



A new species of *Ophiomegistus* Banks (Acari: Paramegistidae) from Papua New Guinea

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Abstract

A new species of *Ophiomegistus*, *O. spectabilis*, is described from New Guinea. This represents the 13th species of this genus from New Guinea skinks. A re-evaluation of host and locality data for the genus shows a host range restricted to squamates, especially skinks, but no obvious specificity for individual skink species. Specificity for small geographical areas seems more likely.

Key words: reptile parasites, associations, Scincidae

Introduction

The island of New Guinea has been identified as a megadiverse region (Mittermeier and Mittermeier 1997) with an estimated 5–7% of the world's biodiversity in an area representing only 0.6% of the Earth's land area. Despite its importance as a biodiversity hotspot (Mittermeier *et al.* 1998), the parasites of New Guinea wildlife are poorly studied. One group that appears to have radiated in New Guinea is the mite genus *Ophiomegistus* (Mesostigmata: Paramegistidae). Species in this genus are unusual among basal Mesostigmata, and even within the family Paramegistidae, by their association with vertebrates rather than with arthropods. Very little is known about their biology. The adults are blood feeding parasites, that live partially lodged under the scales of their hosts, which can be skinks (17 spp. described so far) or snakes (3 spp.) (Domrow 1978, 1984; Goff 1979, 1980a, b; Womersley 1958). Immatures are unknown for the entire genus. Presumably, they live off the host. Biogeographically, the genus is restricted to the Australasian region, but the majority of species (12) has been reported from New Guinea.

A recent collection of skinks from Rambutyo Island (Papua New Guinea) turned up several specimens of a new *Ophiomegistus* species collected from several individuals of *Sphenomorphus pratti* (Scincidae). The purpose of this paper is to describe this species and to review existing records.

Material and methods

Lizards were captured by hand and inspected for parasites. Ectoparasites were placed into a 2.0 mL vial with 90% ethanol for later examination. Lizard specimens were vouchered and deposited at the Louisiana State University Museum of Zoology (LSUMZ).

Mite specimens were cleared and slide mounted. Pencil drawings were prepared using a Zeiss Axioskop®

equipped with a drawing tube. Resulting images were scanned and redrawn in Adobe Illustrator® (Adobe Systems Inc., San Jose). All measurements are in micrometer (μm) in the format: average (range). Palpal chaetotaxy follows Evans (1963b), leg chaetotaxy follows Evans (1963a; 1965; 1969).

***Ophiomegistus spectabilis* Klompen & Austin sp. nov.**

(Figs. 1–5)

Diagnosis. Female with two small setae on each latigynial shield. Ventral opisthosoma of both adults with a few very small setiform setae anterior on the ventri-anal shield and 15–22 large, translucent, leaf-like setae covering most of the posterior parts of that shield. Metapodal shields broadly fused with peritrematal shields. Marginal setae well developed, including long rod-like setae interspersed among larger numbers of distinctly shorter, rounded, and blade-like setae.

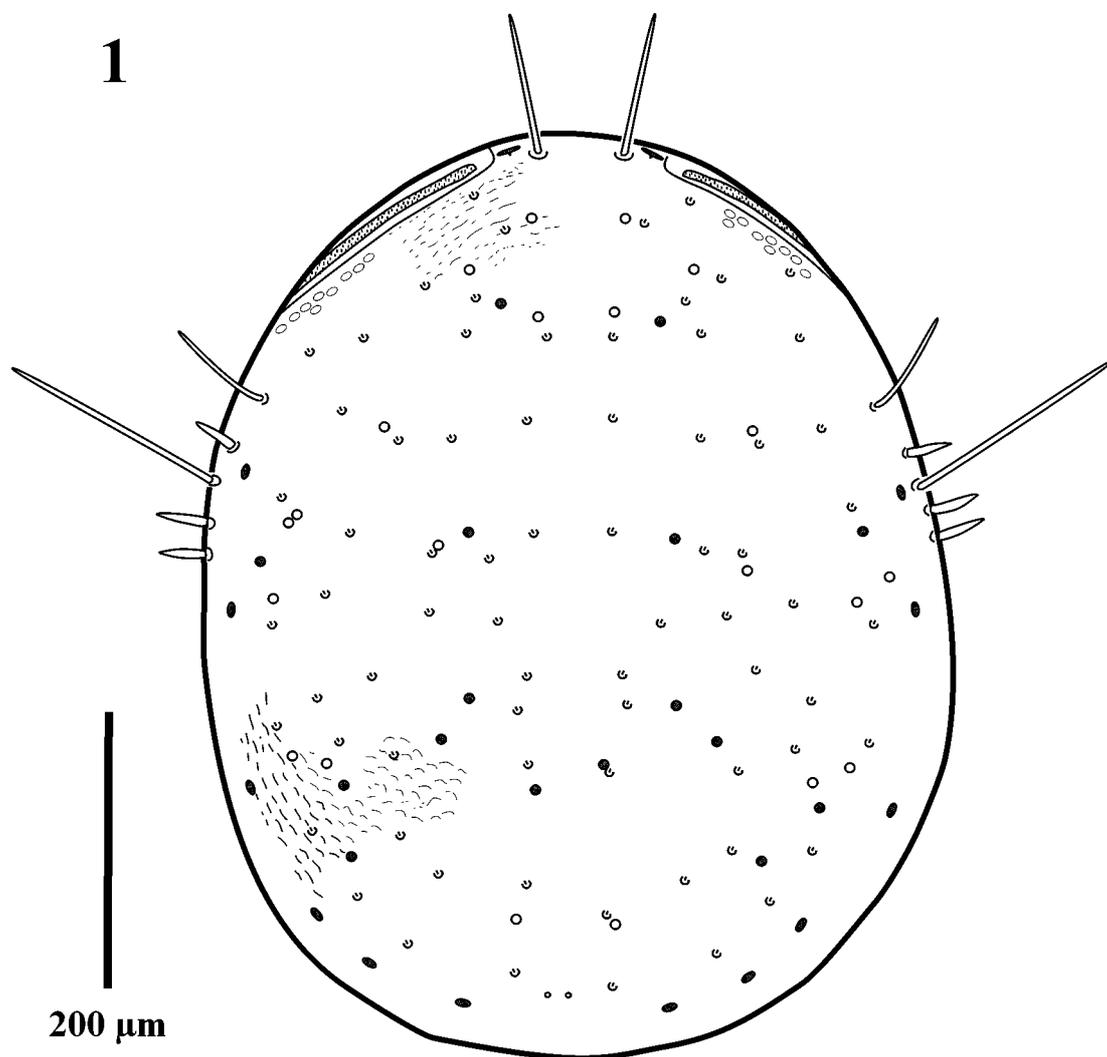


FIGURE 1. *Ophiomegistus spectabilis* sp. nov. (male). Dorsum. Open circles: presumed glands; filled circles: presumed lyrifissures.

Male (Figs. 1–4). Idiosomal length 741 (681–767), width 604 (568–640), N=5. Dorsum covered by a single shield with slightly crenulate patterning (Fig. 1); pattern more or less striate near the margin, uniform in the center of the shield. One pair of anterior marginal setae (*j1*?) long (108 [90–118]) and rod-like with small

barbs near the tip; other dorsal setae minute. Setal patterns are not completely regular and symmetrical, but hypertrichy appears limited; nearly all setae observed can be accommodated within the standard model for Mesostigmata (Lindquist and Evans 1965). With respect to other cuticular structures (glands, lyrifissures) assignment is tentative, due to the difficulty of distinguishing consistently between gland-like structures and lyrifissures (only anterior lyrifissure *idl* is quite distinct). Even so, the patterns appear generally symmetrical and surprisingly regular. Specialized marginal setae (*R* and *Rv* setae?) surround the entire opisthosoma. They include two types of setae, long, rod-like ones and much shorter, blade-like setae with rounded tips. The rod-like setae are generally smooth, with a few very small barbs near the tip, the blade-like setae have rounded tips and are somewhat flattened. The total number and interspersion pattern of these setae is variable between individuals and even between the left and right side of single individuals (Table 1). Lateral blade-like setae smaller than the posterior ones, with the median posterior pair longest [84 (73–90)]. Most rod-like setae of similar size, 231 (211–250) for posterior lateral ones, but the most anterior lateral pair of rod-like setae much shorter [94 (81–102)], and the pair flanking the median posterior pair of blade-like setae somewhat shorter [167 (150–184)].

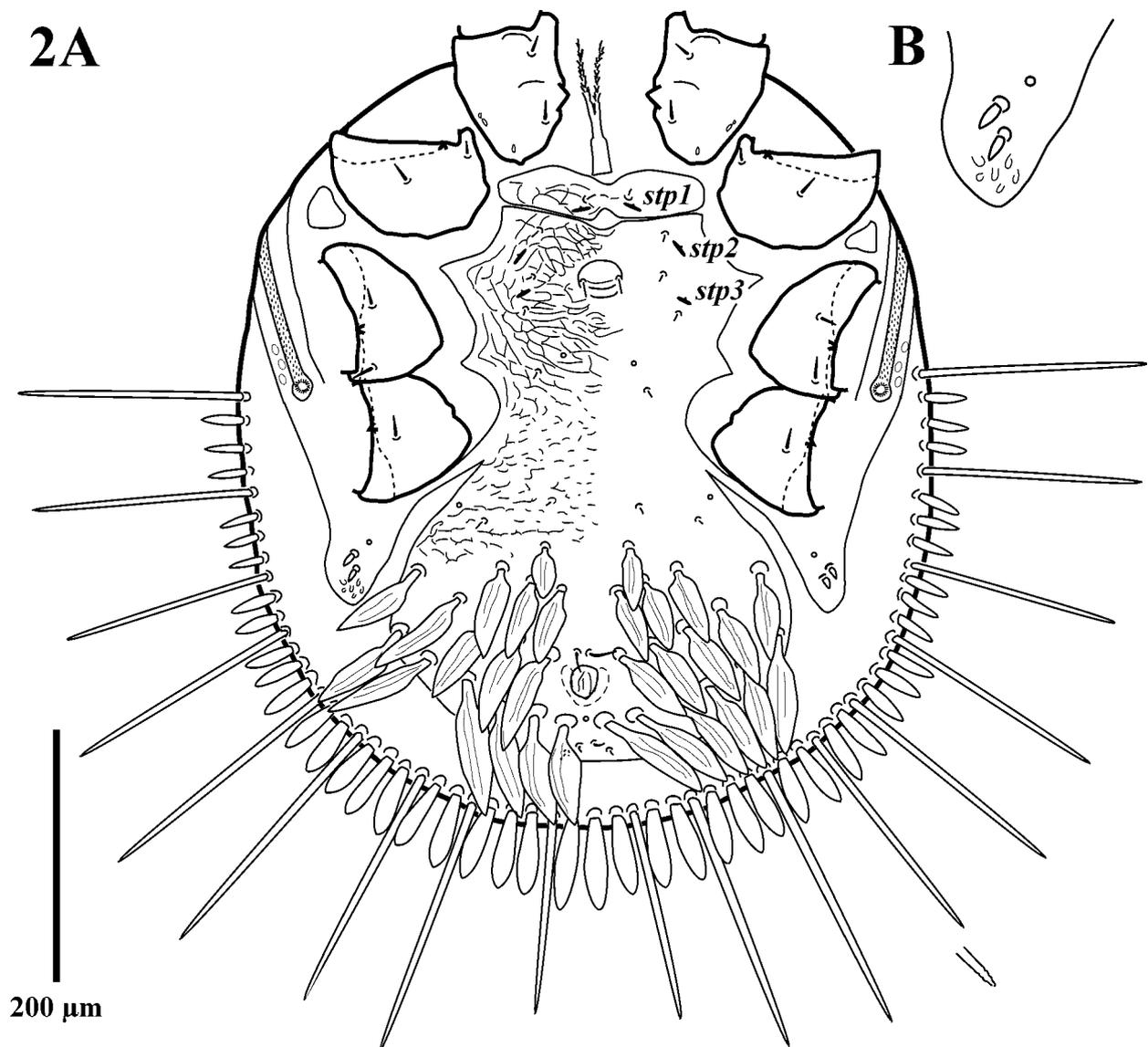


FIGURE 2. *Ophiomegistus spectabilis* sp. nov. (male). A, venter; B, detail metapodal area.

TABLE 1. Individual variability in pattern of marginal setae for *Ophiomegistus spectabilis* sp. nov.

Format: number of short, blade-like setae between long, rod-like setae; listing following margin starting anterior left side to right side; posterior median group in brackets.

Individual	pattern	total blade-like	total rod-like.
Male			
OSAL4135	1-2-3-3-2-3-2-3-2-3-(3)-2-3-2-2-3-3-3-2-1	51	23
OSAL4137	1-2-2-3-2-3-1-1-3-1-3-(2)-2-2-2-2-2-2-4-2-2-1	45	24
OSAL4138	1-2-2-3-2-2-2-1-2-2-2-(1)-2-2-2-2-2-2-3-2-3-2-1	45	25
OSAL4586a	1-2-2-3-2-2-2-2-2-2-(2)-2-2-2-2-3-4-3-2-1	43	22
Female			
OSAL4136	1-2-3-3-3-3-2-2-2-3-2-(2)-2-2-2-1-2-3-4-4-1-1	50	23

Venter (Fig. 2) with a distinct anterior sclerite carrying sternal setae *st1* and one pair of lyrifissures (*stp1*). Genital opening midsternal, covered by two small shields, and including a pair of small (eu)genital setae. Sternito-ventri-anal shield with pronounced patterning anteriorly, less distinct posteriorly. In the sternal region this shield carries four pairs of small setae, two pairs of lyrifissures (*stp2*, *stp3*) and one pair of small pores; two additional pairs of small setae and one pair of pores posterior to coxae IV. Posterior portion of shield with 15–19 pairs of large, translucent, and leaf-like setae, arranged in four rows. As with the marginal setae, patterns are variable (Table 2). One pair of small preanal, and two pairs of small postanal setae surround the anus. Unpaired postanal seta absent. Metapodal areas each with well developed shields, fused broadly to peritrematal (anterior), and weakly to sternito-ventri-anal shields (antero-lateral). Each metapodal shield usually with two subulate setae (Fig. 2B); occasionally with one additional, setiform seta (1 of 8 sides examined), or with one subulate and 1 setiform seta (3 of 8 sides examined). Metapodal shield surface with distinct crenulated patterning near the posterior tip. Peritremes surrounded by relatively small shields, extending anteriorly to the level of coxae I. Tritosternum without subapical spines (Goff 1979) on the tritosternal laciniae.

TABLE 2. Individual variability in pattern of opisthogastral leaf-like setae for *Ophiomegistus spectabilis* sp. nov.

Format: row 1 (most anterior), row 2, row 3, row 4.

Individual	right	left
Male		
OSAL4135	1-3-5-6	1-3-5-6
OSAL4137	1-2(3)-5-6	1-4-6-6
OSAL4138	1-3-5-6	1-3-5-6
OSAL4586a	1-3-5-6	1-3-5-6
OSAL4586b	1-3-6-6	1-4-5-5
Female		
OSAL4136	1-4-7-8	1-5-6-7

Gnathosoma and palps (Fig. 3). Chelicera (Fig. 3A) with long cheliceral seta, and distinct lyrifissure *iα*; lyrifissure *id* not observed. Cheliceral digits edentate, inside movable digit fimbriate. Fixed digit with one basal, movable digit with three terminal extensions; interdigital membranous extension present. Gnathotectum triangular with a smooth anterior edge and a very weakly developed, or absent, keel (Fig. 3B). Subcapitulum with a poorly developed deutosternal groove. Subcapitular setae (*sc*) and setae *hyp2* short blunt spines with minute barbs, setae *hyp1* long, smooth spines, and setae *hyp3* small and setiform (Fig. 3C). Lateral lips fringed on outside, labium and paralacinae brush-like. Designation of brushy, dorsally inserted structures as “parala-

ciniae" (pl in Fig 3C) tentative. Corniculi unclear in all specimens examined, apparently largely membranous and with a shape resembling that illustrated for *O. luzonensis* Banks (Voss 1966) and *O. keithi* Domrow (Domrow 1978). Palp (Fig. 3D). Palp setation for the basal segments follows the standard pattern for Antennophorina, 2 setae on the trochanter, 5 on the femur, and 7 on the genu. Posterior lateral and posterior dorsal setae on the femur and genu thickened, rod-like and barbed. Tibia and tarsus completely fused, with a total of 24 sensilla, 1 more than listed by Domrow (1978) for *O. keithi* and *O. luzonensis*. Pretarsal claw two-tined.

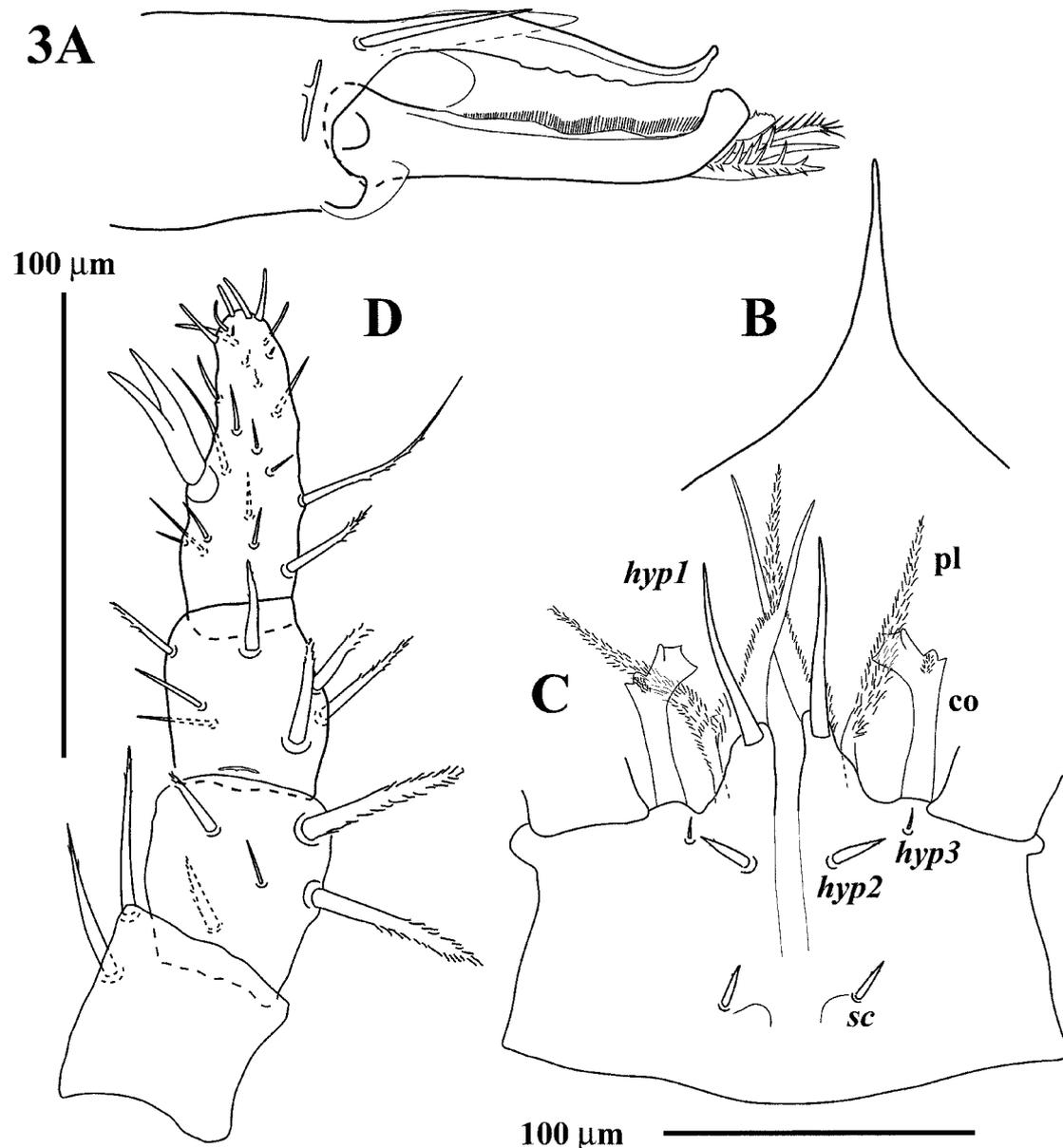


FIGURE 3. *Ophiomegistus spectabilis* sp. nov. (male). A, chelicera; B, gnathotectum; C, subcapitulum; D, palp, dorsal view. Scale for A, B and D identical. Abbreviations: co, corniculus; pl, paralacinia.

Legs (Fig. 4). Coxae I with small anterior spur (Fig. 2A). Setation pattern generally as for *O. luzonensis* (Domrow 1978), but without tibial setae *pd3* I and *pv2* IV, losses shared with *O. keithi*. Legs laterally flattened, most lateral setae poorly developed. Femoral seta *pv1* IV a rounded spine. Anterior dorsal setae of genua, tibiae, and (basi)tarsi III–IV blade-like with fimbriations along one side (less prominent on legs II), posterior dorsal and posterior ventral setae generally longer, rod-like with terminal barbs. Genual and tibial setae *pl1* II–III long, rod-like; genual and tibial *pl1* IV small, setiform. Tarsi II–IV with seta *al3* present. setae

ad1, *pd1* poorly developed, very thin. Ventrodiscal spurs on tarsi II–IV absent. Pretarsi I absent, pretarsi II–IV large, with vestigial claws. Chaetotactic formula's: Coxae 2-2-2-1. Trochanters I: 2 1/2 1; II: 1 0/3 1; III: 1 1/3 0; IV: 1 1/3 0. Femora I: 2 3/3 1/2 1; II: 2 2/2 2/1 1; III: 1 2/1 2/1 0; IV: 1 2/1 2/1 1. Genua I: 2 3/1 3/1 1; II: 2 3/2 3/1 1; III: 2 3/1 2/1 1; IV: 2 3/1 2/1 0. Tibiae I: 2 2/2 2/2 2; II: 2 2/2 2/1 1; III: 2 2/1 2/1 1; IV: 2 2/1 2/1 1. Tarsi II–III with 19 setae (seta *al3* present), tarsi IV with 21 (setae *av4*, *pv4* present). Chaetotactic formula's as noted are slightly different from those proposed by Domrow (1978) for *O. luzonensis* but this may an artifact of leg orientation.

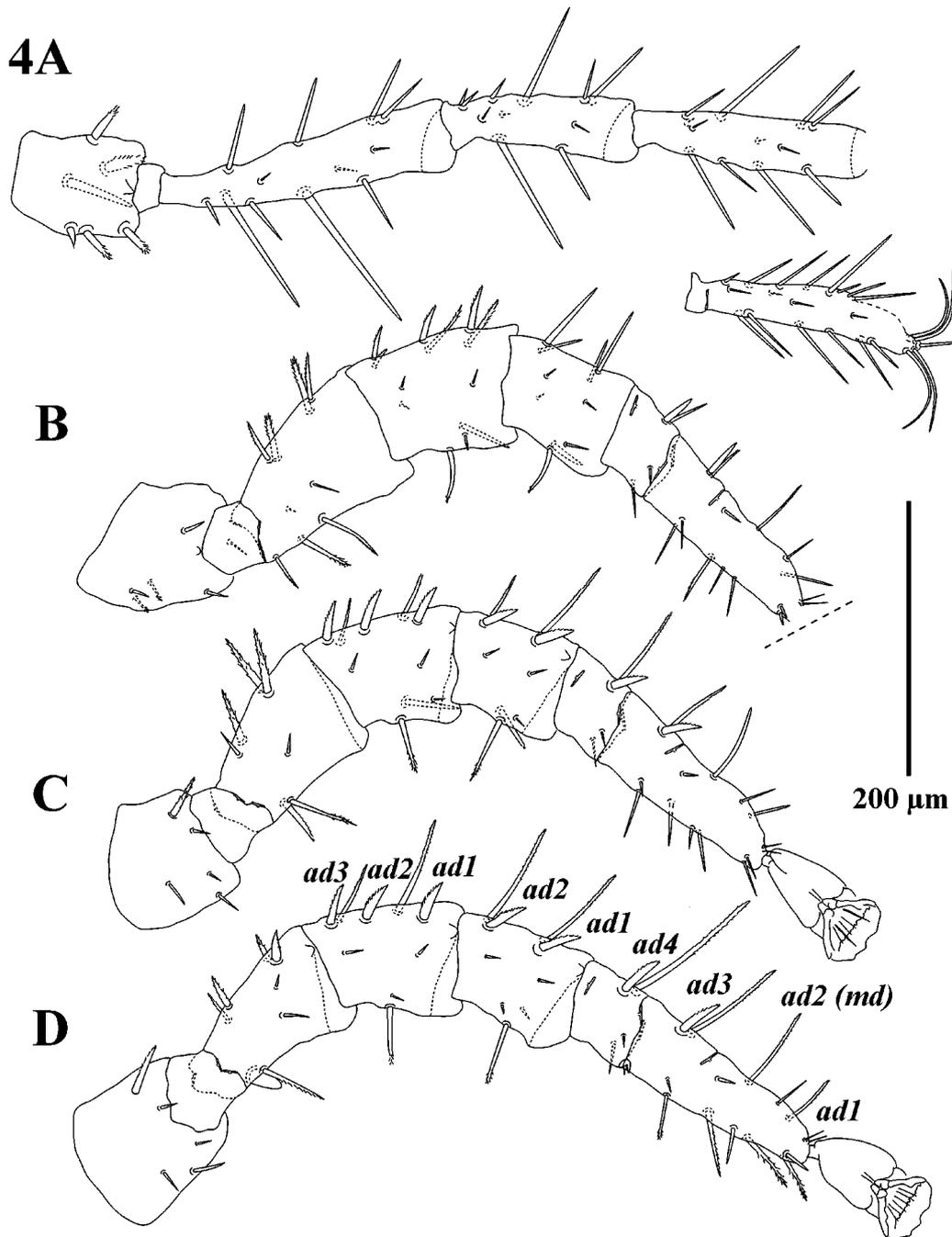


FIGURE 4. *Ophiomegistus spectabilis* sp. nov. (male). Legs, anterolateral view; A, leg I (setae of distal sensory complex omitted); B, leg II; C, leg III; D, leg IV.

Female (Fig. 5). Idiosomal length 868, width 718 (N=1). Dorsum as in male. Marginal setae slightly more numerous and slightly longer than in male, but pattern very similar (Table 1). Blade-like setae in posterior

median pair 98 long. Anterior pair of rod-like long setae (*j1*) 122, anterior lateral pair 113, longest 265, and pair flanking posterior median pair of blade-like setae 197. Peritremes as in male. Metapodal areas sclerotized, shields broadly fused to peritrematal shields (anterior); each with two subulate and one setiform seta (Fig. 5B). Ventri-anal shield with 17–20 pairs of large leaf-like setae, arranged in 4 rows (Table 2). Preanal and postanal setae as in male. Unpaired postanal seta absent. Sternal region anteriorly with two pairs of shields: anterior pair carrying one seta (*st1*) and one lyrifissure (*stp1*) each; second pair carrying three pairs of setae (*st2–st4*) and one lyrifissure (*stp2*) each. Sternogynial shield also paired, with one small lyrifissure (*stp3*) on each shield. Genital area with separate and well developed latigynial shields, each carrying two small setae and one small gland pore. Mesogynial shield fused posteriorly with ventri-anal shield, without setae, lyrifissures or pores. Endopodal shield remnants fused to sternal and latigynial shields. Small exopodal shieldlets between coxae II and III.

Gnathosoma and palps. Gnathotectum triangular with a smooth anterior edge. Chelicera as in male. Subcapitulum, corniculi, subcapitular and hypostomal setae as in male. Palp with tibia and tarsus completely fused; pretarsal claw two-tined. Palp setation (number, position, and shape) as in male.

Legs. Leg shape and chaetotaxy as in male.

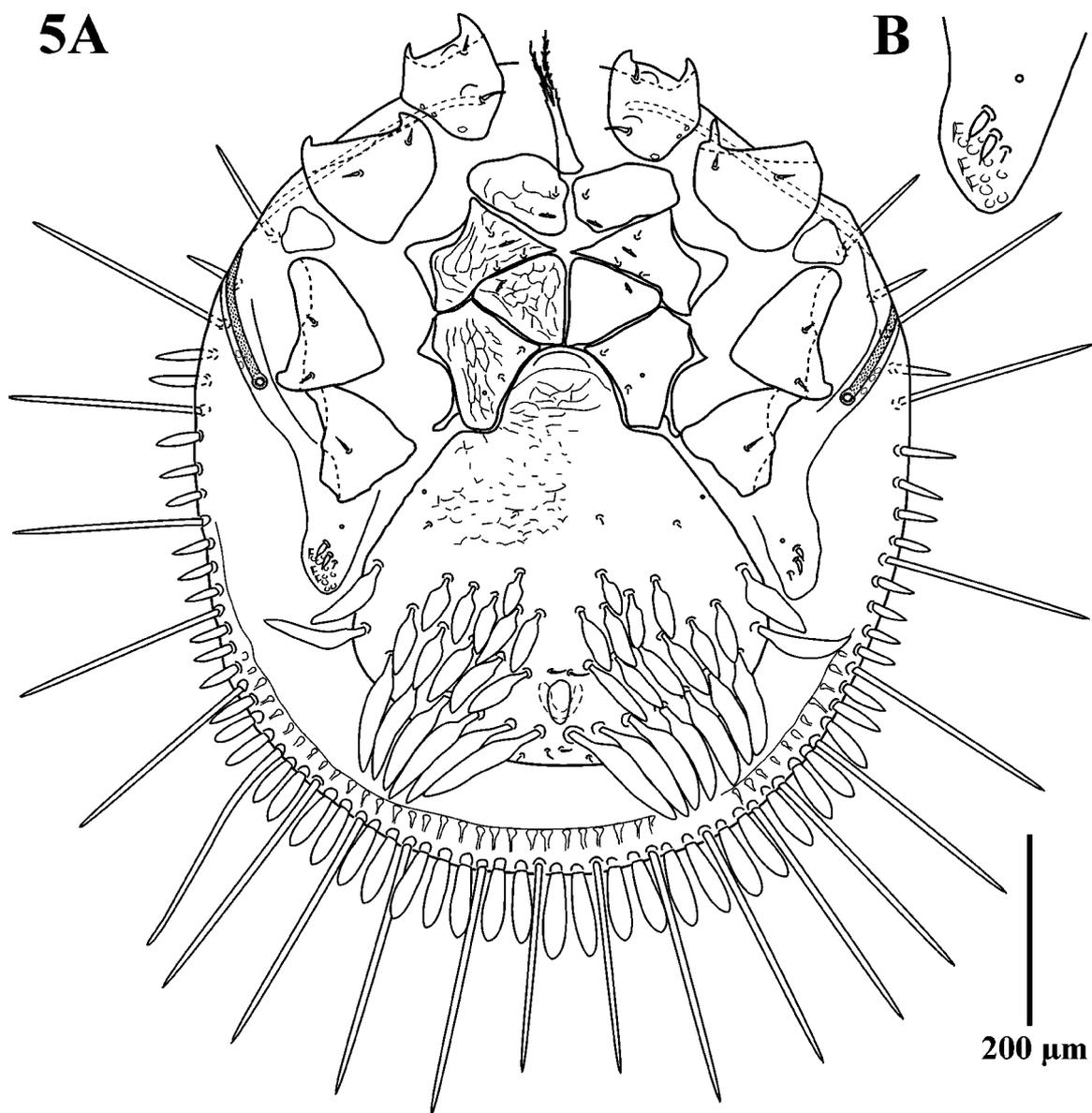


FIGURE 5. *Ophiomegistus spectabilis* sp. nov. (female). A, dorsum; B, detail metapodal area.

Material examined. PAPUA NEW GUINEA: Manus, Rambutyo Island, NE of Penchal Village, Elev 100–150 m, 02°20'26"S 147°47'40"E, coll. Austin, C. C., 3 IX 2001, ex *Sphenomorphus pratti* (Scincidae), host coll. no. LSUMZ 89480, specimens numbers OSAL004135–338 (3M, 1F); same collection data, ex *Sphenomorphus pratti*, host coll. no. LSUMZ 89481, spec. no. OSAL013822 (1M); PAPUA NEW GUINEA: Manus, Penchal Village, 02°19'42"S 147°46'00"E, coll. Austin, C. C., 1 IX 2001, ex *Sphenomorphus pratti* (Scincidae), host coll. no. LSUMZ 89479, spec. no. OSAL004586 (2M on one slide).

Deposition of types. Holotype male in Ohio State Acarology Collection (OSAL) (OSAL4135), paratypes in Australian National Insect Collection (ANIC), Canberra (2M, OSAL004137–38), and OSAL (1F, OSAL004136, 3M, OSAL004586, 013822).

Etymology. The specific name, *spectabilis* or *showy*, refers to the striking pattern of marginal setae in this species.

Systematic affinities. Generic assignment of this species to *Ophiomegistus* is based on the combination of presence of a longitudinally split sternal shield and stout subulate setae on the posterior end of the metapodal shields. It is also consistent with host association, as all known *Ophiomegistus* are associated with squamates (snakes or skinks). The one record of *O. luzonensis* from a host other than a squamate, in this case a rat in New Guinea (Gunther 1942), is almost certainly an artifact. In this assignment we noticed a flaw in the latest key to the genera of Paramegistidae (Kim and Klompen 2002). The couplet in that key separating *Ophiomegistus* from *Neomegistus* uses the number of setae on each latigynial shield as the primary distinction, with *Neomegistus* females carrying only two setae per shield, while *Ophiomegistus* females carry three or more. However, females of *O. brachymeleus* Voss, 1966, *O. mabuyae* Voss, 1966, and *O. keithi* Domrow, 1978, as well as the female of *O. spectabilis* carry only two setae on each latigynial shield.

That being said, *Ophiomegistus* can be distinguished from *Neomegistus* by the presence of foliate setae on the venter (absent in *Neomegistus*), the lack of fusion of the latigynial and ventri-anal shields (partially fused in *Neomegistus*) and the presence of subulate setae on the metapodal shields (absent in *Neomegistus*) (Cheol-Min Kim, pers. comm.). The above emphasizes that *Ophiomegistus* and *Neomegistus* are quite similar, despite being associated with phylogenetically unrelated host groups. This close relationship of squamate (*Ophiomegistus*) and millipede (*Neomegistus*) associated taxa mirrors the situation in the family Heterozerconidae, which also includes squamate (*Amheterozercon*) and millipede (all other genera) associates.

The new species differs from *O. brachymeleus*, *O. mabuyae*, and *O. keithi* by having the foliate setae restricted to the posterior half of the ventri-anal shield (rather than covering nearly all of the ventri-anal shield). In addition, the striking dimorphism in shape of the marginal setae far exceeds that found in any other described *Ophiomegistus* species.

Remarks. We also studied two additional females from skinks collected in Milne Bay province (PAPUA NEW GUINEA: Milne Bay, Saga AHO River, Bush Camp, Cloudy Mountains, Elev 65 m, 10°32'39"S 150°06'55"E, coll. Austin, C. C., 18 X 2001, ex *Sphenomorphus pratti*, host coll. no. LSUMZ 89483, spec. no. OSAL004134 (1F); same collection data, ex *Sphenomorphus jobiensis*, host coll. no. LSUMZ 89482, spec. no. OSAL004133 (1F)). While superficially similar to *O. spectabilis* in the relative size and arrangement of the marginal and opisthogastral setae, these two females are slightly larger, and differ by having (1) only 3 (not 4) rows of opisthogastral setae, (2) bifid tips on the long rod-like marginal setae (rounded in *O. spectabilis*), (3) metapodal shields that are distinctly pointed posteriorly, (4) the coxal IV seta shaped as a thick, blunt spine, and (5) having setae *hyp2*, *hyp3*, and the subcapitular setae of similar shape (distinctly different sizes in *O. spectabilis*). Given the small number of available specimens from that locality, and the lack of males, it is not possible to establish whether these differences are local variations or whether the specimens represent another new species.

A single male recovered at the same locality but from a different host species (PAPUA NEW GUINEA: Milne Bay, Saga AHO River, Bush Camp, Cloudy Mountains, Elev 65 m, 10°32'39"S 150°06'55"E, coll. Austin, C. C., 18 X 2001, ex *Sphenomorphus mulleri*, host coll. no. LSUMZ 89484, spec. no. OSAL004132), does not match *O. spectabilis* or the females from Milne Bay. Instead it closely resembles *O. kaih* Goff, 1979.

Discussion

A summary of all published records of *Ophiomegistus* from New Guinea skinks and snakes is presented in Table 3. This includes updated host and locality data for some previously listed records where individual host collection numbers were cited. Lack of sufficiently detailed information for several records prevented us from resolving all incomplete host and/or locality records. Even with those restrictions, and the limited number of records overall, a few conclusions can be drawn. First, all lizard associated New Guinea *Ophiomegistus* are associated with skink (family Scincidae) hosts. Skinks represent the world's largest and most morphologically diverse family of lizards. With more than 1227 described species, skinks account for one-third of global lizard diversity (Greer 2001; Zug *et al.* 2001). Skinks are divided into four major subfamily lineages; Acontinae, Feyliniinae, Lygosominae, and Scincinae (Greer 1979). Of these four subfamilies Lygosomine skinks, the only subfamily occurring in New Guinea, are by far the most diverse and widely distributed. Within the subfamily Lygosominae the Australasian species have been separated into three presumed monophyletic groups, the *Egernia*, *Eugongylus*, and *Sphenomorphus* species groups, each named after a prominent genus in the group (Greer 1979; Greer 1989; Hutchinson 1993). Unambiguous (see Table 3) records of New Guinea *Ophiomegistus* are from skink hosts in the genera *Emoia*, *Eugongylus*, and *Sphenomorphus*. *Emoia* and *Eugongylus* are members of the *Eugongylus* group and *Sphenomorphus* is a member of the large *Sphenomorphus* group. The mite species do not necessarily appear to be specific for a given species, genus, or lineage of skinks. Two out of three species for which more than one record is available were collected from hosts in different genera. However, they may be specific for host ecology or for regions. For example, with the exception of *Emoia*, all of these skinks are medium to large bodied semi-fossorial lizards that spend considerable time under logs in moist soils and leaf litter. Among the New Guinea snakes from which *Ophiomegistus* has been recorded, *Micropechis ikaheka*, is also semi-fossorial. Semi-fossorial habitats are used by a wide range of skinks and other squamates, presenting a wide range of potential host species. This, and the real possibility that geographic ranges for individual *Ophiomegistus* species may be small, suggests that we can expect to discover many more species in this genus, even on the island of New Guinea.

TABLE 3. *Ophiomegistus* records from New Guinea snakes and skinks.

species	citation record	host species coll no. (where known)	locality
<i>O. luzonensis</i>	Grant, 1947	unidentified snake #	Indonesia, Papua Prov., nr. Jayapura
	Domrow, 1978	<i>Liasis albertisii</i> (Boidae) #	Papua New Guinea, Central Prov., Goldie River
	Domrow, 1978	<i>Stegonotus</i> sp.. (Colubridae) #	Papua New Guinea, Madang Prov., nr. Madang
	Domrow, 1978	<i>Micropechis</i> sp. (Elapidae) #	Papua New Guinea, Madang Prov., Madang
	Domrow, 1984	<i>Micropechis ikaheka</i> (Elapidae) BMNH 1980.534	Papua New Guinea, Morobe Prov. hill S of Buso, S of Lae
	Goff, 1980	<i>Emoia caeruleocauda</i> or <i>Emoia longicauda</i> or <i>Emoia jakati</i> or <i>Lipinia noctua</i> or <i>Lamprolepis smaragdina</i>	Papua New Guinea, East Sepik Prov., Dreikikir
<i>O. alainae</i>	Goff, 1980	<i>Emoia</i> sp. * #	New Guinea

to be continued.

TABLE 3 (continued).

species	citation record	host species coll no. (where known)	locality
<i>O. armouri</i>	Goff, 1979	<i>Sphenomorphus jobiensis</i> * BPBM@	New Guinea
<i>O. blumi</i>	Domrow, 1984	<i>Sphenomorphus derooyae</i> * #	Indonesia, Papua Prov., Munggon, Eipomak Valley
<i>O. iriani</i>	Domrow, 1984	<i>Emoia pallidiceps</i> * #	Indonesia, Papua Prov., Munggon, Eipomak Valley
<i>O. joppae</i>	Domrow, 1984	<i>Carlia fusca</i> or <i>Emoia wernerii</i>	Papua New Guinea, Morobe Prov., nr Buso, S of Lae
<i>O. karii</i>	Goff, 1979	<i>Eugongylus rufescens</i> * BPBM 6097	Papua New Guinea, Morobe Prov., Kalalo
	Goff, 1979	<i>Sphenomorphus neuhaussi</i> BPBM 6095	Papua New Guinea, Morobe Prov., Kalalo
<i>O. nr. karii</i>	present study	<i>Sphenomorphus mulleri</i> LSUMZ 89484	Papua New Guinea, Milne Bay Prov., Sago River
<i>O. keithi</i>	Domrow, 1978	skink * #	Papua New Guinea, East Sepik Prov., Heyfield, 8km S Maprik
	Goff, 1979	<i>Sphenomorphus jobiensis</i> BPBM 5732	Papua New Guinea, Madang Prov., Wanuma, Adelbert Mts.
<i>O. mabuyae</i>	Goff, 1980	<i>Emoia</i> sp. * #	New Guinea
<i>O. novaguinea</i>	Goff, 1980	<i>Sphenomorphus pratti</i> * BPBM@	New Guinea
<i>O. radovskyi</i>	Goff, 1979	<i>Emoia obscura</i> * BPBM 5765	Papua New Guinea, Madang Prov., Mt. Mengam, ca. 21 km NNW of Wanuma
	Goff, 1979	<i>Sphenomorphus derooyae</i> BPBM 5762	Papua New Guinea, Madang Prov., Mt. Mengam, ca. 21 km NNW of Wanuma
	Goff, 1979	<i>Sphenomorphus derooyae</i> BPBM 6096	Papua New Guinea, Morobe Prov., Kalalo
<i>O. samuelsoni</i>	Goff, 1979	<i>Eugongylus rufescens</i> * BPBM 2597	Papua New Guinea, Morobe Prov., upper Watut Valley near Bulolo
<i>O. spectabilis</i>	present study	<i>Sphenomorphus pratti</i> * LSUMZ 89480	Papua New Guinea, Manus, Rambutyo Island

* type host

specific host specimen could not be located

@ probable host specimen located, but not incorporated in collection due to lack of data.

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