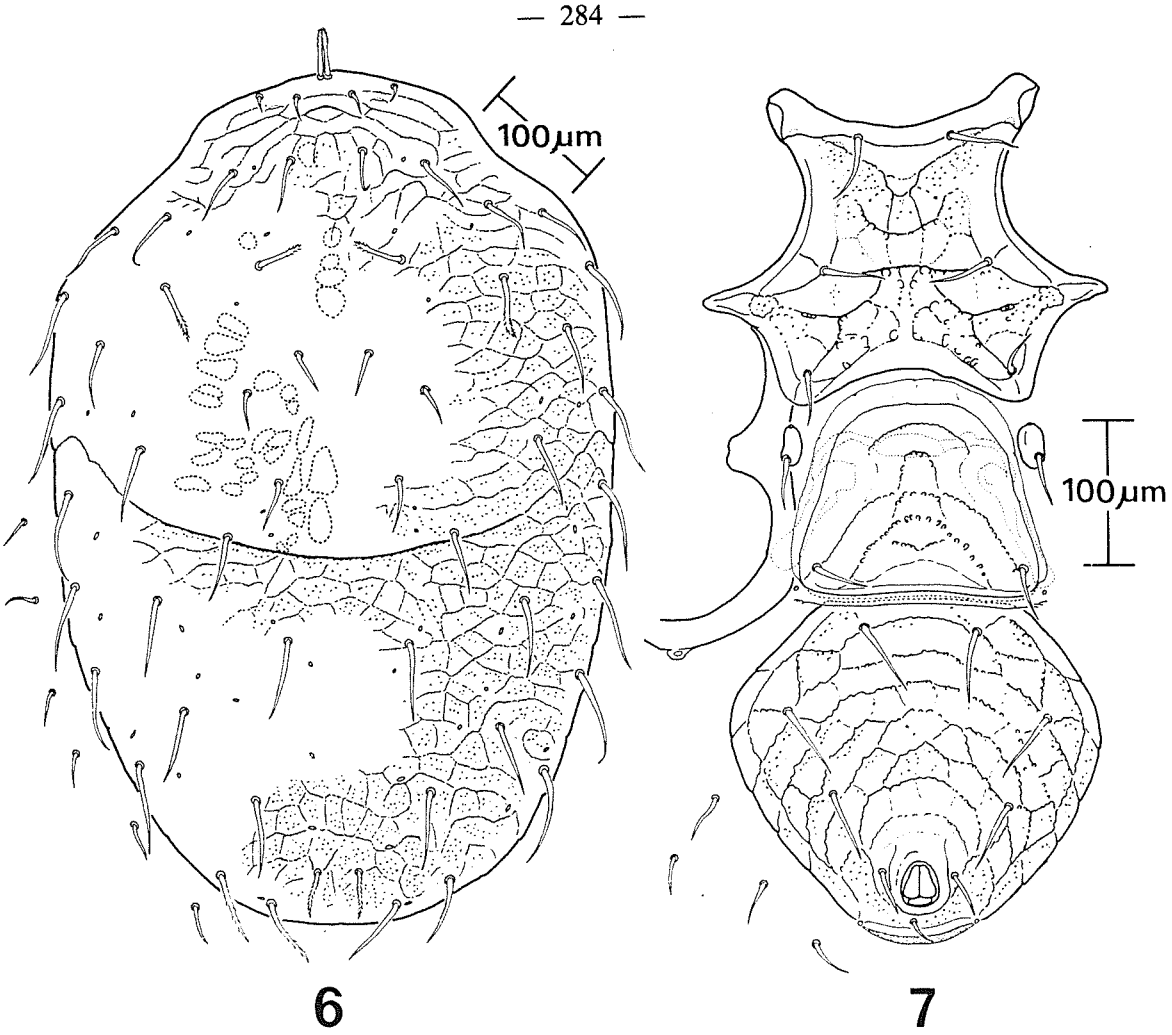

FIG. 6-7 : *Macrocheles caelatus* Berlese, female ; 6. — Dorsal shield ; 7. — Ventral shields.

DISTRIBUTION : Specimens of *M. caelatus* in the OSU collection are from species of *Onitis* and *Copris* collected in Zaire and Rwanda. The BERLESE type specimen (slide number 33/27) was collected in East Africa.

Macrocheles witcoskyanus, new species

(Figs. 8, 9)

M. witcoskyanus is a west African species with the *l. ang.* and ventrianal shield characteristic of the *limue* complex. Unlike other members of the complex, it was collected from a non-coprophilous scarab. The species is named in honor of Dr. Jeffrey WITCOSKY, fellow student and friend at Oregon State University.

DIAGNOSIS : Sternal shield strongly ornamented, with narrow *l. ang.* and strongly punctate *a. p. p.* and *a. pf.* Ventrianal shield ornamented with smoothly dimpled rectangular cells. Setae on the margin of the dorsal shield distally pilose.

FEMALE : Dorsal shield (Fig. 8) 783 to 878 µm in length ($\bar{x}$ = 834.1 ± 33.4 µm, n = 7), broadly elliptical and evenly reticulate, procurved line faint ; setae *j*1 appressed or separate, distally pilose ; setae *z*1, *z*5, *z*6, *j*4, *j*5, *j*6 and *J*2 smooth,

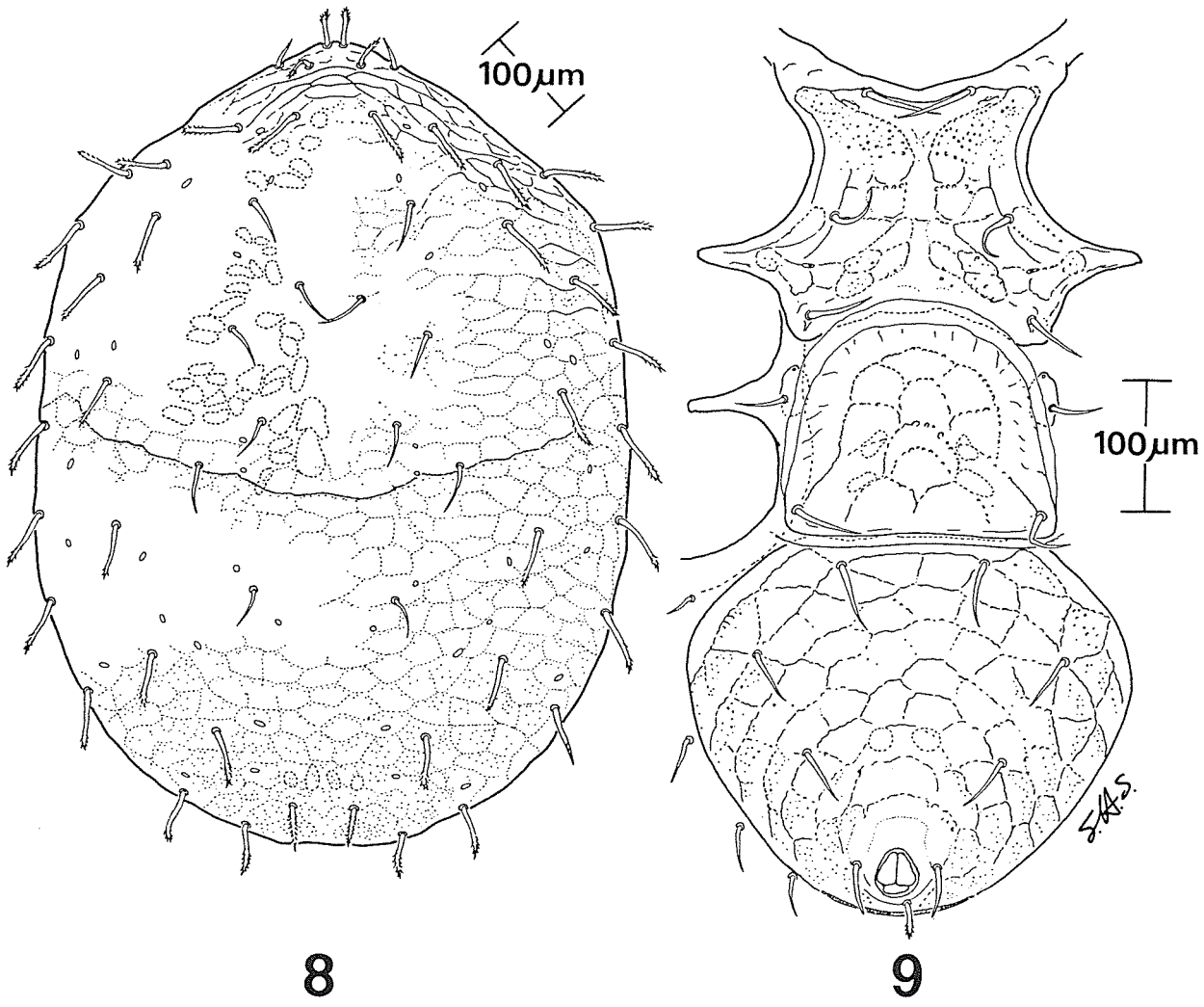

FIG. 8-9 : *Macrocheles witcoskyanus*, n. sp., female ; 8. — Dorsal shield ; 9. — Ventral shields.

other setae sparsely pilose distally ; setae *J5* serrate. Sternal shield (Fig. 9) longer than wide, *l. ang.* narrowly produced and punctate ; with two *l. arc.*, the more posterior deeply punctate and reflexed ; *l. o. p.* bifurcate, *a. p. p.* and *a. pf.* strongly punctate. Metasternal sclerites rounded ; epigynial shield evenly punctate-reticulate. Ventrianal shield broadly expanded laterally, wider than long and ornamented with deeply dimpled rectangular cells ; postcoxal pore appressed to parapodal plate.

MALE : Unknown.

DISTRIBUTION : The holotype female and six paratype females *ex Goliathus goliathus* Drury (Coleoptera : Cetoniinae) collected at Sanaga, the Cameroons, April 1974 (collector unknown).

TYPE DEPOSITION : The holotype and a paratype female will be deposited with USNM, Washington. Paratypes females will be placed in the following collections : KMMA, Tervuren ; USNM ; OSU, Corvallis.

THE *Friggi* COMPLEX

The *friggi* complex exhibits a trend toward reduction of sternal shield ornamentation in conjunction with compression in the length of the sternal shield (Fig. 1d). The complex carries the name of a new species which has been assigned to it.

DIAGNOSIS : Sternal shield compressed so that the length is equal to or less than the width. Ornamentation of the sternal shield reduced, with the *l. ang.* open medially and obsolete, *l. arc.* faint but punctate, *l. m. t.* strongly developed, *l. o. p.* disjunct, and the ramus evanescent or lost. The *a. p. p.* and *a. pf.* are reduced to scattered punctae, or lost. The *friggi* complex is presently known from subsaharan Africa and Thailand.

KEY TO THE SPECIES IN THE *Friggi* COMPLEX

1. Posterior dorsal shield setae and integumental setae bipectinate. Thailand..... *nalani* n. sp.

1′. Dorsal shield setae (except *j*1 and *J*5) and integumental setae smooth. Africa..... 2

2. Sternal shield about as wide as long, *l. arc.* deeply punctate..... *friggi* n. sp.

2′. Sternal shield wider than long, *l. arc.* lost, setae *j*1 flattened distally and pilose.. *pumiliosternus* n. sp.

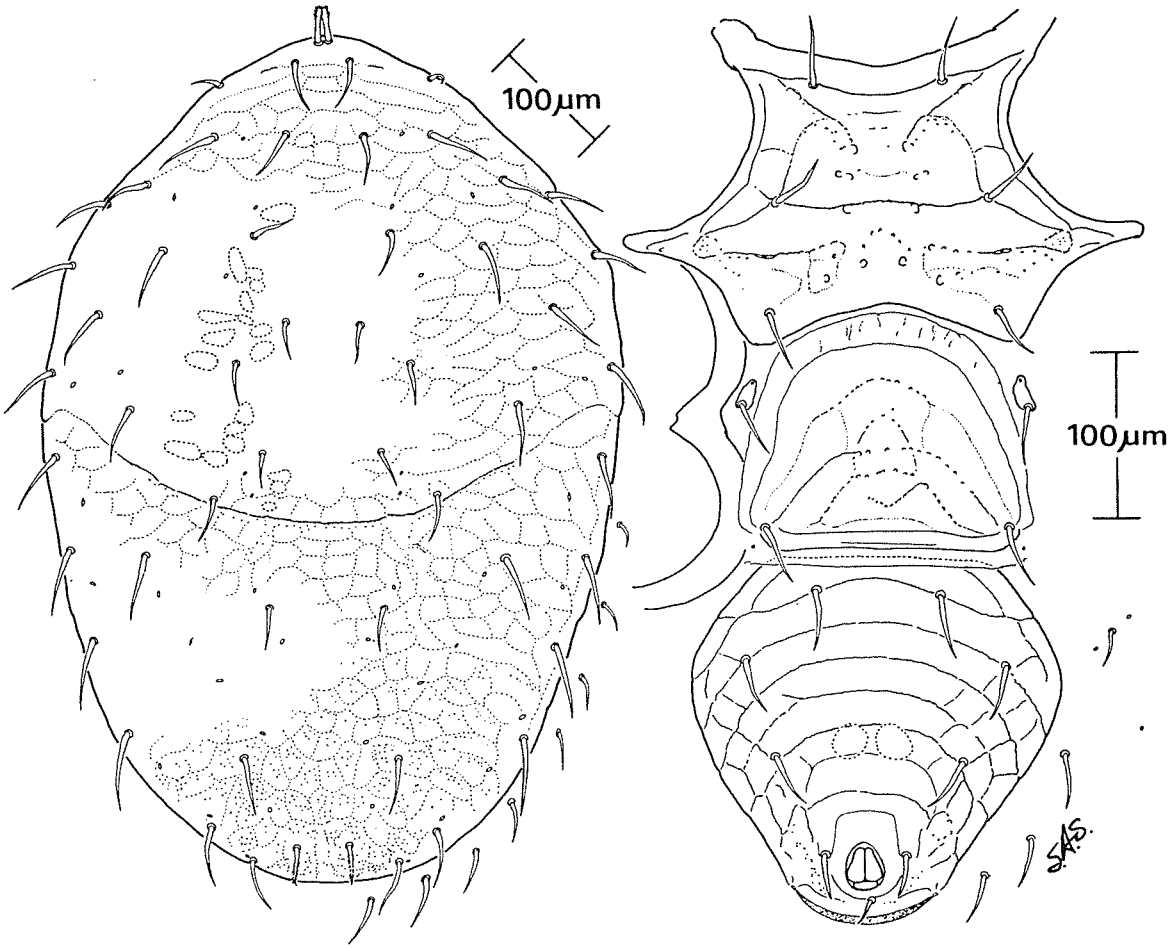

FIG. 10-11 : *Macrocheles friggi*, n. sp., female ; 10. — Dorsal shield ; 11. — Ventral shields.

Macrocheles friggi, new species
(Figs. 1d, 10, 11)

The name *Macrocheles friggi* was proposed by VAN DRIEL (1973) in his doctoral thesis for specimens collected in Zaire.

DIAGNOSIS : Sternal shield about as wide as long, with reduced but deeply punctate lines. Dorsal setae acicular and smooth. Subsaharan Africa.

FEMALE : Dorsal shield (Fig. 10) 648 to 810 μm in length ($\bar{x}$ = 731.4 ± 44.6 μm, n = 42), evenly reticulate, with a strong procurved line and broadly produced over the opisthosoma. Setae *j*1 appressed and distally pilose, setae *J*5 weakly serrate, other dorsal setae smooth and acicular. Sternal shield (Fig. 11) about as wide as long, with an open punctate *l. ang.*, evanescent *l. arc.* with deep punctae, a strong *l. m. t.* and disjunct *l. o. p.* with evanescent ramus, and *a. p. p.* and *a. pf.* reduced to scattered deep punctae. Epigynial shield with reduced reticulations and a strong punctate arch, metasternal sclerites narrow. Ventrianal shield evenly punctate-reticulate and cordate, with the width greater than the length. Postcoxal pore adjacent to the parapodal plates.

MALE : Unknown.

DISTRIBUTION : *M. friggi* has been collected from scarab beetles of the genera *Oniticellus, Catharsius, Heliocopris, Scarabaeus, Heteronitis,* and *Onitis* in the Cameroons, the Central African Republic, Zaire, Kenya and Ethiopia.

TYPE DEPOSITION : The holotype and three paratype females *ex Heteronitis castelnaudi* Har., Stanley Pool, Zaire, 1936 (A. BOUCOMONT, coll.), will be deposited at the USNM, Washington. Paratypes will be placed in the following collections : KMMA, Tervuren ; BM(NH) ; and OSU, Corvallis.

Macrocheles pumiliosternus, new species
(Figs. 12, 13)

Macrocheles neovernalis Ryke and Meyer, COSTA (1975) : Mitt. Hamburg Zool. Mus. Inst. 72 : 124-125 [misidentification].

DIAGNOSIS : *M. pumiliosternus* may be readily distinguished from *M. neovernalis* Ryke and Meyer by its sternal shield, which is greatly shortened and much wider than long (*pumilio*, (L) a dwarf, *stern-*, (L) breast). The short, thick, terminally pilose setae *j*1 of *M. pumiliosternus* differ from those of *neovernalis*, in which setae *j*1 are variable in size and usually pilose in the distal one-fifth. Central and southern Africa.

FEMALE : Dorsal shield (Fig. 12) 495 to 576 μm in length ($\bar{x}$ = 524.3 ± 17.3, n = 20), attenuated posteriorly, reticulate, procurved line strong ; setae *j*1 appressed, short, thick and pilose terminally, setae *J*5 weakly serrate, other dorsal setae acicular and smooth. Sternal shield (Fig. 13) squat, much wider than long, *l. ang.* and *l. arc.* obsolete, *l. m. t.* a strong ridge, *l. o. p.* disjunct and subparallel to *l. m. t.*, and *a. p. p.* and *a. pf.* reduced to a few deep punctae. Epigynial shield ornamentation reduced, with a recurved arch-like ridge, metasternal sclerites small and narrow. Ventrianal shield small, subtriangular, wider than long and evenly punctate-reticulate, postcoxal pore adjacent to the parapodal shield. Chelicerae large, with strongly developed teeth.

MALE : Unknown.

DISTRIBUTION : *M. pumiliosternus* has been collected from Gabon, the Cameroons, Chad, Zaire, Uganda, Kenya and South Africa. Phorionts of *M. pumiliosternus* include beetles of the genera *Onitis, Heteronitis, Catharsius, Heliocopris, Scarabaeus* and *Pritophilus.*

TYPE DEPOSITION : The holotype and five paratype females *ex Onitis inversidius* Lansb., Chamba, Zambezi River, Zaire, December, 1929

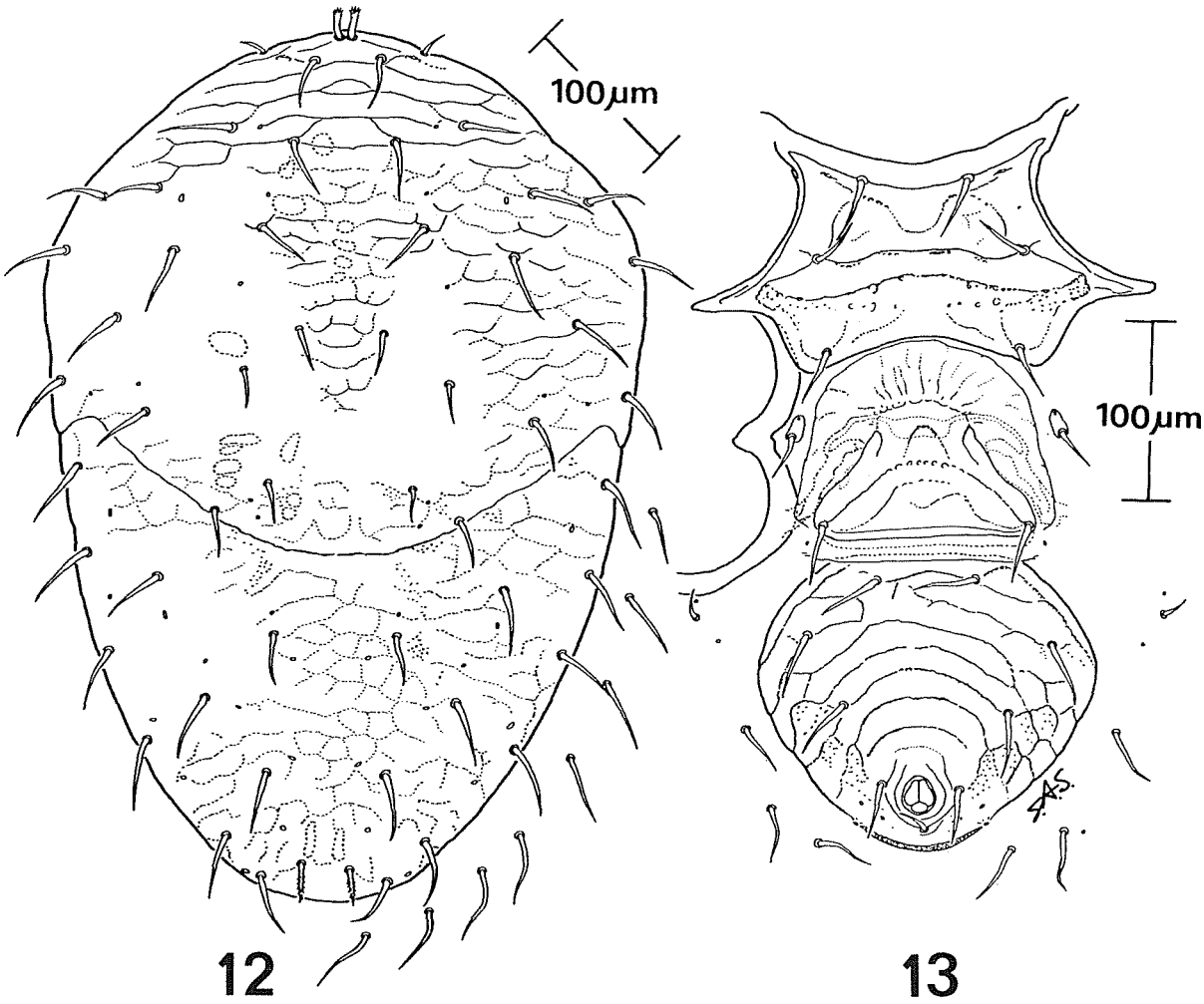

FIG. 12-13 : *Macrocheles pumiliosternus*, n. sp., female ; 12. — Dorsal shield ; 13. — Ventral shields.

(J. SURCOUF, coll.) will be deposited at the KMMA, Tervuren. Paratypes will be placed in the following collections : USNM, Washington, PPRI, Pretoria ; BM(NH) ; OSU, Corvallis.

Macrocheles nalani, new species

(Figs. 14, 15)

M. nalani is described from two collections *ex Heliocopris tyrannus* Thoms. collected in Thailand. *Nalani* (heavenly), is a Hawaiian word.

DIAGNOSIS : *M. nalani* is a distinctive species with enlarged, distally bipectinate posterior opisthonotal setae and a squat sternal shield with ornamentation which is intermediate between those of *M. friggi* and *M. pumiliosternus*.

FEMALE : Dorsal shield (Fig. 14) 603-675 µm long ($\bar{x}$ = 646.2 ± 15.6 µm, n = 19), evenly reticulate, procurved line well developed ; setae *j*1 appressed and distally pilose, *z*1 short and smooth, *j*4 distally pilose, *Z*4, *S*4, *S*5, and *Z*5 thick and pectinate in distal half, setae *J*5 serrate, other dorsal shield setae smooth and acicular. Sternal shield (Fig. 15) much wider than long, *l. ang.* open and evanescent, *l. arc.* punctate but faint, *l. m. t.* strong, *l. o. p.* parallel to *l. m. t.*, disjunct ; ramus evanescent, *a. p. p.* and *a. pf.*

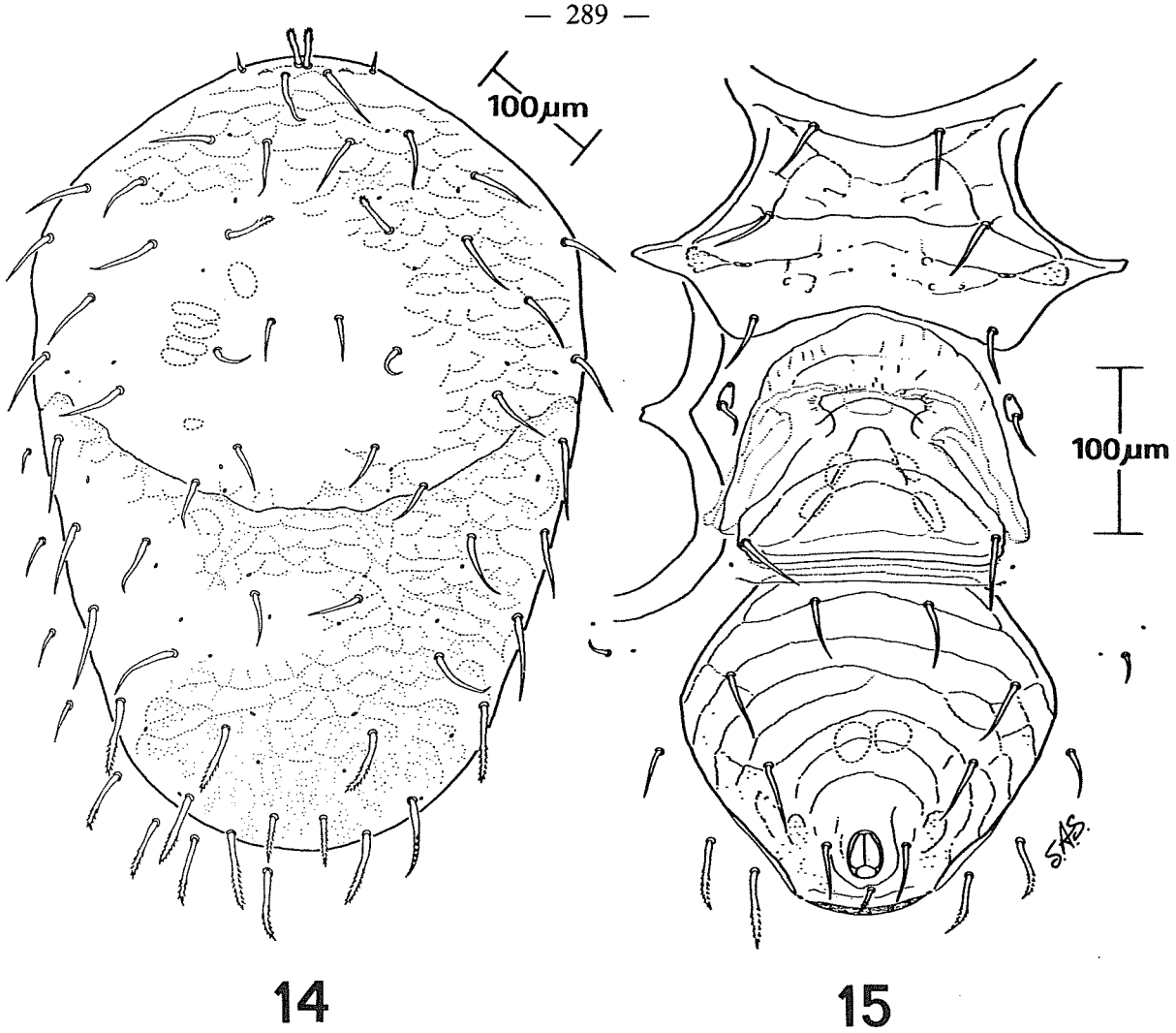

FIG. 14-15 : *Macrocheles nalani*, n. sp., female ; 14. — Dorsal shield ; 15. — Ventral shields.

reduced to a few faint scattered spots. Epigynial shield ornamentation greatly reduced except for the recurved arch, metasternal sclerites narrow. Ventrianal shield rounded cordate, wider than long, evenly punctate-reticulate ; posterior integumental setae elongate and bipectinate.

MALE : Unknown.

DISTRIBUTION : *M. nalani* has been taken only in Thailand, from *Heliocopris tyrannus*.

TYPE DEPOSITION : The holotype and seven paratype females *ex Heliocopris tyrannus* Thoms. were collected at Toak Plateau, Tenaserim, Thailand ; January, 1924 (W. LOWE, coll.). Additional specimens were taken from *H. tyrannus* collected at Bankiriwong, 14 July, 1929 (H. M. SMITH, coll.). The holotype and a paratype female will be deposited at the USNM, Washington. Paratypes will be placed at the following institutions : KMMA, Tervuren ; BM(NH) ; OSU, Corvallis.

THE *Kraepelini* COMPLEX

The *kraepelini* complex includes three species : *M. kraepelini* (Berlese), *tantalus* Walter and Krantz, and *hallidayi* Walter and Krantz.

DIAGNOSIS : Dorsal shield broadly rounded posteriorly, dorsal shield setae enlarged and bipectinate. Genu IV may have six or seven setae. Southern Asia, Australia, and Oceania. The *kraepelini* complex has been reviewed in another paper (WALTER and KRANTZ 1986).

THE *Capensis* COMPLEX

The *capensis* complex consists of two species which apparently are restricted to subsaharan Africa. The complex takes the name of one of these species.

DIAGNOSIS : Dorsal shield strongly reticulate and narrowed posteriorly, procurved line heavily punctate, posterior arms of the procurved line strongly produced ; setae *j*1 appressed, long and plumose ; *J*5 serrate, long and curved ; setae *z*1 short and smooth ; median dorsal setae long and smooth, but other dorsal setae elongate and strongly bipectinate, as are most of the integumental setae. Sternal shield longer than wide and strongly punctate along the margins or across its entire face. Sternal, metasternal, and epigynial setae may be pilose distally ; sternals 1 always distally pilose. Posteroventral carina of basifemur IV produced into a distinct spur.

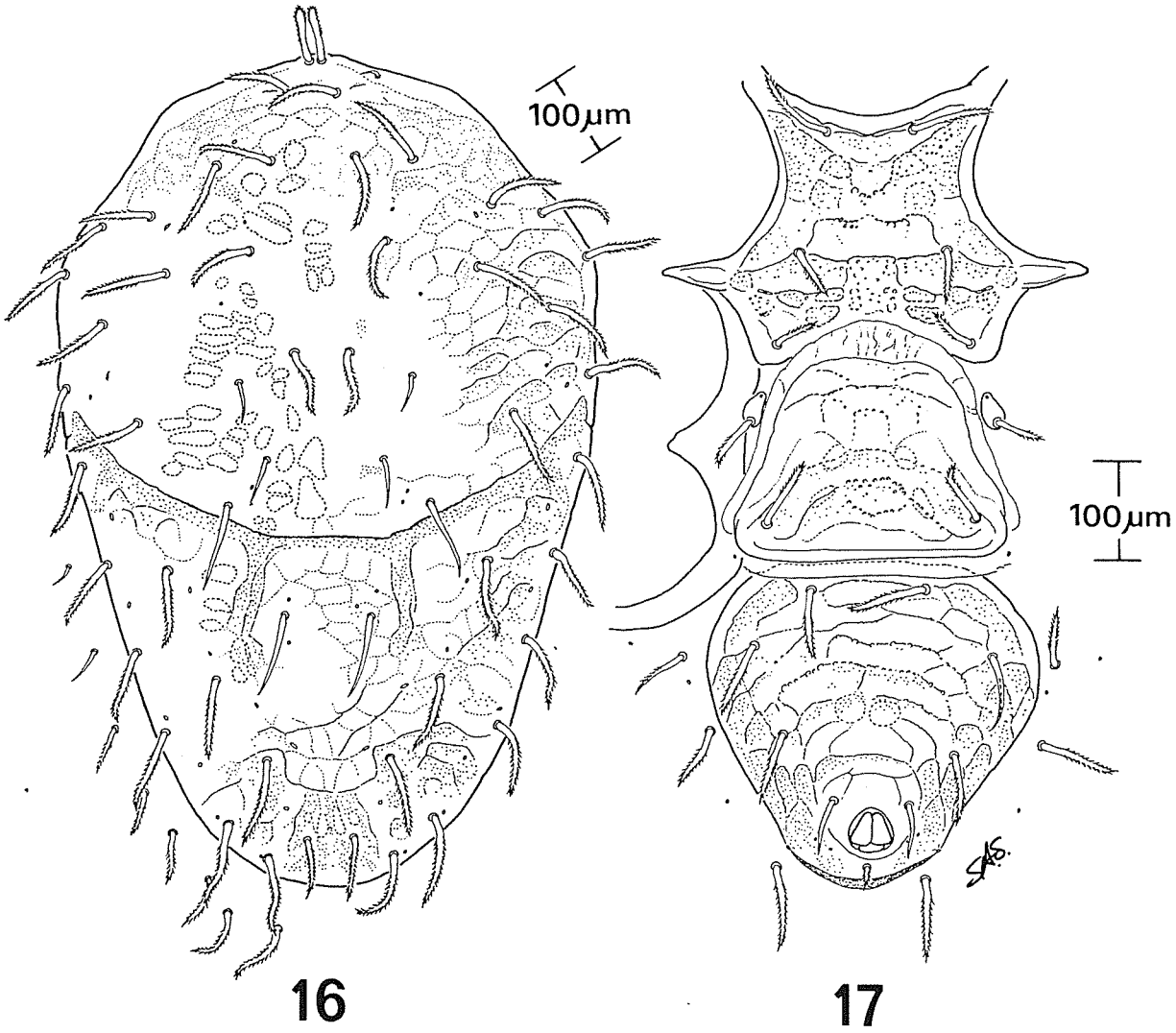

FIG. 16-17 : *Macrocheles capensis*, n. sp., female ; 16. — Dorsal shield ; 17. — Ventral shields.

KEY TO THE *Capensis* COMPLEX

1. Sternal shield evenly punctate, *a. pf.* obscure, setae on ventral plates strongly pectinate, ventrianal shield longer than wide..... *capensis* n. sp.

1′. Background punctation reduced, *a. pf.* deeply punctate, sternal setae 1 distally pilose, other ventral setae at most weakly pilose, ventrianal shield broader than long..... *macroscatophilus* n. sp.

Macrocheles capensis, new species

(Figs. 16, 17)

M. capensis is the name suggested by VAN DRIEL (Ph. D. thesis, 1973) for a collection of this species from Port Elizabeth, South Africa.

DIAGNOSIS : Dorsal shield tapering, bipectinate dorsal and ventral setae, ventrianal shield small and triangular, ventral shields evenly punctate.

FEMALE : Dorsal shield (Fig. 16) 702 to 1018 μm long ($\bar{x}$ = 887.8 ± 78.1, n = 19), narrowing posteriorly, procurved line strongly produced and heavily punctae, with strongly punctate posterior arms ; setae *j*1 plumose, *J*5 long, curved, and serrate ; *j*5 sparsely bipectinate, *z*1, *z*5, *j*6, *z*6 and *J*2 smooth, other dorsal setae elongate and strongly bipectinate. Sternal shield heavily punctate throughout ; with a strong medially punctate *l. ang.*, punctate *l. arc.* and *l. m. t.*, bifurcate *l. o. p.*, and deeply recessed *a. p. p.* ; *a. pf.* obscured by the punctate ornamentation. Epigynial shield and small triangular ventrianal shield punctate-reticulate. Integumental setae and virtually all of the ventral shield setae strongly bipectinate, paranals smooth.

MALE : Unknown.

DISTRIBUTION : *M. capensis* has been collected in South Africa, Kenya, Ethiopia, Rwanda and Zaire. It is occasionally collected as a phoretic on beetles of the genera *Onitis, Heliocopris*, and *Diastellopalpus*.

TYPE DEPOSITION : The holotype (Garamba National Park, Zaire, *ex* elephant dung, 23 April 1951, H. DESAEGER, coll. 1609) will be deposited at the KMMA, Tervuren. Paratypes or identified specimens will be placed with the following collections : USNM, Washington ; BM(NH), London ; PPRI, Pretoria ; and OSU, Corvallis.

Macrocheles macroscatophilus, new species

(Figs. 18, 19)

M. macroscatophilus is a sibling species of *M. capensis* which has been collected in Zaire and Ethiopia. The specific name refers to its size and habitat.

DIAGNOSIS : *M. macroscatophilus* is the largest species in the *glaber* group. The dorsal shield is somewhat tapered posteriorly and the dorsal setae are enlarged and bipectinate. Ventral setae are smooth to weakly pilose.

FEMALE : Dorsal shield (Fig. 18) 874 to 1269 μm long ($\bar{x}$ = 1 002.3 ± 81.3, n = 29), procurved line strongly produced and heavily punctate, with strongly punctate posterior arms ; setae *j*5, *g*1, *z*5, *j*6, *z*6 and *J*2 smooth, other dorsal setae bipectinate. Sternal shield (Fig. 19) punctate marginally, with two deeply punctate *l. arc.*, *a. p. p.* deeply recessed, *a. pf.* with deep punctae ; sternal setae 1 are distally pilose, remaining setae of the ventral plates smooth or at most sparsely pilose distally. Ventrianal shield rounded subcordate, broader than long.

MALE : Unknown.

DISTRIBUTION : *M. macroscatophilus* is common in collections from Garamba National Park, Zaire in elephant and rhinoceros dung. It also has been collected from beetles of the genera *Onitis* and *Heliocopris* from Zaire and Ethiopia.

TYPE DEPOSITION : The holotype and a paratype *ex* unidentified coprophagic insect, grassy savanna, Garamba National Park, Zaire ;

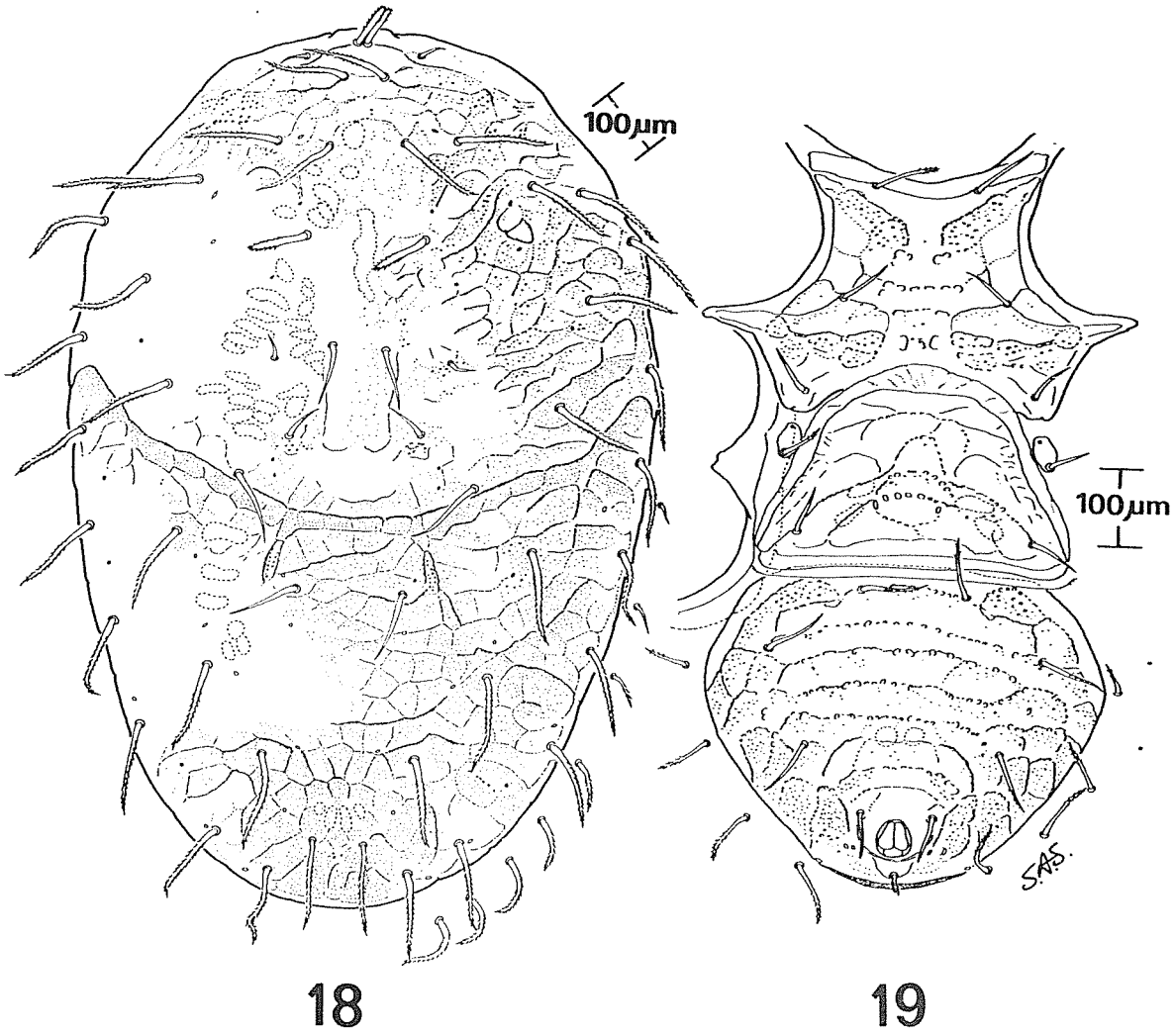

FIG. 18-19 : *Macrocheles macroscatophilus*, n. sp., female ; 18. — Dorsal shield ; 19. — Ventral shields.

26 August 1952 (H. DESAEGER, coll.) will be deposited with the KMMA, Tervuren. Paratypes or identified specimens will be placed with the following collections : PPRI, Pretoria ; BM(NH) ; London ; USNM, Washington ; OSU, Corvallis.

DISCUSSION

Members of the *glaber* group are common in dung habitats and are phoretic on a wide variety of geotrupine, aphodiine, and coprine dung beetles. A broad phoriont range is characteristic of *glaber* group species (KRANTZ 1981 ; WALTER 1984), and has been observed commonly among the species discussed in this review. Exceptions are *M. nalani*, which has been taken only from *Heliocopris tyrannus*, and *M. witcoskyanus* which has been found only on a non-coprophagic cetoniine beetle. A degree of specificity might also be assume for *M. oigru*, which is known only from two species of *Onitis* and an unidentified scarab. These presumably narrow phoriont ranges, however, may be a manifestation of limited sampling (*i.e.* only two collections of *M. nalani* and three collections of *M. oigru* were available to the authors during the course of this study).

The center of diversity of the *glaber* species

group is believed to be the Old World tropics (WALTER 1984). The Ethiopian biogeographic realm is home to 17 *glaber* group species and, of the 30 recognized species in the *glaber* species group *sensu latu*, only five have temperate zone distributions (holaric and Australasian). The remaining eight species are paleotropical (Ethiopian, Oriental, and Oceananian) in distribution (WALTER 1984, WALTER and KRANTZ, *in prep.*). None is neotropical.

The establishment of complexes in the *glaber* group *s. str.* was prompted by the recognition of a number of " subgroups " based on features considered to be secondary to the suite of characteristics being used in a current study of species group concepts in *Macrocheles* (KRANTZ and WALTER, *in prep.*). The features which define *glaber* group complexes concern setal ornamentation, dorsal shield shape and, to a lesser extent, sternal shield ornamentation.

Species of the *friggi* complex have the most reduced sclerotization and sternal shield ornamentation in the *glaber* group *s. str.* They retain the open *l. ang.* and the deep punctate of the *l. ang.* and *l. arc.* characteristic of this subgroup. In addition, the *friggi* complex has undergone a unique reduction of the sternal shield anterior to the *l. m. t.* Species in the *scutatus* subgroup of the *glaber* group illustrate a parallel reduction of sclerotization and ornamentation of the sternal shield without compression of the shield but with the loss of characteristic lines and punctae (WALTER and KRANTZ, *in prep.*). The posterior attenuation of the dorsal shield and the general dorsal facies of species in the *capensis* complex, an Ethiopian assemblage, are strongly reminiscent of the *dimidiatus* species group, a large and exclusively New World assemblage (KRANTZ, *in prep.*). Ventral shield differences between the *capensis* and *dimidiatus* groups, however, provide ample corroboration of their presumed geographic disjunction. The limited known range of the *kraepelini* complex is paralleled by the *capensis* complex, which is restricted to subsaharan Africa. Aside from the *glaber* complex, some members of which have experienced considerable expansion of their range due to the activities of man, complexes in the *glaber* group *s. str.* tend to be restricted in their distribution (Fig. 2). As noted earlier in the discussion, none has been identified from the neotropical realm.

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