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ANNALES

de la
SOCIÉTÉ SUISSE DE ZOOLOGIE
et du
MUSÉUM D'HISTOIRE NATURELLE
de la Ville de Genève

tome 116
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TOME 116—FASCICULE 2

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VILLE DE GENÈVE
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Le comité soumet chaque manuscrit pour évaluation à des experts d'institutions suisses ou étrangères selon le sujet étudié.

La préférence sera donnée aux travaux concernant les domaines suivants: taxonomie, systématique, faunistique, phylogénie, évolution, morphologie et anatomie comparée.

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New species of pseudoscorpions (Arachnida, Pseudoscorpiones: Chthoniidae, Chernetidae) from caves in China

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New species of pseudoscorpions (Arachnida, Pseudoscorpiones: Chthoniidae, Chernetidae) from caves in China. - Three new species are described and figured in the genus *Tyrannochthonius* J.C. Chamberlin (*akaelus* sp.n., *ganshuanensis* sp.n., *antridraconis* sp.n.), two species in the genus *Megachernes* Beier (*glandulosus* sp.n., *tuberosus* sp.n.) and one species of *Nudochernes* Beier (*troglobius* sp.n.). The affinities of these new taxa are discussed. They bring up to 13 the number of species currently recorded from caves in China, but this is certainly only a small proportion of the total number occurring in the numerous cave systems of this country.

Keywords: China - Sichuan - Hubei - biospeleology - Pseudoscorpiones - new species.

INTRODUCTION

Since 1992, seven speleological surveys of China have been carried out by the French Federation of Speleology (Aventures Karstiques Lointaines) in collaboration with the Institute of Technology Chengdu, China. The pseudoscorpions collected were sent to me by Mrs Josiane Lips (Lyon) (collections of 1992-1999, 2002-2006) and Dr Philippe Marti (Geneva) (collection of 2001). Schawaller (1995) mentioned three species from caves in his synopsis of Chinese pseudoscorpions, to which four new species were added by Mahnert (2003), all of which belonged to just two families, Neobisiidae and Chernetidae. The collections studied here add the first troglobiont species of Chthoniidae and further species of Chernetidae to the list. The species of the genera *Megachernes* and *Tyrannochthonius* recorded differ clearly from already known Asian species by certain morphological characters not yet recorded for these genera and underline our poor knowledge of the pseudoscorpions of the huge country of China in general and of its numerous caves in particular. Furthermore, the recent definition of the tribe Tyrannochthoniini proposed by Judson (2007) needs to be reconsidered due to the inconstancy of one important character (presence/absence of chemosensory setae on chelal hand) and the subsequent erection of the new tribe Ayyaloniini for a cave-dwelling species from Israel (Ćurčić, 2008). The presence of chemosensory setae is probably a synapomorphic character of Tyrannochthoniini (Judson, *loc. cit.*) but the number of these setae might have been reduced at least partially in some species groups (e.g. the Chinese species recorded here) or might be of value for splitting the highly diversified genus *Tyrannochthonius* into several groups.

Descriptions of the caves in which the new material was collected have been published by Degouve *et al.* (1997, 1999) and Lips (2006), who also provide the French and Chinese names and GPS data.

Terminology of trichobothria follows Harvey (1992), the term "rallum" (for flagellum) is adopted following Judson (2007).

Holotypes and paratypes of the new species are deposited in the Natural History Museum, Geneva, Switzerland, if not otherwise specified.

DESCRIPTIONS

Tyrannochthonius akaleus sp. n.

Figs 1-5

Pseudoscorpion troglobie. – Degouve *et al.*, 1997: p. 119, Fig.

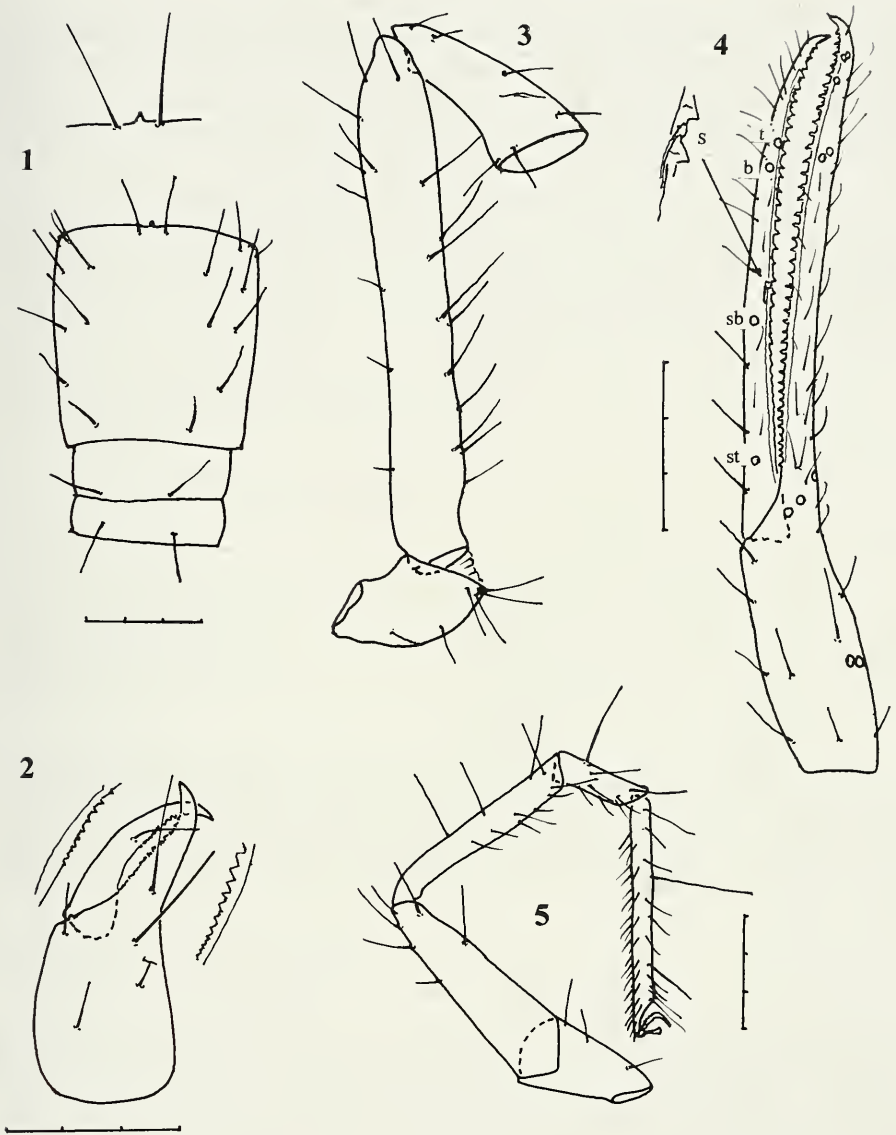
MATERIAL EXAMINED: China, Sichuan Province, Xin Long, bassin de la Source Noire, grotte du Passage (Chuan Dong Zi), alt. 1450 m, 24.8.1997, leg. J. Lips (no. 297): ♀ (holotype).

DIAGNOSIS: The new species is characterized by the following combination of characters: troglomorphic species with elongate appendages (chela in female 7.7 times longer than broad, length 1.28 mm); cephalothorax without eyes or eyespots; epistome small triangular; tergites I–II with 2 setae; intercalary teeth present on both chelal fingers, 9 on fixed finger between tip and marginal tooth distal of trichobothrium *it*, 8 on movable finger between tip and marginal tooth distal of trichobothrium *t*; sensillum at base of tooth distal of *sb*; lacking chemosensory setae on dorsum of chelal hand (but two of them being present near *eb*).

DESCRIPTION: Colour light yellowish, chelicerae brownish. Cephalothorax (Fig. 1) slightly longer than broad (1.06 times) and basally constricted, 18 setae, with 2 on posterior margin (6-4-4-2-2); epistome small triangular, one seta on each side clearly separated from its base; no eyes nor eyespots; chaetotaxy of tergites: 2-2-3-4-4-5-5-5-4-4 (2 submedian tactile setae). Manducatory process pointed, with 2 setae; coxae of pedipalps with 3 setae (2 marginal, 1 discal), coxa I 3, lateral process finger-like, II 4 + 11 dentate coxal spines placed in one row, III - IV 5 setae; intercoxal tubercle absent; genital operculum with 9 setae, chaetotaxy of sternites: 6 + 4 suprastigmatic microsetae on each side - 6 + 3 suprastigmatic microsetae -10-8-9-9-9-7 (2 submedian tactile setae). Anal cone 0 dorsal/2 ventral setae. Pleural membrane striated, with microgranules.

Chelicera (Fig. 2): 5 setae on hand, fixed finger with 15 basally shorter teeth, movable finger with 12 small teeth of equal length; spinneret absent, serrula exterior with approximately 21 lamellae, rallum composed of 8 anteriorly dentate blades, the first three and the last not paired.

Pedipalp (Figs 3-4): Trochanter 2 times longer than broad, femur 6.6 times longer than broad, chaetotaxy: 5-6-2-6, patella 2.4 times, hand 2.5 times, finger 2.1 times longer than hand, chela 7.7 times longer than broad, no chemosensory setae on dorsum of hand, but two such setae present near *eb* (one slightly basal of *eb*, at the limit between hand dorsum and finger), no medial spine-like seta present on hand; fixed finger with 43 pointed teeth of equal length, intercalary teeth present between the first 9 marginal teeth; movable finger with 37 marginal teeth and intercalary teeth between the distal 8 teeth; marginal teeth in distal third pointed, becoming retrorse till tricho-



FIGS 1-5

Tyrannochthonius akaelus sp. n., ♀ holotype (1-5). (1) Cephalothorax and tergites I and II, with detail of epistomal region. (2) Left chelicera with detail of dentition (at higher magnification) of fingers. (3-4) Left pedipalp, with detail of sensillum (s) (higher magnification). (5) Leg IV. Scale units 0.1 mm.

bothrium *b*, from here to finger base lower, rounded and indistinct; one sensillum at base of marginal teeth distal of *sb*; base of movable finger unmodified. Trichobothrium *sb* indistinctly nearer *st* than *b*, *it/est* at level of *t*, line *eb-esb-ist* straight (Fig 4).

Leg I: Femur 7.8 times longer than deep and 2.1 times longer than patella, patella 3.9 times longer than deep, tibia 4.2 times, tarsus 10.0 times longer than deep and 2.06 times longer than tibia. Leg IV (Fig. 5): Femur+patella 4.2 times longer than deep, tibia 7.15 times longer than deep, basitarsus 3.4 times longer than deep, with one basal tactile seta (TS = 0.30), telotarsus 11.7 times longer than deep and 2.48 times longer than basitarsus, tactile seta in basal third (TS = 0.32).

MEASUREMENTS (length/width in mm): Total length 2.1; cephalothorax 0.55/0.52. Pedipalp: Trochanter 0.27/0.13, femur 0.90/0.14, patella 0.37/0.16, hand 0.42/0.17, length of finger 0.88, length of chela 1.28. Leg I: Femur 0.54/0.07, patella 0.26/0.07, tibia 0.25/0.06, tarsus 0.51/0.05; leg IV: Femur+patella 0.79/0.19, tibia 0.56/0.08, basitarsus 0.24/0.07, telotarsus 0.59/0.05.

ETYMOLOGY: Its name is a phonetic transcription of AKL, abbreviation for "Aventures Karstiques Lointaines", organiser of the speleological expeditions to China since 1992.

DISCUSSION: Affinities are discussed under the following species.

Tyrannochthonius ganshuanensis sp. n.

Figs 6 - 8

MATERIAL EXAMINED: China, Sichuan, Xin Long, grotte de Gan Shuan, 30°38.96N/109°19.23 E, 6.8.1999, leg. J. Lips (no. 429): ♀ (holotype), 1♀ 1T (paratypes). – Xin Long, grotte du Poisson à Moustaches (Chang Chao Jia Dong), 30°33.497N/109°18.639E, 8.2.2004, leg. J. Lips (no. 1473): 1♀ (paratype) (Muséum national d'histoire naturelle, Paris MNHN Ps 146-01). – Hubei, commune Banqiao, grotte Tie He (grotte and perte de Tie He) 30°15.614N/109°37.423E, leg. J. Lips (2361): 1♂ (paratype).

DIAGNOSIS: Moderately sized troglomorphic species with elongate appendages (chela in female 6.9-7.3 times longer than broad, length 1.21-1.37 mm), without eyes or eyespots, tergites I/II (or III) with 2 setae; cephalothorax with 2 setae on posterior border, intercalary teeth present on both chelal fingers between finger tip and marginal teeth at level of trichobothrium *sb* (approximately tooth 18-20); lacking chemosensory setae on dorsum of chela hand, but two of them being present near trichobothrium *eb*.

DESCRIPTION: Yellowish, except chelicerae which are brownish. Cephalothorax shorter or longer than broad (0.90-1.04 times), not or slightly constricted posteriorly, epistome long and thin (1♂ broadly triangular, short), one seta near its base on each side; eyes or eyespots absent; with 18 setae (6-4-4-2-2), 2 on posterior margin, tergal chaetotaxy: 2/2/2-4/4/4/4-5/5/4-5/4 (2 submedian tactile setae). Manducatory process acute, with 2 bristles; coxae of pedipalps 3 setae (one discal), coxa I 3, lateral process finger-like, II 3-4, 10-12 deeply incised dentate coxal spines, placed in row (Fig. 6), III-IV 5 setae; anterior genital operculum with 9 setae; sternal chaetotaxy: 6 + 2x2-3 suprastigmatic microsetae/6+2x2-3/6-8/7-8/7-9/7-9/7-9/7-9/0. Anal cone 0 dorsal/2 ventral setae. Pleural membrane striate with tiny granules.

Chelicera: as in *T. akaelus*; serrula exterior 21–23 lamellae, spinneret absent;

Pedipalp (Figs 7-8): Trochanter 1.8 times longer than broad, femur 5.9-6.7 times (♂ 6.6 times) longer than broad, patella 2.2-2.4 times, hand 2.3 (♂: 2.6) times longer than broad, no medial strong longer seta near finger base, no chemosensory setae on dorsum, but two of them being present near *eb*; chela with pedicel 6.9-7.3

(δ : 7.9) times longer than broad; finger 2.0-2.2 times longer than hand; fixed finger with 36-40 pointed teeth, distinct and pointed intercalary teeth present from tip to nearly level of *sb*, movable finger with unmodified base, with 35-38 teeth, slightly retrorse in distal third, basal of *sb* flattening and rounded rudiments, intercalary teeth present near to *sb*; sensillum near trichobothrium *sb*. Trichobothrial pattern as in Fig. 8: *sb* slightly nearer *b* than *st*; line *eb-esb-ist* with slight angle.

Leg I: Femur 6.9-7.3 (δ : 8.0) times longer than deep and 2.06-2.25 times longer than patella, patella 3.6-4.3 times longer than deep, tibia 3.9-4.3 times, tarsus 9.7-11.0 times longer than deep and 2.18-2.28 times longer than tibia. Leg IV: femur+patella 3.7-4.1 times longer than deep, tibia 6.1-6.8 times longer than deep, with a pseudo-tactile seta in basal third, basitarsus 3.1-3.5 times longer than deep, with a basal tactile seta (TS = 0.27-0.34), telotarsus 11.3-12.6 times longer than deep and 2.57-2.71 longer than basitarsus, a tactile seta in distal third (TS = 0.31-0.41).

MEASUREMENTS (in mm): Total length 1.4-1.8; cephalothorax 0.51-0.54/0.50-0.54; Pedipalps: Trochanter 0.26-0.29/0.15-0.16, femur 0.95-0.97/0.13-0.16, patella 0.34-0.39/0.15-0.18, hand 0.38-0.45/0.17-0.19, length of fixed finger 0.84-0.98, length of movable finger 0.83-0.93, length of chela 1.21-1.44. Leg I: Femur 0.52-0.58/0.07-0.08, patella 0.23-0.27/0.06-0.07, tibia 0.22-0.25/0.06, tarsus 0.49-0.56/0.05; leg IV: Femur+patella 0.75-0.83/0.20, tibia 0.52-0.58/0.08-0.09, basitarsus 0.22-0.25/0.07, telotarsus 0.58-0.64/0.05.

ETYMOLOGY: The name derives from the Chinese name of the cave (Gan Shuan).

DISCUSSION: *Tyrannochthonius ganshuarensis* sp.n. shares with *akaelus* sp.n. the same tergal chaetotaxy (only two setae on the anterior tergites), but differs from it by the more numerous and more distinct intercalary teeth, slightly more distal position of *ist* compared to *eb-esb* (line with angle), and (at least in female) by a slightly stouter chela (hand 2.3 times vs 2.5 times, chela 6.9-7.3 times vs 7.7 times longer than broad).

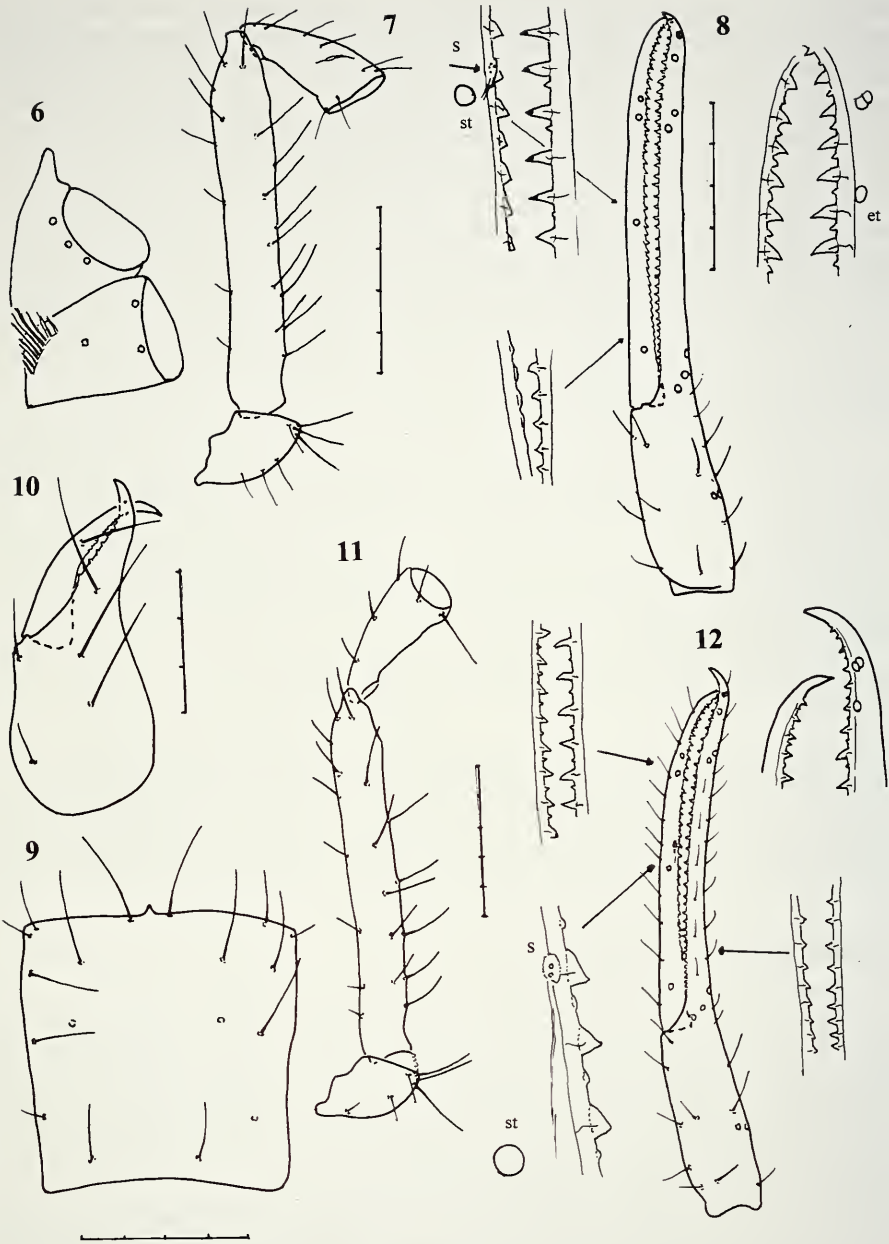
Tyrannochthonius antridraconis sp. n.

Figs 9-12

Pseudoscorpion troglobie. – Degouve *et al.*, 1997: p. 115, Figs.

MATERIAL EXAMINED: China, Sichuan Province, Xin Long, bassin de la Source Noire, grotte "Perte du Dragon", alt. 1470 m, 23.8.1997, leg. J. Lips (no.255): δ (holotype). – Xin Long, bassin de la Source Noire, grotte du Dragon (Long Qiao Dong), 30°94N/109°21.16E, 22.8.1997, leg. J. Lips (no. 245): 1 ♀ (paratype). – Xin Long, gouffre de la Bouche du Serpent (Shekon Tian Ken), NE of Han Re Ba, 5.8.1999, leg. J. Lips (no.404): 1 ♀ (paratype). – Xin Long, grotte du Poisson à Moustaches (Chang Chao Jia Dong), 30°33.39N/109°18.639E, 8.2.2004, leg. J. Lips (no. 1473): 1 ♂ (paratype).

DIAGNOSIS: Troglobitic species of relatively large size and elongate appendages (length of palpal femur 1.18-1.29 mm, length of chela 1.68-1.76 mm), cephalothorax without eyes or eyespots, 2 setae on posterior border, epistome broad, triangular; first tergites with four setae; one slightly longer seta on medial distal face of hand, lacking chemosensory setae on dorsum of hand, but two of them being present near trichobothrium *eb*; chelal finger with intercalary teeth between the marginal teeth, on fixed finger on the distal 2/3 of finger, on movable finger reaching to near *sb*.



FIGS 6-12

Tyrannochthonius ganshuarensis sp. n., ♀ holotype (6-8). (6) Left coxa I and II. (7-8) Left pedipalp, with details of dentition (higher magnification) of chelal fingers and sensillum (s). Scale units 0.1 mm. – *Tyrannochthonius antridraconis* sp. n., ♂ holotype (9-12). (9) Cephalothorax. (10) Left chelicera. (11-12) Left pedipalp, with details of dentition and sensillum (s) (higher magnification). Scale units 0.1 mm.

DESCRIPTION: Colour whitish yellow, chelicerae light brown. Cephalothorax (Fig. 9) as long as broad (0.97-1.06 times), eyes or eyespots absent; 18 setae in total, 2 on posterior margin (6-4-4-2-2) (in one ♀ 2 preocular setae present instead of 1), epistome distinct, triangular; tergal chaetotaxy: I-VII 4, VIII 5-6, IX 5 (2 longer setae), X 4-5 (2 longer setae), XI 6 (2 submedian tactile setae). Manducatory process pointed, with 2 marginal setae; coxae of pedipalps 3 setae (one discal), coxa I 3, lateral process short, finger-like, II 3 + 12-15 dentate coxal spines, arranged in one row, III-IV 5, intercoxal tubercle absent; anterior genital operculum 9-10 setae, male genital opening small slit-like in the basal 2/3, 6 marginal setae on each side, distal margin finely dentate; sternal chaetotaxy: 6-8 + 2-4 microchaetae on each stigma/6-8 + 2-3/9-10/7-9/8-10/8-9/8-9 (2 submedian tactile setae)/6-9 (2 tactile setae). Anal cone 0/2 setae. Pleural membrane striate, with tiny granules. Chelicera (Fig. 10): 5 setae on hand, fixed finger with about 12-14 small pointed teeth, some distal ones slightly enlarged, movable finger with 11-13 small, pointed teeth of equal length, spinneret absent, serrula exterior with 22-26 lamellae, rallum composed of 8 serrate blades, four of them arranged in two pairs.

Pedipalp (Figs 11-12): Trochanter 1.7-1.8 times longer than broad, femur 7.3-8.3 (♂)/7.1-7.5 (♀) times longer than broad, patella 2.2-2.6 times, hand 2.5-2.7 times longer than broad, without chemosensory setae on dorsum, but two of them being present near trichobothrium *eb*, an indistinct groove basal of *ib/isb*, no strong longer seta on medial face near finger base; chela 7.9-8.0 (♂)/6.9-7.55 (♀) times longer than broad, finger 1.90-2.04 times longer than hand, basal apodeme of movable finger quite simple; fixed finger with 33-36 cusped teeth, rounded and partly indistinct intercalary present in the distal 2/3 of the finger; 6 basal marginal teeth smaller and less spaced; movable finger with 30-36 cusped slightly retrorse teeth (flattened and rounded in basal third), intercalary teeth distinct, some half of length of marginal teeth, till trichobothrium *sb*; sensillum at base of 3rd tooth distal of *sb*. Trichobothrial pattern see Fig. 12: *sb* slightly nearer *b* than *st*; line *eb-esb-ist* straight (or nearly so).

Leg I: Femur 7.7-9.4 times longer than deep and 2.09-2.27 times longer than patella, patella 4.0-4.3 times longer than deep, tibia 4.3-4.9 times, tarsus 10.1-11.3 times longer than deep and 2.16-2.32 times longer than tibia. Leg IV: Femur+patella 4.3-4.7 times longer than deep, tibia 6.7-7.3 times longer than deep, basitarsus 3.3-4.2 times longer than deep, with a basal tactile seta (TS = 0.30-0.36), telotarsus 12.0-13.7 times longer than deep and 2.3-2.8 times longer than basitarsus, tactile seta in basal third (TS = 0.31-0.36); arolia undivided, half as long as the smooth and slender claws.

MEASUREMENTS (length/width in mm): Total length 1.8-2.3; cephalothorax 0.61-0.68/0.62-0.64. Pedipalp: Trochanter 0.33-0.35/0.19-0.20, femur 1.18-1.29/0.16-0.17, patella 0.45-0.49/0.19-0.20, hand 0.50-0.60/0.22-0.24, length of fixed finger 1.15-1.20, of movable finger 1.07-1.13, length of chela 1.70-1.76 (♂)/1.68-1.70 (♀). Leg I: Femur 0.72-0.79/0.08-0.09, patella 0.32-0.36/0.08-0.09, tibia 0.32-0.33/0.07-0.08, tarsus 0.70-0.76/0.07; leg IV: Femur+patella 1.04-1.13/0.23-0.25, tibia 0.70-0.79/0.10-0.11, basitarsus 0.30-0.34/0.08-0.10, telotarsus 0.79-0.88/0.0-0.07.

ETYMOLOGY: The name derives from the Latin name of the cave (*antrum draconis*) (cave of the dragon).

DISCUSSION: This taxon is distinguished from the two previously described species *Tyrannochthonius acaelus* n.sp. and *T. ganshuanensis* n.sp. by the tergal chaetotaxy (anterior tergites with 4 marginal setae) and larger size (length of palpal femur min. 1.18 mm vs max. 0.97 mm; length of chela min. 1.68 mm vs max. 1.44 mm).

Forty-eight cave-dwelling and anophthalmous species of Tyrannochthoniini (genera *Tyrannochthonius*, *Lagynochthonius* and *Paraliochthonius*) have been recorded, mainly from the USA and Australia, but also from Jamaica, Spain (mainland and Canary Islands), Portugal and New Zealand (Edward & Harvey, 2008), one *Lagynochthonius* species is known from continental Asia (Vietnam: Judson, 2007), but none has previously been recorded from China. The taxon *Ayyalonia dimentmani* Ćurčić, 2008, type genus of the tribe Ayyaloniini Ćurčić, 2008, has been described from caves in Israel, but its status should be reconsidered based on richer material, since no convincing differences seem to exist between this genus and tribe and *Tyrannochthonius* and Tyrannochthoniini.

Three epigeal species of *Tyrannochthonius* are known from China (*japonicus* Ellingsen, *pachythorax* Redikorzev, *robustus* Beier) (Schawaller, 1995), but all of them possess 4 setae on the anterior tergites and are described as having a different dentition of the fixed cheliceral finger (distal submedian tooth large). The three taxa described here probably form an endemic group of species sharing, beside the troglobitic adaptations, the following characters: the nearly uniform dentition of cheliceral fingers (particularly of the fixed one), chelal hand without an medial spine-like seta near finger; base of movable chelal finger nearly unmodified, without a strong internal apodeme, absence of chemosensory setae on dorsum of chelal hand (a character considered by Judson, 2007 as a synapomorphy of the tribe Tyrannochthoniini) but two of them being present near trichobothrium *eb*. The reduction of this series of chemosensory setae on dorsum of chelal hand might be helpful in defining species groups within this highly diversified genus since Australian species seem to present also a reduced number of these chemosensory setae (Edwards & Harvey, 2008). *Tyrannochthonius* species from other countries of continental Asia are easily distinguished from the three Chinese species by their smaller size, stouter pedipalps, the presence of 2 or 4 eyes, the chaetotaxy of abdominal tergites and other morphological characters.

Tyrannochthonius sp.

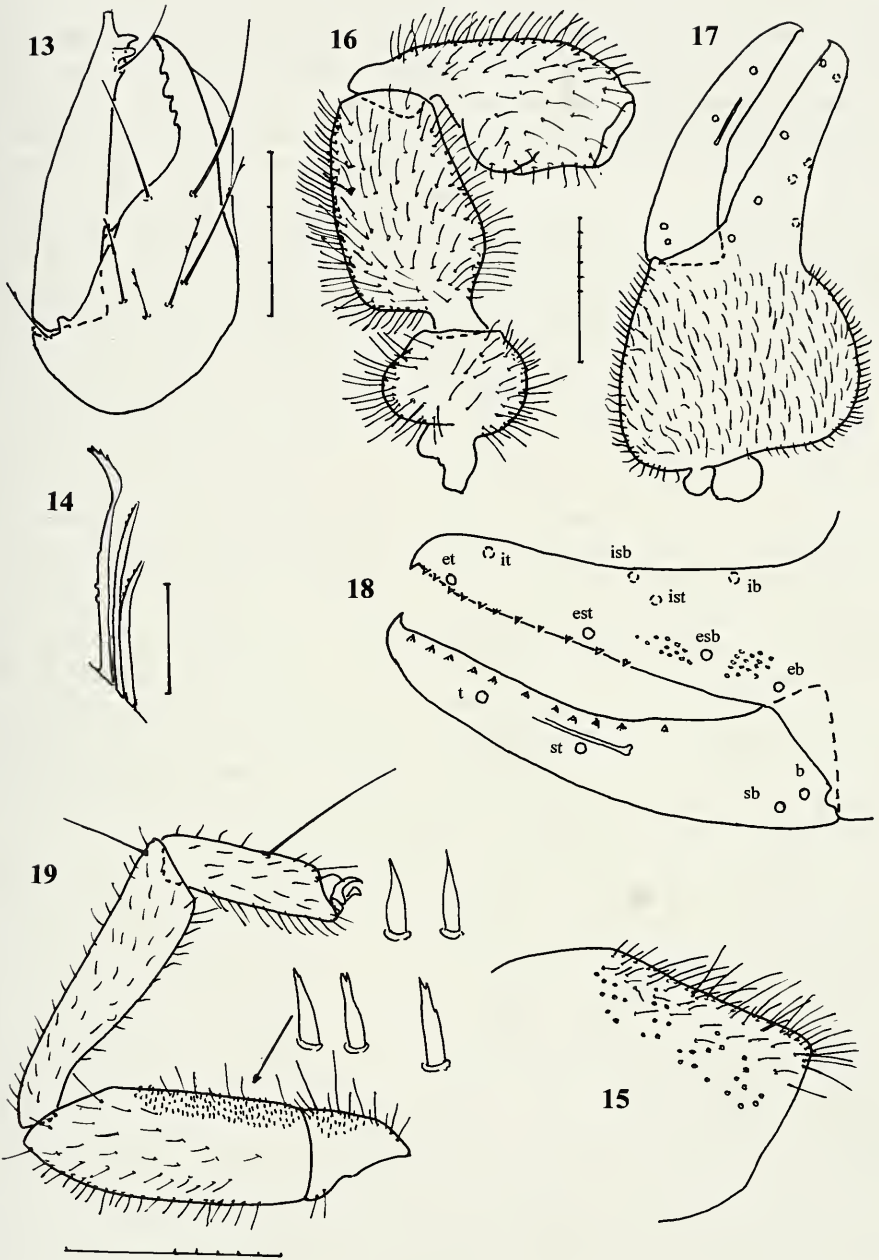
MATERIAL EXAMINED: China, Sichuan, Xin Long, grotte Lei Da Bae, 19.8.1997, leg. J. Lips (no. 223): 1 deutonymph.

Megachernes glandulosus sp. n.

Figs 13-19

MATERIAL EXAMINED: China, Hubei, Banqiao, grotte Xiao Dong, 30°35.13N/109°15.727E, 3.8.2006, leg. J. Lips (no. 2238): ♂ (holotype).

DIAGNOSIS: A species of the genus *Megachernes* characterized by very stout pedipalps (femur 1.85 times longer than broad), a prominent median hump on palpal patella, the presence of numerous, densely-set, long ("fur-like") setae on femur and patella, presence of normal setae on cephalothorax, the presence of numerous glandular(?) pores on coxae, half-sternites IV-IX and on basal lateral face of fixed chelal finger, and the presence of numerous glandular(?) microsetae on ventral side of femur and patella of legs III and IV.



FIGS 13-19

Megachernes glandulosus sp. n., ♂ holotype (13-19). (13) Left chelicera. (14) Rallum. (15) Posterior margin of coxa IV. (16-17) Left pedipalp. (18) Trichobothrial pattern. (19) Leg IV, with details of the glandular(?) microsetae (higher magnification). Scale units 0.1 mm.

DESCRIPTION: Cephalothorax and pedipalps dark reddish, tergites and sternites brown, inner third of half-tergites with a dark spot. Cephalothorax broader than long (1.1 times), without eyes or eyespots, two distinct and granulate transverse furrows, the subbasal one slightly nearer to median furrow than to posterior border, median part of cephalothorax smooth, the prozone and lateral zones indistinctly scaly sculptured, metazone with a small longitudinal groove and numerous sensory (or glandular?) pores; numerous short acute setae, about 12 on anterior and about 16 on posterior border; tergites distinctly divided, ctenoid-scaly sculptured, all half-tergites with field of pores along the posterior border (these zones smooth), lateral margins not modified, with about 10-15 marginal setae, 3-6 lateral and 1-2 median anterior setae, seta short, acute or finely dentate apically, half-tergite X with one median discal tactile seta, tergite XI with 45 setae (6 tactile setae). Manducatory process with 4 marginal setae (suboral seta short) and 5 discal ones; pedipalpal coxa nearly smooth, with numerous long acute setae, coxa I about 20 setae and numerous pores, II about 30 setae/numerous pores, III about 40 setae/numerous pores, IV numerous setae and pores, lateral hind-corner moderately elongate, with densely set, long setae (Fig. 15); anterior genital operculum with numerous short, acute and curved setae; tergite III with numerous short smooth discal setae behind the genital opening. Sternites IV-XI divided, scaly-ctenoid sculptured, half-sternites IV-IX each with smooth triangular fields of sensory (or glandular?) pores along hind margin, X/XI scaly sculptured, about 8-10 supra-stigmatic microchaetae; half-sternites with about 11-14 marginal setae, 1 lateral and 1 median anterior seta; setae acute and of moderate length; anal cone 2/2 setae. Chelicera (Figs 13-14): 7 setae on hand, the basal five finely dentate apically, fixed finger with 4 large retrorse teeth, movable finger with a long broadly rounded subapical lobe, spinneret on left chelicera broken, on right chelicera short and apically forked, rallum with 3 setae, with knob-like protuberances on anterior side, apical part of distal seta slightly enlarged and twisted, serrula exterior 27 lamellae.

Pedipalp (Figs 16-18): Trochanter, femur and patella densely and finely granulate, with numerous long and densely-set acute setae ("fur-like" setation), between them on medial face of femur and patella numerous short and apically dentate setae; hand finely granulate, with dense and short setation, fixed finger in basal half with fields of pores on lateral face; trochanter with high and broad dorsal hump, femur abruptly enlarged at base, distally narrowing, 1.85 times longer than broad, patella with a distinct rounded protuberance on median side, 2.0 times longer than broad, club 1.4 times longer than broad and 2.25 times longer than pedicel, hand with pedicel 1.06 times longer than deep and about 1.7 times longer than broad, chela with pedicel 2.2 times, without pedicel 2.1 times longer than deep and with/without pedicel about 3.5 times longer than broad; chelal finger longer than hand with pedicel, distinctly gaping, fixed finger with 59 small cusped marginal teeth, 11 lateral and 18 medial accessory teeth, movable finger with 67 cusped marginal teeth, 11 lateral and 15 medial accessory teeth, the medial ones partly arranged in 2 or 3 irregular rows; venom duct long, nodus ramosus basal of *st*. Trichobothrial pattern (Fig. 18): *st* nearer to *t* than to *sb*; *ist* close to *isb*, halfway between *ib* and *est* and distinctly distal of *esb*.

Leg I: Femur 1.4 times longer than deep, patella 2.7 times longer than deep and 1.7 times longer than femur, tibia 3.1 times longer than deep and 1.35 times longer than

tarsus, tarsus 3.2 times longer than deep; leg IV (Fig. 19): trochanter, femur and patella with large fields of glandular(?) microsetae along lower margin; femur with a few long setae, patella, tibia and tarsus with numerous mostly short and finely dentate setae; femur+patella 3.6 times longer than deep, tibia 4.4 times longer than deep and 1.7 times longer than tarsus, with a tactile setae near apex (TS = 0.93), tarsus 3.5 times longer than deep, tactile seta in middle (TS = 0.55), arolia shorter than the broad and smooth claws, subterminal seta smooth and curved.

MEASUREMENTS (length/width in mm): Total length 5.3; cephalothorax 2.08/1.87; pedipalp: Trochanter 1.10/0.93; femur 1.71/0.92, patella 1.84/0.90, pedicel 0.57, hand (length/depth) 1.64/1.54, length of movable finger 1.80, of chela with pedicel 3.44, without pedicel 3.19; leg I: femur 0.53/0.38, patella 0.89/0.33, tibia 0.81/0.26, tarsus 0.60/0.19; leg IV: femur+patella 1.72/0.48, tibia 1.44/0.32, tarsus 0.84/0.24.

ETYMOLOGY: a Latin adjective, meaning rich with glands.

DISCUSSION: Species of the genus *Megachernes* are associated with nests of small mammals and are perhaps also guanophilous. Twenty-three species and subspecies are described from the Asian and Australian regions, of which half are distributed in continental Asia (Schawaller, 1991, 1994). Three (or four) are recorded from the Chinese Republic (Schawaller, 1995, Harvey, 2008), most specimens having been collected in caves: *himalayensis* (Ellingsen, 1914) (Sichuan prov.) and cf. *himalayensis* (Ell.) (Guanxi prov.), cf. *titanus* Beier, 1951 (Yunnan prov.) and cf. *vietnamensis* Beier, 1967 (Hubei and Sichuan prov.).

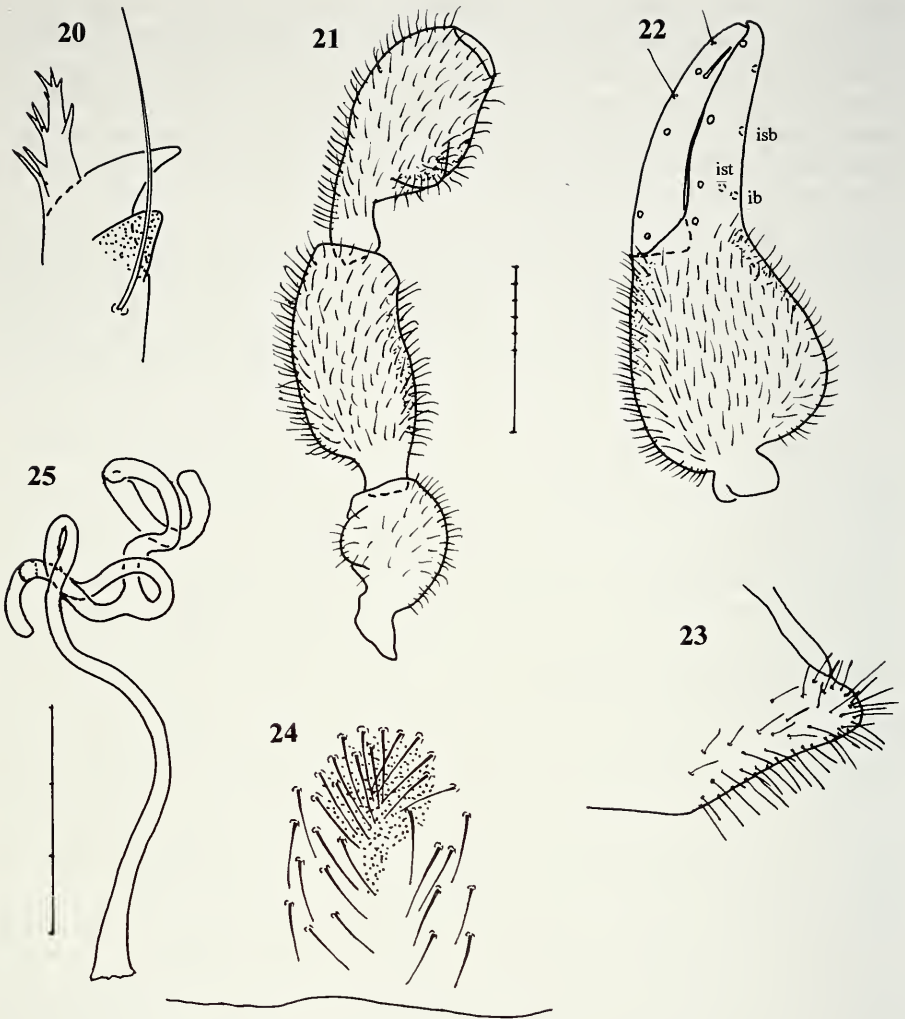
Only a few of the described *Megachernes* species show a sexual dimorphism or "fur-like" (hirsute) setation on pedipalps and/or cephalothorax and only four of these are found in continental Asia (*M. afghanicus* Beier, 1959; *M. barbatus* Beier, 1951; *M. loebli* Schawaller, 1991 and *M. trautneri* Schawaller, 1994). None of those species is recorded as having a prominent protuberance of the palpal patella (at least in the male) or having glandular(?) setae on the legs, coxae and abdominal segments. Furthermore *Megachernes loebli* (from Nepal) and *M. trautneri* (from Thailand) are easily distinguished by their smaller size (length of palpal femur max. 1.53mm vs 1.71mm). *M. barbatus* from Vietnam is similar in size (femur length 1.72-1.90 mm: ♂ ♀), and also has "fur-like" setation on palpal segments (in both sexes), gaping chelal fingers in the male and a similar trichobothrial pattern (*ist/isb* near to *est* and distinctly distal of *esb*) (Beier, 1951), but it differs from *glandulosus* sp.n. by its more slender palpal segments (e.g. femur in male 2.2-2.4 times longer than broad), the absence of a protuberance on the male patella (even if Fig. 17 in Beier, 1967 suggests a sexual dimorphism), the absence of glandular structures and the presence of a "fur-like" setation of the cephalothorax in both sexes.

The presence of a protuberance on the male palpal patella is a supplementary sexual dimorphic character in this genus, but it seems to be quite variable and more or less pronounced depending on the size of the male.

Megachernes tuberosus sp. n.

Figs 20-25

MATERIAL EXAMINED: China, Sichuan, Tong Jian, grotte de la Montagne (Gao Feng Dong), near Zhong Fong Dong, 32°27.53N/107°10.81E, alt. 1000m, 13.8.2004, leg. F. Schalke (no. 1542): ♂ (holotype), 1♂, 2♀ (paratypes).



FIGS 20-25

Megachernes tuberosus sp. n., ♂ holotype. (20) End of movable cheliceral finger. (21-22) Left pedipalp. (23-25) ♀ paratype. (23) Posterior margin of left coxa IV. (24) Genital operculum. (25) Spermatheca. Scale units 0.1mm.

DIAGNOSIS: A large species of *Megachernes* (length of pedipalpal femur 1.18-1.50mm) with a long "fur-like" setation on palpal femur and patella, but not on cephalothorax, relatively slender pedipalps (femur 2.2-2.4 times longer than broad), with a more or less distinct protuberance on male palpal patella, non-gaping chelal fingers and with trichobothrium *ist* in basal position near *ib* and at level of *esb*, distinctly separated from *isb*, which is at level of *est*, and indistinctly reinforced medial and lateral margins of half-tergites.

DESCRIPTION: Cephalothorax and pedipalps reddish brown, tergites brown. Cephalothorax broader than long (♀: 0.8 times) or as long as broad (♂: 0.98-1.01 times), without eyes or eyespots, indistinctly sculptured ("paving-stones"), setae short and finely dentate apically; two distinct granulate traverse furrows, metazone with a small longitudinal groove, about 10-12 setae on anterior and 11-15 on posterior margin (the lateral ones shorter and thicker); all tergites distinctly divided, scaly sculptured, small fields with pores along the posterior margin; setae short, apically dentate, the lateral and median borders of half-tergites indistinctly reinforced; half-tergites with about 8-11 marginal setae, 1-4 lateral and one medial anterior setae, tergite XI with 14-16 setae (4 tactile setae). Manducatory process with 3 marginal setae (1 microchaeta) and 4-5 discal ones; pedipalpal coxa granulate laterally, with numerous setae, coxa I-IV with numerous short apically dentate setae, lateral hind corner of coxa IV (Fig. 23) moderately elongate, with numerous longer setae; anterior genital operculum of male with numerous setae arranged in several rows, the internal setae long and curved, that of female (Fig. 24) with about 26 setae arranged in two rows, spermatheca (Fig. 25) with a long, thin, central tube dividing into two, short, coiled and thin tubes. Sternites divided, half-sternites with fields of pores along posterior margin, otherwise scaly sculptured; sternite III with numerous (♂) or 6 (♀) marginal setae and 4-6 supra-stigmatic microchaetae, half-sternite IV 8-11 marginal setae and 5-8 suprastigmatic microchaetae, the following half-sternites with about 11-17 marginal setae, one medial and 1-2 lateral anterior setae, sternite XI 10-24 setae (4 tactile setae); anal cone with 2+2 setae. Chelicera: 7 setae on hand, five basal ones finely dentate, fixed finger with 4-6 retrorse teeth and 2-3 apical granules, movable finger with a long, tooth-like sub-apical lobe, galea relatively short, with 6-7 branchelets (Fig. 20), serrula exterior 28-33 lamellae, rallum of 3 setae, scarcely dentate anteriorly, the apex of the first one slightly twisted.

Pedipalp (Figs 21-22): Long ("fur-like") setae on trochanter, femur and patella, numerous shorter setae on hand, all finely granulate; trochanter with a large and distinct dorsal protuberance, 1.4-1.7 times longer than broad, femur 2.2-2.4 times, patella 2.1-2.2 times longer than broad, with a more or less pronounced protuberance in males only, club 1.5-1.6 times longer than broad, hand with pedicel 1.4-1.6 times longer than broad, chela with pedicel 2.7-3.0 times longer than broad; finger as long as hand with pedicel, not gaping, fixed finger with 62-63 cusped marginal teeth, 10-13 lateral and 10-16 medial accessory teeth, movable finger with 60-66 marginal teeth, 11-14 lateral and 8-11 medial accessory teeth (arranged in 2-3 irregular rows on both fingers); venom duct short, nodus ramosus at level of trichobothrium *t*. Trichobothrial pattern (Fig. 22): *st* on movable finger only slightly nearer *t* than *sb*; on fixed finger *isb* nearly at level of *est*, *ist/ib/lesb* forming a basal group.

Leg I: Femur 1.6-1.7 times longer than deep, patella 3.0-3.2 times longer than deep and 1.6-1.7 times longer than femur, tibia 4.1-5.0 times longer than deep and 1.3-1.4 times longer than tarsus, tarsus 4.1-4.6 times longer than deep. Leg IV: Femur+patella 4.1-4.6 times longer than deep, tibia 5.5-6.0 times longer than deep and 1.6-1.7 times longer than tarsus, tarsus 4.6-5.1 times longer than deep. Undivided arolia shorter than smooth claws, subterminal seta smooth and curved.

MEASUREMENTS (length/width in mm): total length 4.0-4.4; cephalothorax 1.36-1.49/1.34-1.52(♂) (♀: 1.33-1.34/1.56-1.62); pedipalps: Trochanter 0.79-1.03/0.53-0.62, femur 1.18-1.50/0.54-0.65, patella 1.31-1.53/0.60-0.65, hand with pedicel 1.20-1.50/0.79-1.07, length of movable finger 1.21-1.52, of chela with pedicel 2.31-2.96; leg I: femur 0.41-0.49/0.25-0.30, patella 0.69-0.80/0.22-0.26, tibia 0.71-0.79/0.14-0.19, tarsus 0.51-0.60/0.11-0.14; leg IV: Femur+patella 1.24-1.51/0.29-0.33, tibia 1.06-1.25/0.18-0.23, tarsus 0.66-0.75/0.13-0.16.

ETYMOLOGY: A Latin adjective, meaning "possessing a protuberance", referring to the protuberance of the patella in males.

DISCUSSION: *Megachernes tuberosus* sp.n. is easily distinguished from *M. glandulosus* sp. n. by its more slender palpal femur (2.2-2.4 times vs 1.85 times), the much more slender palpal hand and by its shape, the non-gaping chelal fingers and the basal position of trichobothrium *ist* which is near *ib* (in *glandulosus ist* is placed in the middle of the finger, near *isb*). It shares with *M. barbatus* (from Vietnam) the "fur-like" setation on palpal segments (in both sexes) and similar palpal proportions, but differs by the presence of a protuberance on the male palpal patella, by its smaller size (e.g. palpal femur length max. 1.50 mm vs 1.72 mm min.), by the non-gaping chelal fingers and the basal position of *ist*, nearly at level of *esb*).

Megachernes sp.

MATERIAL EXAMINED: China, Sichuan, Xin Long, without collecting data, VIII.1995 (AKL 95.13): 1 tritonymph.

Nudochernes troglobius sp. n.

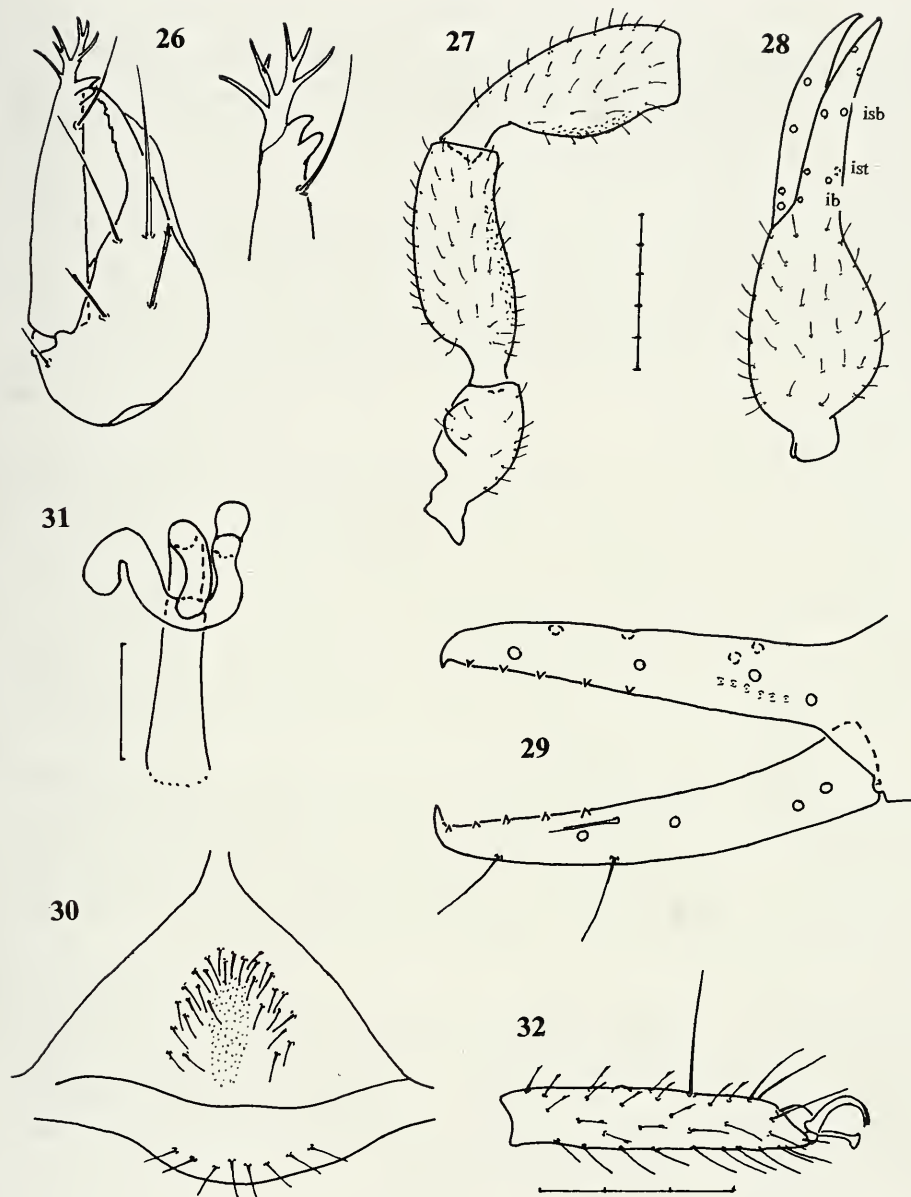
Figs 26-32

Pseudoscorpions. – Lips, 2006: photo, p. 108.

MATERIAL EXAMINED: China, Hubei, Banqiao, Grotte du Dauphin (Dolphin Cave), 30°32.606N/109°16.815 E, alt. 1489 m, 8.10. 2006, leg. J. Lips (no. 2319): ♀ (holotype), 2♂ 5♀ 1 tritonymph (paratypes). – Sichuan, Xin Long, grotte de Gan Shuan, 30°38.96N/109°19.23 E, 6.8.1999, leg. J. Lips (no. 429): 2♀ (paratypes). – Sichuan, Xin Long, without collecting data (AKL 95.2): 2♀ (paratypes).

DIAGNOSIS: A species characterized by its short and dentate vestitural setae, its spermatheca with a long median tube and two apical short branches, stout pedipalps (e.g. femur 2.4-2.9 times, patella 2.4-2.8 times), small size (e.g. length of palpal femur 0.63-0.81mm, length of chela 1.35), and by the presence a dentate pseudotactile seta on tarsus IV.

DESCRIPTION: Pedipalps and cephalothorax reddish brown (basal half lighter than reddish distal half), tergites and sternites yellowish. Cephalothorax normally as long as broad (0.92-0.97 times), densely granulate, with two granulate transverse furrows, the subbasal one slightly nearer to posterior margin than to median furrow, an narrow longitudinal shallow groove in metazone, no eyes or eyespots; 10-12 setae at anterior and 14-17 (+ 0-5 submarginal) at posterior margin; setae of cephalothorax and tergites indistinctly clavate and apically dentate; tergites I-X divided, chaetotaxy of half-tergites: 6-9 marginal setae, one lateral and one median anterior seta, XI with a total of 7-10 (2 tactile setae, 2 elongate median discal setae). Manducatory process



FIGS 26-32

Nudochernes troglobius sp. n., ♀ holotype (26-32). (26) Left chelicera, with details of end of movable finger. (27-28) Left pedipalp, setae on chelal fingers (28) omitted. (29) Trichobothrial pattern. (30) Genital operculum. (31) Spermatheca. (32). Tarsus of leg IV. Scale units 0.1mm.

with 3 marginal (1 microchaeta) and 2-4 discal setae; coxae of pedipalps granulate, with dense setation (1 tactile seta, distal ones apically crown-like dentate), coxae I about 20, II 20, III about 30 setae, IV numerous setae, longer at posterior margin; anterior genital operculum (Fig. 30) with 20-30 setae (in semi-circular arrangement), male genital opening with 2-4 acute inner microchaetae, spermatheca (Fig. 31) with a long unpaired tube and two short apical tubules; sternites divided, scaly sculptured, setae finely dentate (particularly on posterior sternites) and long, chaetotaxy: 11-14 (δ : marginal and discal setae)(4(φ))+4 suprastigmatic microchaetae - 6(δ)(3-5(φ))+4, following ones with 8-10 marginal setae, 1 lateral and 1 median anterior seta, XI with total of 9-11 (4 tactile setae). Pleural membranes striate. Chelicera (Fig. 26): 5 setae on hand, *db* and *ib* dentate, fixed finger with 5 retrorse teeth and 2-3 subapical granules, movable finger with a long cone-like subapical lobe, spinneret (Fig. 26) with 6 long branchelets in distal part, serrula exterior with 20-22 lamellae, rallum with three, apically dentate blades.

Pedipalp (Figs 27-29): Most segments finely granulate; trochanter with distinct rounded dorsal hump, 1.9-2.1 times longer than broad, femur 2.4-2.9 times longer than broad, patella 2.4-2.8 times, club 1.7-1.9 times longer than broad, hand indistinctly granulate medio-distally, with pedicel 1.8-1.95 times longer than broad and 1.0-1.07 times longer than finger, chela with pedicel 3.4-3.8 times longer than broad; fixed finger granulate in basal half, with a small dorsal depression distal of *isb*, with 44-51 cusped teeth, 5-6 lateral and 3-4 medial accessory teeth, movable finger with 46-52 cusped teeth, 5-7 lateral and 2-5 medial accessory teeth; nodus ramosus closer to *t* than to *st*. Trichobothrial pattern as in Fig. 29: *est* halfway between *et* and *esb*, *isb* distal to *est*, *ist-ib-esb* grouped at base of finger.

Leg I: Femur 1.5-1.6 times longer than deep, patella 2.7-3.1 times longer than deep and 1.6 times longer than femur, tibia 3.4-4.35 times, tarsus 4.7-5.0 times longer than deep. Leg IV (Fig. 21): Femur+patella 4.0-4.5 times, tibia 5.1-5.6 times, tarsus 4.5-5.0 times longer than deep, an acute tactile setae near middle of tarsus (TS = 0.48-0.61) and distinctly longer than width of tarsus; arolia undivided, slightly shorter than the smooth and large claws, subterminal seta smooth and curved.

MEASUREMENTS (length/width, in mm): Total length 2.1-3.3; cephalothorax 0.74-0.82/0.69-0.87. Pedipalp: Trochanter 0.42-0.51/0.22-0.24, femur 0.63-0.81/0.21-0.29, patella 0.61-0.78/0.24-0.30, hand with pedicel 0.58-0.72/0.30-0.40, length of finger 0.58-0.72, length of chela with pedicel 1.13-1.35. Leg I: Femur 0.21-0.25/0.13-0.16, patella 0.33-0.40/0.11-0.14, tibia 0.31-0.42/0.08-0.10, tarsus 0.32-0.38/0.07-0.08; leg IV: Femur+patella 0.61-0.78/0.14-0.17, tibia 0.46-0.62/0.09-0.11, tarsus 0.36-0.45/0.08-0.09, length of tactile seta 0.11-0.17.

ETYMOLOGY: Latin, meaning cave inhabiting.

DISCUSSION: One species of the genus *Nudochernes* (*lipsae* Mahnert 2003) has recently been described from the Da Hei Dong cave (Yunnan Province), *troglobius* sp.n. differs from it in having slightly stouter pedipalps (e.g. femur 2.4-2.9 times vs 3.2 times, patella 2.4-2.8 times vs 3.0 times) and being smaller in size (e.g. length of palpal femur 0.63-0.81mm vs 0.91mm, length of chela 1.35 vs 1.53mm). Furthermore, *N. lipsae* possesses a dentate pseudotactile seta on tarsus IV, whereas in *troglobius* sp.n. this seta is longer and acute.

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Two new species of the *Sapromyza obsoleta* Fallén species-group (Diptera, Lauxaniidae)

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Two new species of the *Sapromyza obsoleta* Fallén species-group (Diptera, Lauxaniidae). - The terminalia of both sexes of *Sapromyza obsoleta* Fallén, 1820, are illustrated for the first time. The study of specimens from Eastern Turkey and the Iberian Peninsula allowed discovery, description and illustration of two new species, *S. carlestolrai* sp. n. and *S. villosula* sp. n. The three species differ from each other in external characters and in the structure of the terminalia of both sexes. A key to the species of the *S. obsoleta* s. str. group is presented.

Keywords: Diptera - Lauxaniidae - *Sapromyza obsoleta* group - terminalia - new species - Western Palaearctic Region.

INTRODUCTION

Species of the family Lauxaniidae are usually abundant in moist environments, like on the vegetation in the undergrowth of deciduous forests, on bark of dead or old trees, or along creeks. Few species, however, prefer more dry and exposed habitats, like the borders of forests, isolated trees, or – even rarer (at least in Europe) – grassland (Merz, 2003a). Despite their often high population densities, most species are quite poorly known. Their distribution reflects more the collecting localities of entomologists than the reality, and immature stages are known only for few species. It is therefore not surprising that new species turn up regularly, even in comparatively well-studied areas, like the Western Palaearctic Region.

Recently, a new species of the *Sapromyza obsoleta* group was described from the Swiss Alps (*S. alpina* Merz), and a key to the species-group was provided (Merz, 2007a). This key was mostly based on external characters. Terminalia of both sexes were studied only for few species in detail. In particular, the terminalia of *Sapromyza obsoleta* Fallén, 1820, the type species of the genus, have so far never been illustrated, probably because of its unique external characters which allow a rather easy and quick identification, and because of its rarity in collections. Some time ago, the author received from Miguel Carles-Tolrá a female of *Sapromyza* from Spain which prompted a more careful study of the species-group. In addition, in two samples of Lauxaniidae from various parts of the Western Palaearctic Region, two apparently undescribed species from Eastern Turkey and the Iberian Peninsula belonging to the *S. obsoleta* s. str. group were detected. In order to resolve the taxonomy and nomenclature of this

species-group, the available specimens were studied in detail and the descriptions of the two new species is presented here. A revised key to the species of the *S. obsoleta* s. str. group is provided which should help to recognize easily both new species.

MATERIAL AND METHODS

The specimens examined are deposited in the following collections:

- MHNG Muséum d'histoire naturelle, Genève
 NRS Naturhistoriska Riksmuseet, Stockholm, Sweden
 ZSM Zoologische Staatssammlung München, Germany
 CMCT private collection Miguel Carles-Tolrá, Barcelona, Spain

Terminology follows generally Merz (2007a) where the species-group is diagnosed and keyed, and where a key to the genera of the *Sapromyza* Fallén and *Lyciella* Collin groups is provided.

SYSTEMATIC PART

Sapromyza obsoleta s. str. species-group

The three Western Palaearctic species currently placed in this group in its narrow sense (see key below) can be recognized by the following combination of characters:

- General body colour yellow brown (plate A)
- Postpedicel black in apical half (figs 2, 17, 29)
- Palpus black in apical half (figs 1, 15, 28)
- Frons shining
- Anterior of suture with or without one strong dorsocentral seta, or with some distinctly longer setulae in addition to the 3 postsutural dorsocentral setae (figs 3, 30)
- Fore tarsus darker than fore tibia (plate A)
- Dorsal preapical seta on hind tibia absent or weak (figs 4, 5, 18, 32)
- Abdominal tergites without paired black spots
- Male terminalia: surstylus with medially directed tooth (figs 8, 21, 35)

The group may be separated from the other species of the *S. obsoleta* s. lat. species-group as defined by Merz (2007a) by the apically black palpus, and the modified hind leg in the male (plate B). Currently, three species are placed in this group: *S. carlestolrai* sp. n., *S. obsoleta* Fallén and *S. villosula* sp.n. Excluded from this group is *S. alpina* Merz, 2007, a morphologically similar species (colouration, presence of a presutural dorsocentral seta) but it has a distinct dorsal preapical seta on the hind tibia and the male does not have a modified hind leg. It should be stressed, however, that this diagnosis is preliminary and the study of the terminalia of all species of *Sapromyza* may modify concept as it is presented here.

Sapromyza villosula sp. n.

Fig 1-14, Plates A1, B1

MATERIAL: Holotype ♂; Turkey, Hakkari, Habur, Deresi-Tal, S. Beylsebab, 1200m, 26.VI.1985, W. Schacht (ZSM). – Paratypes: 3♂, 4♀, same data as holotype (MHNG, ZSM). The holotype is directly, slightly laterally pinned and is in good condition.

ETYMOLOGY: This species is named after the modified sternite 5 in the male (fig. 6).

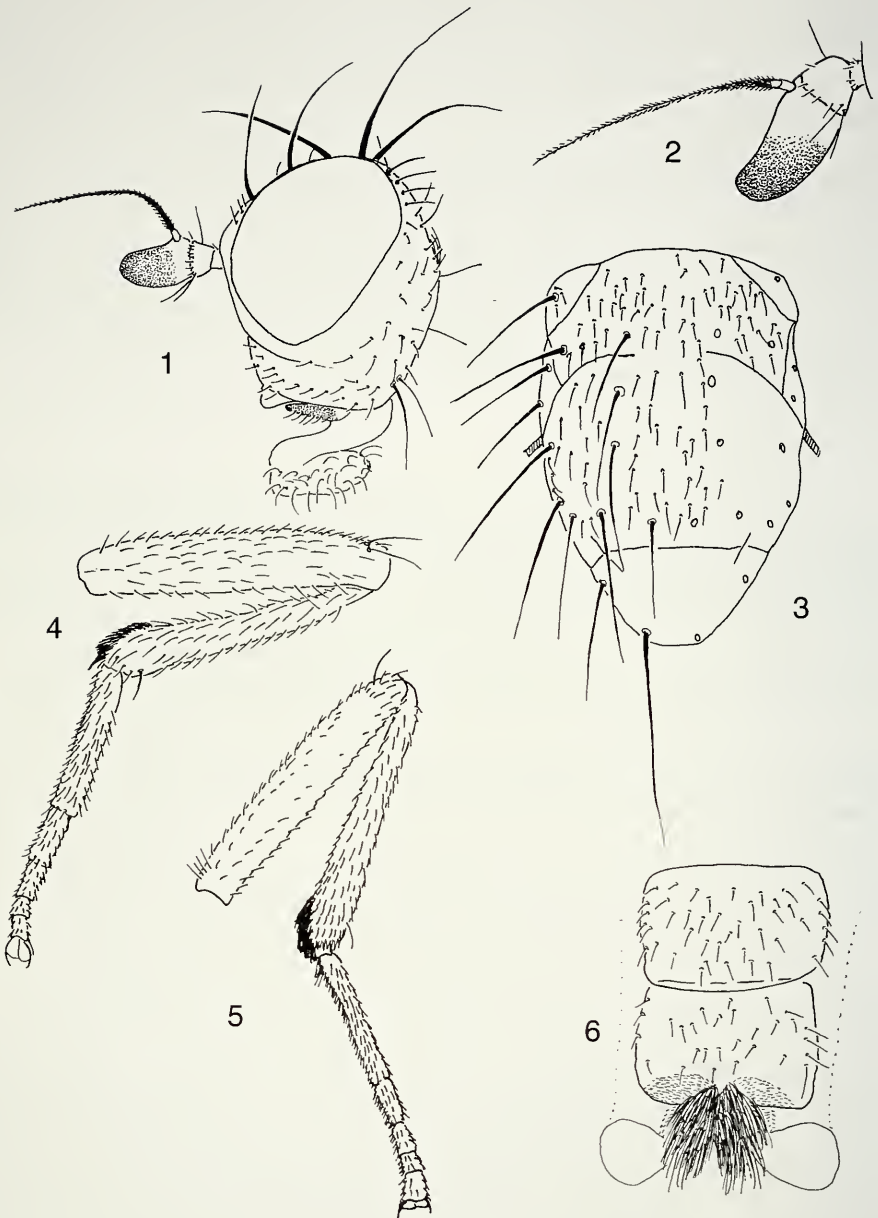
DIAGNOSIS: Yellow brown species with apical half of postpedicel and most of palpus contrastingly black (plate A1); frons shining; 1+3 strong dorsocentral setae; acrostichal setulae arranged in 4 irregular rows (fig. 3); wing hyaline; fore tarsus black but last tarsomere yellow brown; hind tibia with a short dorsal preapical seta (figs 4-5). Male: hind tibia apicoventrally with a dense brush of black setulae and a small black spine anteriorly (figs 4-5; plate B1); sternite 5 with a conspicuous brush of long, soft, black setulae medioposteriorly (fig. 6); epandrium (figs 7-8) wider than high; surstylus with a medially directed tooth; hypandrium and gonites forming a ring (figs 9-10). Female: genital segments a short retractible ovipositor; supra-anal plate and subanal plate isolated, densely setulose (figs 11-13).

DESCRIPTION MALE

Wing length: 3.8-4.2 mm (n=4).

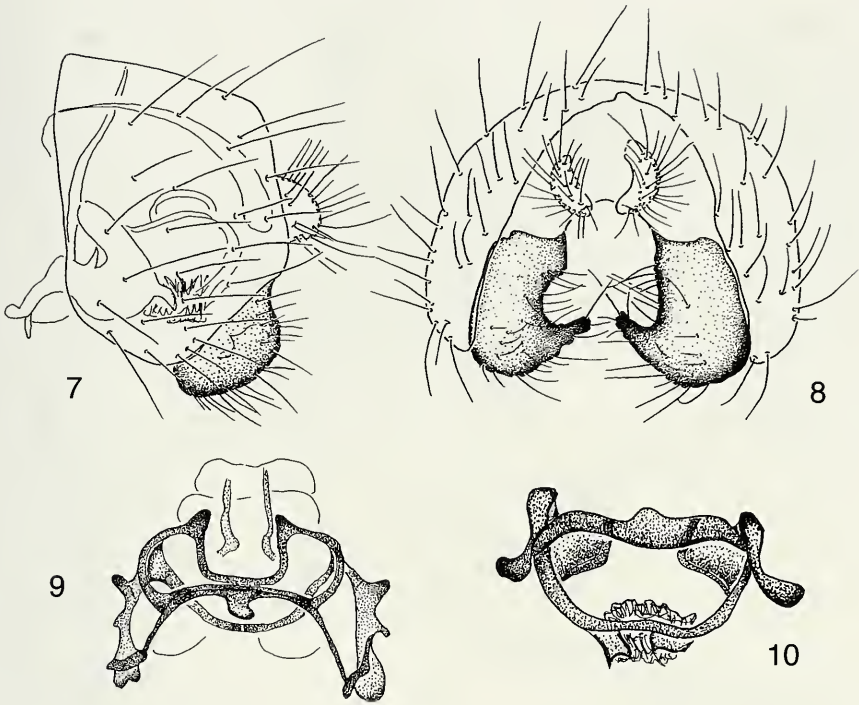
Head (figs 1-2): *Colouration* – Palpus and distal half of postpedicel black, remaining parts including ocellar triangle and occiput yellow brown. Frons distinctly shining, other parts subshining or almost matte. Face pale yellow. Arista yellow at base, flagellum dark brown. *Structure* – In profile 1.2 times higher than long; occiput indistinctly convex, almost straight. Gena one quarter to one third as high as compound eye, about 1.25 times as high as height of postpedicel; along ventral margin with a row of few short, black setulae. Parafacial narrow, almost invisible in lateral view. Compound eye 1.1-1.2 times as high as long. Frons almost parallel-sided, about 1.25 times as wide as one eye, almost square, 1.05 times as wide as long (measured between posterior border of posterior ocelli and lunule), in anterior half with about 15 conspicuous, black setulae. Face slightly concave, without antennal grooves and without a carina. Lunule dorsally of antennal bases almost straight. *Antenna* – Scape almost entirely hidden below lunule, with an apical cercle of few black setulae. Pedicel in lateral view about 0.4 times as long as postpedicel, apically with a cercle of black setulae, ventrally with two stronger setulae, dorsally with one upright, strong setula. Postpedicel about twice as long as high, apically evenly rounded, dorsally almost straight, without a distinct dorso-apical tip. Arista short setulose, longest rays shorter than basal diameter of arista. *Mouthparts* – Clypeus, palpus and labellae not protruding in lateral view. Palpus apically and ventrally with few stiff, short, black setulae. *Chaetotaxy* – All setae and setulae black. 2 reclinate fronto-orbital setae; 1 long ocellar seta inserted inside triangle formed by the 3 ocelli, reaching anteriorly almost the lunule; 1 slightly inclinate medial vertical seta; 1 eclinate lateral vertical seta; 1 slightly inclinate postocellar seta which is about half as long as medial vertical seta; 1 row of postocular setae; occiput with unordered occipital setulae.

Thorax (fig. 3): *Colouration* – Shining yellow brown, but mesonotum slightly microtrichose, microtrichia not obscuring underlying cuticule. Postpronotal lobe and notopleuron pale yellow. *Structure* – Mesonotum in lateral view only slightly convex, almost flat; in dorsal view about 1.2 times as long as wide at level of wing bases. Scutellum at base about twice as wide as long. *Chaetotaxy* – All setae and setulae black. Acrostichal setulae in 4 more or less regular rows, some setulae on median two rows



FIGS 1-6

Sapromyza villosula sp. n., male. (1) Head, lateral view (holotype). (2) Antenna, lateral view (paratype). (3) Thorax, dorsal view (holotype, setae and setulae only drawn on left side). (4) Hind leg, anterior view (holotype). (5) Hind leg, posterior view (paratype). (6) Sternites 4 & 5 (paratype).



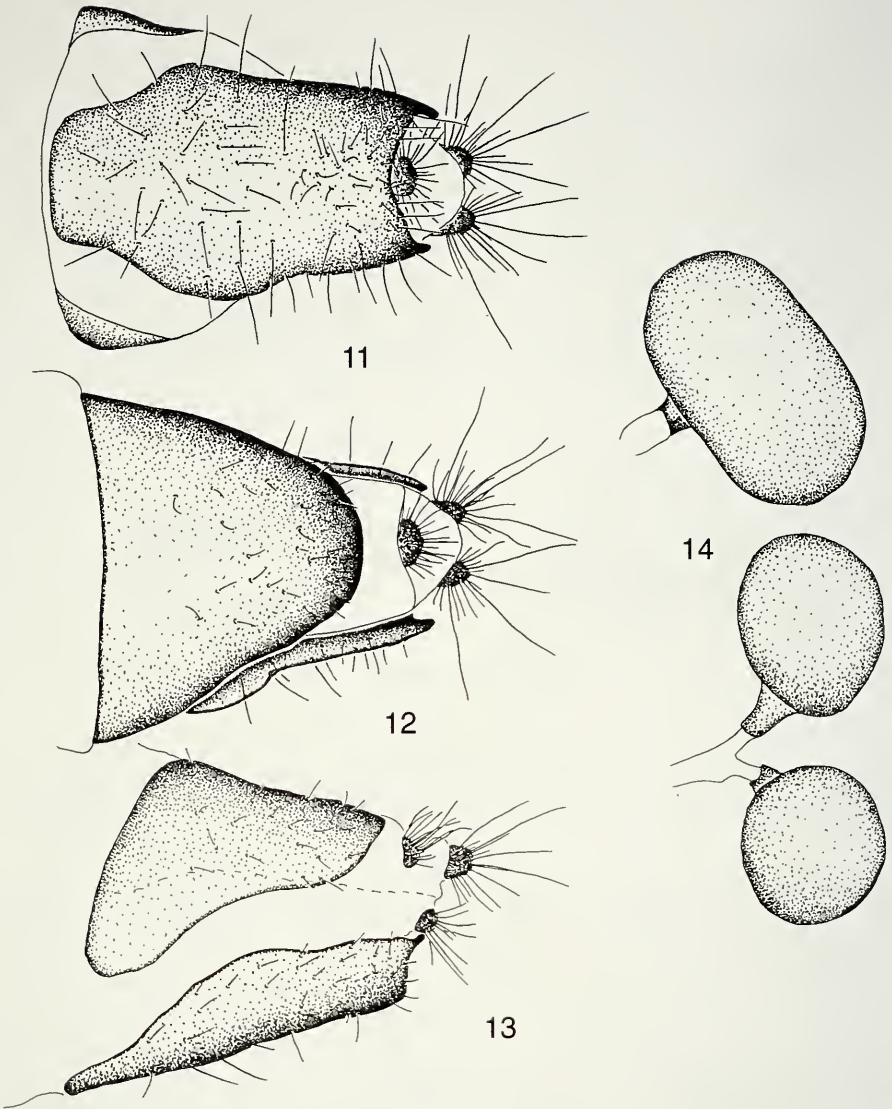
Figs 7-10

Sapromyza villosula sp. n., male paratype. (7) Terminalia, lateral view (surstylus dotted). (8) Terminalia, posterior view (surstylus dotted). (9) Inner terminalia, anterior view. (10) Inner terminalia, dorsal view.

slightly longer; prescutellar acrostichal seta about as long as presutural dorsocentral seta; 1+3 distinct dorsocentral setae, the presutural seta over $3/4$ length of anterior post-sutural dorsocentral seta; sometimes a supernumerary seta on one side; 1 presutural intra-alar seta; 2 supra-alar setae; 1 postalar seta; no postsutural intra-alar seta; 1 post-pronotal seta; 2 notopleural setae of subequal length; 2 (pairs of) scutellar setae of equal size; scutellum otherwise bare; 1 weak proepisternal seta; 1 anepisternal seta, anepisternum with some black setulae in posterior half; katepisternum with 2 setae and some black setulae ventrally; anepimeron bare; 1 (pair of) soft, weak prosternal setula.

Wing: Hyaline, with yellowish tinge; veins yellowish, bare; sapromyziform. row of black setulae on Costa ending halfway between R2+3 and R4+5; distance between R-M and DM-Cu on M1+2 slightly more than twice the length of DM-Cu and about two third as long as distance between DM-Cu and wing margin on M1+2.

Legs (figs 4-5): General colour yellow brown, but entire fore tarsus dark brown to black or last tarsomere yellow brown. Fore femur without ctenidium. Mid tibia apicoventrally with one strong and often a weak seta. Hind femur posterodorsally with 2 stronger, outstanding setulae. Fore and mid tibia with a strong, dorsal preapical seta. Hind tibia with a short, weak dorsal preapical seta which is sometimes almost indis-



FIGS 11-14

Sapromyza villosula sp. n., female paratype. (11) Terminal segments, ventral view. (12) Terminal segments, dorsal view. (13) Terminal segments, lateral view. (14) Spermathecae.

tinguishable from usual appressed setulae. Male hind tibia apicoventrally with a brush of black setulae; anteriorly with a short, black spine; hind basitarsus ventrally simply setulose, without brush of black setulae. Hind leg of female unmodified.

Male abdomen and terminalia (figs 6-10): Colouration as mesonotum, black setulose, setulae along posterior margin of tergites longer but not as long as



A1



A2

PLATE A

Sapromyza obsoleta s. str. group (male). Lateral view. (1) *S. villosula* sp. n. (holotype). (2) *S. obsoleta* (Germany).

corresponding tergite. Tergites without pairs of black spots. Sternite 5 (fig. 6) posteriorly in middle with a conspicuous, thick brush of long, black setulae. Epandrium in posterior view wider than high (fig. 8). Surstylus setulose, in lateral view (fig. 7) longer than high, in posterior view with a medially directed tooth. Cercus densely setulose, partly hidden in epandrium. Inner terminalia (figs 9-10) highly modified; hypandrium and gonites forming a ring in which the aedeagus is embedded; phallopodeme not developed; aedeagus a short, membranous tube.

DESCRIPTION FEMALE

Similar to male, but without the modified hind leg.

Wing length: 3.8-4.1 mm (n=4).

Female abdomen and terminalia (figs 11-14): Evenly setulose, setulae along posterior margin of tergites somewhat longer, but not as long as corresponding tergite. Sternites unmodified. Terminalia soft, retracted into preabdomen, not forming a sclerotized ovipositor. Tergite 8 (fig. 12) sparsely setulose, distally evenly rounded, shorter than corresponding sternite. Sternite 8 setulose on entire surface, elongated, latero-distally with a conspicuous tooth-like projection (figs 11 & 13). Supra-anal plate a small sclerite, strongly setulose. Subanal plate strongly setulose, small, in lateral view partly hidden by the tooth of sternite 8. One egg-shaped, large and a pair of smaller, spherical spermathecae of smooth surface present (fig. 14).

REMARKS: The male is unique among Western Palaearctic *Sapromyza* by the structure of its hind leg in combination with chaetotaxy and terminalia. The female is superficially similar to *S. obsoleta* and they can be safely separated from each other only by the study of the terminalia. The dorsal preapical seta on the hind tibia may be very short and almost undistinguishable from surrounding setulae in *S. villosula* as it is the case in *S. obsoleta*.

BIOLOGY: Nothing is known about the biology of the species.

DISTRIBUTION: So far only known from the type series from SE Turkey.

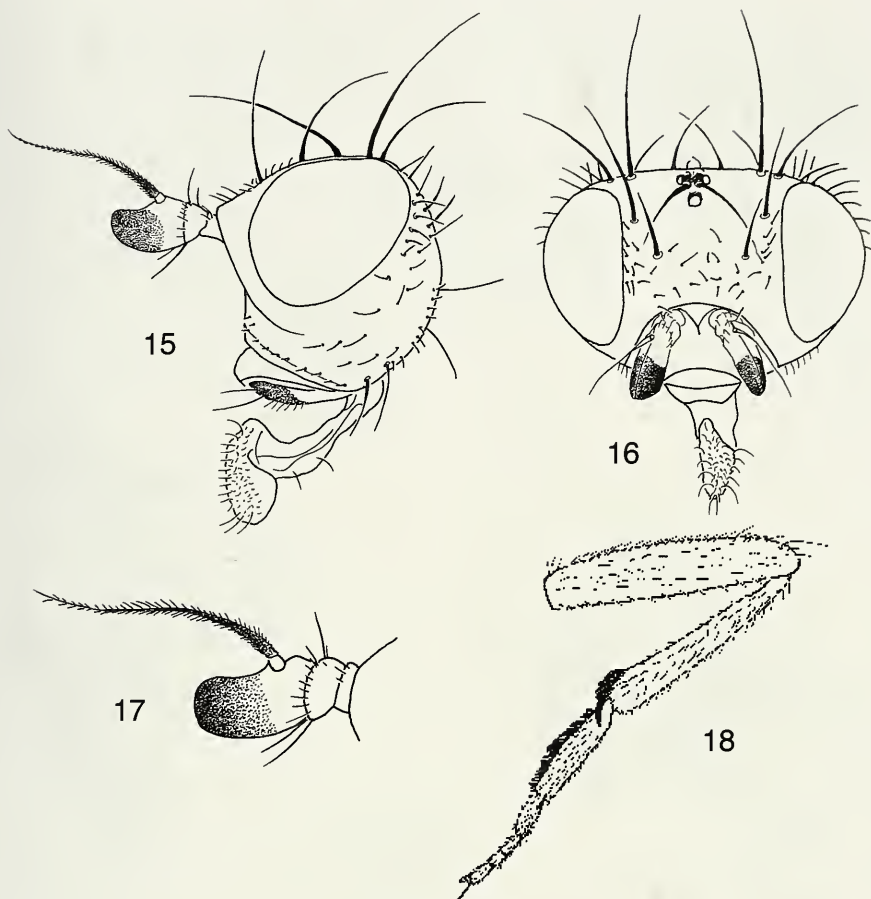
Sapromyza obsoleta Fallén, 1820

Figs 15-27, Plates A2, B2

Sapromyza obsoleta Fallén, 1820: 31. Lectotype ♂ (designated by Merz, 2003b): Sweden, Skåne (? presumed, not stated) (NRS).

MATERIAL: 1♂; Germany, Mecklenburg-Vorpommern, Gross Polzin, NW Anklam, Sandhügel, 20m, 55.50N/13.36E, 14.VI.2003. C. Lange & J. Ziegler (MHNG). – 2♂; Greece, Macedonia, Apollonia, at Volvi Lake, relict forest and meadow, 60m, 40.39N/23.30E, 30.V.2002, E. Kameneva & V. A. Korneyev (MHNG). – 2♂; Greece, Macedonia, Horthiatis, 12km ENE Thessaloniki, 650-750m, 40.36N/23.06E, 28.V.2002, E. Kameneva & V. A. Korneyev (MHNG). – 1♂; Greece, Macedonia, Horthiatis, 12km ENE Thessaloniki, 650-900m, 40.36N/23.06E, 2.VI.2003, E. Kameneva & V. A. Korneyev (MHNG). – 1♂; Greece, Macedonia, Rendina, 6.V.1995, A. Orosz (MHNG). – 1♂; Hungary, Kiskunsagi N. P., Ocsa, Madenica erdo, 5.VI.1979, L. Papp (MHNG). – 1♀; Hungary, Kiskunsagi N. P. Lakitelek, Toserdo, 6.VI.1979, L. Papp (MHNG). – 1♂ (lectotype), 4♀ (paralectotypes): Sweden, Skåne (?), Fallén (NRS). – 1♀; Switzerland, GE, Genthod, Frey-Gessner (MHNG).

DIAGNOSIS: This is the only known Western Palaearctic species of *Sapromyza* with the modified hind tibia and basitarsus in the male (fig. 18). It is easy to recognize by the strong spur anteriorly and the dense brush of black setulae ventrally at apex of

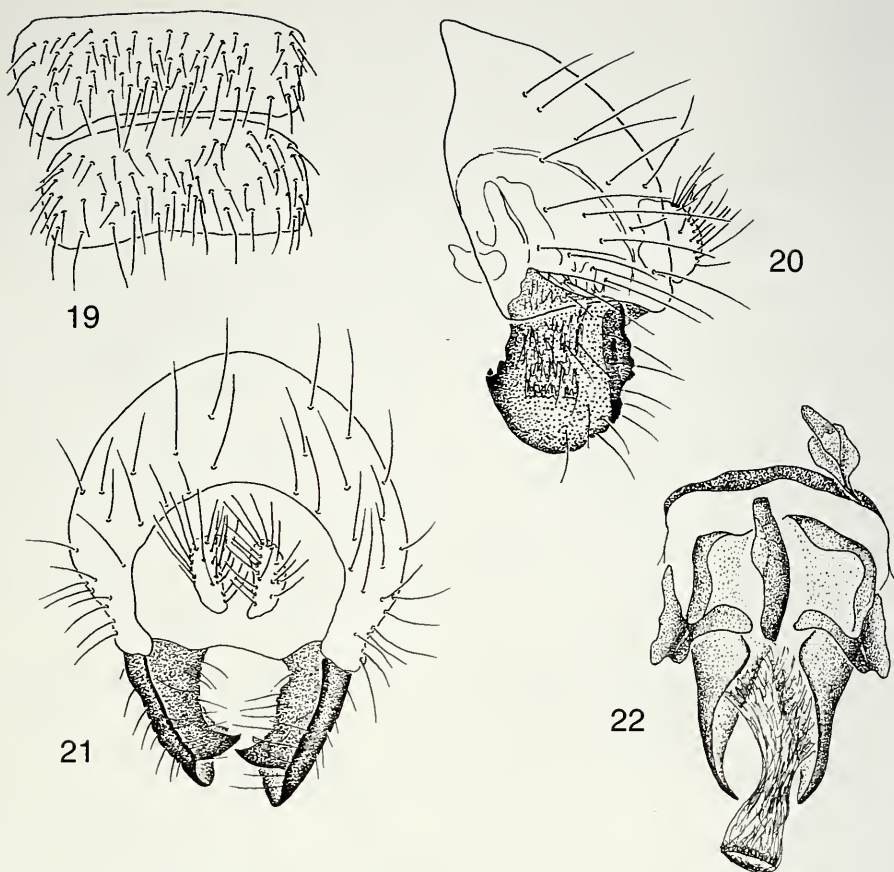


FIGS 15-18

Sapromyza obsoleta Fallén, 1820, male. (15) Head, lateral view (Germany). (16) Head, frontal view (Germany). (17) Antenna, lateral view (Germany). (18) Hind leg, posterior view (Hungary).

the hind tibia, and a long brush of black setulae along the entire ventral side of the hind basitarsus (Plate B2). The terminalia of both sexes are distinct and differ from all known Western Palearctic Lauxaniidae (see description below).

DESCRIPTION OF MALE TERMINALIA: Sternites strongly black setulose, those on sternite 5 not stronger than on other sternites (fig. 19); epandrium (fig. 21) higher than wide, black setulose; surstylus (figs 20, 21) higher than wide in lateral view; of rather complicated shape, with a medially directed sclerotized plate which carries a medially directed tooth; in lateral view with a basally directed tooth; posteriorly with a slightly undulating border; cercus (figs 20, 21) strongly black setulose; inner terminalia (fig. 22): hypandrium basally closed, ventrally ending in two branches; phallapodeme short; pregonite of V-shape, strongly sclerotized; postgonite forming a sheath around

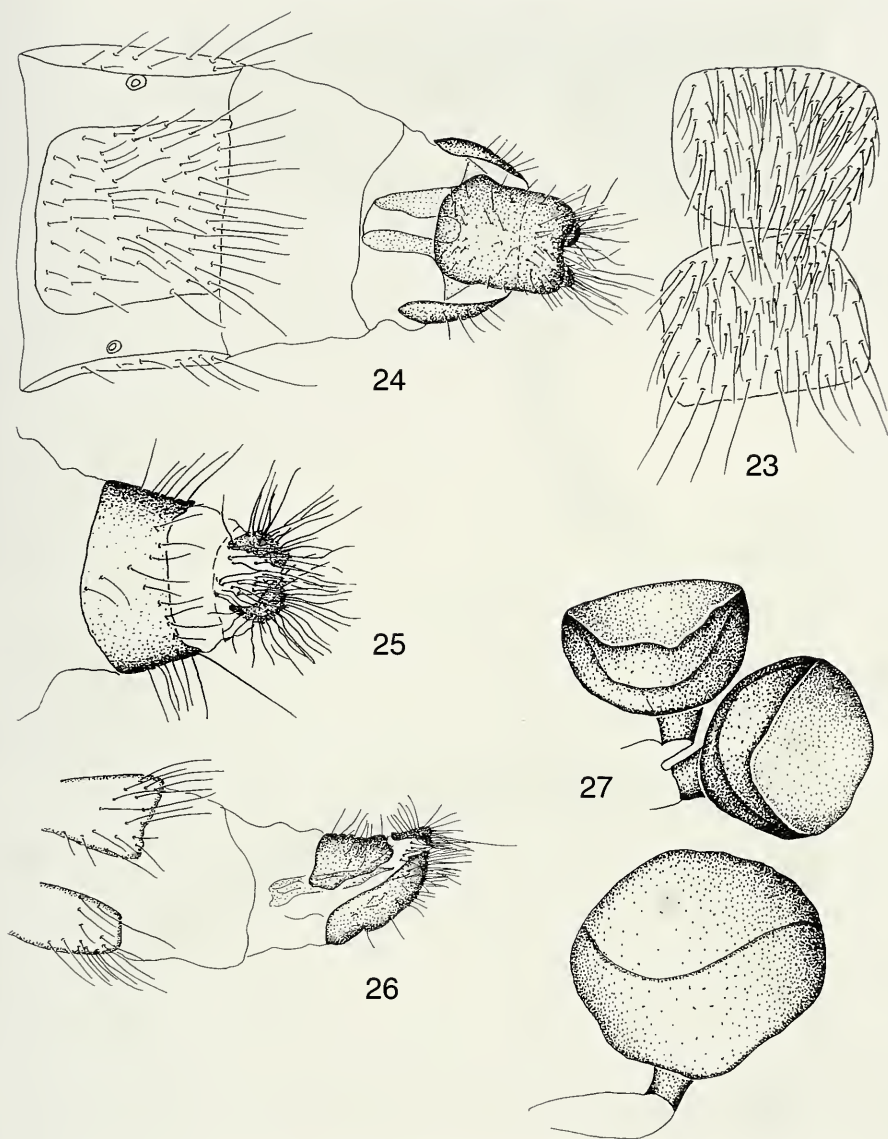


Figs 19-22

Sapromyza obsoleta Fallén, 1820, male (Greece). (19) Sternites 4 & 5. (20) Terminalia, lateral view (surstylus dotted). (21) Terminalia, posterior view (surstylus dotted). (22) Inner terminalia, ventral view.

aedeagus, with two pointed tips posteriorly; aedeagus a membranous sack; ejaculatory apodeme sclerotized.

DESCRIPTION OF FEMALE TERMINALIA: Pregenital sternites (fig. 23) strongly black setulose, setulae of similar structure; segment 8 supra-anal plate and subanal plate forming a small ovipositor; tergite 8 (fig. 25) black setulose, extended laterally on ventral side; sternite 8 (fig. 24) rather square; supra-anal plate (figs 25, 26) wider than long, dorsally and laterally black setulose, folded on ventral side; subanal plate (figs 24, 26) longer than wide, apically stronger setulose than on surface, apical border not straight; inside ovipositor with a sclerite on level of supra-anal and subanal plates (figs 24, 26); cercus strongly black setulose, small and only little protruding; with strong setulae on membranous apical part between cerci; 3 sclerotized spermathecae (fig. 27) of smooth



FIGS 23-27

Sapromyza obsoleta Fallén, 1820, female (Switzerland). (23) Sternites 4 & 5. (24) Terminal segments, ventral view. (25) Terminal segments, dorsal view. (26) Terminal segments, lateral view. (27) Spermathecae.

surface present, the unpaired spermatheca larger than the paired ones. The 3 spermathecae are cup-shaped in the only dissected female. It is unknown whether this shape reflects the reality or whether they collapsed during preparation.



PLATE B

Sapromyza obsoleta s. str. group (male). Hind tibia and tarsus. (1) *S. villosula* sp. n. (paratype). (2) *S. obsoleta* (Greece).

REMARKS: In the key of Shatalkin (2000) the species runs to a group of 4 Palaearctic species which lack the preapical dorsal seta on the hind tibia (*S. ferganica* Shatalkin, *S. hissarica* Shatalkin, *S. obsoleta*, *S. simplicipes* Czerny). Although no specimens of the 3 other species (known so far from Middle Asia only) could be

studied it is obvious from the illustrations and characters given in the key that *S. obsolata* differs from them by the above mentioned diagnosis.

BIOLOGY: The species seems to have a preference for sandy soil in North and Central Europe as it was collected on a sandy hill in Germany and in a large sanddune area in Hungary. The ecological range is larger in South Europe as it was collected in forests and in meadows. Immature stages, however, are unknown and its apparant rarity in collections does not allow to give more precise information about its biology.

DISTRIBUTION: This Western Palaearctic species is recorded from the following countries (Merz, 2007b): Austria, Belgium, Czech Republic, Denmark, Finland, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Poland, Slovakia, Sweden, Switzerland, "Yougoslavia". Shatalkin (2000) recorded the species from "Turkey" without further information.

Sapromyza carlestolrai sp. n.

Figs 28-39, Plate C1-4

MATERIAL: Holotype ♂; Portugal, 7 km E of Manteitgas, nr. river, 580m, sweeping, 40.24.42N/7.28.04W, Barták M., 23.V.2008 (MHNG). – Paratype ♀; same data as holotype (MHNG). – 1 ♀; Spain, Salamanca, Villar de la Yegua, Vado de la Vina (E: Salamanca), Gelbschalen [= in yellow pans], in Alkohol, 40.44N/06.42W, 6.-9.VI.2003, Tschorsnig (CMCT).

The holotype is laterally glued on a cardpoint and is in good condition (medial vertical setae absent or broken). The abdomen was removed and it is stored with the terminalia dissected in a glass tube in glycerol on the same pin.

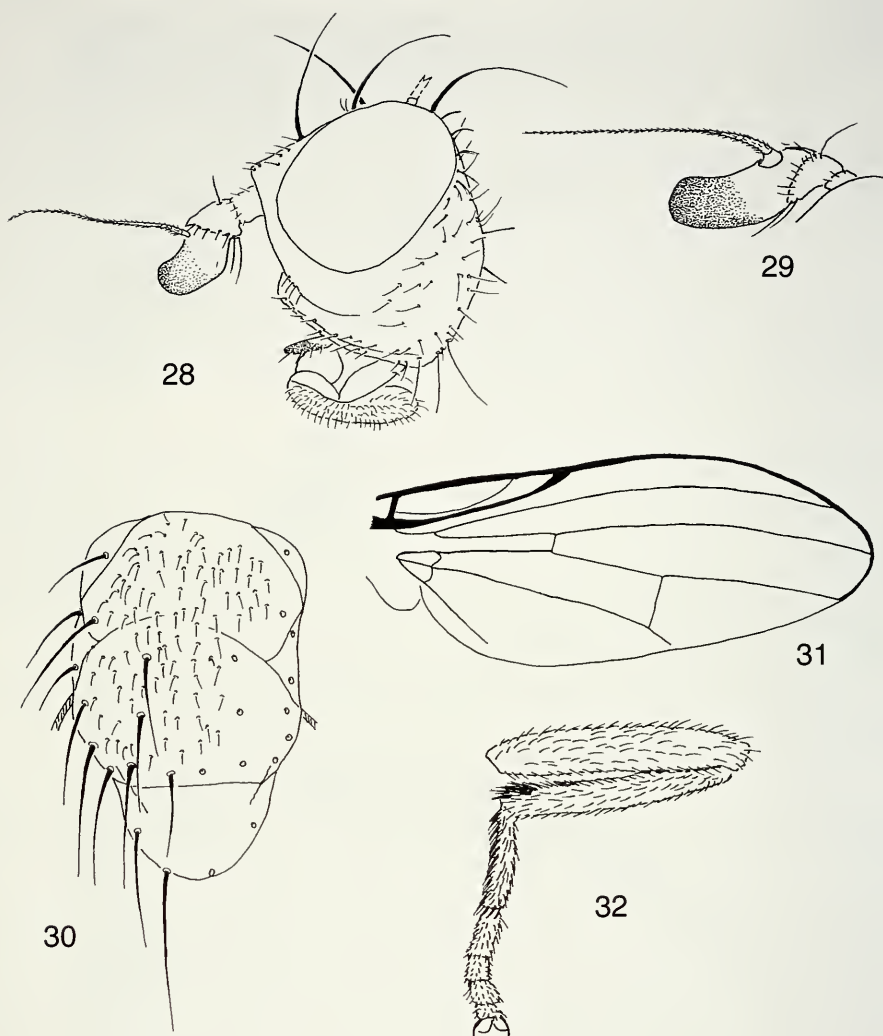
ETYMOLOGY: Named in honour of Miguel Carles-Tolrá, Barcelona, one of the rare specialists of the family Lauxaniidae, who was stimulating this study, and in recognition of his efforts for the progress of dipterology in Europe.

DIAGNOSIS: Yellow brown species with apical half of postpedicel and palpus contrastingly black (plate C1); frons shining; thorax (fig. 30) with 0+3 dorsocentral setae, but without longer setulae anterior of suture; acrostichal setulae arranged in 4 more or less regular rows; wing (fig. 31) hyaline; fore tarsus black but last tarsomere yellow brown; hind tibia without a dorsal preapical seta. Male: hind tibia (fig. 32, plate C2) at tip with a short, black, anteroventral spine; hind basitarsus ventrally with a loose brush of black setulae; terminalia (plate C3) with sternite 5 (fig. 33) unmodified; small papillose sternite 6 present; surstylus in lateral view (fig. 34) arched; in ventral view (fig. 35) distinctly concave apically; postgonites asymmetrical (fig. 36). Female (figs 37-39, plate C4): tergite 7 and sternite 7 fused to form a short, heavily sclerotized ovipositor; sternite 8 a rigid plate, medially with a longitudinal keel, apically distinctly concave, lateroapically extended into a small tooth; supra-anal and subanal plates small, densely setulose.

DESCRIPTION MALE

Wing length: 4.35 mm (n=1).

Head (figs 28-29): *Colouration* – Most of palpus and distal half of postpedicel black, remaining parts including ocellar triangle and occiput yellow brown. Frons shining, other parts subshining or almost matte. Face pale yellow. Arista yellow at base, flagellum dark brown. *Structure* – In profile 1.2 times higher than long; occiput indistinctly convex, almost straight. Gena almost half as high as compound eye, about 1.4



FIGS 28-32

Sapromyza carlestolrai sp. n. male holotype. (28) Head, lateral view. (29) Antenna, lateral view. (30) Thorax, dorsal view (setulae omitted on one side). (31) Wing, drawn in situ. (32) Hind leg, anterior view.

times as high as height of postpedicel, along its ventral margin with a row of fine black setulae, near vibrissal corner with few additional setulae. Parafacial over half as long as height of postpedicel. Compound eye 1.1 times as high as long. Frons more or less parallel-sided, about 1.25 times wider than long, and about 1.6 times as wide as compound eye; in anterior half with about 30 black setulae. Face indistinctly concave, without antennal grooves and without a distinct carina. Lunule dorsally of antennal bases almost straight. *Antenna* – Scape only slightly projecting in lateral view, apically

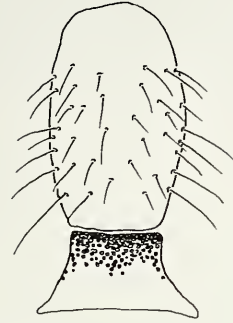
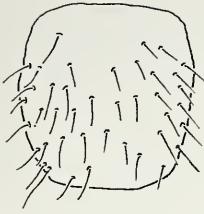
with some black setulae. Pedicel about half as long as postpedicel, apically with a row of black setulae, dorsally with one long, upright setula, ventrally with 3 longer setulae. Postpedicel about twice as long as high, apically evenly rounded, dorsally almost straight, without a distinct dorso-apical tip. Arista short setulose, longest rays shorter than basal diameter of arista. *Mouthparts* – Clypeus, palpus and labellae in lateral view in almost one line with face. Palpus apically and ventrally with few stiff, black setulae. *Chaetotaxy* – All setae and setulae black. 2 reclinate fronto-orbital setae; 1 long ocellar seta inserted inside triangle formed by the 3 ocelli, reaching anteriorly almost the lunule; medial vertical seta long, probably inclinate (one absent, the other broken); lateral vertical seta eclinate; 1 distinctly inclinate postocellar seta which is about half as long as lateral vertical seta; 1 row of postocular setae; occiput with unordered occipital setulae.

Thorax (fig. 30, plate C1): *Colouration* – Shining yellow brown, but postpronotum, notopleuron and dorsal half of pleurae pale yellow. *Structure* – Mesonotum in lateral view only slightly convex, almost flat; in dorsal view about 1.1 times as long as wide at level of wing bases. Scutellum at base about twice as wide as long. *Chaetotaxy* – All setae and setulae black. Acrostichal setulae in 4 more or less regular rows; prescutellar acrostichal seta about two third as long as posteriormost dorsocentral seta; 0+3 dorsocentral setae, no longer setulae on line of dorsocentral setae anterior suture; 1 presutural intra-alar seta; 2 supra-alar setae; 1 postalar seta; no postsutural intra-alar seta; 1 postpronotal seta; 2 notopleural setae, the posterior about two third as long as anterior notopleural seta; 2 (pairs of) scutellar setae of subequal length; 1 proepisternal seta; 1 anepisternal seta, anepisternum with some black setulae in posterior half; 2 katepisternal setae, katepisternum covered with some black setulae; anepimeron bare; 1 tiny, weak prosternal setula.

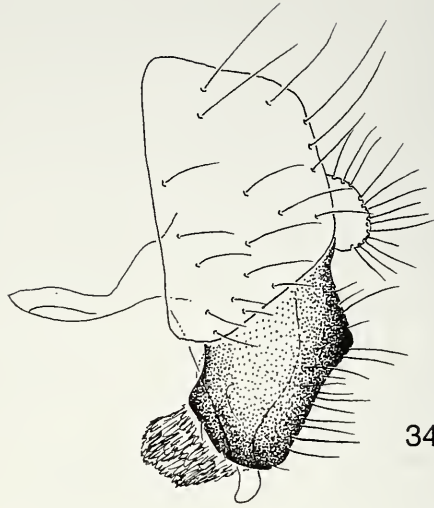
Wing (fig. 31): Hyaline, with yellowish tinge; veins yellowish, bare; sapromyziform, row of black setulae on Costa ending halfway between R2+3 and R4+5; Costa reaching M1+2; distance between R-M and DM-Cu on M1+2 about twice as long as length of DM-Cu and about 0.6 times as long as distance between DM-Cu and wing margin on M1+2.

Legs (fig. 32, plate C2): General colour yellow brown, but fore tarsus dark brown to black with last tarsomere yellow brown. Fore femur without ctenidium. Fore and mid tibia with a strong dorsal preapical seta; hind tibia without dorsal preapical seta. Mid tibia apicoventrally with a strong seta. Hind femur with one outstanding posterodorsal seta near apex. Hind tibia apicoventrally with a short, black spine. Hind tarsus with a rather indistinct row of black setulae ventrally which do not form a conspicuous brush.

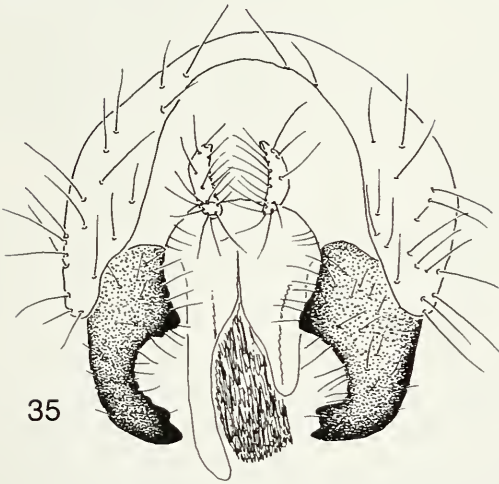
Male abdomen and terminalia (figs 33-36, plate C3): Colouration as mesonotum, black setulose, setulae along posterior margin of tergites longer but not as long as tergite on which they are inserted. Tergites without pairs of black spots. Sternite 5 unmodified; distally with a small sclerotized plate which is covered at base with numerous papillae (sternite 6?). Epandrium in lateral view slightly higher than long, in posterior view about as high as wide. Surstylus setulose, in lateral view arched, slightly longer than wide; in posterior view basally with a medially directed tooth; at tip with a distally concave, medially-directed, finger-like protuberance. Hypandrium open



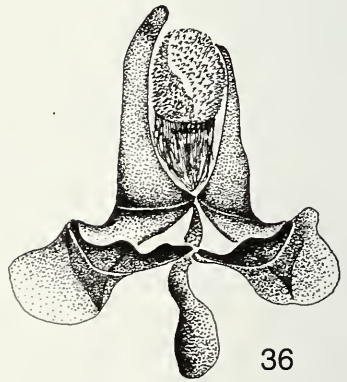
33



34



35

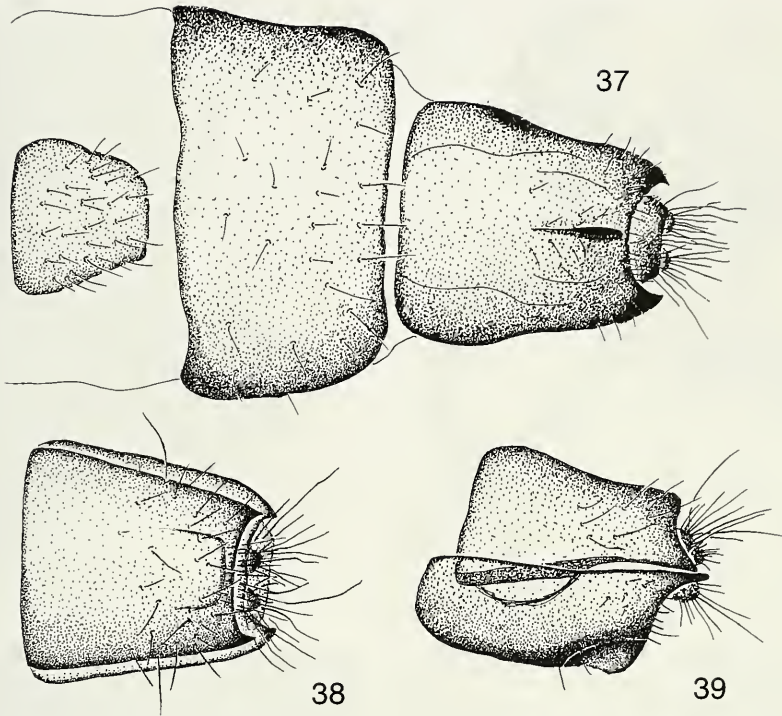


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FIGS 33-36

Sapromyza carlestolrai sp. n. male holotype. (33) Sternites 4-6. (34) Terminalia, lateral view (surstylus dotted). (35) Terminalia, posterior view (surstylus dotted). (36) Inner terminalia, anterior view.

anteriorly, fused with postgonites posteriorly. Pregonite absent (?). Two finger-like, asymmetrical (or broken on one side?) postgonites forming a sheath for the aedeagus. The latter a membranous tube with is apically densely covered with small papillae. Phallapodeme well developed, almost as long as postgonite.



FIGS 37-39

Sapromyza carlestolrai sp. n. female paratype. (37) Terminal segments, ventral view. (38) Terminal segments, dorsal view. (39) Terminal segments, lateral view.

DESCRIPTION FEMALE

Similar to male, differing in the entirely unmodified hind leg and the structure of the terminalia.

Wing length: 4.6-4.75 mm (n=2).

Female abdomen and terminalia (figs 37-39, plate C4) Setulae along posterior margin of tergites shorter than in male. Pregenital sternites unmodified, simply setulose. Tergite 7 and sternite 7 fused to a short ring, forming an ovipositor which cannot be retracted in preabdomen. Sternite 8 a strongly sclerotized plate, apically distinctly concave, lateroapically extended into a short tooth; medially in posterior half with a prominent keel which is apically elevated. Tergite 8 forming an apically setulose plate which is slightly longer than wide, but shorter than corresponding sternite; apically almost straight, lateroapically with a small tooth; Supra-anal and subanal plates small, strongly setulose, partly hidden under tergite 8 and sternite 8. Spermathecae not visible (dissected abdomen filled with dirt).



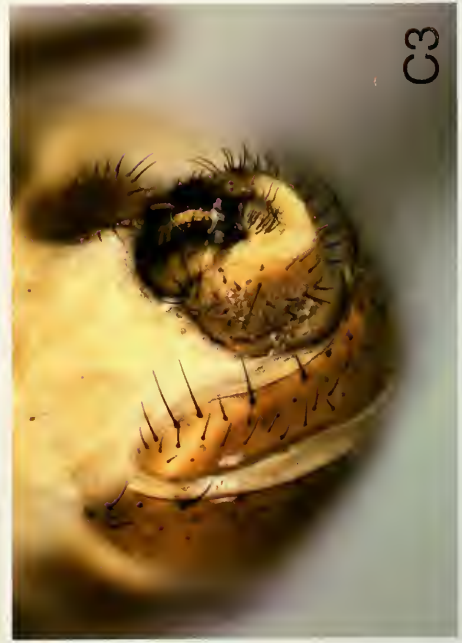
C2



C4



C1



C3

PLATE C

Sapromyza carlestolrai sp. n. (holotype and paratype from Portugal). (1) lateral view (male holotype). (2) hind leg (male holotype). (3) Externally visible terminalia (male holotype). (4) same (female paratype).

KEY TO MALES OF THE WESTERN PALAEARCTIC SPECIES OF THE
SAPROMYZA OBSOLETA S. STR. SPECIES GROUP

Characters given in brackets at the end of each section apply to all species of the couplet but they may also be present in some species of the other couplet.

- 1a Dorsal preapical seta on hind tibia absent or weak, almost indistinguishable from other setulae (yellow brown species, but apical half of postpedicel, most of palpus and anterior tarsus except for last tarsal segment contrastingly dark brown to black; frons shining; gena higher than height of postpedicel; abdomen without paired black spots on last tergites) (*Sapromyza obsoleta* s. str. group) 2
- 1b Dorsal preapical seta well developed on all three tibiae
 other species of *Sapromyza* (see Merz, 2007a)
- 2a Hind tibia apicoventrally with a brush of black setulae and apically with a curved, long, black spine anteriorly; hind basitarsus ventrally along entire length with a brush of black setulae (anterior of suture with some longer setulae on line of dorsocentral setae) . *Sapromyza obsoleta* Fallén, 1820
- 2b Hind basitarsus ventrally without distinct brush of black setulae; hind tibia anteriorly at apex without long, outstanding black spine 3
- 3a Hind tibia (figs 4-5) with a distinct brush of black setulae apicoventrally; dorsal preapical seta weak, sometimes barely longer than other setulae; 1+3 distinct dorsocentral setae; sternite 5 posteromedially with a brush of black setulae (fig. 6) *Sapromyza villosula* sp. n.
- 3b Hind tibia (fig. 32) without brush of black setulae apicoventrally, but with a small, black spine; dorsal preapical seta absent; 0+3 dorsocentral setae, anterior of suture without longer setulae; sternite 5 unmodified
 *Sapromyza carlestolrai* sp. n.

KEY TO FEMALES OF THE WESTERN PALAEARCTIC SPECIES OF THE
SAPROMYZA OBSOLETA S. STR. SPECIES GROUP

Characters given in brackets at the end of each section apply to all species of the couplet but they may also be present in some species of the other couplet.

- 1a Dorsal preapical seta on hind tibia absent or weak, almost indistinguishable from other setulae (yellow brown species, but apical half of postpedicel, most of palpus and anterior tarsus except for last tarsal segment contrastingly dark brown to black; frons shining; gena higher than height of postpedicel; abdomen without paired black spots on last tergites) (*Sapromyza obsoleta* s. str. group) 2
- 1b Dorsal preapical seta well developed on all three tibiae
 other species of *Sapromyza* (see Merz, 2007a)
- 2a 1+3 strong dorsocentral setae present; dorsal preapical seta on hind tibia short and weak, sometimes barely longer than surrounding setulae
 *Sapromyza villosula* sp. n.
- 2b Without strong dorsocentral seta anterior of suture, either some longer setulae present or without any prominent setulae at all; hind tibia without dorsal preapical seta 3

- 3a Anterior of suture with 1-3 stronger setulae on line of dorsocentral setae; sternite 8 and tergite 8 of abdomen forming a fused ovipositor; subanal plate distinct *Sapromyza obsoleta* Fallén, 1820
- 3b Anterior of suture without any longer setulae on line of dorsocentral setae; abdomen with a short rigid ovipositor formed by fused tergite 7 and sternite 7 which cannot be retracted in preabdomen; sternite 8 a strongly sclerotized plate, apically concave, laterally divided into two teeth; medially with a keel; subanal plate small, partly hidden under sternite 8 *Sapromyza carlestolrai* sp. n.

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On a collection of Pterophoridae (Lepidoptera) from Haut-Katanga, Democratic Republic of the Congo

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On a collection of Pterophoridae (Lepidoptera) from Haut-Katanga, Democratic Republic of the Congo. - Between 1929 and 1932, 33 species of Pterophoridae were collected in Haut-Katanga, Democratic Republic of the Congo, by Jean Romieux of Geneva, Switzerland. From these, eight turned out to be new and are here described as: *Platyptilia romieuxi*, *P. rubriacuta*, *Sphenarches bifurcatus*, *Exelastis pilum*, *Stenodacma cognata*, *Hellinsia katangae*, *H. bengtssoni*, and *H. punctata*. *Oidaematophorus madecasseus* Gibeaux, 1994 is recognized as a junior synonym of *Adaina microdactyla* (Hübner, [1813]).

Keywords: Afrotropical - Democratic Republic of the Congo - Katanga - Lepidoptera - Pterophoridae - new species.

INTRODUCTION

Recently the Pterophoridae (Lepidoptera) collection of the Geneva Muséum d'histoire naturelle was brought to my attention by Lepidoptera curator Bernard Landry. It turned out to contain a valuable collection of specimens from Haut-Katanga, Democratic Republic of the Congo. Most of the specimens were unidentified and had been collected by Jean Romieux of Geneva between 1929 and 1932. Eight new species were found and they are described here. Specimens are placed in the MHNG, unless otherwise indicated. The classification follows Gielis (1993).

Born in 1893, Jean Romieux obtained his doctorate of sciences in Geneva in 1932. He was destined to become an engineer and prospector. He was a passionate lepidopterist and a member of the Lepidopterological Society of Geneva since 1919. He collected Lepidoptera of all sizes in Switzerland, but also where his professional duties took him, such as Brazil, Laos, the Democratic Republic of the Congo, and Turkey. Most of his specimens were deposited in the MHNG and his Haut-Katanga material yielded new species in several Lepidoptera families. He died in Marseille, France, in 1951 (Rehfous, 1952).

The Democratic Republic of the Congo has been surveyed by investigators from Belgium, for example by: Ch. Seydel, J. Ghesquière, M. Fontaine and R.P. Hulstaert. They have collected mainly around the cities they were stationed: Elisabethville (= Lubumbashi), Stanleyville (= Kisangani), Eala and Leopoldville (= Kinshasa). The specimens they collected have been deposited in the Royal Museum for Central Africa, in Tervuren, Belgium. The collection of this museum has been

examined by Bigot (1969), who recognized 21 species from the province of Katanga. Some of the specimens have been identified by Meyrick, but were not published. The author has neither knowledge of additional collecting in Katanga, nor of publications on this region.

In his World Catalogue of Pterophoroidea, Gielis (2003), mentions 24 species from the Democratic Republic of the Congo. He also lists from surrounding countries: Uganda 16, Rwanda 2, Burundi 1, Tanzania 39, Zambia 1 and from Angola no species. These low numbers of known species in the Central African region are illustrative for the under sampling and our lack of knowledge from the region and underline the importance of the Jean Romieux collection.

ABBREVIATIONS

CG	Dr. Cees Gielis, Lexmond, The Netherlands.
Gent. prep.	Genital preparation.
MHNG	Muséum d'Histoire Naturelle de Genève, Switzerland.
NHMO	Natural History Museum, University of Oslo, Norway.
TL	Type locality.
ZMUC	National Zoological Museum, University of Copenhagen, Denmark.

RESULTS

Deuterocopus deltoptilus Meyrick, 1930 Fig. 1

Deuterocopus deltoptilus Meyrick, 1930: 565. TL: Uganda.

MATERIAL: 1 ♂, Haut-Katanga, Panda, 22.II.[19]30, Gent. prep. Gielis 5861.

REMARKS: Known from Uganda, Kenya and Nigeria.

Platyptilia benitensis Strand, 1912 Fig. 2

Platyptilia benitensis Strand, 1912: 64. TL: Cameroun.

MATERIAL: 2 ♂♂, Haut-Katanga, Tshinkolobwe, 14.IV.[19]31, 26.I.[19]31. – 1 ♂, Haut-Katanga, Panda, 1.XI.[19]29. – 1 ♀, Haut-Katanga, Tantara, 19.VII.[19]31.

REMARKS: Known from Nigeria, Cameroun, Uganda, Kenya, Tanzania, São Tomé Islands and Rep. of S. Africa.

Platyptilia romieuxi sp. n. Figs 3-4

MATERIAL: Holotype ♀, '[Democratic Republic of the Congo] Ht Katanga | Tshinkolobwe | 8.6.[19]31 | J. Romieux', 'MHNG ENTO 00005544', 'Gent. prep. | Gielis | Nr. 5857', 'HOLOTYPE | Platyptilia | romieuxi | Gielis (red label)' (MHNG). – Paratype (blue label): 1 ♀, same data except 15.9.[19]30 (CG).

DIAGNOSIS: The species is characterized by the bright wing pattern and the shape of the spine on the ostium in the female genitalia, which separates it from other species in the genus.

DESCRIPTION: Wingspan 18-21 mm. Head appressedly scaled, pale ochreous-brown, with a frontal conus of scales of 2/3rd of eye-diameter. Labial palpus pale ochreous-brown, protruding, twice the eye-diameter. Antenna alternately ringed brown and ochreous-brown, shortly ciliated. Thorax and tegula pale ochreous-brown, rostrally



FIG. 1

Deuterocopus deltoptilus Meyrick. Imago. Ht. Katanga, Panda, 22.II.[19]30, J. Romieux.



FIG. 2

Platyptilia benitensis Strand. Imago. Ht. Katanga, Tshinkolobwe, 14.IV.[19]31, J. Romieux.



FIG. 3

Platyptilia romieuxi sp. n. holotype. Imago. Ht. Katanga, Tshinkolobwe, 8.VI.[19]31, J. Romieux.

darker. Mesothorax grey-white. Abdomen ochreous-brown and dark brown. Legs ochreous-white, with brown scale bristle at base of spurs and terminally on first tarsal segment.

Fore wing cleft from 7/10th; ochreous-brown; markings dark brown as a discal spot, a dorsal spot at 1/8th, costal triangle just before base of cleft, a costal streak in middle of first lobe, and a subterminal field in both lobes. Along costa of first lobe with four small pale spots, and pale subterminal line marginal to subterminal dark field. Fringes pale ochreous, with basal row of dark brown scales terminally and around apices and anal angle of both lobes. Two scale-teeth along the dorsum at 2/3rd and 3/4th, and with some scattered scales; with scattered scales in cleft. Underside brown, with whitish spots terminally from the costal triangle; with four small spots at costa and subterminal line as upperside.

Hind wing and fringes grey-brown. First and second lobe with a line in fringes around apex; apex of third lobe with a small group of scales, and with scattered brown scales along dorsum with large scale-tooth in middle. Underside brown. Venous scales dark ferruginous, in a double row, costal row longer.

MALE GENITALIA: Unknown.

FEMALE GENITALIA: Ostium with distinct small spike on left side. Antrum ten times longer than wide, moderately sclerotized. Ductus bursae 2/3rd of antrum. Ductus seminalis from tip of bursa copulatrix. Bursa copulatrix vesicular, with a pair of

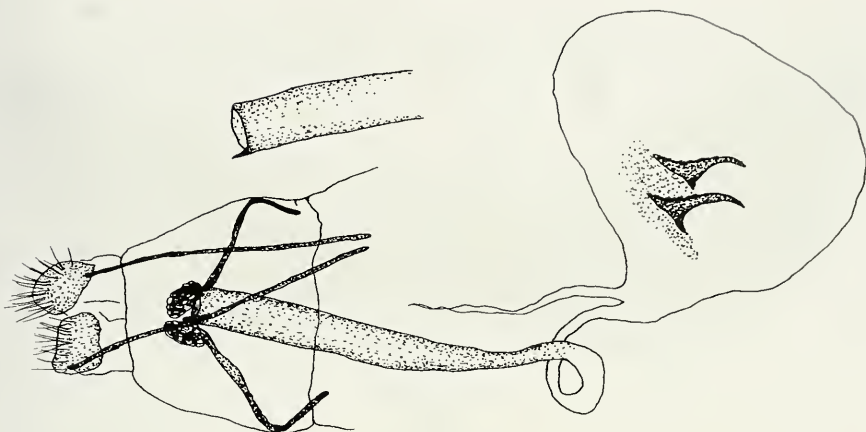


FIG. 4

Platyptilia romieuxi sp. n. holotype. Female genitalia. Ht. Katanga, Tshinkolobwe, 8.VI.[19]31, J. Romieux, Gent. prep. Gielis 5857.

curved, horn-like signa. Lamina postvaginalis with sclerotized ridge, centrally with two small plates. Apophyses anteriores longer than papillae anales. Apophyses posteriores 4-5 times papillae anales.

ECOLOGY: The moth flies in June and September. The host plant is unknown.

DISTRIBUTION: Democratic Republic of the Congo, Haut-Katanga.

ETYMOLOGY: The species is named after the collector, Mr. J. Romieux, who compiled a very thorough collection from this remote area.

Platyptilia picta Meyrick, 1913

Fig. 5

Platyptilia picta Meyrick, 1913: 109. TL: Kenya.

MATERIAL: 1 ♂, Haut-Katanga, Tantara, 19.VII.[19]31, Gent. prep. Gielis 5858 (MHNG). - 1 ♂, 1 ♀, Haut-Katanga, Tshinkolobwe, 18.III.[19]31, 2.IV.[19]31, Gent. prep. Gielis 5825 (♀) (MHNG, CG).

REMARKS: Known from Kenya and Rep. of S. Africa.

Platyptilia rhyncholoba Meyrick, 1924

Fig. 6

Platyptilia rhyncholoba Meyrick, 1924: 1. TL: Rwanda.

MATERIAL: 1 ♀, Haut-Katanga, Sakania, 7.XII.[19]31, Gent. prep. Gielis 5853.

REMARKS: Known from DR Congo, Rwanda, Kenya and Tanzania.

Platyptilia locharcha Meyrick, 1924

Fig. 7

Platyptilia locharcha Meyrick, 1924: 94. TL: Zimbabwe.

MATERIAL: 4 ♂♂, Haut-Katanga, Sakania, 12.I.[19]32, 19.I.[19]32, 10.XII.[19]31, 31.XII.[19]31, Gent. prep. Gielis 5822, 5856 (MHNG, CG).

REMARKS: Known from Zimbabwe. So far only the type series was known.



FIG. 5

Platyptilia picta Meyrick. Imago. Ht. Katanga, Tantara, 19.VII.[19]31, J. Romieux.



FIG. 6

Platyptilia rhyncholoba Meyrick. Imago. Ht. Katanga, Sakania, 7.XII.[19]31, J. Romieux.



FIG. 7

Platyptilia locharcha Meyrick. Imago. Ht. Katanga, Sakania, 19.I.[19]32, J. Romieux.

***Platyptilia rubriacuta* sp. n.**

Figs 8-9

MATERIAL: Holotype ♂, '[Democratic Republic of the Congo] Ht Katanga | Sakania | 24.12.[19]31 | J. Romieux', 'MNHG ENTO 00005545', 'HOLOTYPE | *Platyptilia | rubriacuta | Gielis*' (red label) (MHNG). – Paratypes (blue label): 2 ♂♂, Sakania, 24.12.[19]31, J. Romieux, Gent. prep. Gielis 5823, 5859 (MHNG, CG).

DIAGNOSIS: The species is characterized by the fore wings with acute tips, and the male genital structure with the spade-like valves, the blunt uncus, and the wide and elongated saccus.

DESCRIPTION: Wingspan 24-27 mm. Head appressedly scaled, pale ferruginous-ochreous. Labial palpus protruding, ferruginous-ochreous, as long as eye-diameter. Antenna ringed, ferruginous-ochreous and brown. Thorax, tegula, and mesothorax pale ferruginous-ochreous; caudal part of thorax and tegula darker tinged. Abdominal segments 1 and 2 ochreous, segments 3 to 5 laterally ochreous and dorsally greyish; segments 6 to 9 greyish, dorsally darker grey. Legs pale ochreous, at base of spurs with some ferruginous scales forming small bristle.

Fore wing cleft from 2/3rd, ferruginous. First lobe acutely tipped, second lobe with indication of a termen. Costal with line of ochreous scales. Fringes grey-brown; Brown at anal and apical region of both lobes; along dorsum and terminal region of second lobe a continuous, basal row of white scales, interrupted in anal region by brown scales; in cleft and towards tip of first lobe also with basal scales but ferruginous of co-



FIG. 8

Platyptilia rubriacuta sp. n. Holotype. Imago. Ht. Katanga, Sakania, 24.XII.[19]31, J. Romieux.

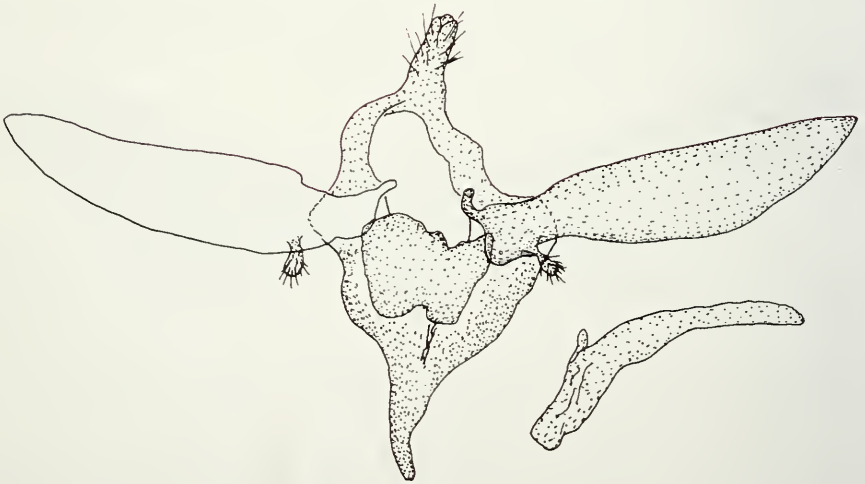


FIG. 9

Platyptilia rubriacuta sp. n. paratype. Male genitalia. Ht. Katanga, Sakania, 24.XII.[19]31, J. Romieux, Gent. prep. Gielis 5859.

lor. Underside ferruginous-brown.

Hind wing and fringes ferruginous-brown. Along dorsum of third lobe an irregular row of basal, ferruginous, and occasionally white, scales. Underside ferruginous-brown. Venous scales dark ferruginous, in double row, costal row longer.

MALE GENITALIA: Valvae symmetrical. Valve lanceolate, with basal, saccular small process. Tegumen arched. Uncus simple. Anellus arms short. Saccus in shape of large triangular plate. Phallus slightly arched, without cornuti.

FEMALE GENITALIA: Unknown.

ECOLOGY: The moth flies in December. The host plant is unknown.

DISTRIBUTION: Democratic Republic of the Congo: Haut-Katanga.

ETYMOLOGY: The name is composed from *ruber* (= red colored) and *acuta* (= sharp pointed), and reflects the reddish color and the acute tips of the fore wing lobes.

Lantanophaga pusillidactylus (Walker, 1864)

Fig. 10

Oxyptilus pusillidactylus Walker, 1864: 933. TL: Jamaica.

Platyptilia tecnidion Zeller, 1877: 13.

Platyptilia hemimetra Meyrick, 1886: 18.

Platyptilia lantana Busck, 1914:

Platyptilia teleacma Meyrick, 1932: 250.

Platyptilia lantanadactyla Amsel, 1951: 66.

MATERIAL: 1 ♀, Haut-Katanga, Tshinkolobwe, 21.I.[19]31.

REMARKS: Recorded hostplants in following families: Asteraceae, Euphorbiaceae, Lamiaceae, Lentibulariaceae, and Verbanaceae (Matthews & Lott, 2005).

Known from the tropical and subtropical zone of all faunistical regions.

Stenoptilodes taprobanes (Felder & Rogenhofer, 1875)

Fig. 11

Amblyptilia taprobanes Felder & Rogenhofer, 1875: plate 140, fig. 54. TL: Sri Lanka.

Platyptilia brachymorpha Meyrick, 1888: 240.

Platyptilia seeboldi Hofmann, 1898: 33.

Platyptilia terlizzii Turati, 1926: 67.

Platyptilia monotrigona Diakonoff, 1952: 15..

Amblyptilia zavatterii Hartig, 1953: 67.

Platyptilia legrandi Bigot, 1962: 86.

Stenoptilodes vittata Service, 1966: 11.

MATERIAL: 1 ♂, 1 ♀, Haut-Katanga, Tshinkolobwe, 7.X.[19]30, 10.XI.[19]30. – 1 ♂, Haut-Katanga, Kamwale, 13.I.[19]30. – 1 ♂, Haut-Katanga, Panda, 18.II.[19]30. – 1 ♂, Haut-Katanga, Sakania, 11.XII.[19]31.

REMARKS: Recorded hostplants are in following families: Acanthaceae, Asteraceae, Caryophyllaceae, Ericaceae, Gentianaceae, Hydroleaceae, Lamiaceae, Orobanchaceae, Plantaginaceae, Scrophulariaceae, and Theophrastaceae (Matthews & Lott, 2005).

Known from the tropical and subtropical zone of all faunistical regions.

Stenoptilia zophodactylus (Duponchel, 1838)

Fig. 12

Pterophorus zophodactylus Duponchel, 1840: 668. TL: France.

Pterophorus loewii Zeller, 1847: 38.

Pterophorus canalis Walker, 1864: 944.

Mimeseoptilus semicostata Zeller, 1873: 323.



FIG. 10

Lantanophaga pusillidactylus (Walker). Imago. Ht. Katanga, Tshinkolobwe, 21.I.[19]31, J. Romieux.

MATERIAL: 1 ♀, Haut-Katanga, Tshinkolobwe, 10.III.[19]31, Gent. prep. Gielis 5832.

REMARKS: Recorded hostplants are in the following families: Asteraceae, Gentianaceae, Orobanchaceae, and Plantaginaceae (Matthews & Lott, 2005).

Known from the tropical and temperate zone of all faunistical regions.

***Stenoptilia bandamae* Bigot, 1964**

Fig. 13

Stenoptilia bandamae Bigot, 1964: 113. TL: Côte d'Ivoire.

MATERIAL: 1 ♀, Haut-Katanga, Tshinkolobwe, 19.X.[19]30 (CG). – 1 ♂, Haut-Katanga, Tshinkolobwe, 27.VIII.[19]30, Gent. prep. Gielis 5829 (MHNG).

REMARKS: So far only known from the holotype, from Côte d'Ivoire.

***Xyroptila masaia* Kovtunovich & Ustjuzhanin, 2006**

Figs 14

Xyroptila masaia Kovtunovich & Ustjuzhanin, 2006: 257. TL: Kenya.

MATERIAL: 1 ♂, Haut-Katanga, Panda, 12.II.[19]30. – 1 ♂, Haut-Katanga, Tshituru, 19.V.[19]29, prep. MNHG 2911. – 1 ♂, Haut-Katanga, Tshinkolobwe, 22.XI.[19]30.

REMARKS: Known from Kenya, Zambia and Zimbabwe.



FIG. 11

Stenoptilodes taprobanes (Felder & Rogenhofer). Imago. Ht. Katanga, Tshinkolobwe, 10.XI.[19]30, J. Romieux.



FIG. 12

Stenoptilia zophodactylus (Duponchel). Imago. Ht. Katanga, Tshinkolobwe, 10.III.[19]31, J. Romieux.



FIG. 13

Stenoptilia bandamae Bigot. Imago. Ht. Katanga, Tshinkolobwe, 19.X.[19]30, J. Romieux.



FIG. 14

Xyroptila masaia Kovtunovitch & Ustjuzhanin. Imago. Ht. Katanga, Panda, 12.II.[19]30, J. Romieux.

Amblyptilia direptalis (Walker, 1864)

Fig. 15

Oxyptilia direptalis Walker, 1864: 934. TL: Republic of South Africa.*Platyptilia amblydectis* Meyrick, 1932: 108.

MATERIAL: 1 ♂, 2 ♀♀, Haut-Katanga, Tshinkolobwe, 5.I.[19]31, 27.I.[19]31, 30.I.[19]31, Gent. prep. Gielis 5824 (♂). – 1 ♂, Haut-Katanga, Panda, 6.I.[19]30.

REMARKS: Recorded hostplants are in the Lamiaceae and Plantaginaceae (Matthews & Lott, 2005).

Known from Ethiopia, Kenya, Tanzania and Rep. of S. Africa.

Sphenarches bifurcatus sp. n.

Figs 16-17

MATERIAL: Holotype ♀, '[Democratic Republic of the Congo] Ht Katanga | Tshinkolobwe | 26.I.[19]31 | J. Romieux', 'MHNG ENTO 00005513', 'Gent. prep. | Gielis | nr. 5835', 'HOLOTYPE | Sphenarches | bifurcatus | Gielis' (red label) (MHNG).

DIAGNOSIS: The species is characterized by the distinct long tubular antrum, and the lamina antevaginalis with two caudal extensions.

DESCRIPTION: Wingspan 15 mm. Head appressedly scaled, grey-brown; grey-white between eyes. Collar with erect, bifid scales. Labial palpus grey-brown, slender, protruding, twice eye-diameter. Antenna grey-brown, with longitudinal row of whitish scales, shortly ciliated. Thorax and tegula rostrally pale orange-brown, caudally densely mixed with whitish scales. Mesothorax greyish-white. Abdomen pale brown-orange, rostral segments mixed dark brown. Legs grey-white; segments before spurs with mix of dark brown scales, thickened to a brush around base of spurs.

Fore wing cleft from 5/12th; pale brown-orange. First lobe acute, second lobe with sinuate termen. With brown spots in discus and at costal side of base of cleft; brown scales along costa in shape of three longitudinal spots in first lobe. With faint subterminal line in both lobes. Fringes grey, ochreous-white at anal and costal angles; mixed with black scales, particularly in cleft and at dorsum. Underside pale brown-orange, with subterminal white line as upperside.

Hind wing orange-brown. Fringes of first and second lobe grey-brown; of third lobe grey. Third lobe with subterminal, black scale tooth, and some black scales at apex and along costa and dorsum, also with scattered white scales along dorsum. Underside pale brown-orange. Venous scales ferruginous, in double row, dorsal row longer and extending into second lobe.

MALE GENITALIA: Unknown.

FEMALE GENITALIA: Ostium mildly curved. Antrum tube-like, seven times longer than wide. Ductus bursae narrow, long. Ductus seminalis from the tip of the bursa copulatrix. Bursa copulatrix vesicular, with a dense spiculation in the lower 2/3rd. Lamina ante-vaginalis prominently bifurcate. Apophyses anteriores absent. Apophyses posteriores three times length of papillae anales.

ECOLOGY: The only known specimen was flying in January. The hostplant is unknown.

DISTRIBUTION: Democratic Republic of the Congo: Haut-Katanga.

ETYMOLOGY: The name *bifurcatus* (= forked twice) reflects the extended, forked shape of the 7th female sternite and indented ostium.



FIG. 15

Amblyptilia direptalis Meyrick. Imago. Ht. Katanga, Tshinkolobwe, 27.I.[19]31, J. Romieux.



FIG. 16

Sphenarches bifurcatus sp. n. holotype. Imago. Ht. Katanga, Tshinkolobwe, 26.I.[19]31, J. Romieux.

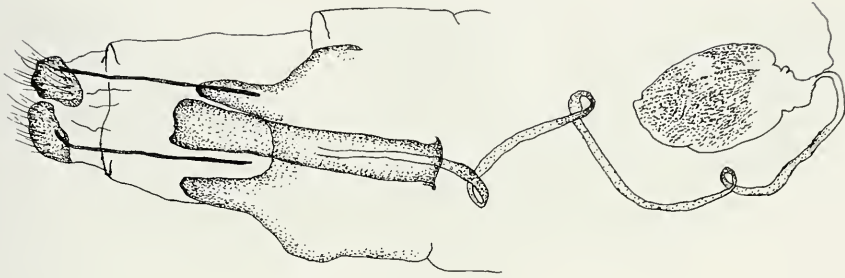


FIG. 17

Sphenarches bifurcatus sp. n. holotype. Female genitalia. Ht. Katanga, Tshinkolobwe, 26.I.[19]31, J. Romieux, Gent. prep. Gielis 5835.

Exelastis phlyctaenias (Meyrick, 1911)

Fig. 18

Marasmarcha phlyctaenias Meyrick, 1911: 106. TL: Sri Lanka.

MATERIAL: 2 ♂♂, 1 ♀, Haut-Katanga, Tshinkolobwe, 22.VIII.[19]31, 23.VIII.[19]30, 1.XI.[19]30, Gent. prep. Gielis 5827 (♂). – 1 ♀, Haut-Katanga, Kyala, 4.IX.[19]29; 1 ♀, Ht. Katanga, no locality, no date.

REMARKS: Recorded hostplants are in the Anacardiaceae and Fabaceae (Matthews & Lott, 2005).

Known from Philippines, Sri Lanka, Ethiopia, Tanzania, Malawi, Rep. of S. Africa, Madagascar, Réunion Island and the Virgin Islands. The species seems to be distributed by man.

Exelastis pumilio (Zeller, 1873)

Fig. 19

Mimeseoptilus pumilio Zeller, 1873: 324. TL: USA (Tx).

Marasmarcha liophanes Meyrick, 1886: 19.

Mimaesoptilus gilvidorsis Hedemann, 1896: 8 [not Zeller, 1877].

MATERIAL: 2 ♂♂, 1 ♀, Haut-Katanga, Tshinkolobwe, 16.IV.[19]31, 12.IX.[19]30, no date, Gent. prep. Gielis 5828 (♂) (MHNG, CG). – 1 ♂, Haut-Katanga, Panda, 12.VI.[19]29 (MHNG).

REMARKS: Recorded hostplants are in the following families: Asteraceae, Fabaceae, and Oxallidaceae (Matthews & Lott, 2005).

Known from the tropical and subtropical zone of all faunistical regions.

Exelastis vuattouxi Bigot, 1970

Fig. 20

Exelastis vuattouxi Bigot, 1970: 761. TL: Côte d'Ivoire.

MATERIAL: 1 ♂, 1 ♀, Haut-Katanga, Tshinkolobwe, 25.IX.[19]30, 29.IX.[19]30, Gent. prep. Gielis 5852 (♂).

REMARKS: Known from Nigeria, Côte d'Ivoire, Ghana and Tanzania.

Exelastis pilum sp. n.

Figs 21-22

MATERIAL: Holotype ♂, '[Democratic Republic of the Congo] Ht Katanga | Tantara | 10.10.[19]31 | J. Romieux', 'MHNG ENTO 00005521', 'Gent. prep. | Gielis | nr. 5830', 'HOLOTYPE | Exelastum | pilum | Gielis' (red label) (MHNG).



FIG. 18

Exelastis phlyctaenias Meyrick. Imago. Ht. Katanga, Tshinkolobwe, 23.VIII.[19]30, J. Romieux.



FIG. 19

Exelastis pumilio Zeller. Imago. Ht. Katanga, Tshinkolobwe, 16.IV.[19]31, J. Romieux



FIG. 20

Exelastis vuattouxi Bigot. Imago. Ht. Katanga, Tshinkolobwe, 29.IX.[19]30, J. Romieux.



FIG. 21

Exelastis pilum sp. n. holotype. Imago. Ht. Katanga, Tantara, 10.X.[19]31, J. Romieux.

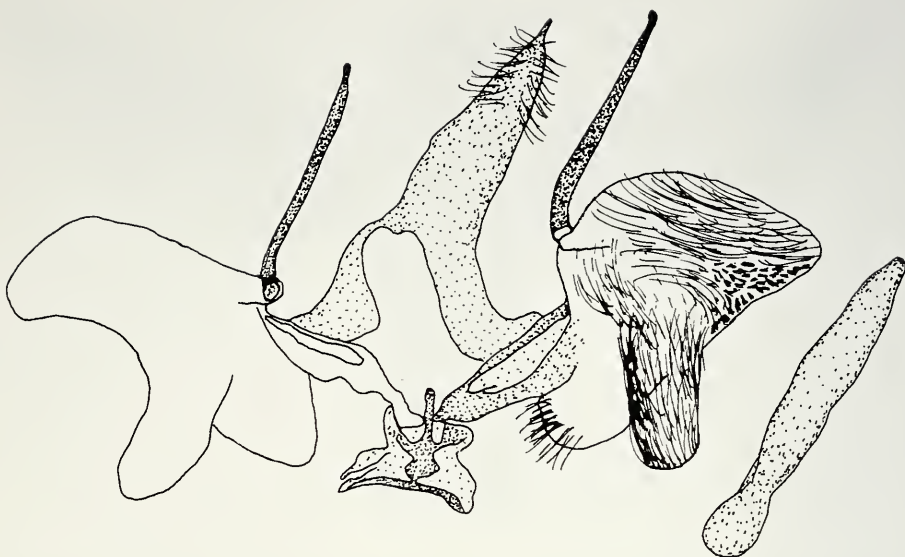


FIG. 22

Exelastis pilum sp. n., holotype. Male genitalia. Ht. Katanga, Tantara, 10.X.[19]31, J. Romieux, Gent. prep. Gielis 5830.

DIAGNOSIS: The species is characterized by the spiny processes on the right and left valves of the male genital structure.

DESCRIPTION: Wingspan 19 mm. Head with some erect scales, ochreous-white, pale ochreous between base of antennae. Labial palpus ochreous-white, protruding, second segment slightly thickened by scales, just longer than eye-diameter. Antenna brown and ochreous-white scaled, shortly ciliated. Thorax and tegula too descaled to be described. Abdomen ochreous-white. Legs pale ochreous-white.

Fore wing cleft from 9/15th, pale grey-white. Spots pale ochreous: a discal spot, a pair of spots just before base of cleft, and diffuse scaling along costa. Fringes pale grey, with dark grey patches at anal angle of second lobe, and at terminal 1/3rd of cleft; basally positioned dark scales at termen of both lobes. Underside pale ochreous, whitish in both lobes.

Hind wing very pale grey-brown, pale grey-white in terminal half of first lobe. Fringes pale grey-brown. With some pale grey scales at apex of first and second lobe. Underside pale ochreous, whitish mixed in terminal half of first, second and entire third lobe. Venous scales ferruginous, in double row, costal row longer.

MALE GENITALIA: Valves symmetrical; basally slender, followed by basal lobe, terminally large and crescent shaped. Dorsal edge with large spine, almost half as long as valve. Uncus simple, acute. Anellus arms short. Saccus broad. Phallus straight, slightly tapering. Vesica without cornutus.

FEMALE GENITALIA: Unknown.

ECOLOGY: The single specimen known was flying in October. The host plant is unknown.

DISTRIBUTION: Democratic Republic of the Congo: Haut-Katanga.

ETYMOLOGIE: The name *pilum* (= javelin, spear) reflects the spine-like process on the dorsal edge of the valva in the male genitalia.

Antarches aguessei (Bigot, 1964)

Fig. 23

Oxyptilus aguessei Bigot, 1964: 178. TL: Guinea.

MATERIAL: 1 ♂, Haut-Katanga, Panda, 6.II.[19]30, Gent. prep. Gielis 5833. – 1 ♂, Haut-Katanga, Tshinkolobwe, 4.II.[19]31. – 1 ♀, Haut-Katanga, Tshituru, 15.XII.[19]29.

REMARKS: Known from Cameroun, Guinea, Tanzania.

Capperia insomnia (Townsend, 1956)

Fig. 24

Capperia insomnia Townsend, 1956: 93. TL: Kenya.

MATERIAL: 1 ♀, Haut-Katanga, Panda, 15.II.[19]30, Gent. prep. Gielis 5839.

REMARKS: Recorded hostplants are in the family Lamiaceae (Matthews & Lott, 2005). So far only known from the type series, from Kenya.

Stenodacma cognata sp. n.

Figs 25-26

MATERIAL: Holotype ♂, '[Democratic Republic of the Congo] Ht Katanga | Tshinkolobwe | 9.10.[19]30 | J. Romieux', 'MHNG Prep. micr. | No 1323 ♂', 'HOLOTYPE | Stenodacma | cognata | Gielis' (red label) (MHNG). – Paratype (blue label): 1 ♂, 'Tanzania, Mpanda, 57 km S Uvinza, on Mpanda road, 1700 m, 3.VIII.1990, L. Aarvik', 'Gent. prep. Gielis 4463' (NHMO).

DIAGNOSIS: The species is characterized by the slender bifid uncus, and the distinct cucullar process on both valves in the male genitalia.

DESCRIPTION: Wingspan 15-17 mm. Head appressedly scaled, pale orange-brown. Collar with some erect bifid scales. Labial palpus protruding, pale orange-brown, second segment slightly thickened by scales. Antenna with longitudinal rows of dark brown and whitish scales. Thorax, tegula and mesothorax pale orange-brown, on caudal parts of thorax and tegulae mixed with whitish scales. Legs pale ochreous-white, at the base of the spurs thickened with bristles of orange-brown scales.

Fore wing cleft from 3/7th, pale orange-brown with both lobe tips acute. With brown spot at base of cleft, and costal dash in middle of first lobe; with faint pale transverse band in middle of both lobes. Fringes pale orange-brown, terminal 1/6th in cleft whitish on dorsum of first and costa of the second lobe. Dark brown fringe scales at the dorsum of the first lobe at 2/3rd and near base, at costa of second lobe at 2/3rd, and with small scale teeth at dorsum of second lobe at 1/2, 2/3rd, 3/4th, 4/5th, and sub-terminal. Underside pale orange-brown; with pale markings as upperside.

Hind wing and fringes orange-brown. Along dorsum of third lobe with large scale tooth at 2/3rd, and small subapical; with scattered white scales from base til 3/4th. Underside pale orange-brown. Venous scales dark ferruginous, in double row, costal row longer.



FIG. 23

Antarches aguessei Bigot. Imago. Ht. Katanga, Panda, 6.II.[19]30, J. Romieux.



FIG. 24

Capperia insomnis Townsend. Imago. Ht. Katanga, Panda, 15.II.[19]30, J. Romieux.



FIG. 25

Stenodacma cognata sp. n. holotype. Imago. Ht. Katanga, Tshinkolobwe, 9.X.[19]30, J. Romieux.

MALE GENITALIA: Valvae symmetrical, lanceolate, with basally positioned sacular ridge. With basal cucullar process, almost half of valve's length, with knob-like tip. Tegumen arched. Uncus long, slender, bifid. Anellus arms small and slender. Saccus knob-like. Phallus slightly curved, gradually tapering; vesica without cornutus.

FEMALE GENITALIA: Unknown.

ECOLOGY: The moth flies in August and October. In Tanzania the species occurs at an altitude of 1700 meters. The hostplant is unknown.

DISTRIBUTION: Democratic Republic of the Congo: Haut-Katanga; Tanzania: Mpanda.

ETYMOLOGY: The name *cognata* (= related to) reflects the similarity between the present species and *Stenodacma wahlbergi* (Zeller, 1851) in the shape of the genitalia, especially the double uncus.

Buckleria girardi Gibeaux, 1992

Fig. 27

Buckleria girardi Gibeaux, 1992: 14. TL: Guinea

MATERIAL: 1 ♂, Haut-Katanga, Tshinkolobwe, 19.III.[19]31, Gent. prep. Gielis 5826.

REMARKS: So far only known from the holotype, from Guinea.

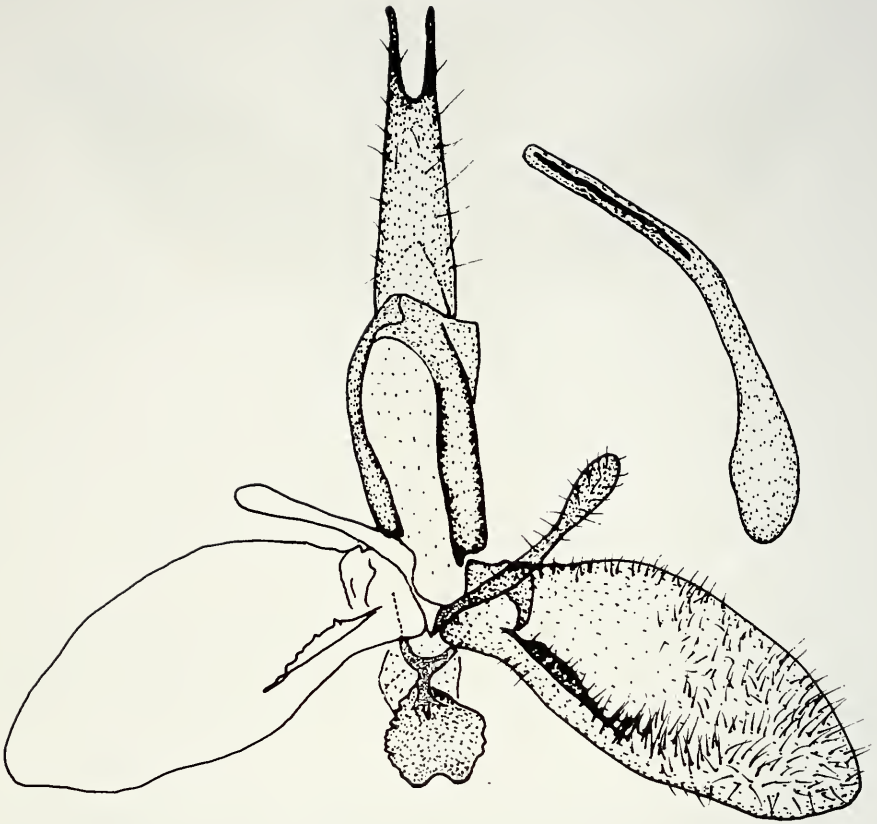


FIG. 26

Stenodacma cognata sp. n. paratype. Male genitalia. Tanzania, Mpanda, 57 km S Mpanda, Uvinza, on Mpanda road, 1700 m, 3.VIII.1990, L. Aarvik, Gent. prep. Gielis 4463.

***Trichoptilus vivax* Meyrick, 1909**

Fig. 28

Trichoptilus vivax Meyrick, 1909: 1. TL: Republic of South Africa.

MATERIAL: 1 ♂, 1 ♀, Haut-Katanga, Tshinkolobwe, 22.VIII.[19]31, 8.X.[19]30. – 1 ♂, Haut-Katanga, Panda, 22.I.[19]30. Gent. prep. Gielis 5840.

REMARKS: Known from Rep. of S. Africa, Namibia and Gambia.

***Megalorhipida leptomerus* (Meyrick, 1886)**

Fig. 29

Trichoptilus leptomerus Meyrick, 1886: 15. TL: Reunion Island.

MATERIAL: 1 ♂, 1 ♀, Haut-Katanga, Tshinkolobwe, 6.VI.[19]31, 22.VII.[19]31, Gent. prep. Gielis 5841 (♀).

REMARKS: Known from Oman, Yemen, Kenya, Tanzania, Rep. of S. Africa, DR Congo, Madagascar, Seychelles and Réunion Island.



FIG. 27

Buckleria girardi Gibeaux. Imago. Ht. Katanga, Tshinkolobwe, 19.III.[19]31, J. Romieux.



FIG. 28

Trichoptilus vivax Meyrick. Imago. Ht. Katanga, Tshinkolobwe, 8.X.[19]30, J. Romieux.



FIG. 29

Megalorhipida leptomeres (Meyrick). Imago. Ht. Katanga, Tshinkolobwe, 6.VI.[19]31, J. Romieux.

Hellinsia ecstaticus (Meyrick, 1932)

Fig. 30

Pterophorus ecstaticus Meyrick, 1932: 335. TL: Uganda.

MATERIAL: 2 ♂♂, 1 ♀, Haut-Katanga, Kyala, 19.VII.[19]29, 24.VII.[19]29, 25.VII.[19]29, prep. MHNG 1320 (♀), 1324 (♂) (MHNG, CG).

REMARKS: Known from Uganda, Kenya and Tanzania.

Hellinsia katangae sp. n.

Figs 31-32

MATERIAL: Holotype ♂, '[Democratic Republic of the Congo] Ht Katanga | Tshinkolobwe | 13.3.[19]31 | J. Romieux', 'MHNG ENTO 00005490', 'Gent. prep. | Gielis | nr. 5843', 'HOLOTYPE | *Hellinsia | katangae* | Gielis' (red label) (MHNG). – Paratype (blue label): ♂, 'Ø. Kongo, Kafho, N. f. Rutshuru, 13.XII.1946, Univ. Centralafr. Exp. 1946-47', 'Gent. prep. Gielis 4022' (ZMUC).

DIAGNOSIS: The species is characterized by the pale bone colour, and particularly by the rounded blunt tip in the right valve of the male genitalia.

DESCRIPTION: Wingspan 15 mm. Head, thorax, abdomen and legs bone-white. Labial palpus curved up, bone-white, as long as eye-diameter. Antenna bone-white, shortly ciliated. Hind leg with two pairs of spurs, proximal pair of unequal length, distal pair shorter than shortest of proximal pair and of almost equal length.

Fore wings cleft from middle. Colour of wing and fringes bone-white; marking pale brown, in shape of a half crescent around base of cleft. Underside pale brown, pattern as upperside.



FIG. 30

Hellinsia ecstasticus (Meyrick). Imago. Ht. Katanga, Kyala, 24.VII.[19]29, J. Romieux.



FIG. 31

Hellinsia katangae sp. n. holotype. Imago. Ht. Katanga, Tshinkolobwe, 13.III.[19]31, J. Romieux.



FIG. 32

Hellinsia katangae sp. n. holotype. Male genitalia. Ht. Katanga, Tshinkolobwe, 13.III.[19]31, J. Romieux, Gent. prep. Gielis 5843.

Hind wing on both sides and fringes silvery-white. Venous scales blackish, in double row, costal row extending into second lobe.

MALE GENITALIA: Valves asymmetrical. Left valve with saccular spine of 1/4th of valve length, with base at 2/3rd of valve. Right valve with small saccular process at slightly beyond middle of valve, and curved blunt tipped process apically. Tegumen bilobed. Uncus short and slender. Juxta with short anellus arms. Saccus narrow, simple. Phallus slightly curved, with acute tip.

FEMALE GENITALIA: Unknown.

ECOLOGY: The moth flies in March and December. The hostplant is unknown.

DISTRIBUTION: Democratic Republic of the Congo: Haut-Katanga, Rutshuru.

ETYMOLOGY: The species is named after the region of its occurrence, Katanga.

REMARKS: The species belongs to the *Hellinsia pectodactylus*-group, differing in the shape of the tip of the right valve.

Hellinsia bengtssoni sp. n.

Figs 33-34

MATERIAL: Holotype ♂, '[Democratic Republic of the Congo] Ht Katanga | Sakania | 16.12.[19]31 | J. Romieux', 'MHNG ENTO 00005491', 'Gent. prep. | Gielis | nr. 5854', 'HOLOTYPE | *Hellinsia* | *bengtssoni* | Gielis' (red label) (MNHG).



FIG. 33

Hellinsia bengtssoni sp. n. holotype. Imago. Ht. Katanga, Sakania, 16.XII.[19]31, J. Romieux.

DIAGNOSIS: The species is characterized by the male genital structure, in which the valves have extensions of the margins and apex, not found in other species of this genus.

DESCRIPTION: Wingspan 23 mm. Head appressedly scaled, pale ochreous. Labial palpus protruding, pale ochreous, one and a half times eye-diameter. Antenna pale ochreous, shortly ciliated. Thorax, tegula, and legs pale ochreous. Mid leg with dark brown longitudinal scale lines along femora and tibia; hind leg with longitudinal dark brown scale patches on tibia. Hind leg with two pairs of spurs, with proximal pair longer, individual spurs laterally dark brown, medially pale ochreous.

Fore wing cleft from 3/5th, pale ochreous. Markings darker ochreous tinged: at base until 1/10th; from base of costal to just before base of cleft; at dorsum of second lobe; and diffusely in first lobe. Fringes pale ochreous. Underside pale brown, in lobes mixed with white.

Hind wing pale brown. Fringes pale ochreous, darker apically. Underside grey-brown. Venous scales dark ferruginous, in double row, costal row with linear patch in second lobe.

MALE GENITALIA: Valves asymmetrical. Left valve long, centrally narrowed; with extensions on ventral margin at 2/3rd; on dorsal margin at 4/5th, and apically. Right valve shorter than left one, with narrow section at 2/5th and extension dorsally at 3/5th and apically. Tegumen simple. Uncus double, short and stout. Saccus narrow. Phallus slightly curved, with acute tip.

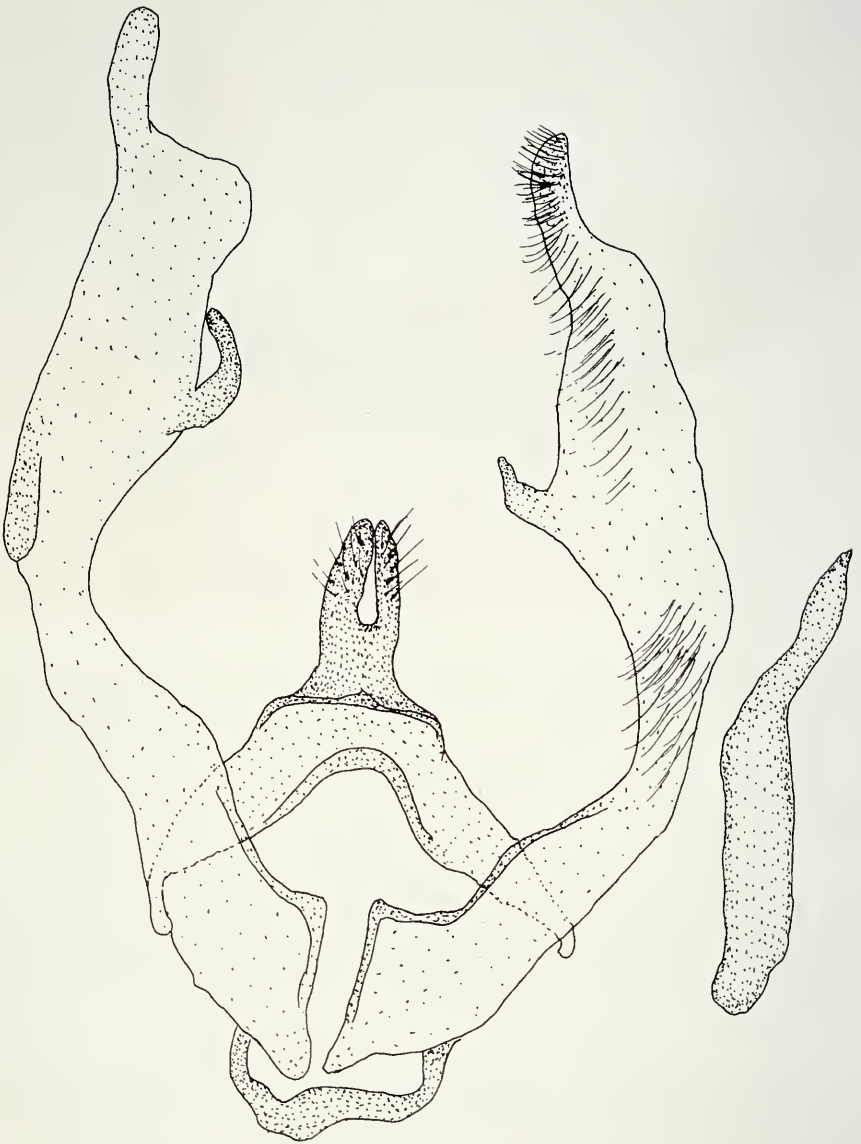


FIG. 34

Hellinsia bengtssoni sp. n. holotype. Male genitalia. Ht. Katanga, Sakania, 16.XII.[19]31, J. Romieux, Gent. prep. Gielis 5854.

FEMALE GENITALIA: Unknown.

ECOLOGY: The single specimen known was flying in December. The hostplant is unknown.

DISTRIBUTION: Democratic Republic of the Congo: Haut-Katanga.

ETYMOLOGY: The species is named after Dr. Bengt Å. Bengtsson, to honour his knowledge of the microlepidopteran fauna of the Old World, and his for warm friendship.

Hellinsia timidus (Meyrick)

Fig. 35

Pterophorus timidus Meyrick, 1908: 494. TL: Republic of South Africa.

MATERIAL: 1 ♂, 1 ♀, Haut-Katanga, Tshinkolobwe, 20.I.[19]31, 14.XII.[19]30, Gent. prep. Gielis 5855(♂), 5860 (♀) (MHNG). – 2 ♂♂, Haut-Katanga, Sakanian, 16.I.[19]32, 18.I.[19]32, Gent. prep. Gielis 5836 (MHNG, CG).

REMARKS: Known from the Rep. of S. Africa.

Hellinsia punctata sp. n.

Figs 36-37

MATERIAL: Holotype ♂: '[Democratic Republic of the Congo] Ht Katanga | Tshinkolobwe | 4.4.[19]31 | J. Romieux', 'MHNG ENTO 00005494', 'HOLOTYPE | Hellinsia | punctata | Gielis' (red label) (MHNG). – Paratypes (blue label): 3 ♂♂, Haut-Katanga, Tshinkolobwe, 22.1.[19]31, 14.4.[19]31, 20.4.[19]31, Gent. prep. Gielis 5838, 5842, 5845 (♂) (MHNG, CG).

DIAGNOSIS: The species is characterized by the strongly developed punctation along the costal and dorsal margin of the fore wing and the distinct male genital structure with a single arched, small saccular spine in the left valve and a short bifid saccular spine in the right valve.

DESCRIPTION: Wingspan 13-17 mm. Head pale ochreous-brown; creamy-white between base of antennae; appressedly scaled. Collar ochreous. Labial palpus very thin and slender, curved up, pale ochreous, 3/4th of eye diameter. Antenna ochreous, shortly ciliated. Thorax, tegula, and abdomen pale ochreous. Abdomen dorsally with two longitudinal yellow-ochreous lines. Fore and mid leg ochreous with longitudinal dark brown lines on femora and tibia. Hind leg ochreous; with two pairs of spurs of equal length.

Fore wing cleft from middle; pale ochreous whitish along costa and dorsum. Markings dark brown: diffuse scaling at basal 1/5th of dorsum; small discal spot; double spot at base of cleft, dorsal one bigger; three spots at the dorsum of second lobe, central one bigger and more elongate; another spot at dorsum of first lobe at 3/4th, elongate; and minute spot on costa of first lobe. Fringes pale ochreous. Underside pale brown, with spots as upperside.

Hind wing and fringes pale ochreous-brown, with a small brown spot at tips of lobes. Underside pale brown. Venous scales black, in two continuous rows, costal row longer.

MALE GENITALIA: Valves asymmetrical. Left valve with spiny saccular process of 1/4th of valve length, originating from 1/4th of length. Right valve with small double process at 1/3rd of valve length. Tegumen bilobed. Uncus moderate, slender. Juxta with two short and stout anellus arms. Saccus rather wide, ribbon-like. Phallus mildly curved, with cornuti as diffuse thickening.

FEMALE GENITALIA: Unknown.

ECOLOGY: The moth flies in January and April. The hostplant is unknown.



FIG. 35

Hellinsia timidus (Meyrick). Imago. Ht. Katanga, Sakania, 16.I.[19]32, J. Romieux.

DISTRIBUTION: Democratic Republic of the Congo: Haut-Katanga.

ETYMOLOGY: The name reflects the strong punctation along the fore wing margins.

Paulianilus madecasseus (Bigot, 1964)

Fig. 38

Pterophorus madecasseus Bigot, 1964: 34. TL: Madagascar.

Leioptilus devius Bigot, 1969: 197.

MATERIAL: 4 ♂♂, 6 ♀♀, Haut-Katanga, Tshinkolobwe, 5.I.[19]31. 23.I.[19]31, 5.V.[19]31, 25.V.[19]31, 27.VII.[19]30, 3.VIII.[19]30, 6.VIII.[19]30, 3.X.[19]30, 15.XII.[19]30, Gent. prep. Gielis 5837 (♂) (MHNG. CG). – 1 ♀, Haut-Katanga, Panda, 20.VI.[19]29.

REMARKS: Known from DR Congo, Tanzania and Madagascar.

Emmelina anseli (Bigot, 1969)

Fig. 39

Leioptilus anseli Bigot, 1969: 198. TL: Democratic Republic of the Congo.

MATERIAL: 1 ♂, 3 ♀♀, Haut-Katanga, Kyala, 2.VII.[19]29, 4.VII.[19]29, 16.VII.[19]29, 22.VIII.[19]29, Gent. prep. Gielis 5831 (♂).

REMARKS: Known from DR Congo, Kenya and Tanzania.



FIG. 36

Hellinsia punctata sp. n. holotype. Imago. Ht. Katanga, Tshinkolobwe, 4.IV.[19]31, J. Romieux.

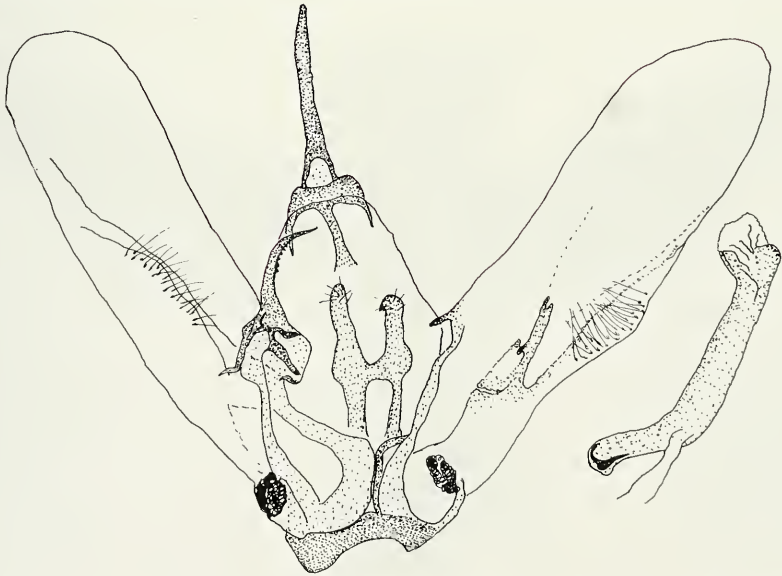


FIG. 37

Hellinsia punctata sp. n. paratype. Male genitalia. Ht. Katanga, Tshinkolobwe, 22.I.[19]31, J. Romieux, Gent. prep. Gielis 5842.



FIG. 38

Paulianilus madecasseus (Bigot). Imago. Ht. Katanga, Tshinkolobwe, 15.XII.[19]30, J. Romieux.



FIG. 39

Emmelina anseli Bigot. Imago. Ht. Katanga, Kyala, 2.VII.[19]29, J. Romieux.



FIG. 40

Adaina microdactyla (Hübner). Imago. Ht. Katanga, Tshinkolobwe, 24.XII.[19]30, J. Romieux.



FIG. 41

Pterophorus ischnodactyla (Treitschke). Imago. Ht. Katanga, Panda, 10.II.[19]30, J. Romieux.

Adaina microdactyla (Hübner, [1813])

Fig. 40

Alucita microdactyla Hübner, [1813]: pl. 5, figs. 26, 27. Europe.*Pterophorus carphodactylus* Stephens, 1834: 374.*Adaina montivola* Meyrick, 1937: 170.*Adaina subflavescens* Meyrick, 1930: 568.*Oidaematophorus madecasseus* Gibeaux, 1994: 130. syn. n.

MATERIAL: 2 ♀♀, Haut-Katanga, Tshinkolobwe, 4.XII.[19]30, 24.XII.[19]30, Gent. prep. Gielis 5834, 5844; 1 ♀, Haut-Katanga, Panda, 13.XII.[19]29.

REMARKS: Recorded hostplants are in Asteraceae, Brassicaceae, and Rosaceae (Matthews & Lott, 2005).

Known from the palaeartic, south-east Asian, Australian regions and DR Congo, Tanzania and Madagascar.

After checking the genital structures of the *Oidaematophorus madecasseus* Gibeaux specimen described and illustrated by Gibeaux (1994), it became obvious this species has to be transferred to the present genus, and that the genital structures are the same as in *A. microdactyla* Hübner. The bursa copulatrix is stretched, as often happens in preparing the genital slide, but the twists are still well recognizable.

Pterophorus ischnodactyla (Treitschke, 1833)

Fig. 41

Alucita ischnodactyla Treitschke, 1833: 223. TL: Hungary.*Aciptilia actinodactyla* Chrétien, 1891: 99.*Aciptilia eburnella* Amsel, 1968: 14.

MATERIAL: 1 ♂, 1 ♀, Haut-Katanga, Panda, 10.II.[19]30, prep. MHNG 1310 (♂) (MHNG, CG).

REMARKS: Recorded hostplants are in Convolvulaceae, Lamiaceae, and Rosaceae (Matthews & Lott, 2005).

Known from the warmer zone in the palaeartic region and Rep. of S. Africa.

ACKNOWLEDGEMENTS

I wish to thank Mr H.W. van der Wolf for his linguistic help.

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Oribatid mites from the Arabian Peninsula, including further records from Socotra (Acari: Oribatida).

(Acarologica Genavensia CXII)

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Oribatid mites from the Arabian Peninsula, including further records from Socotra (Acari: Oribatida) (*Acarologica Genavensia CXII*). - Nineteen newly determined oribatid species and one not identified species (*Eremobelba* sp.) are reported from three regions of the Arabian Peninsula. Six of them are described as new to science: *Papillocephus longisetosus* sp. n., *Eremulus arabicus* sp. n., *Decoroppia prodigiosa* sp. n., *Ethiovertex vanharteni* sp. n., *Zygoribatula sharjah* sp. n., *Scheloribates sacculipunctatus* sp. n. One species represents a new genus, *Decoroppia* gen. n. (Oppiidae), for which the new subfamily *Decoroppiinae* subfam. n. is proposed.

Keywords: Taxonomy - new species - new genus - new subfamily.

INTRODUCTION

Antonius van Harten, an excellent collector of soil arthropods in tropical regions, has been gathering samples in the Arabian Peninsula, for some time, particularly in Yemen, and more recently in the territory of the United Arab Emirates. I have already elaborated (Mahunka, 2000) samples from Yemen collected by him, described taxa new to science and also listed many poorly known species from this region. The recently collected material contains several new, taxonomically and zoogeographically interesting species, an account of which is given here. From mainland Yemen he collected three species for the first time, one of them is described as new to science. Among the specimens from the United Arab Emirates eleven species could be identified, three of them are described as new to science; five of them are recorded for the first time for this region, while three of them were collected earlier in mainland Yemen.

The extraordinary fauna of Yemen's Sokotra Archipelago is famous, and it is known that the affinities of its insect and vertebrate fauna lie with the Ethiopian region rather than the Arabian Peninsula. Kay van Damme, from Ghent University (Belgium), collected aquatic mites from there. Although his collecting was not focussed on the soil fauna, the material includes a small number of oribatid specimens. Unfortunately, many of these are badly damaged, but the identification of five species was possible,

two of which were new to science, and for one of them the establishment of a new genus was necessary suggesting also the proposition of a new subfamily. All species treated here are recorded for the first time for the Archipelago and four of them are also new for the Yemen. The Oribatida fauna of the Socotra Archipelago, as far as I am aware, has been quite unknown up to know.

The Oribatida fauna of Yemen is poorly known. Saudi Arabia is a better explored part in the region, from where Al-Khalifa & Bayoumi (1983a, 1983b) and Bayoumi & Al-Khalifa (1983, 1984, 1985, 1986a, 1986b)) described some taxa. Unfortunately, the descriptions of these species are inadequate and consequently some of them need revision. The material treated here supports this observation. To clarify these problems further investigations are needed.

MATERIAL AND METHODS

In this paper I follow the system of Marshall *et al.* (1987), with some modifications introduced by Woas (2002), Subías (2004) and Weigmann (2006). In the descriptions the morphological terminology of Woas (2002) was used with some modifications concerning the studied groups (e.g. Norton *et al.*, 1997, Mahunka & Mahunka-Papp, 2001), and the above mentioned authors). Depositories: MHNG = Muséum d'histoire naturelle, Geneva, Switzerland; HNHM: Hungarian Natural History Museum, Budapest, Hungary.

LIST OF LOCALITIES

United Arab Emirates

- UAE-556: UNITED ARAB EMIRATES: Near al-Hayer, from leaf litter; 15.I.2005; leg. A. van Harten.
 UAE-5541: UNITED ARAB EMIRATES: Sharjah, from leaf litter; 30.X.2006; leg. A. van Harten.
 UAE-5847: UNITED ARAB EMIRATES: Bithnah, from humid soil; 26.XI.2006; leg. A. van Harten.
 UAE-6262: UNITED ARAB EMIRATES: Sharjah Desert Park, pitfall traps; 6-28.XII.2006; leg. A. van Harten.
 UAE-6304: UNITED ARAB EMIRATES: Sharjah Desert Park, from leaf litter; 4.I.2006; leg. A. van Harten.

Yemen: Mainland

- 3746: YEMEN: Khamis Bani Sa'd, in leaf litter in banana plantation; 9.VI.1999; leg. A. van Harten.

Yemen: Socotra Archipelago

- So1: YEMEN: Socotra, Aduno Pass, Adho di Melho, stream; 3.II.1999; leg. K. van Damme.
 So4b: YEMEN: Socotra, Hoq Cave, inside cave; 6.II.1999; leg. K. van Damme.
 So5b: YEMEN: Socotra, Wadi Erher, stream; 6.II.1999; leg. K. van Damme.

So7a: YEMEN: Socotra, Homhill, drinking water well; 8.II.1999; leg. K. van Damme.

So10c: YEMEN: Socotra, NE Costal plain, brackish water well; 10.II.1999; leg. K. van Damme.

So11: YEMEN: Socotra, Wadi Daneghan, stream; 13.II.1999; leg. K. van Damme.

So12: YEMEN: Samha Island, costal well; 15.II.1999, leg. K. van Damme.

So22: YEMEN: Socotra, Deksam Plateau, marsh; 24.II.1999; leg. K. van Damme.

LIST OF IDENTIFIED SPECIES

Cosmochthoniidae Grandjean, 1947

Cosmochthonius lanatus (Michael, 1885)

Locality: 3746, Yemen: 2 specimens.

Remark: Second record for Yemen.

Epilohmanniidae Oudemans, 1923

Epilohmannia cylindrica cylindrica (Berlese, 1904)

Locality: UAE-6304: 2 specimens

Remark: First record for UAE.

Phthiracaridae Perty, 1841

Hoplophorella hamata (Ewing, 1909)

Locality: 3746, Yemen: 2 specimens

Remark: First record for Yemen.

Malaconothridae Berlese, 1916

Trimalaconothrus glaber (Michael, 1888)

Localities: So4b: 5 specimens; So5b: 4 specimens; So11: 3 specimens; So12: 4 specimens.

Remark: First record for Yemen

Tectocepheidae Grandjean, 1954

Tectocepheus velatus (Michael, 1880)

Locality: UAE-5847: 1 specimen.

Remark: First record for UAE.

Tetracondylidae Aoki, 1961

Papillocepheus longisetosus sp. n.

Locality: So1: Holotype.

Eremulidae Grandjean, 1965

Eremulus arabicus sp. n.

Locality: 3746. Yemen: Holotype + 1 paratype.

Eremobelbidae Balogh, 1961

Eremobelba sp.

Locality: 3746. Yemen: 1 specimen.

Oppiidae Sellnick, 1937*Decoroppia prodigiosa* gen. n., sp. n.

Locality: So10c: Holotype.

Hydrozetidae Grandjean, 1954*Hydrozetes lemnae* (Coggi, 1899)

Localities: So1: 2 specimens. So11: 2 specimens, So22: 2 specimens.

Remark: First record for Yemen.

Scutoverticidae Grandjean, 1954*Ethiovertex vanharteni* sp. n.

Locality: UAE-6262: Holotype + 2 paratypes.

Tegoribatidae Grandjean, 1954*Hypozetes imitator* Balogh, 1959

Locality: UAE-6262: 1 specimen.

Remark: First record for UAE.

Oribatulidae Thor, 1929*Zygoribatula mabar* Mahunka, 2000

Locality: UAE-6304: 10 specimens.

Remark: First record for UAE (hitherto only known from the type locality in Yemen).

Zygoribatula sharjah sp. n.

Localities: UAE-6262: Holotype + 18 paratypes; UAE-5541: 5 paratypes; UAE-5847: 2 paratypes.

Scheloribatidae Grandjean, 1953*Scheloribates sacculipunctatus* sp. n.

Locality: UAE-556: Holotype + 1 paratype.

Haplozetidae Grandjean, 1936*Haplozetes vindobonensis* (Willmann, 1935)

Locality: UAE- 6304: 2 specimens.

Remark: First record for UAE, also known from Yemen.

Protoribates capucinus Berlese, 1908

Locality: UAE- 6304: 2 specimens.

Distribution: First record for UAE.

Rostrozetes ovulum (Berlese, 1908)

Localities: So7a: 2 specimens; So22: 1 specimen.

Remark: First record for Socotra Archipelago, previously known from mainland Yemen.

Galumnidae Jacot, 1925*Pilogalumna arabica* Bayoumi & Al-Kalifa, 1986

Locality: UAE-6304: 2 specimens.

Remark: First record for UAE, also known from Yemen.

DESCRIPTIONS AND REMARKS

Papillocephus longisetosus sp. n.

Figs 1-4

MATERIAL EXAMINED: Holotype (MHNG): So1: YEMEN, Sokotra, Aduno Pass, Adho di Melho, stream; 3.XI.1999; leg. K. van Damme.

DIAGNOSIS: Rostrum wide, without median apex. Lamellae and translamella well developed, two pairs of prodorsal condyles weakly developed. Rostral and lamellar setae setiform, interlamellar ones conspicuously long, slightly dilated. Sensillus short, its head round. Ten pairs of phylliform notogastral setae, setae c_2 narrower than the others. Genitoanal setal formula: 3 - 0 - 2 - 3, anal setae spiniform, adanal setae dilated like the notogastral ones.

MEASUREMENTS: Length of body: 582 μm , width of body: 290 μm .

DESCRIPTION: *Prodorsum*. Rostral part of prodorsum broad, slightly and flatly convex. Lamellae wide, with small cusps, connected by a distinct translamella (Fig. 1). Interlamellar surface with foveolae, their inside punctate. Two pairs of hardly observable prodorsal condyles present, the lateral ones (co. pl.) connected with the bothridia. Rostral setae arising laterally, far from each other. Lamellar setae similar to rostral setae, setiform, bent inwards, distinctly ciliate. Interlamellar setae very long, nearly as long as half the length of the lamella. Distal part willow-leaf-shaped, elongate. Sensillus short, its peduncle thin, head small, round (Fig. 4).

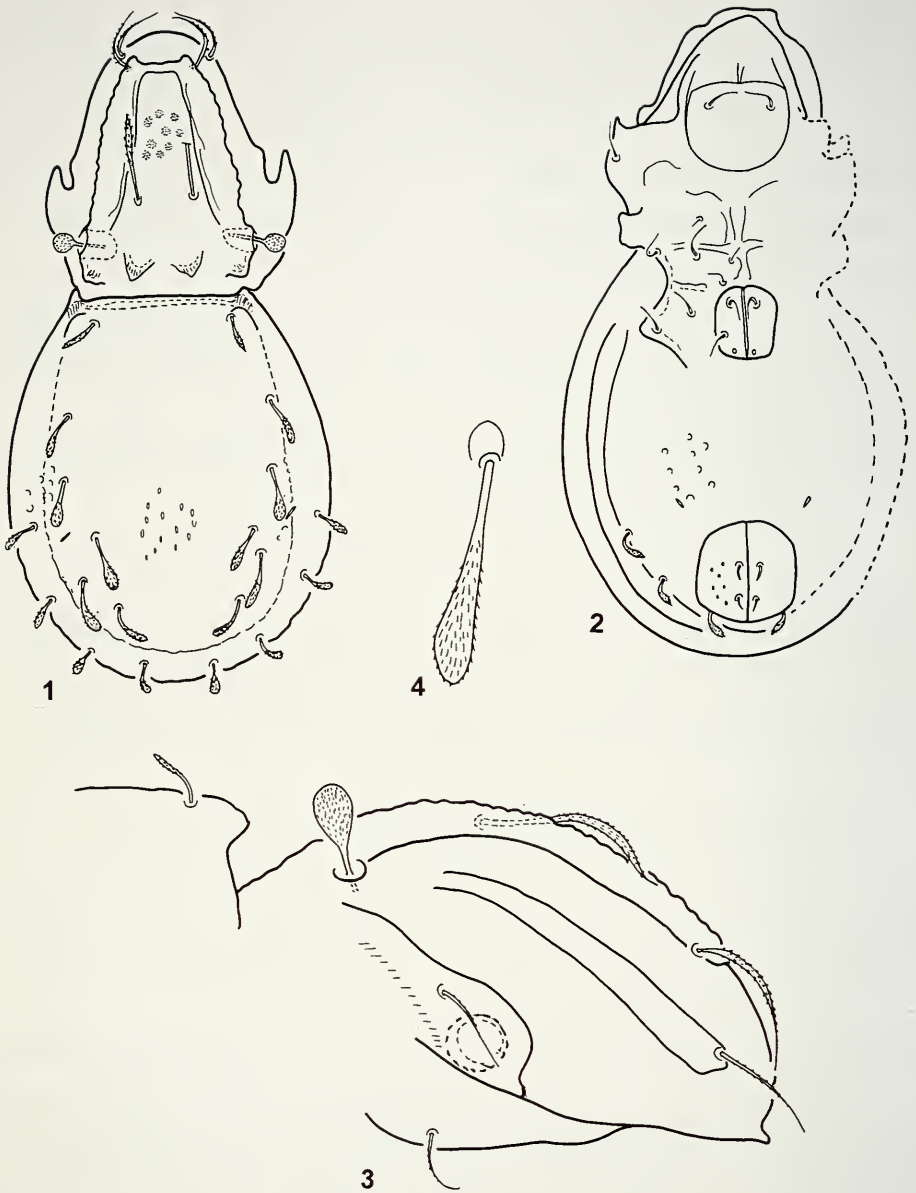
Notogaster: Notogastral surface ornamented with small elongate foveolae medially, by larger and roundish ones laterally. A pair of humeral processes (maybe the notogastral lateral condyles) also observable. Ten pairs of phylliform notogastral setae present (Fig. 4), setae c_2 narrower and more elongate than the others. These others roundish, more strongly dilated distally. All covered by small acicules or bristles. Setae p and h_3 shorter than the remaining ones.

Lateral part of podosoma: Tutorium well developed, strong, rostral setae thin, setiform, arising on distal end of the tutorium (Fig. 3). Lamellae wide, bearing dilated lamellar setae at their distal end. Pedotecta I large, setae $1c$ arising on them.

Ventral parts (Fig. 2): Epimeral setae long, thin. Surface of ventral plate ornamented with large foveolae, anal plates with smaller ones. Genital setae thin, aggenital setae absent (?), anal setae spiniform, adanal ones dilated distally like the notogastral ones. The latter covered with short cilia. Lyrifissures *iad* in a preanal position.

Legs: All legs partly missing.

REMARKS: The holotype is severely damaged, therefore some of the drawings are only sketches. The new species is well characterised by the strong translamella, the median prodorsal condyles, the very long and distally dilated interlamellar setae, and the round sensillus. The new species is closest to *P. decoratus* Mahunka, 1994 (Madagascar) and *P. areolatus* Mahunka, 1987 (Kenya). *P. longisetosus* sp. n. is dis-



FIGS 1-4

Papillocepeus longisetosus sp. n., for sizes see text. (1) Body in dorsal view. (2) Body in ventral view. (3) Podosoma in lateral view. (4) Seta *lp*.

tinguished from both earlier described species by the form and length of the interlamellar setae, by the much stronger and wider translamella, by the form of the sensillus, by the ornamentation of the notogaster and the ventral plate, and by the presence of the prodorsal condyles (co. pm.). The form of the sensillus is also different among the three species.

ETYMOLOGY: The species name refers to the conspicuously long interlamellar setae.

Eremulus arabicus sp. n.

Figs 5-7

MATERIAL EXAMINED: Holotype (MHNG): Yemen: Khamis Bani Sa'd, in leaf litter in banana plantation; 9.VI.1999; leg. A. van Harten (3746). – 1 paratype (1738-PO-2007, HNHM) from the same sample.

DIAGNOSIS: Rostrum nasiform. Costulae long, running parallel with each other. All prodorsal setae long, lamellar ones reaching over the rostrum. Sensillus slightly dilated, characteristically curved, with short spines. Notogastral setae strong, mostly straight and dilated. Ventral setae typical for the genus, epimeral, genital and aggenital setae stelliform, anal and adanal ones simple, *ad*₁ longest among the latter.

MEASUREMENTS: Length of body: 458-471 μm , width of body: 295-302 μm .

DESCRIPTION

Prodorsum: Rostral apex slightly elongated, nasiform, costulae nearly straight, long, transcostula absent (Fig. 5). No crest running to the bothridium. All prodorsal setae conspicuously long, lamellar ones originating on lamellar cusps, reaching well over the rostrum. Interlamellar setae also long, nearly as long as the length of the costulae. Exobothridial setae much shorter.

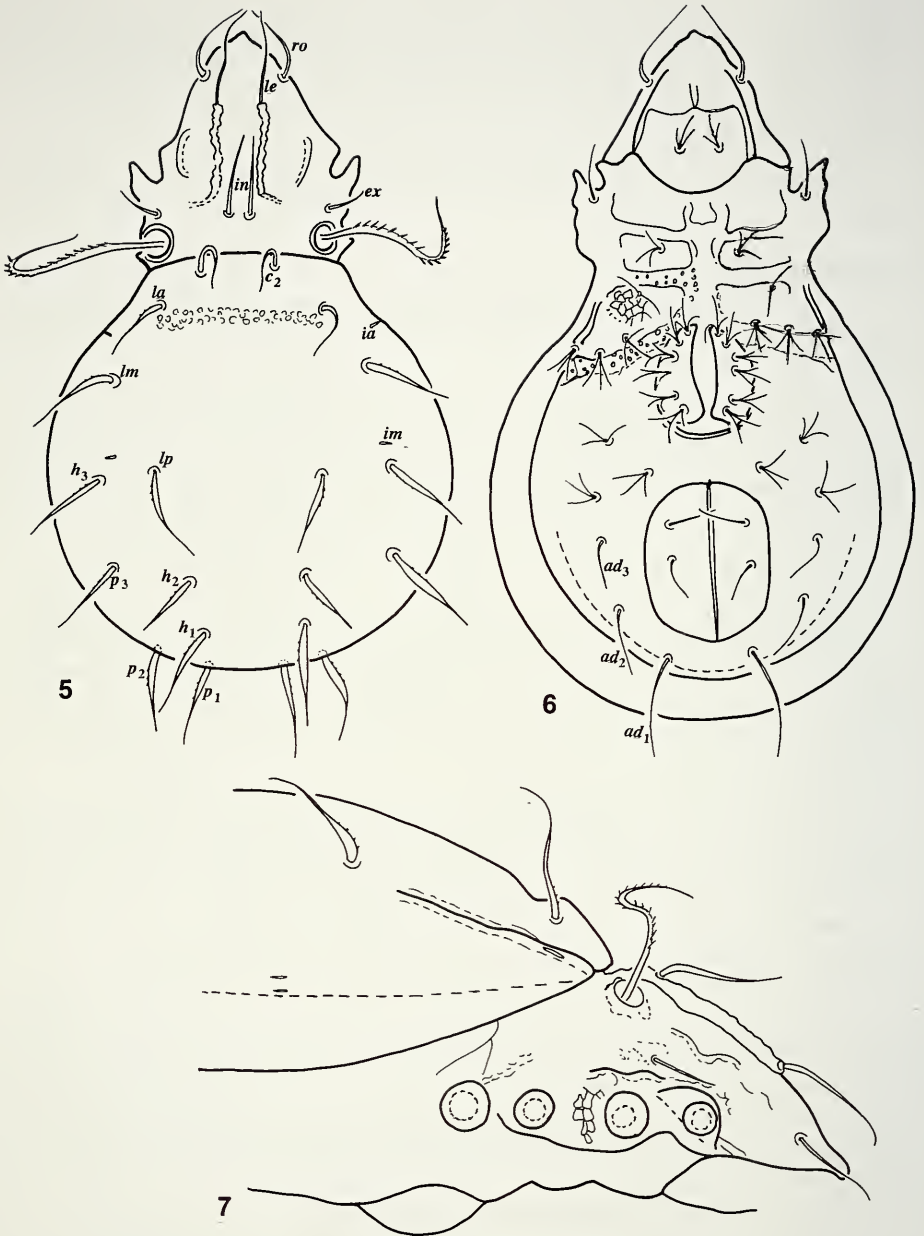
Notogaster: Notogastral surface with transversal hollow composed of alveoli. Ten pairs of strong, mostly straight and basally dilated notogastral setae present. These varying in length, with short, sometimes hardly observable spines basally. Lyrifissures and glandular opening well visible, lyrifissures hardly visible.

Lateral part of podosoma (Fig. 7): Pedotectum I small, well convex. Tutorium indistinct. Lateral part of prodorsum ornamented with polygonal pattern.

Ventral parts (Fig. 6): Whole ventral surface strongly covered by secretory granules. Epimeral surface ornamented with polygonal pattern, sejugal and 4. borders (bo. 4 according to Grandjean, 1952) also with alveoli. Epimeral setae partly simple (setae *1c*), mostly stellate. Genitoanal setal formula 6 -3 -2 - 3. Genital and aggenital setae stellate, anal and adanal ones simple and comparatively long. Adanal setae gradually becoming shorter anteriorly, setae *ad*₁ the longest, setae *ad*₃ the shortest of all. All these setae smooth.

Legs: All legs monodactylous, claws well developed.

REMARKS: The differential diagnoses for the species of the genus *Eremulus* Berlese, 1913 are partly absent or insufficient, so the species are hardly distinguishable from each other, based on the available literature. However, the newly described species have some characters, which are very revealing, therefore I am able to distinguish it from all the heretofore described species. The character combination: Long and parallel costulae, absence of transversal costula and crest between the costulae, conspi-



FIGS 5-7

Eremulus arabicus sp. n., for sizes see text. (5) Body in dorsal view. (6) Body in ventral view. (7) Podosoma in lateral view.

cuously dilated notogastral setae, hardly widened sensillus, alveolate sejugal and 4. borders in the epimeral region and ratio of adanal and anal setae distinguishes the new species from all its congeners. Maybe it is closest to *E. truncatus* Hammer, 1971 from Viti Levu (!). The transversal ridge behind the costulae is absent, the sensillus is much longer and the notogastral setae in *E. truncatus* are much narrower than in the new species. In spite of that, the similarities between both species are very conspicuous.

From this region another *Eremulus* species (*E. flagellifer* Berlese, 1908) was recorded, however, judging from the figures in Bayoumi & Al-Khalifa (1985) it is neither identical with the new species nor with *E. flagellifer*.

ETYMOLOGY: Named after its region of origin.

DECOROPPIINAE subfam. n.

TYPE GENUS: *Decoroppia* gen. n.

DIAGNOSIS: See diagnosis of *Decoroppia* gen. n.

Decoroppia gen. n.

TYPE SPECIES: *Decoroppia prodigiosa* sp. n.

DIAGNOSIS: Family Oppiidae Sellnick, 1937. Rostrum conical. Prodorsum with a strong, horseshoe-shaped median costula, and a pair of elliptical lateral costulae. Prodorsal setae modified, wide, spiniform. Sensillus clavate, with long branches. Fourteen pairs of notogastral setae, all (?) with long cilia basally. Epimeral region well sclerotised, sternal apodemes absent. Pedotecta 1 large, discidium large and wide, nearly quadrangular. Genitoanal setal formula: 5 - 1 - 2 - 3. Lyrifissures *iad* in direct apoanal position, setae *ad*₁ in postanal, setae *ad*₃ in preanal position, setae *ad*₂ located at anterior corner of anal aperture. A corn-shaped structure of unknown function in postanal position.

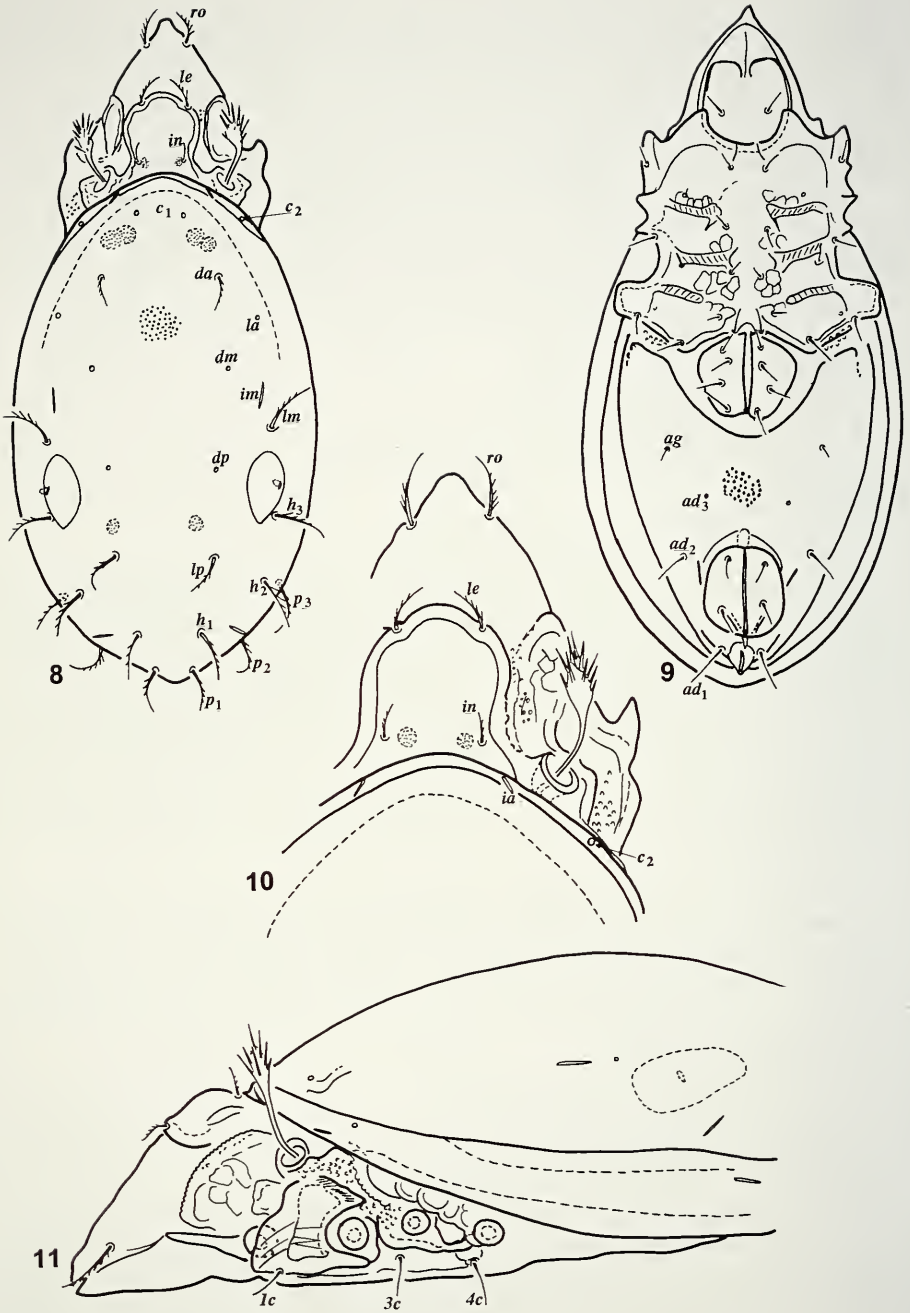
REMARKS: The single specimen examined is strongly damaged, therefore I am not able to give a complete description. Nevertheless, some of the main characters given in the diagnosis (sculpture of prodorsum, number of notogastral setae, structure of epimeral region, form of discidium, anal and postanal features) are unique in the family Oppiidae. Therefore the description as a new genus and also the establishment of a new subfamily are justified:

Decoroppia prodigiosa sp. n.

Figs 8-11

MATERIAL EXAMINED: Holotype (MHNG): So10c: YEMEN, Socotra, NE coastal plain, brackish water well; 10.II.1999; leg. K. van Damme.

DIAGNOSIS: Rostrum narrowed anteriorly. Prodorsum with well-developed costulae, median one horseshoe-shaped. A pair of small maculae present on interbothridial surface. All prodorsal setae thickened basally, with long cilia. Sensillus fusiform, with spiniform branches. Fourteen pairs of peculiar notogastral setae, slightly dilated and with long cilia. Two pairs of prose fields and a well-framed glandula observable. Epimeral surface ornamented with polygonal pattern and divided by strong epimeral borders. Sternal border absent. Epimeral setal formula: 3 - 1 - 3 - 3.



FIGS 8-11

Decoroppia prodigiosa sp. n., for sizes see text. (8) Body in dorsal view. (9) Body in ventral view. (10) Prodorsum in dorsal view. (11) Podosoma in lateral view.

Genital opening large, framed. Anal plate with a short crest. Anal, adanal and aggenital setae simple, thin.

MEASUREMENTS: Length of body: 332 μm , width of body: 157 μm .

DESCRIPTION

Prodorsum: Rostral apex narrowed anteriorly, conical but obtuse. Prodorsum with well-developed costulae. Median one horseshoe-shaped, well arched and also framing the bothridia (Fig. 10). Lateral arch elliptical, inner surface with weak polygonal pattern. Some small tubercles observable between median and lateral arches and also in lateral part of prodorsum. A pair of small maculae on interbothridial surface near to interbothridial setae. All prodorsal setae widened basally, rostral setae the longest, interlamellar one the shortest of all. Sensillus large, directed forwards, with fusiform head bearing 9-10 long, thin spines, directed also anteriorly.

Notogaster: Dorsosejugal suture convex, protruding anteriorly, well sclerotised. Surface of notogaster distinctly punctate. Some indistinct maculae and two distinct pairs of anterior and one pair of posterior maculae (porose areas?) (Fig. 8) observable. Fourteen pairs of notogastral setae present, setae c2 represented only by alveoli (?), but some setae in the anterior part also missing, probably broken off. Lyrifissures im running longitudinally. Notogastral gland plumstone-shaped, strongly framed (Fig. 8).

Lateral part of prodorsoma: Pedotecta 1 large. Lateral part of prodorsum ornamented with strong lath and other peculiar crests (Fig. 11). Surface well tuberculate. Exobothridial setae not visible.

Ventral parts (Fig. 9): Anterior margin of hypostome broken medially, seemingly open. Epimeral surface well sclerotised, four pairs of epimeres well separated from each other, posterior border also strong, with a tuberculate hollow. Sternal apodema and border not clearly observable, maybe absent, a weak median line framing the epimeres. Pedotecta 2-3 with two apices, discidium very large, quadrangular, reaching laterally. Genital opening large, much larger than anal opening and framed with weak line. Ventral plate punctate, as is the notogaster. All setae in ventral region simple, setiform, smooth. Aggenital setae and setae ad3 short, all others normal.

Legs: All broken off, not studied.

REMARKS: See the remarks after the genus diagnosis.

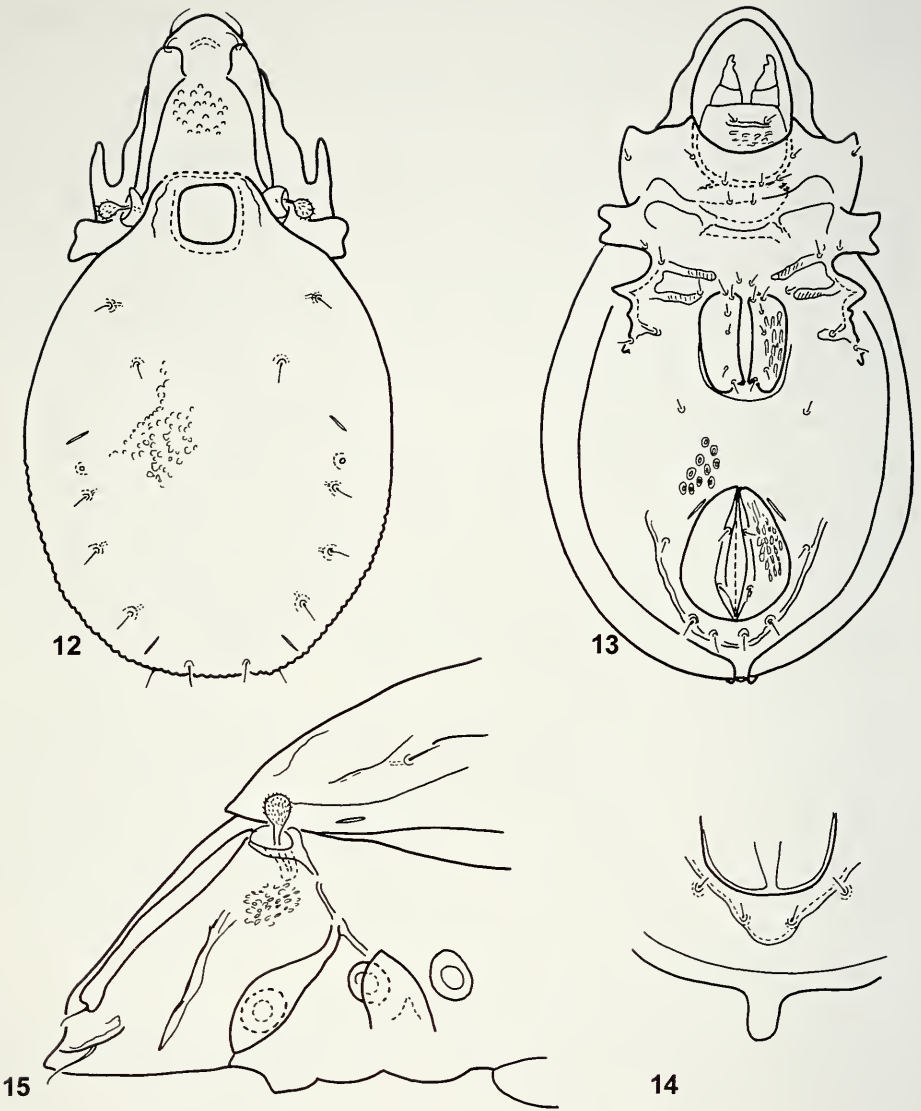
ETYMOLOGY: The species name refers to the characteristic, unusual structure of the four large maculae, which seem to form an area porosa.

Ethiovertex vanharteni sp. n.

Figs 12-15

MATERIAL EXAMINED: Holotype (MHNG): UAE-6262: UNITED ARAB EMIRATES: Sharjah Desert Park, pitfall traps; 6-28.XII.2006; leg. A. van Harten. – 2 paratypes MHNG. HNHM 1738-PO-2007) from the same sample.

DIAGNOSIS: Lamellae situated marginally, lamellar apex wide, much wider than the basal part. Rostral setae longer than lamellar ones, interlamellar and exobothridial setae absent. Sensillus short, its peduncle slightly shorter than the round head. Seven pairs of notogastral setae present. Hypostome with transversal ribs. Apodemes weakly developed. Epimeral setae short, their alveoli framed with an annular structure. Surface



FIGS 12-15

Ethiovertex vanharteni sp. n., for sizes see text. (12) Body in dorsal view. (13) Body in ventral view. (14) Postanal region in posterior view. (15) Podosoma in lateral view.

of genital and anal plate ornamented with short ribs, surface of ventral plate with annular pustules. All legs tridactylous.

MEASUREMENTS: Length of body: 600-613 μm , width of body: 350-363 μm .

DESCRIPTION

Prodorsum: Rostrum widely rounded, behind the rostral part a convex rib present. Lamellar apices rounded anteriorly, much wider than the long basal part, the latter gradually narrowing basally (Fig. 12). Prodorsal surface covered with pustules. Rostral and lamellar setae very thin, setiform; lamellar setae smooth, rostral setae slightly roughened. Interlamellar and exobothridial setae not visible. Sensillus small, its head round, covered with short bristles, its stalk not longer than the head.

Notogaster: Dorsosejugal suture indistinct but observable. Notogastral surface covered with irregular tubercles or pustules (Fig. 12). Seven pairs of very thin, setiform, smooth notogastral setae present. Lyrifissures *im* and *ip* narrow and fine.

Lateral part of podosoma (Fig. 15): Lateral surface with divided ribs. Rostral rim well observable, bearing rostral setae. Tutorium present, without apex.

Ventral parts (Fig. 13): Hypostome with a distinct transversal rib bearing the hypostomal setae. Epimeral region well sclerotised, apodemes not touching medially. Lateral margin of pedotecta I with ribs. Epimeral setae mostly setiform or bacilliform, finely roughened. Their alveoli well framed. Epimeral setal formula: 3 - 1 - 3(?) - 3. Setae 1c arising far laterally, on the margin of pedotecta 1.

Surface of ventral plate with pustules, with a characteristic bright annular central part. Surface of genital and anal plates with short ribs or narrow tubercles. Genitoanal setal formula: 6 - 1 - 2 - 3. First pair of genital setae much longer than the others. Aggenital and adanal setae spiniform, *ad*₁ and *ad*₂ in postanal position (Fig. 14), located on a rib around the anal opening.

Legs: All legs tri- and heterodactylous.

REMARKS: The genus *Ethiovertex* Mahunka, 1982 was separated from the other Scutoverticidae on the basis of the number of notogastral setae, the absence of a translamella, and by the wide lamellar apices and the lateral position of the lamellae. The number of claws (2-3) and the sculpture of different surfaces of the body are variable.

The new species is closest to the type species of the genus, *E. macrosetosus* Mahunka, 1982 (Ethiopia), and to *E. bidactylus* (Mahunka, 1989) (Kenya). *E. vanharteni* sp. n. is distinguished from these two congeners by the short round head of its sensillus (much longer and clavate in *E. macrosetosus* and *E. bidactylus*) and by the sculpture of its genital and anal plates (nearly smooth in the old species and well covered with short ribs in *E. vanharteni*).

ETYMOLOGY: I dedicate the new species to Antonius van Harten, who collected mites all over the world.

***Hypozetes imitator* Balogh, 1959**

The species of the genus *Hypozetes* are difficult to separate, therefore a thorough revision is desirable. It is highly probable that only one or two valid species will remain in the genus, the rest are mere synonyms.

The newly collected single specimen cannot be distinguished from the type species of the genus. It is interesting that Bayoumi and Al Khalifa (1984) reported *H. translamellatus saudicus* from this territory. This record needs to be confirmed.

Zygoribatula sharjah sp. n.

Figs 16-19

MATERIAL EXAMINED: Holotype (MHNG): UAE-6262: UNITED ARAB EMIRATES: Sharjah Desert Park, pitfall traps; 6.-28.XII.2006; leg. A. van Harten. – 18 paratypes from the same sample. – 5 paratypes: UAE 5541: UNITED ARAB EMIRATES: Sharjah, from leaf litter; 30.X.2006; leg. A. van Harten. – 2 paratypes: UAE-5847: UNITED ARAB EMIRATES: Bithnah, from humid soil; 26.XI.2006; leg. A. van Harten. Holotype and 17 paratypes in MHNG, 8 paratypes (1739-PO-2007) in HNHM.

DIAGNOSIS: Rostral apex elongate, well separated from rostral margin. Lamellae and translamella wide, without sharp cusps. Prodorsal setae long, sensillus small, with a small, rounded, barbed head. Dorsosejugal suture convex, humeral projection present. Notogastral setae varying in length and in shape. Porose area *Aa* very long, slit-like. Epimeral borders weakly developed, epimeral setae mostly short and fine. All legs tridactylous.

MEASUREMENTS: Length of body: 502-564 μm , width of body: 370-402 μm .

DESCRIPTION

Prodorsum: Rostral apex strongly narrowing anteriorly, bill-shaped, rostral margin on both sides of projection slightly excavated (Fig. 18). Lamellae well developed, nearly as wide as translamella. Lateral cusps rounded, translamella slightly undulate anteriorly. A fine arched line present at insertion of rostral setae. All prodorsal setae long, setiform, ciliate, their ratio: $ex < ro < le < in$.

Notogaster: Dorsosejugal suture convex medially, concave beside median projection, humeral elevation laterally observable. Notogastral surface smooth, fourteen pairs of notogastral setae of different lengths, setae in anterior part of notogaster mostly much longer and stronger than setae in posterior part. Setae c_1 only half as long as setae c_2 and la . Posteromarginal setae shortest of all. Four pairs of well-developed porose areas present, *Aa* narrow, slit-like, long (Fig. 16), located very close to seta la . Porose area A_1 slightly elongate, A_2 and A_3 much shorter than the A_1 .

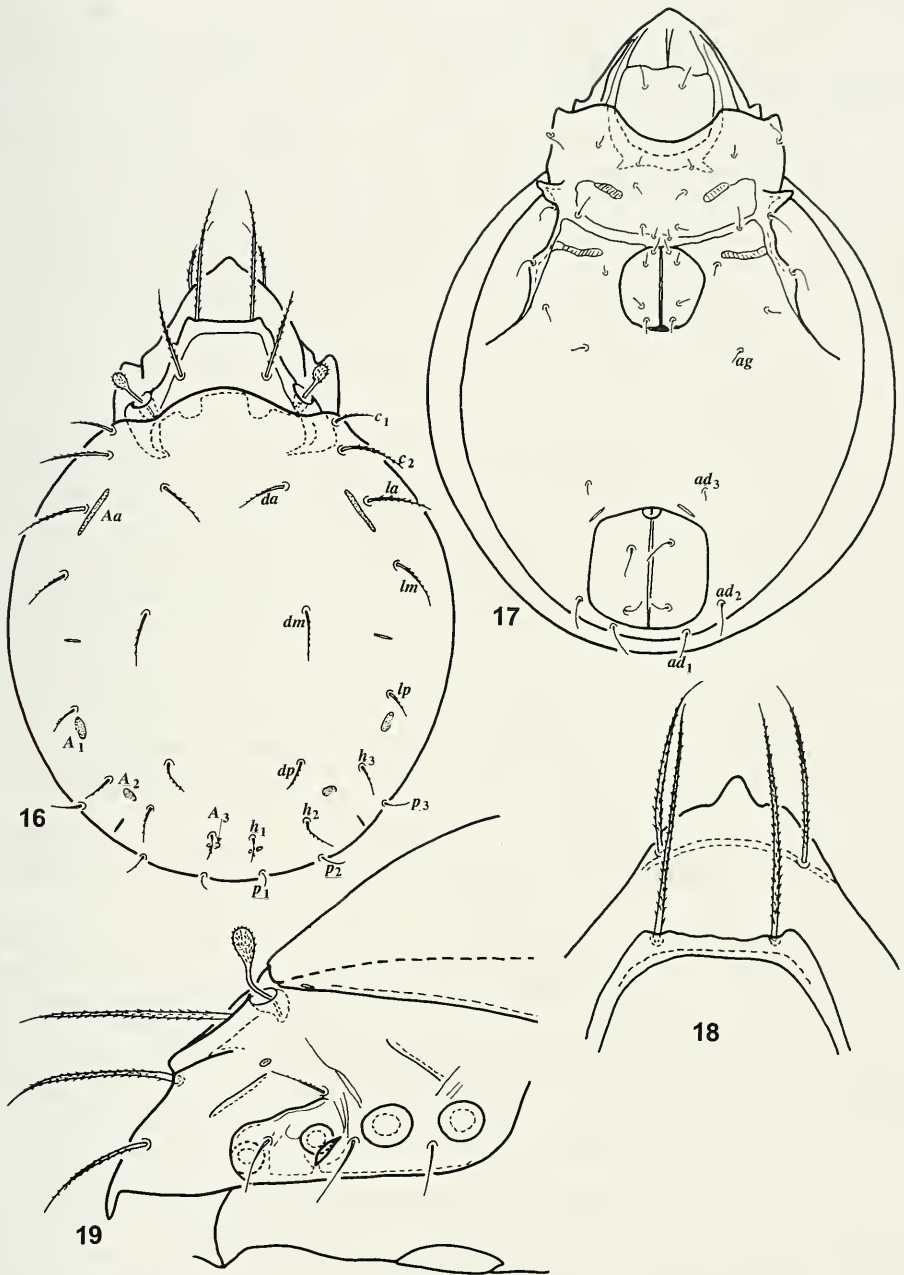
Lateral part of podosoma (Fig. 19): Rostral apex distinctly projecting, separate from the rostrum. Sublamella very short. Tutorium also short, indistinct. Porose area Al small. Dorsal margin of pedotecta I undulating, seta lc arising on it. Circumpedal carina not reaching lateral margin of ventral plate.

Ventral parts (Fig. 17): Apodemes and borders weakly developed, short, only the sejugal ones long and forming a transversal band. All epimeral setae short, mostly smooth, only the lateral ones slightly ciliate. Setae $4c$ arising on lateral margin of discidium. Anal setae as long as setae ad_1 and ad_2 in postanal position, ad_3 in preanal position shorter. Lyrifissures iad also in preanal position.

Legs: All legs tridactylous and heterodactylous.

REMARKS: The new species belongs to the *Z. undulata* species group (see Grobler, 1993; Grobler & Kok, 1993), which is characterised by the elongate porose area *Aa*. On the basis of the very long and narrow *Aa* the new species is closest to *Z. lineaporosa* Grobler, 1993. The notogastral setae are much shorter, equal in length and smooth in *Z. lineaporosa*, varying in length and partly well pilose in the new species. The position of the porose area *Aa* also different in these two species.

ETYMOLOGY: The specific epithet is a noun in apposition and refers to the type locality.



FIGS 16-19

Zygoribatula sharjah sp. n., for sizes see text. (16) Body in dorsal view. (17) Body in ventral view. (18) Anterior part of prodorsum. (19) Podosoma in lateral view.

Scheloribates sacculipunctatus sp. n.

Figs 20-22

MATERIAL EXAMINED: Holotype (MHNG): UAE 556; UNITED ARAB EMIRATES: Near al-Hayer, from leaf litter, 15.I.2005; leg. A. van Harten. – 1 paratype (1740-PO-2007, HNHM) from the same sample.

DIAGNOSIS: Rostrum without median apex, rounded. Lamellae well developed, prelamellae and sublamellae present. Prelamella not directed to insertion of rostral setae. A pair of comparatively long, fine lines present in translamellar position. All prodorsal setae densely barbed. Sensillus long, directed backwards, gradually dilated. Ten pairs of distinct notogastral setae and four pairs of sacculi present, all sacculi distinctly punctate, resembling a porose area. Most epimeral setae finely pilose, setae in ventral region short. All legs tridactylous.

MEASUREMENTS: Length of body: 275-302 μm , width of body: 132-143 μm .

DESCRIPTION

Prodorsum: Rostral apex wide, rounded. Lamellae narrow, directed inwards, bearing rostral setae distally. A pair of fine, conspicuously long translamellar lines present between them, both lines nearly straight (Fig. 20). Prelamellae and sublamellae long, prelamellae not directed to insertion of rostral setae (Fig. 22). Sublamellae not reaching to bothridium. Ratio of prodorsal setae: $in > le > ro > ex$. All setae densely barbed. Sensillus long, directed outwards and backwards, its head gradually widening distally, comparatively long, lanceolate, with pointed distal end, covered by short bristles.

Notogaster: Very wide, nearly as long as wide. Dorsosejugal suture conspicuously arched medially and excavate behind the bothridia. Pteromorphae large, well observable laterally. Notogastral surface smooth. Ten pairs of distinct, comparatively long setae and four pairs of large sacculi present. All sacculi well discernible, their inside well punctate (Fig. 20).

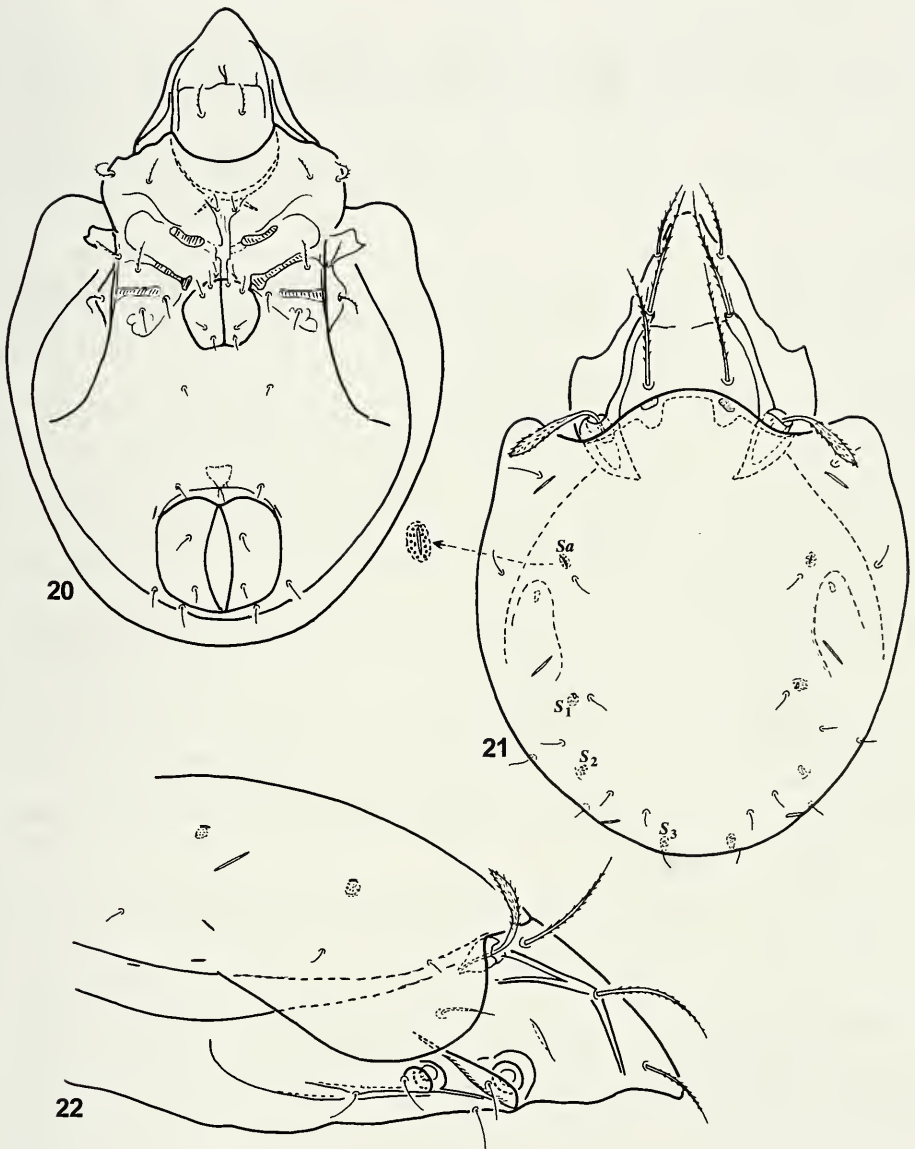
Lateral part of podosoma (Fig. 22): Sublamellar and exobothridial region without pattern. Lamellar area porosa small, round, exobothridial setae short. Tutorium short but discernible. Pedotecta 1 narrow.

Ventral parts (Fig. 21): Apodema 2 and sejugal apodema long, the latter ending near the genital apertures. Epimeral setal formula 3 - 1 - 3 - 3. All setae in inner position thin and simple, outer setae (1c, 3b, 3c, 4c) thicker and densely barbed. Discidium large, circumpedal carina long but not reaching to lateral border of ventral plate. Anogenital surface smooth. Genital aperture small, much smaller than the anal one, situated far from each other. All setae short and simple, lyrifissures iad located at anterior corner of anal aperture.

Legs: All tarsi tri- and heterodactylous. Ventral blades of femora II-IV rounded.

REMARKS: The new species is well characterised by the presence of long translamellar lines, the form of its sensillus, the characteristically punctate sacculi, the distinct notogastral setae and the number of claws. On this basis it can be attributed to the genus *Scheloribates* Berlese, 1908 and to the *praeincisus* species group (see Balogh & Balogh 2002). The new species is distinguished from related species by the unique structure of its sacculi and the form of its sensillus.

ETYMOLOGY: The species name refers to the characteristic structure of the sacculi, resembling an area porosa.



FIGS 20-22

Scheloribates sacculipunctatus sp. n., for sizes see text. (20) Body in dorsal view. (21) Body in ventral view. (22) Podosoma in lateral view.

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Two new *Pristimantis* (Anura, Strabomantidae) belonging to the *myersi* group from the Andean slopes of Ecuador

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Two new *Pristimantis* (Anura, Strabomantidae) belonging to the *myersi* group from the Andean slopes of Ecuador. - *Pristimantis onorei* sp. nov. and *Pristimantis lucidosignatus* sp. nov. are described from the eastern versants of the Andes in Ecuador. Both species are members of the *Pristimantis myersi* group. *Pristimantis onorei* sp. nov. is easily distinguished from other *Pristimantis* by having prominent W-shaped dermal ridges extending from posterior part of upper eyelid to scapular region, lack of large cream spots on venter and by uniform light brown anterior and posterior surfaces of tights. *Pristimantis lucidosignatus* sp. nov. is unique among other *Pristimantis* of the *myersi* group in the following combination of characters: lack of narrow lateral fringes on fingers; prominent W-shaped dermal ridges extending from posterior part of upper eyelid to scapular region; presence of flash spots on shanks; no large cream spots on venter; anterior and posterior surfaces of tights uniform light brown, prominent light markings on tibia. The two new species extend the *P. myersi* group to 13 known members.

Keywords: Amphibia - Strabomantidae - Systematics - *Pristimantis onorei* sp. nov. - *Pristimantis lucidosignatus* sp. nov. - Ecuador

INTRODUCTION

The Andes of Ecuador in South American harbor one of the most diverse anuran fauna, whereby members of the family Strabomantidae (former *Eleutherodactylus*) make up a major part. Until 2007 the genus *Eleutherodactylus* was with more than 700 recognized species one of the larger vertebrate genera (Wells, 2007). Recently, Heinicke *et al.* (2007) reassigned species of *Eleutherodactylus* into the three genera *Craugastor*, *Eleutherodactylus* and *Pristimantis* based on a genetic study comprising 280 species. Later, La Marca (2007) recognized two new genera of high Andean Venezuelan brachycephalid frogs, *Mucubatrachus* and *Paramophrynella*, but these were more recently treated as synonyms of *Pristimantis* within the family of Strabomantidae by Hedges *et al.* (2008), who presented a completely new classification for the frogs formerly comprising the family Brachycephalidae (sensu Frost *et al.*

2006). Following Hedges *et al.* (2008) classification all Ecuadorian strabomantid frogs fall within the genera *Barycholos*, *Isodactylus*, *Lynchius*, *Noblella*, *Oreobates*, *Pristimantis* and *Strabomantis*. Reviewing material housed at the Muséum d'Histoire Naturelle, Genève, we identified two new species that can be assigned to the genus *Pristimantis*. The frogs described herein were collected by L. A. Coloma and G. Onore between 1984 and 1985 at mid elevations in the Cordillera Occidental, Ecuador. Discoveries of species new to sciences within this region are even more common today than in the past (Coloma, 2005-2007; Fig. 1).

MATERIAL AND METHODS

Vouchers were preserved in ethanol (70 %). Diagnosis and description follow Lynch & Duellman (1997). All measurements were taken with calipers to the nearest 0.1 mm. Abbreviations for measurements are: SVL = snout-vent length; TiL = tibia length; FeL = femur length; TaL = tarsus length; FL = foot length; HeL = head length; HW = head width; Ind = internarial distance; IOD = interorbital distance; EN = eye-nostril distance (straight line distance between anterior corner of eye and nostrils); ED = horizontal eye diameter; ETS = eye-tip of snout distance (straight line distance between the anterior corner of eye and tip of snout); TD = horizontal tympanum diameter. Sex was determined by inspection of vocal slits.

For comparison we examined alcohol-preserved specimens from the herpetological collections of the Muséum d'Histoire Naturelle, Genève, Switzerland (MHNG), and the Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany (ZFMK).

Pristimantis festae. – Ecuador, Napo, Paralgacta, MHNG 2390.56-57.

Pristimantis simonbolivari. – Ecuador, Bolivar, Cashca Totoras, MHNG 2637.039-041.

Pristimantis unistrigatus. – Ecuador, Páramos near Quito, ZFMK 47377; Ecuador, 60 km S Quito, 4000 m, Paramó ZFMK 45764.

DESCRIPTION

Pristimantis onorei sp. nov.

Figs 2, 3, 4

Onore's Rubber Frog

HOLOTYPE: MHNG 2392.25, a ♂, collected at Tandapi, Pichincha, Ecuador, approximately 78.91°W, 0.54°S, 2,115 m a.s.l., by L. A. Coloma during December 1984 (Fig. 5).

PARATYPES: MHNG 2392.26, a ♀, collected at San Francisco de Las Pampas, Cotopaxi, Ecuador, approximately 78.96°W, 0.43°S, 1,711 m a.s.l., by L. A. Coloma during December 1985. – MHNG 2710.24 a ♀ and MHNG 2710.25, a ♂, collected at Santo Domingo de Los Colorados, Pichincha, by G. Onore during February 1984. Although the label attached to the specimen states that it was collected at Santa Domingo de Los Colorados, it remains unclear if the city at approximately 79.15°W, 0.25°S, 543 m a.s.l. was indicated or another place within the county Santo Domingo de Los Colorados (approximately 79.42 – 78.83°W, 0.04 – 0.51°S, 200-1700 m a.s.l.).

ETYMOLOGY: The specific name is a noun in the genitive case and is a patronym for our colleague, G. Onore, who collected large parts of the type series.

DIAGNOSIS: The species can be assigned to the *Pristimantis myersi* species group sensu Hedges *et al.* (2008) characterized by being small (♀ ♀ less than 28 mm

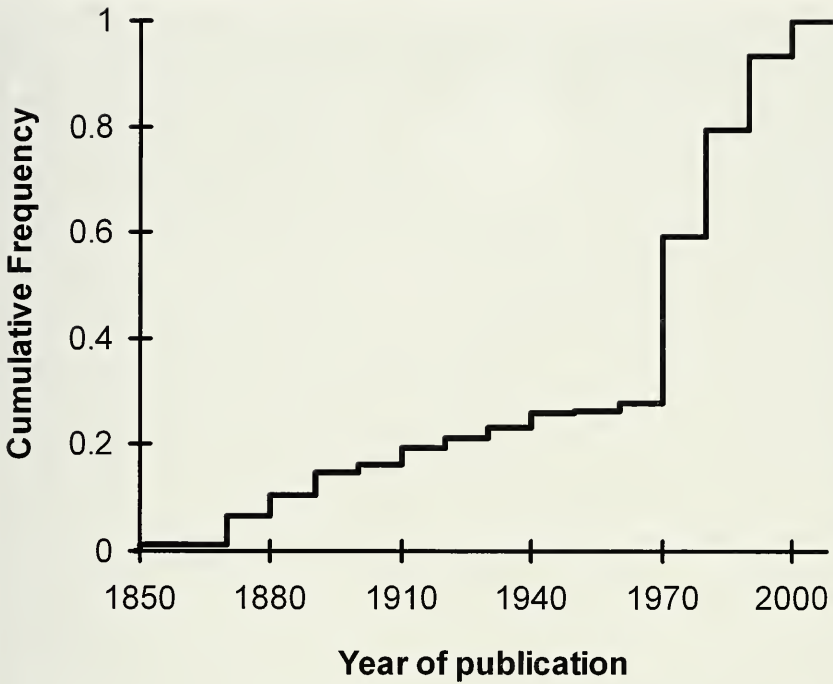


FIG. 1

Cumulative frequency of strabomantid frogs described from Ecuador. Source: Coloma (2005-2007).

SVL) with short snouts and relatively narrow heads, robust bodies, and short to moderately long limbs. Finger I is shorter than Finger II, and Toe V is only slightly longer than Toe III and does not extend to the proximal edge of the distal subarticular tubercle of Toe IV. Digital discs are narrow and rounded. The tympanic membrane is differentiated (except in *P. leoni* and *P. ocreatus*). Cranial crests are absent, vocal slits present (except in *P. floridus*). Vomerine teeth are present.

Pristimantis onorei has (1) skin on dorsum, upper flanks and limbs tubercular, that on venter finely areolate; weakly developed W-shaped occipital-scapular ridge, rest of dorsum covered with numerous interrupted dermal ridges; some large conical warts on upper eye lid and posterior parts of the tympanic region; dorsolateral and discoidal folds absent (2) tympanum completely concealed beneath the skin in ♀♀, oval and well developed in ♂♂, supratympanic fold absent; (3) snout rounded to slightly subovoid in dorsal view, acuminate in profile; canthus rostralis concave, edge distinct; (4) upper eyelid with one to two prominent, conical tubercles and irregularly scattered smaller tubercles; (5) choanae elliptical, slightly larger than nostrils; small but distinct detingerous process of vomers posterior and medial to choanae; tongue round, filling the whole mouth; (6) ♂♂ with short vocal slits and a external subgular vocal sac; (7) Finger I slightly shorter than Finger II; (8) fingers without lateral keels; (9) axillary

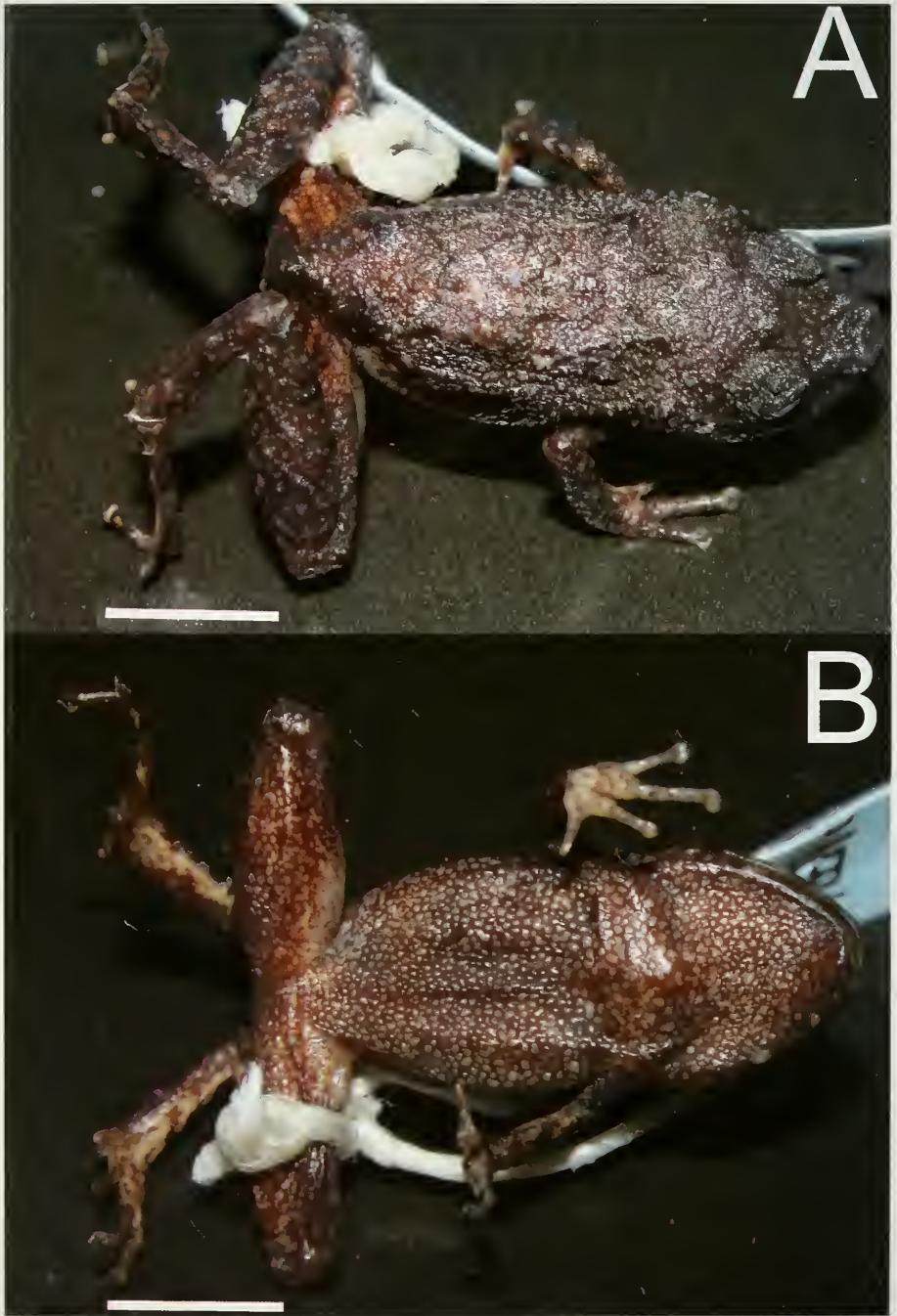


FIG. 2

♀ holotype (MHNG 2392.25) of *Pristimantis onorei* sp. nov. in lateral (A) and ventral view (B). Scale 10 mm.

tubercle absent; (10) ulnar tubercles present; (11) calcars absent; (12) inner metatarsal tubercle elliptic, protruding, outer metatarsal tubercle half the size of inner metatarsal tubercle; (13) toes with weak lateral keels; no webbing; Toe IV with small round disc, twice the size of disc on Toes I, II, III, and V (Fig. 3); (14) in preservative, dorsal and dorsolateral ground color brown with scattered darker spots, limbs dark banded, two darker subocular stripes radiating from lower eye lid to upper lip present; ventral coloration light brown; anterior and posterior thigh surfaces uniform brown lacking spots; (15) SVL 20.1 and 20.5 mm in ♀♀, 17.1 and 20.1 mm in ♂♂.

Pristimantis onorei is unique among other *Pristimantis* of the *myersi* group in the following combination of characters: tympanum completely concealed beneath the skin in ♀♀, oval and well developed in ♂♂; weak W-shaped dermal ridges extending from posterior part of upper eyelid to scapular region; no large cream spots on venter; anterior and posterior surfaces of tights uniform light brown.

COMPARISON WITH OTHER SPECIES (conditions of *P. onorei* in parenthesis): *Pristimantis onorei* is most similar to *P. leoni* and *P. ocreatus*. The former has a partly concealed tympanum beneath the skin (completely concealed beneath the skin in ♀♀, distinct in ♂♂), small tubercles on the heel (absent), and cream spots on venter (absent), and a brown barred throat (uniform brown). *Pristimantis ocreatus* lacks vomerine odontophores (present), has a reddish brown middorsal stripe or a broad dorsal band (absent), white spots on flanks and stomach, pale spots on surfaces of posterior tights (uniform light brown). Despite a distinct tympanum present in ♂♂ and ♀♀, *P. pyrrohermus* is most easily confused with this species, but can be separated by lacking digital discs or pads on Finger II and Toe II (present). Furthermore, preserved specimens of *P. pyrrohermus* have colorless areas in axial, groin and on anterior and posterior surfaces of tights, which are bright red in life (only present in groin, posterior and anterior surfaces of tights light brown), and a cream venter with brown reticulation (light brown with minute cream spots). *Pristimantis onorei* can be easily distinguished from *P. festae*, which has only small finger discs (larger), white spots on venter, throat and in groin in preserved specimens (absent), and lacks well defined dermal ridges on the dorsum (present). *Pristimantis floridus* has larger digital discs (smaller), an indistinct supratympanic fold obscuring the upper edge of the tympanic annulus (no supratympanic fold), and a shagreen dorsum with many rounded warts without dermal ridges (no warts, many dermal ridges). *Pristimantis gladiator* has small heel tubercles (absent), a cream flecked venter with brown flecks (brown), and a yellowish throat (brown). *Pristimantis hectus* shows prominent dorsolateral folds (absent) and lacks upper eye lid tubercles (present). *Pristimantis repens* has a finely shagreen to tuberculate dorsum lacking dermal ridges (present) and cream flecks on posterior tight surfaces, throat, chest and anterior venter (no cream flecks). *Pristimantis xeniolium* has a shagreen dorsum lacking dermal ridges (present). *Pristimantis lucidosignatus* sp. nov. has a much stronger developed W-shaped dorsal ridges (weaker developed) and light spots on shanks (absent).

DESCRIPTION OF HOLOTYPE: Snout outline rounded to slightly subovoid in dorsal view, acuminate in profile; head weakly distinct from body in dorsal view, HW 38.8 % SVL; canthus rostralis concave, distinct; nostrils slightly protuberant, directed

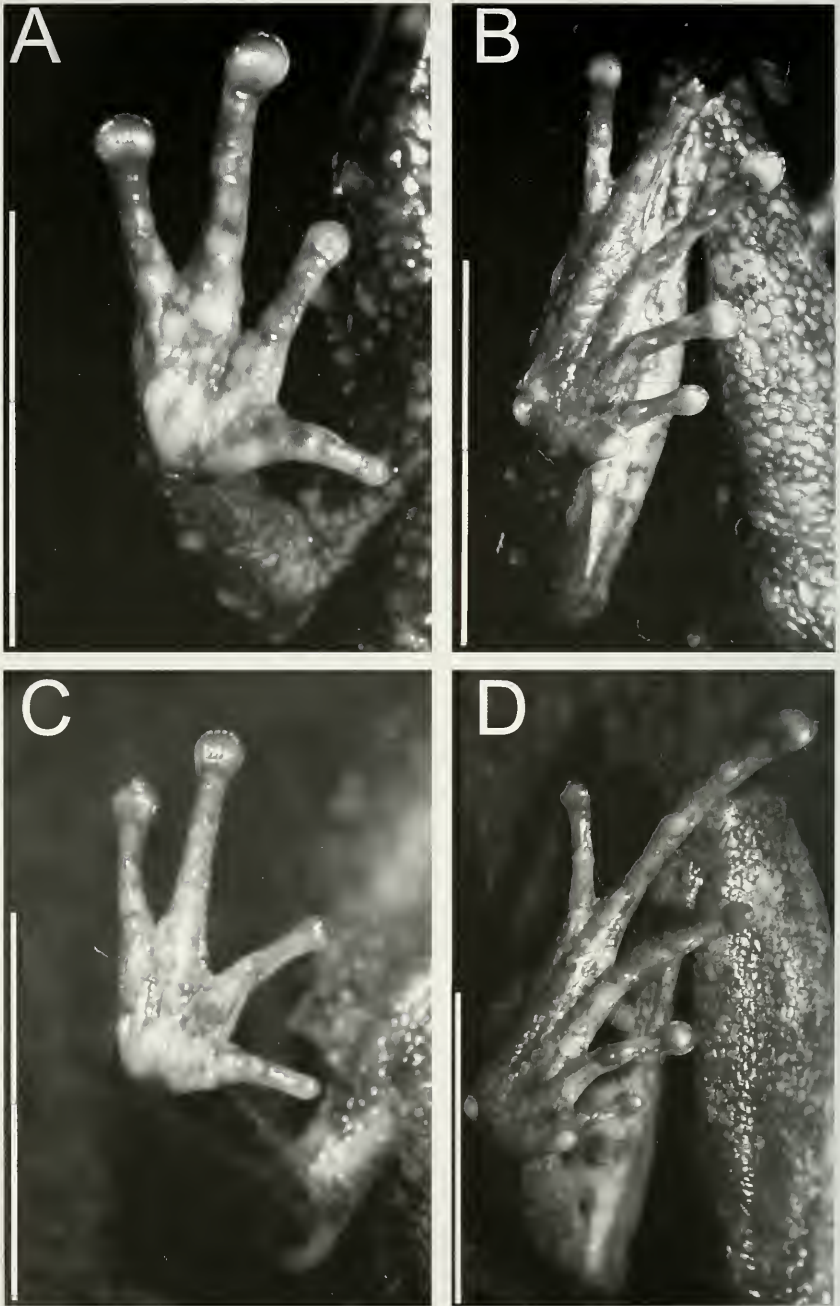


FIG. 3

Hand (A) and foot (B) of the preserved holotype of *Pristimantis onorei* sp. nov. (MHNG 2392.25) and hand (C) and foot (D) of the preserved holotype of *Pristimantis lucidosignatus* sp. nov. (MHNG 2392.27). Scale 5 mm.

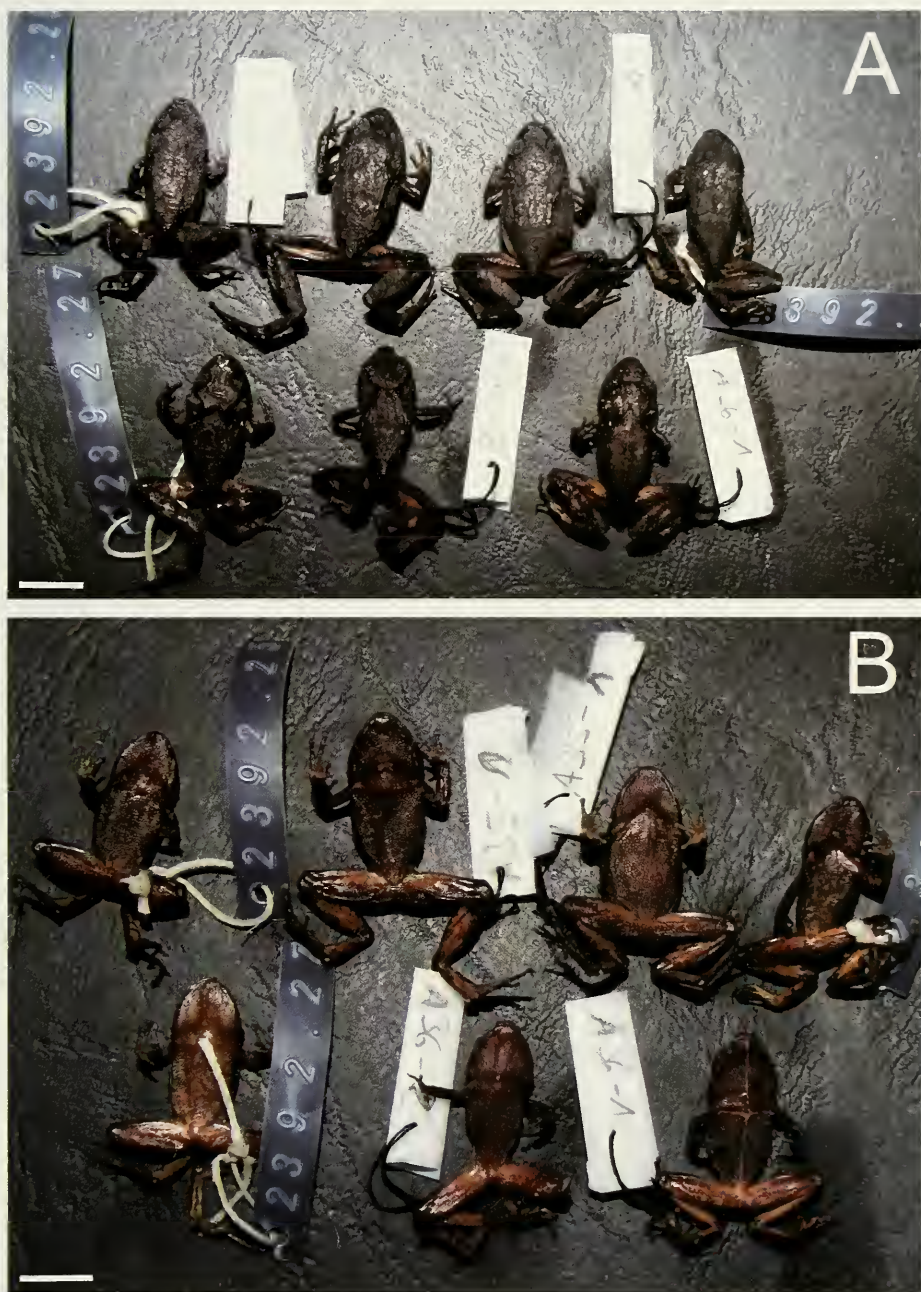


FIG. 4

Type series of *Pristimantis onorei* sp. nov. (upper row, holotype left) and *Pristimantis lucid-signatus* sp. nov. (lower row, holotype left). Scale 10 mm.

laterally; loreal region concave, interorbital space flat, no cranial crests; ♂♂ with short vocal slits and external subgular vocal sac; choanae elliptical, slightly larger than nostrils; small but distinct vomers posterior and medial to choanae; tongue round, filling the whole mouth; cranial crests absent; nostrils separated by a distance of 1/2 of IOD; eyes large, their diameter slightly smaller than EN; IOD 88.5 % of ED; upper eyelids with prominent, conical tubercles and many scattered, smaller tubercles; distinct in ♂♂, separated from the eye by a distance of 2/3 the TD; supratympanic fold absent, somewhat larger tubercle posterior of the tympanic region; skin on dorsum, upper flanks and limbs tuberculate, covered with many longitudinal interrupted dermal ridges; weakly visible W-shaped ridges extending from the posterior eyelid to scapular region; skin on venter finely areolate; relative length of adpressed fingers $I < II < IV < III$, not webbed, no lateral fringes or ridges; finger discs round, only slightly wider than finger; largest disc on Finger III; palmar and thenar tubercle well developed, palmar tubercle partly bifid, thenar tubercle elliptical and elongated; subarticular tubercles as broad as finger, not protruding; two prominent supernumerary tubercles at the base of Fingers III and II, numerous smaller supernumerary tubercles; two small ulnar tubercles; relative length of adpressed toes $I < II < III < V < IV$, unwebbed, no lateral fringes or ridges, discs round; disc of Toe IV equal in size to disc of Finger IV, those on other toes smaller; inner metatarsal tubercle protuberant, oval, larger than outer tubercle; outer metatarsal tubercle ovoid, 1/3 of the size of inner metatarsal tubercle, subarticular tubercles round, equal or slightly smaller to toe width and slightly protruding; only few scattered supernumerary tubercles; calcars absent; TiL 45.3 % of SVL.

COLOURATION: In preservative, dorsal ground color uniform dark brown with scattered darker spots, often associated with dermal ridges; some more prominent darker markings along the W-shaped dermal ridge and a somewhat darker interocular bar present in some specimens; flanks somewhat lighter than dorsum; ventral coloration light brown; crossbars on the forearms and the shanks present; anal triangle somewhat darker than dorsum, indistinct.

VARIATION: Coloration patterns are quite similar among our sample, however the venter of MHNG 2392.26 is somewhat dark marbled. The tympanum is completely concealed beneath the skin in ♀♀, but oval and well developed in ♂♂. For variation in morphometric parameters see table 1.

REMARKS: *Pristimantis onorei* is known from Santo Domingo de Las Colorados, Pichincha, from Tandapi, Pinchincha, and from San Francisco de Las Pampas, Cotopaxi, Ecuador (MHNG 2710.24, MHNG 2710.25) (Fig. 5). Although the label attached to the specimen MHNG 2710.25 states that it was collected at Santa Domingo de Los Colorados, it remains unclear if the city at approximately 79.15°W, 0.25°S, 543 m a.s.l. was indicated or another place within the county Santo Domingo de Los Colorados (approximately 79.42 – 78.83°W, 0.04 – 0.51°S, 200–1700 m a.s.l.). *Pristimantis onorei* inhabits humid lowland tropical forest and cloud forest and possibly co-occurs with *P. floridus*. The species is presumed to breed by direct development as other members of the *myersi*-group. Its vocalization is unknown.

Pristimantis lucidosignatus sp. nov.

Figs 3, 4, 6

Lightspot Robber Frog

HOLOTYPE: MHNG 2392.27, a ♀, collected at Tandapi, Pichincha, Ecuador, approximately 78.91° W, 0.54° S, 2,115 m a.s.l., by L. A. Coloma during December 1984.

PARATYPES: MHNG 2710.26 and MHNG 2710.27, both ♂♂, collected San Francisco de Las Pampas, Cotopaxi, Ecuador, approximately 78.96°W, 0.43°S, 1,711 m a.s.l., by G. Onore during April 1986.

ETYMOLOGY: Latin, *lucido*, meaning light, bright; and *signatus*, meaning sign. The specific name is referring to the flash spots on the shanks of the species.

DIAGNOSIS: The species can be assigned to the *Pristimantis myersi* species group *sensu* Hedges *et al.* (2008), see above. *Pristimantis lucidosignatus* has (1) skin on dorsum, upper flanks and limbs tubercular, that of venter finely areolate; well developed W-shaped occipital-scapular ridge, rest of dorsum covered with numerous interrupted dermal ridges; some large conical tubercles on upper eye lid and posterior parts of the tympanic region; dorsolateral and discoidal folds absent; (2) tympanum oval, supratympanic fold absent; (3) snout rounded to slightly subovoid in dorsal view, acuminate in profile; canthus rostralis concave, edge rounded; (4) upper eyelid with two to three prominent, conical tubercles and irregularly scattered smaller tubercles; (5) choanae small, elliptical; distinct dentigerous processes of vomers posterior and medial to choanae; tongue round, posterior 2/3 free, not notched behind, filling the whole mouth; (6) ♂♂ with short vocal slits and a external subgular vocal sac; (7) Finger I slightly shorter than Finger II; (8) fingers without lateral keels; (9) axillary tubercle absent; (10) ulnar tubercles present, not projecting; (11) calcars absent; (12) inner metatarsal tubercle elliptic, protruding, outer metatarsal tubercle half the size of inner metatarsal tubercle; (13) toes with weak lateral keels; no webbing; Toe IV with small round disc, twice the size of disc on Toes I, II, III, and V (Fig. 3); (14) in preservative, dorsal and dorsolateral ground color light brown with scattered dark spots, limbs dark banded, two darker subocular stripes radiating from lower eye lid to upper lip; ventral coloration light brown; anterior and posterior thigh surfaces uniform brown lacking spots; each shank with one flash spot; (15) SVL 17.0 mm in ♀, 21.6 and 22.0 mm in ♂♂.

Pristimantis lucidosignatus is unique among other *Pristimantis* of the *myersi* group in the following combination of characters: lack of narrow lateral fringes on fingers; prominent W-shaped dermal ridges extending from posterior part of upper eyelid to scapular region; presence of flash spots on shanks; no large cream spots on venter; anterior and posterior surfaces of tights uniform light brown, prominent light markings on tibia.

COMPARISON WITH OTHER SPECIES (conditions of *P. lucidosignatus* in parenthesis): *Pristimantis leoni* has a partly concealed tympanum beneath the skin (completely visible), and cream spots on venter (absent). *Pristimantis ocreatus* has a reddish brown middorsal stripe or a broad dorsal band (absent), white spots on flanks and stomach, pale spots on surfaces of posterior tights (uniform light brown). *Pristimantis pyrromerus* has no digital discs or pads on Finger II and Toe II (present). Furthermore,

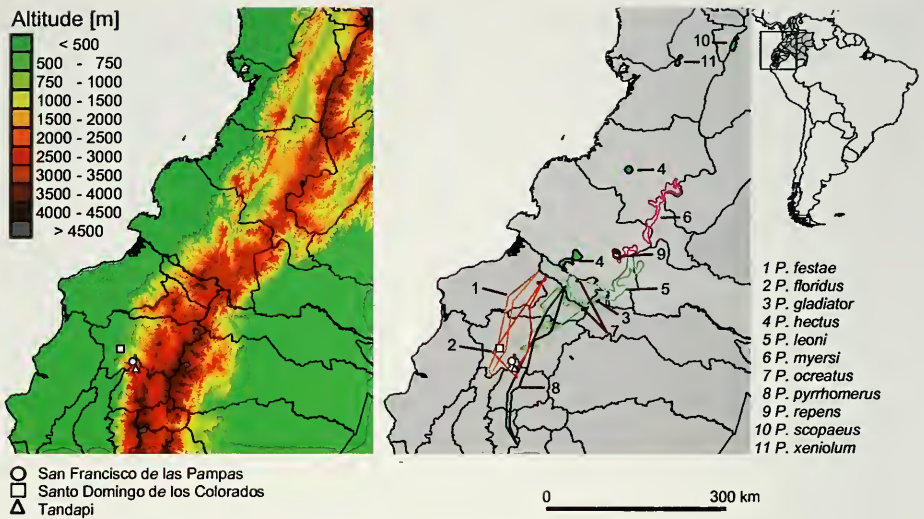


FIG 5

Map of the Andean slopes in Colombia and Ecuador with the type-locations of *Pristimantis onorei* sp. nov., *Pristimantis lucidosignatus* sp. nov., and the known ranges of the other members of the *P. myersi* group according to IUCN *et al.* (2006).

preserved specimens of *P. pyrthomerus* have colorless areas in axial, groin and on anterior and posterior surfaces of tights, which are bright red in life (only present in groin, posterior and anterior surfaces of tights light brown), and a cream venter with brown reticulation (light brown with minute cream spots). *Pristimantis lucidosignatus* can be easily distinguished from *P. festae*, which has small finger discs (larger), white pots on venter, throat and in groin in preserved specimens (absent) and lacks dermal ridges on the dorsum (present). *Pristimantis floridus* has larger digital discs (smaller), vocal slits (lacking in males), small, pustular tubercles which are not larger than those on the rest of head (much larger), and a shagreen dorsum with many rounded warts (many dermal ridges). *Pristimantis gladiator* has small heel tubercles (absent), and *P. hectus* shows prominent dorsolateral folds (absent) and lacks upper eye lid tubercles (present). *Pristimantis leoni* has a partly concealed tympanum beneath the skin (not concealed, completely visible in males, absent in females), TD 43.9 – 45.2 % of ED (10.3 and 10.4 %), a supratympanic fold obscured by tubercles (absent), small tubercles on the heel (absent), cream spots on venter (absent), no cream spots at the upper shanks (present) and a brown barred throat (uniform brown). *Pristimantis onorei* sp. nov. has weakly developed W-shaped dorsal ridges (much stronger developed) and lacks light spots on shanks (present). *Pristimantis repens* has a finely shagreen to tuberculate dorsum lacking dermal ridges (present) and cream flecks on posterior tight surfaces, throat, chest and anterior venter (no cream flecks). *Pristimantis xeniolum* has a shagreen dorsum lacking dermal ridges (present).

DESCRIPTION OF THE HOLOTYPE: Snout outline rounded in dorsal view, truncate in profile; head weakly distinct from body in dorsal view, HW 43.5 % SVL; canthus rostralis concave, distinct; nostrils slightly protuberant, directed laterally; loreal region

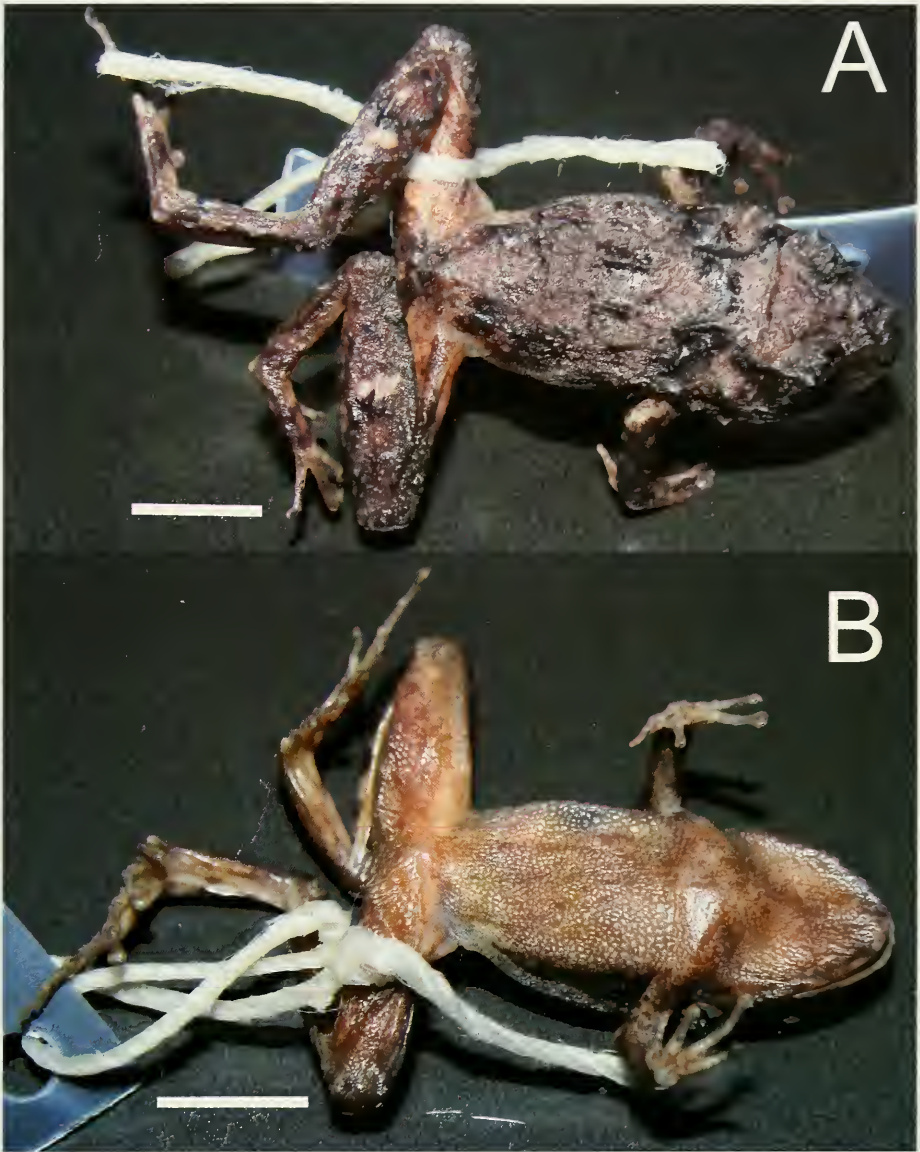


FIG. 6

Holotype of *Pristimantis lucidosignatus* sp. nov. (MHNG 2392.27) in dorsolateral (A) and ventral (B) view. Scale 10 mm.

concave, interorbital space flat, no cranial crests; choanae small, elliptical; distinct vomers posterior and medial to choanae; tongue round, posterior 2/3 free, not notched, filling the whole mouth; cranial crests absent; nostrils separated by a distance equal to IOD; eyes large, their diameter slightly smaller than EN; IOD 106.7 % of ED; upper eyelids with prominent, conical tubercles and many scattered, smaller tubercles;

tympanum completely concealed below the skin; supratympanic fold absent, more prominent spiny tubercles posterior to the tympanic region, which is somewhat swollen; skin on dorsum, upper flanks and limbs tuberculate, covered with many longitudinal interrupted dermal ridges; prominent W-shaped ridges extending from the posterior eyelid to scapular region; skin on venter areolate; relative length of adpressed fingers $I < II < IV < III$, not webbed, no lateral fringes or ridges, discs round, only slightly larger than phalanx of adjacent finger; largest disc on Finger III, discs on Finger I not larger than phalanx; palmar tubercle partly bifid, thenar tubercle elliptical and elongated, partly coalesced with palmar tubercle; subarticular tubercles as broad as finger, not protruding; some scattered small supernumerary tubercles; two small, not projected ulnar tubercles; relative length of adpressed toes $I < II < III < V < IV$, unwebbed, weak lateral fringes or ridges, discs round; disc of Toe IV equal in size to disc of Finger IV, those on other toes smaller; inner metatarsal tubercle protuberant, oval, larger than outer tubercle; outer metatarsal tubercle round, 1/2 of the size of inner metatarsal tubercle, protuberant; subarticular tubercles round, equal in size to toe width and slightly protruding; only one small supernumerary tubercle at base of Toe IV; calcars absent; TiL 58.2 % of SVL.

COLOURATION: In preservative, dorsal ground color uniform brown with scattered darker spots, often associated with dermal ridges; some more prominent darker markings along the W-shaped dermal ridge; flanks becoming lighter than dorsum ventrally; ventral coloration light brown; crossbars on the forearms and the shanks present; two cream spots at the upper shanks; anterior and posterior surfaces of thighs light brown without markings; anal triangle dark brown.

VARIATION: In ♂♂, tympanum distinct, oval, 10.3 – 10.4 % of ED, separated from the eye by a distance of 1/3 the TD. Tympanum absent in ♀♀. One specimen (MHNG 2710.26) with a thin, cream dorsal stripe extending from the tip of the snout to toe urostyle, stripe continues on the venter and is crossed by a thin stripe connecting both arm insertions (Fig. 4). The specimen has also a thin cream stripe running from knee to knee along the posterior thigh surfaces and cream stripes extending from tarsus to foot. For variations in morphometric parameters see table 1.

REMARKS: *Pristimantis lucidosignatus* is known from two specimens collected at San Francisco de Las Pampas, Cotopaxi, and one specimen collected at Tandapi, Pichincha, Ecuador (Fig. 5). It inhabits humid lowland tropical forest and cloud forest and possibly co-occurs with *P. floridus*. The species is presumed to breed by direct development as other members of the *myersi*-group. Its vocalization is unknown.

DISCUSSION

With 472 formally described amphibian species (442 Anura, 7 Caudata and 23 Gymnophiona) Ecuador has the third-greatest amphibian diversity after Brazil and Colombia. In Ecuador 39 % of the species are endemic (182 species), and most endemics can be found in the Andean region (75 %) (Coloma, 2005-2007). Generally, the Andes in Colombia, Ecuador, Peru and Bolivia as well as the upper Amazon region are distinguished in having a great number of species of strabomantid frogs (Coloma, 2005-2007; Hedges, *et al.*, 2008; Lynch & Duellman, 1997). With 155 species in Ecuador, members of this genus make up to 35 % of the anuran fauna (Coloma, 2005-

TABLE 1. Morphometric measurements of *Pristimantis onorei* sp. nov. and *Pristimantis lucidosignatus* sp. nov. [mm]. For abbreviations see text.

Specimen Sex	<i>Pristimantis onorei</i> sp. nov.				<i>Pristimantis lucidosignatus</i> sp. nov.		
	MHNG 2392.25	MHNG 2392.26	MHNG 2710.24	MHNG 2710.25	MHNG 2392.27	MHNG 2710.26	MHNG 2710.27
	♂	♀	♀	♂	♀	♂	♂
SVL	20.1	20.1	20.5	17.1	17.0	21.6	22.0
TiL	9.1	10.8	10.9	9.5	9.9	10.2	10.5
FeL	10.2	10.5	10.1	10.9	10.9	10.4	12.0
TaL	6.0	5.9	7.4	7.0	5.9	5.9	7.1
FL	9.4	9.4	11.4	9.6	9.6	10.1	10.1
HeL	7.4	7.6	7.4	8.2	5.0	7.1	8.0
HW	7.8	8.3	8.4	8.0	7.4	8.0	9.0
Ind	1.4	2.0	2.5	1.4	2.0	2.4	1.9
IOD	2.3	2.5	2.6	2.4	2.4	2.3	2.2
EN	2.3	2.4	2.5	2.3	2.2	2.4	2.4
ED	2.6	3.2	3.1	3.2	2.7	3.1	3.1
ETS	3.0	3.0	3.7	2.5	2.2	3.7	2.2
TD	0.7	0.8	0.8	0.7	-	0.3	0.3
TiL % of SVL	42.3	53.8	53.1	55.3	58.2	47.1	47.7
HeL % of SVL	36.8	37.8	36.1	47.6	29.2	32.8	36.3
HW % of SVL	38.8	41.4	41.1	46.7	43.5	37.2	40.8
TD % of ED	26.9	24.3	25.4	22.6	-	10.4	10.3
IOD % of ED	88.5	107.6	104.4	103.9	106.7	98.7	91.1

2007). Although many areas are comparatively well sampled (Lynch & Duellman, 1997), discovery of species new to science is still common and several species are discovered each year (Fig. 1).

Both new species described herein are members of the *Pristimantis myersi* species group as currently defined by Hedges *et al.* (2008). This group contains eleven species distributed in the in the Ecuadorian and Colombian Andes (Fig. 6): *Pristimantis festae* (Lynch, 1975; Peracca & Conte, 1904), *P. floridus* (Lynch & Duellman, 1997), *P. gladiator* (Lynch, 1976), *P. hectus* (Lynch & Burrowes, 1990), *P. leoni* (Lynch, 1976), *P. myersi* (Goin & Cochran, 1963), *P. ocreatus* (Lynch, 1981), *P. pyrrhomerus* (Lynch, 1976), *P. repens* (Lynch, 1984), *P. scopaeus* (Lynch *et al.*, 1996) and *P. xeniolum* (Lynch, 2001). Of these, only *P. festae*, *P. floridus*, *P. leoni* and *P. pyrrhomerus*, inhabiting distinct altitudinal bands, might potentially co-occur with the new species, but are readily distinguished from them. The frequent discovery of undescribed species of *Pristimantis* along the versants of the Andes in Ecuador during the last three decades suggests that the anuran diversity within these unique habitats may still be largely underestimated.

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Four new species of earthworms belonging to the genus *Amyntas* (Oligochaeta: Megascolecidae) from Diaoluo Mountain, Hainan Island, China

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Four new species of earthworms belonging to the genus *Amyntas* (Oligochaeta: Megascolecidae) from Diaoluo Mountain, Hainan Island, China. - This paper describes four new species of earthworms from Hainan Island, China: *Amyntas diaoluomontis* sp. nov., *Amyntas octopapillatus* sp. nov., *Amyntas zhangii* sp. nov. and *Amyntas lingshuiensis* sp. nov. All four species have two pairs of spermathecal pores in 5/6-6/7, simple paired caeca from XXVII and some papillae in the male pore region. The four new species are easily distinguished from other similar *Amyntas* species, especially those of the provisional *morrissi* species-group.

Keywords: Earthworms - *Amyntas* - Megascolecidae - Clitellata - new species - Hainan - China.

INTRODUCTION

Hainan is a large tropical island in southern China with a diverse endemic flora and fauna (Deng *et al.*, 2008). The major sites of virgin tropical forests are located in Jianfeng Ridge, Five Fingers Mountain, Diaoluo Mountain, Limu Mountain, and Macaque Ridge. The earliest research on earthworms from Hainan Island was carried out by Chen Yi (1938), who reported 32 species, 22 of which were described as new. This Hainan earthworm fauna is clearly distinct from other regions in China, leading Chen (1956) to hypothesize that Hainan Island has been separated from the mainland for a long time. More recently, Quan (1985) and Quan & Zhong, (1989) reported three new earthworm species from Hainan. In this paper we report new earthworm species collected from Diaoluo Mountain during a fieldtrip in June 2006.

MATERIAL AND METHODS

Diaoluo Mountain National forest park (about 18°50'N 109°50'E) is located in the southeast of Hainan island. The climate is typical monsoonal, with a distinct dry season from November to January, a transition period from February to March, and a rainy season from April to October. Ninety-six percent of the total annual rain falls

during the rainy season. Soils in the area include latosols below 300 meter and mountain zheltozem at higher elevations (Wang & An, 1999).

Material was collected by digging and hand sorting. Specimens were preserved in formalin. Descriptions are based on dorsal dissections. The species were determined to be new based on comparisons to all the species of the *morrisi*-group (Beddard, 1892, 1895, 1896; Chen, 1933, 1936, 1938, 1946; Gates, 1926, 1936; Kobayashi, 1936, 1938; Michaelsen, 1892, 1923, 1927; Rosa, 1894; Sims & Easton, 1972). We provide a table to compare the four new species to similar species previously found in Hainan Island (Table 1).

Holotypes and paratypes are deposited in the Shanghai Natural Museum (MNS) and the Natural History Museum of Geneva (MHNG).

DESCRIPTIONS

Amyntas diaoluomontis Qiu & Sun sp. n.

Fig. 1

MATERIAL: Holotype, one clitellate (MNS C-HN001A); China, Hainan Island, Mt. Diaoluo (18°43'39"N 109°51'55"E), 930 m, 6 June 2006, J. P. Qiu & M. B. Bouché colls. – 17 paratypes; 15 clitellates (MNS C-HN001B), 2 clitellates (MHNG INVE62881), same data as for holotype. – Nontype material; Mt. Diaoluo (18°43'45"N 109°51'50"E), 1008 m, zheltozem under rotten trees in cinnamomum camphora, 8 a clitellate specimens, 6 June 2006.

ETYMOLOGY: The species is named for its type locality.

EXTERNAL CHARACTERS: Preserved specimens lacking pigment on dorsum and ventrum. Dimensions 135-189 mm by 3.9-4.8 mm at clitellum, segments number 213-237. Secondary annulations conspicuous in segments V-XXXVI. Prostomium combined probolous and 1/3 epilobous. First dorsal pore in 12/13. Setae numerous, 56-78 at III, 72-94 at V, 72-106 at VIII, 44-66 at XX, 48-66 at XXV; 9-13 between male pores; 18-32 between spermathecal pores, setal formula: aa=1.1-1.2ab, zz=1.2-2zy. Clitellum annular, reddish-brown colour, in XIV-XVI, setae visible externally, particularly evident on ventrum.

Spermathecal pore: two pairs in 5/6-6/7, ventral, eye-like, 0.25 body circumference apart from each other. Genital markings not present.

Male pores: one pair in XVIII, 0.33 body circumference ventrally apart from each other, each on the centre of a slightly raised, conical, glandular porophore, without circular folds. Male field genital papillae ovate, flat-topped, diameter 0.8-1.2 mm, paired on 17/18, 18/19 median to male pores (Figure 1A).

Female pore: one in a small ovoid tubercle, mid-ventral in XIV, lighter colour than surroundings.

INTERNAL CHARACTERS: Septa 5/6-7/8 thick and muscular, 10/11-14/15 slightly thickened, 8/9-9/10 absent. Gizzard ball-shaped, in VIII-IX according to septum 7/8. Intestine enlarged distinctly from XVI. Intestinal caeca paired in XXVII, simple, smooth, with two indentations on dorsal edge, extending anteriorly to XXVI. Esophageal hearts in X-XIII.

Spermathecae two pairs in VI-VII, ampulla ovoid, about 2 mm long with a slender duct about equally long. Diverticulum a little shorter than main pouch, slender, a distorted circle, terminal 0.6 dilated into a band shaped chamber, partially filled, milky white (Figure 1B).

TABLE 1. A comparison of characters between these four new species and other similar species with two pairs of spermathecal pores in 5/6 and 6/7

Character	<i>A. diaoluomontis</i>	<i>A. octopapillatus</i>	<i>A. shangi</i>
Size (mm)	135-189/3.9-4.8	123-138/3.0-3.5	124-200/3.1-5.3
Segments papillae	213-237 Paired 0.8-1.2 mm oval flat-topped papillae on 17/18/19 median in male pores	139-205 Paired 0.6-0.8 mm oval papillae on 17/18/19/20/21 median to male pores	186-206 Paired 0.8-1.0 mm round papillae on XVII and XIX in line with male pores
Spermathecal pores	0.25 body circumference apart from each other	0.25 body circumference apart from each other	About 0.5 body circumference apart from each other
Diverticulum	A little shorter than main pouch, with a band-shaped chamber	Longer than main pouch by 1/5 with a tube-shaped chamber	Shorter than main pouch by 1/4, with a pear-shaped chamber
First dorsal	12/13	12/13	12/13
Testis sacs	First pair of seminal vesicles not enclosed in testis-sacs	Seminal vesicles in XI enclosed in testis sacs of that segment	Seminal vesicles in XI enclosed in testis-sacs of that segment
Character	<i>A. lingshuiensis</i>	<i>A. puerilius</i>	<i>A. hainanicus</i>
Size (mm)	76-132/2.7-3.1	20-37/1.2	50/1.8
Segments papillae	123-153 Paired 0.3 mm oval flat-topped papillae on XVIII and XIX above setae annulet. The first pair is 0.17 body circumference apart from other and the second pair is 0.25. The four papillae form a trapezoid	47-72 paired small papillae on XVII	110 No papilla
Spermathecal pores	0.33 body circumference apart from each other	About 0.5 body circumference apart from each other	0.2 body circumference apart from each other
Diverticulum	Longer than main pouch by 1/5, with a band-shaped distal seminal chamber	Shorter than main pouch with short conical chamber	Longer than main pouch with thin-walled chamber
First dorsal	12/13	11/12	12/13
Testis sacs	Seminal vesicles in XI enclosed in testis sacs of that segment	First pair of seminal vesicles not enclosed in testis-sacs	Seminal vesicles in XI enclosed in testis sacs of that segment

Character	<i>A. oculatus</i>	<i>A. monoseriali</i>	<i>A. sinuosus</i>
Size (mm)	27-40/1.2-1.8	52-150/3-4	170-240/4-5
Segments papillae	74-86 Paired large disc-like papillae on 118/19 behind each male pore	136-146 Ventre-medial papillae on XVI-XX, generally postsetal	168-205 Paired raised papillae on XVII and XIX in line with male pores
Spermathecal pores	0.43 body circumference apart from each other	0.33 body circumference apart from each other	0.33 body circumference apart from each other
Diverticulum	Longer than main pouch, its ventral 0,8 whitish as seminal chamber	Long or shorter, with an ovoid seminal chamber	Shorter than main pouch by 1/4, with a zigzag twisted chamber
First dorsal	12/13	12/13	12/13
Testis sacs	Seminal vesicles in XI enclosed in testis sacs of that segment	Seminal vesicles in XI enclosed in testis sacs of that segment	Seminal vesicles in XI enclosed in testis sacs of that segment

Holandric: testis sacs two pairs, well-developed, ventral in X, XI, in close proximity, but separated from each other. Seminal vesicles paired in XI-XII, anterior pair bigger in size, none enclosed in testis sacs. Prostate glands developed, extending from XVI-XX, coarsely lobate. Prostatic duct U-shaped, slightly thicker at the distal part. No accessory glands present.

LOCALITY AND HABITAT: The specimens were collected from the zheltomez, under bushes by the roadside and the humus layer under trees of Diaoluo Mountain, Hainan province, China.

REMARKS: After comparing to the *Amyntas* species reported from China and Southeast Asia with two pairs of spermathecal pores in 5/6 and 6/7 and with one pair of spermathecal pores in 5/6 (Chang & Chen, 2004; Chen, 1931, 1933, 1936, 1938, 1946; Chen *et al.*, 1975; Chen & Hsu, 1977; Ding, 1985; Gates, 1935, 1939a, 1939b, 1972; Hong *et al.*, 2001; Hong & James, 2001, 2004, 2008; Hong, 2007; James, 2004; James *et al.*, 2004; James *et al.*, 2005; Qiu & Wen, 1987; Shen *et al.*, 2003; Tsai *et al.*, 2000; Tsai *et al.*, 2001; Tsai *et al.*, 2004; Tsai *et al.*, 2007) we find the present species to be most similar to *Amyntas tetrapapillatus* (Quan & Zhong, 1989). However, they differ with respect to the number of spermathecae, shape of spermathecal diverticulum, location of first dorsal pores, pigmentation, and enclosure of testes in sacs. *Amyntas diaoluomontis* sp. nov. has two pairs of spermathecae in VI and VII, a straight diverticulum stalk, the first dorsal pore in 12/13, no pigmentation and the first pair of seminal vesicles is not enclosed in the second pair of testis sacs. In contrast, *Amyntas tetrapapillatus* has only one pair of spermathecae in VI, a zigzag looped diverticulum

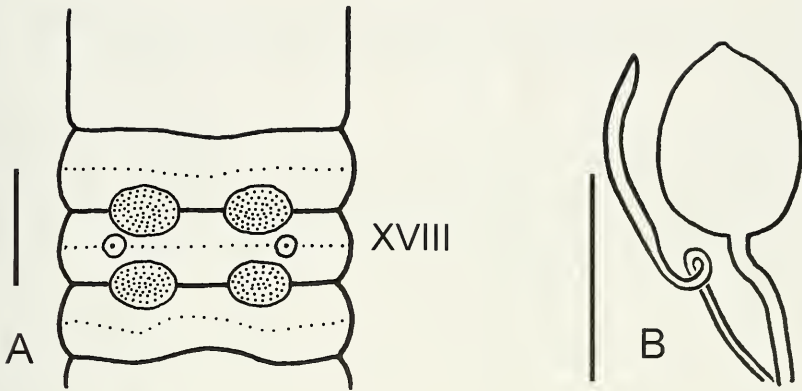


FIG. 1

Amyntas diaoluomontis spec. nov. (A) External view of ventral side with male pores, XVIII = segment number; scale bar 1 mm. (B) Spermatheca, scale bar 1 mm.

stalk near the seminal chamber, the first dorsal pore in 11/12, light maroon pigment on ventrum and dorsum, and the first pair of seminal vesicles contained in the second pair of testis sacs.

A comparison of characters between this new species and other similar species with two pairs of spermathecal pores in 5/6 and 6/7 collected from Hainan has been given in Table 1.

Amyntas octopapillatus Qiu & Sun sp. n.

Fig. 2

MATERIAL: Holotype, one clitellate (MNS C-HN002A); China, Hainan Island, Mt. Diaoluo (18°43'39" N 109°51'55" E), 930 m, 6 June 2006, J. P. Qiu & J. X. Li colls. – 3 paratypes, 1 clitellate (MNS C-HN002B), 2 clitellates (MHNG INVE62882); same data as for holotype. – Nontype material; same data as for holotype, 2 semiclitellate specimens.

ETYMOLOGY: The species name refers to its eight papillae.

EXTERNAL CHARACTERS: Preserved specimens lacking pigment on dorsum and ventrum, clear dorsal midline because of dorsal vessel. Dimensions 123-138 mm by 3.0-3.5 mm at clitellum, segments number 139-205. Secondary annulations conspicuous in both anterior segments and others. Prostomium ? epilobous. First dorsal pore in 12/13. Setae numerous, 56-70 at III, 74-92 at V, 68-90 at VIII, 64-66 at XX, 56-68 at XXV; 14-20 between male pores; 13-19 between spermathecal pores, setal formula: aa=1.1-1.4ab, zz=1.3-2zy. Clitellum annular, swollen, brownish, in XIV-XVI, setae and intersegmental furrow visible externally. 30 of them can be clearly seen on ventrum.

Spermathecal pores: two pairs in 5/6-6/7, intersegmental, ventral, eye-like. 0.25 body circumference apart from each other. Genital markings not present.

Male pores: paired in XVIII, 0.33 body circumference ventrally apart from each other, each on the centre of a slightly raised, conical, glandular porophore, with 1-2 circular folds. Paired 0.6-0.8 mm oval papillae on 17/18/19/20/21 median to level of male pores (Figure 2A).

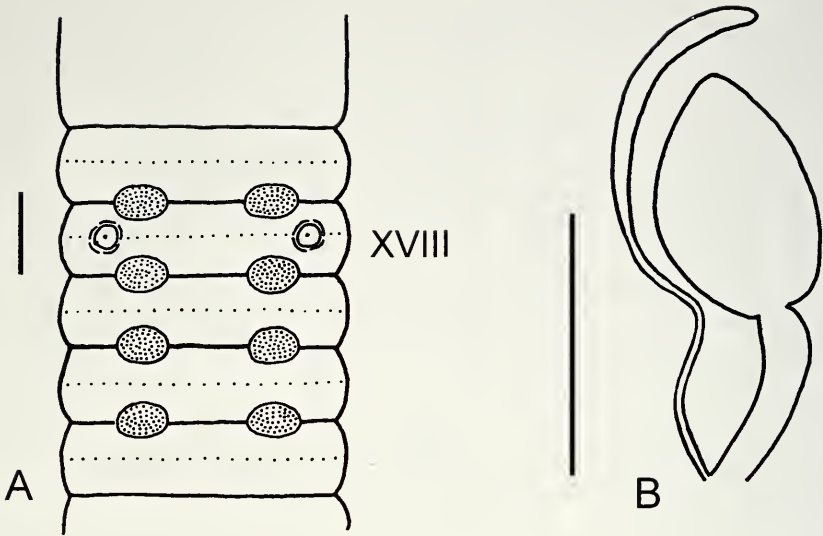


FIG. 2

Amyntas octopapillatus spec. nov. (A) External view of ventral side with male pores, XVIII = segment number; scale bar 1 mm. (B) Spermatheca, scale bar 1 mm.

Female pore: one in a small ovoid tubercle, mid-ventral in XIV.

INTERNAL CHARACTERS: Septa 6/7-7/8 thick and muscular, 10/11-13/14 slightly thickened, 8/9-9/10 absent. Gizzard bucket-shaped, in VIII-IX according to septum 7/8. Intestine enlarged distinctly from XVI. Intestinal caeca paired in XXVII, simple, smooth, extending anteriorly to XXIV. Esophageal hearts in X-XIII.

Spermathecae two pairs in VI-VII, heart-shaped, about 1.8 mm with a long duct. Diverticulum is longer than main pouch by 1/5, no kinks, terminal 1/2 dilated into a tube-shaped chamber, partially filled, silvery white (Figure 2B).

Holandric: testis sacs two paired, in X-XI, anterior pair larger, sacs of a segment very close ventrally, second pair enclosing first pair of seminal vesicles. Seminal vesicles paired in XI-XII, well developed. Prostate glands developed, extending from 0.33XVI-0.33XX, coarsely lobate. Prostatic duct U-shaped, slightly thicker at the distal part. Accessory glands not seen.

LOCALITY AND HABITAT: The specimens were collected in Malacosoma marina under the fallen trees and camphor forests of Diaolu mountain (elevation 930m, 18°43'39"N 109°51'55"E), Hainan province, China.

REMARKS: In appearance, *Amyntas octopapillatus* sp. nov. is somewhat similar to *Amyntas diaoluomontis* sp. nov. Both species have two pairs of spermathecal pores in 5/6 and 6/7, no pigment, and the shape of the papillae on the ventrum. However, *Amyntas octopapillatus* sp. nov. is distinguished from *Amyntas diaoluomontis* sp. nov. by its smaller body size, its two additional pairs of papillae on 19/20/21, and by having the first pair of seminal vesicles enclosed in the second pair of testis sacs.

A comparison of characters between this new species and other similar species with two pairs of spermathecal pores in 5/6 and 6/7 collected from Hainan is given in table 1.

Amyntas zhangii Qiu & Sun sp. n.

Fig. 3

MATERIAL: Holotype, one clitellate (MNS C-HN003A); China, Hainan Island, Mt. Diaoluo (18°43'30"N 109°52'07"E), 920 m, 6 June 2006, J. P. Qiu & X. L. Zhang colls. – 2 paratypes, 2 clitellates (MHNG INVE62883); same data as for holotype. – Nontype material; Mt. Diaoluo (18°43'45"N 109°51'50"E), 920 m, 18 acitellate specimens, 6 June 2006.

ETYMOLOGY: The species is named in honour of its collector, Xiaolong Zhang.

EXTERNAL CHARACTERS: Preserved specimens grayish on dorsum before clitellum, light brownish on dorsum after clitellum. Dimensions 124-200 mm by 3.1-5.3 mm at clitellum, segments number 186-206. Secondary annulations conspicuous in segments V-XIII. Prostomium combined prolobous and ? epilobous. First dorsal pore in 12/13. Setae numbering, 50-64 at III, 60-76 at V, 64-70 at VIII, 60-70 at XX, 60-70 at XXV; 4-6 between male pores; 33-35 between spermathecal pore, setae formula: aa=1.1-2ab, zz=1.5-2zy. Clitellum annular, brownish, thinly glandular, intersegmental furrows clear, in XIV-XVI, 20-28 setae visible externally, evident only on ventrum.

Spermathecal pores paired in 5/6-6/7, eye-like, about 0.5 body circumference apart from each other. Genital markings not present.

Male pores: one pair in XVIII, 0.33 body circumference ventrally apart from each other, each on the top centre of a slightly raised, conical porophore, with two circular folds not very clear. In XVII and XIX, in line with male pores, there are paired large round papillae, diameter 0.8-1.0 mm (Figure 3A).

Female pore: single, midventral in a small ovoid tubercle, in XIV.

INTERNAL CHARACTERS: Septa 5/6-7/8 thick and muscular, 10/11-12/13 slightly thickened, 8/9-9/10 absent. Gizzard long ball-shaped, in VIII-IX according to septum 7/8. Intestine enlarged distinctly from XVI. Intestinal caeca paired in XXVII, simple, slender, smooth, extending anteriorly to XXV. Esophageal hearts in X-XIII.

Spermathecae two pairs in VI-VII, lanceolate, yellowish, about 1.9 mm long with a slender terminal duct about equally long. The length of diverticulum is 3/4 length of main pouch, in zigzag fashion, terminal 1/7-1/6 dilated into pear-shaped chamber, with pointed tip, partially filled (Figure 3B).

Holandric: testis sacs two pairs, undeveloped, in X-XI, second pair enclosing first pair of seminal vesicle. Seminal vesicles paired in XI-XII, small. Prostate glands small, extending from 0.75XVII-0.75XIX, coarsely lobate. Prostatic duct S-shaped, slender. No accessory glands present.

LOCALITY AND HABITAT: The specimens were collected in the cinnamon soil found under oleander trees and bushes of Diaoluo Mountain, Hainan province, China.

REMARKS: In comparison to the other species of the *morrisoni*-group reported from China and Southeast Asia (Sims & Easton, 1972), we find *Amyntas zhangii* sp. nov. is similar to *Amyntas sinuosus* (Chen, 1938) because both have two pairs of spermathecal pores in 5/6 and 6/7, a rather big body, the diverticulum zigzag twisted, and paired raised papillae in XVII and XIX in line with male pores. However, they differ

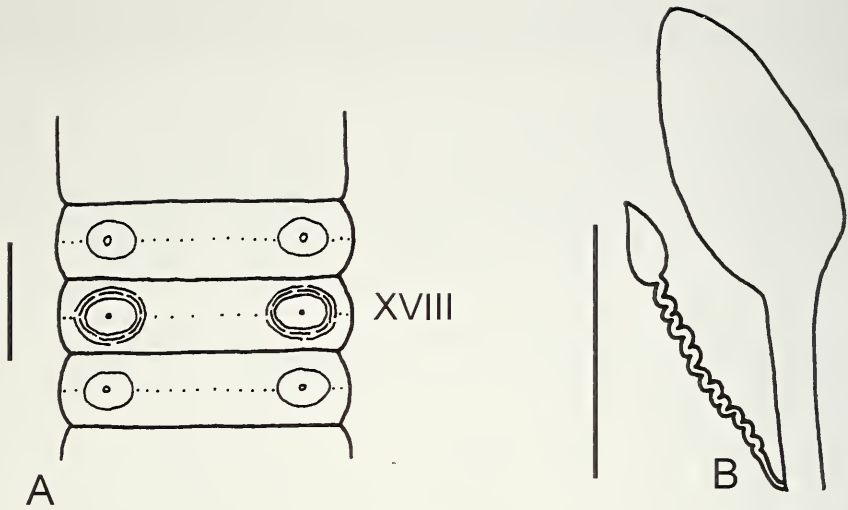


FIG. 3

Amynthes zhangii spec. nov. (A) External view of ventral side with male pores, XVIII = segment number; scale bar 1 mm. (B) Spermatheca, scale bar 1 mm.

markedly in that the male pores of *A. Zhangii* do not have a lateral skin fold covering the pores, the diverticulum seminal chambers being oval, and the male organs being small and somewhat reduced. The male pores of *Amynthes sinuosus* are partly covered by a lateral skin fold, the seminal chambers are not oval-shaped, and the prostatic glands and other male organs are well-developed.

A comparison of character between this new species and other similar species with two pairs of spermathecal pores in 5/6 and 6/7 collected from Hainan is given in Table 1.

Amynthes lingshuiensis Qiu & Sun sp. n.

Fig. 4

MATERIAL: Holotype, one clitellate (MNS C-HN004A); China, Hainan Island, Mt. Diaoluo (18°44'08"N 108°52'07"E), 850 m, 4 June 2006, J. P. Qiu & W. X. Zhang colls. – 5 paratypes, 3 clitellate (MNS C-HN004B), 2 clitellate (MHNG INVE62884); same data as for holotype.

ETYMOLOGY: The specific epithet refers to the type locality.

EXTERNAL CHARACTERS: Preserved specimens lacking pigment on dorsum, light brown on ventrum, having purple dorsal midline, can be seen clearly. Dimensions 76–113 mm by 2.7–3.1 mm at clitellum, segments number 123–153. Prostomium $\frac{1}{2}$ epilobous. First dorsal pore in 12/13. Setae numerous, 44–60 at III, 44–54 at V, 48–52 at VIII, 38–46 at XX, 44–50 at XXV; 5–7 between male pores; 19–23 between spermathecal pores, setal formula: aa=1-1.3ab, zz=1.3-2.2zy. Clitellum annular, swollen, light reddish, in XIV–XVI, setae and dorsal pore invisible.

Spermathecal pores: two pairs in 5/6–6/7, intersegmental, ventral, eye-like, 0.33 body circumference apart from each other. Genital markings not present.

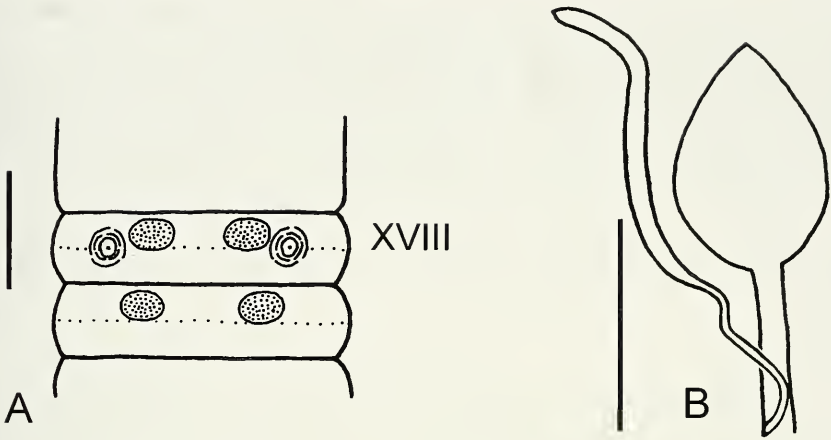


FIG. 4

Amynthus lingshuiensis spec. nov. (A) External view of ventral side with male pores, XVIII = segment number; scale bar 1 mm. (B) Spermatheca, scale bar 1 mm.

Male pores: one pair in XVIII, 0.33 body circumference ventrally apart from each other, each on the centre of a slightly raised, conical porophore, with 2-3 circular folds. Male field genital papillae ovoid, flat-topped, diameter 0.3 mm; paired above setae annulet on XVIII and XIX. The first pair is 0.17 body circumference apart from each other and the second pair is 0.25. The four papillae form a trapezoid (Figure 4A).

Female pore: one in a small ovoid tubercle, mid-ventral in XIV.

INTERNAL CHARACTERS: Septa 6/7-7/8 thick and muscular, 10/11-12/13 slightly thickened, 8/9-9/10 absent. Gizzard long bucket-shaped, in VIII-IX according to septum 7/8. Intestine enlarged gradually from XVI to XX and enlarged suddenly from XXI. Intestinal caeca paired in XXVII, simple, smooth, extending anteriorly to XXV. Esophageal hearts in X-XIII.

Spermathecae two pairs in VI-VII, ampulla heart-shaped, about 1.9 mm with about equal duct. Diverticulum is longer than main pouch by 1/5, 2/5 base curved, terminal 3/5 dilated into a band-shaped distal seminal chamber (Figure 4B).

Holandric: testis sacs two pairs, in X-XI, developed, separated on ventrum, second pair enclosing first pair of seminal vesicle. Seminal vesicles paired in XI-XII, small. Prostate glands developed, extending from 0.5XVI-0.67XX, composed of three parts. The first two parts are bigger than the last one, which is finger-shaped. Prostatic duct inverted U-shaped. No accessory glands present.

LOCALITY AND HABITAT: The specimens were collected in brown forest soil under the roadside forests of Diaoluo Mountain, Hainan province, China.

REMARKS: In comparison to the other species of the morrisi-group reported from China and Southeast Asia (Sims & Easton, 1972), *Amynthus lingshuiensis* sp. nov. is somewhat similar to *Amynthus hainanicus* (Chen, 1938) in having spermathecal pores in 5/6 and 6/7, a diverticulum longer than main pouch, and a thin-walled seminal

chamber. However, it is easy to distinguish *Amyntas lingshuiensis* sp. nov. from *Amyntas hainanicus* (character states of *A. lingshuiensis* given) by the larger body size, two pairs of papillae in 19/20 and 20/21, the larger interval spacing between spermathecal pores of a segment, and the lack of I-shaped depression in the male field. *Amyntas hainanicus* has an I-shaped depression on ventral side of 1/2XVII-1/2XIX which is glandular in appearance and the male pore is on the inner wall of the depression.

A comparison of characters between this new species and other similar species with two pairs of spermathecal pore in 5/6 and 6/7 collected from Hainan is given in Table 1.

DISCUSSION

The four new species described above belong to the *morrissi*-species group, which is defined by the following attributes: spermathecal pores intersegmental; first spermathecal pores at 5/6; two thecal segments; bithecate (holandric) (Sims & Easton, 1972).

Among the 30 members of the *morrissi*-group listed in Sims & Easton (1972), the following species are known to occur in China: *A. choeinus* (Michaelsen, 1927), *A. dignus* (Chen, 1946), *A. gravis* (Chen, 1946), *A. hainanicus* (Chen, 1938), *A. incongruous* (Chen, 1933), *A. insulae* (Beddard, 1896), *A. lacinatus* (Chen, 1946), *A. lubricatus* (Chen, 1936), *A. monoserialis* (Chen, 1938), *A. morrissi* (Beddard, 1892), *A. oculatus* (Chen, 1938), *A. puerilis* (Chen, 1938), *A. sapinianus* (Chen, 1946), *A. sinuosus* (Chen, 1938), *A. tripunctus* (Chen, 1946), and *A. variens* (Chen, 1938). A comparison of the new species and the ones resembling them most closely is provided under Remarks for each new species. After the revision of Sims & Easton (1972), two additional species of the *morrissi*-group were recorded from China, namely *A. nanulus* (Chen et Yang, 1975) and *A. parvus* (Chen & Xu, 1977). However, they are both very different from the four new species described here.

Amyntas morrissi, a common peregrine species that was also used to name the *morrissi*-group, is rather unique due to the following characters:

- (1) The colour is dark grey or slight grey with some violet tinge on anterior-dorsal side, brownish grey or dark buff grey on posterior-dorsal side, grayish ventrally;
- (2) A narrow zone at anterior edge of XIV and at posterior edge of XVI;
- (3) Two small round flat-topped male region papillae, one in front and another behind the setal zone;
- (4) Each pair of testis-sacs is entirely separated;
- (5) The diverticulum is slender, tube-like, a little shorter than the main part, its duct occupying one third the entire length, slightly larger and roundish at end;
- (6) The whitish, stalked gland in a place close to the external genital papillae.

In comparison with *A. morrissi*, three of the four new species lack pigmentation, indicating that they live in deeper layers with low organic content. The most remarkable character of these new species is the arrangement of the big papillae which may be related to their mating behaviour.

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Discovery of Stenochilidae Thorell, 1873 (Araneae) in China, with description of a new species from Yunnan

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Discovery of Stenochilidae Thorell, 1873 (Araneae) in China, with description of a new species from Yunnan. - The family Stenochilidae is reported for the first time from China and a new species, *Colopea lehtineni* sp. n. (male and female), is described from the Xishuangbanna rainforest of Yunnan Province. The new species is close to *C. laeta* (Thorell, 1895) but differs in the shape of copulatory organs and in somatic characters.

Keywords: Spider - *Colopea* - rainforest - taxonomy - fauna.

INTRODUCTION

China has one of the most diverse spider faunas, at both the species and family levels. According to the latest compilation (Song *et al.*, 1999), the Chinese spider fauna comprises 2361 species belonging to 56 families. Since then six additional families have been reported from south and central China: Desidae Pocock, 1895 (Zhu *et al.*, 2006), Mysmenidae Petrunkevitch, 1928 (Yin *et al.*, 2004; Lin & Li, 2008), Ochyroceratidae Fage, 1912 (Tong & Li, 2007), Pimoidae Wunderlich, 1986 (Xu & Li, 2007), Symphytognathidae Hickman, 1931 (Tong & Li, 2006) and Tetrablemmidae O. P.-Cambridge, 1873 (Tong & Li, 2008); members of Cybaeidae Banks, 1892 and Miturgidae Simon, 1885 were known from China but treated in Song *et al.* (1999) as members of other families (Platnick, 2009). In addition, the subfamily Nephilinae Simon, 1894 was elevated to family level (Kuntner, 2006), and one family new to science, Sinopimoidae Li & Wunderlich, 2008 (Li & Wunderlich, 2008) has been described from Yunnan, southwestern China. Here we present a new family record, Stenochilidae Thorell, 1873, from southwestern China. Thus, the spider fauna of China currently comprises 67 families.

Among the 109 spider families recognized at present (Platnick, 2009), Stenochilidae is the 19th smallest, containing only 12 species in two genera, and has one of the smallest geographical ranges, from India to Fiji. Together with the Palpimanidae, the Stenochilidae belong to the superfamily Palpimanoidea (see Coddington *et al.*, 2004). Stenochilids were earlier treated as a subfamily of the Palpimanidae but then re-

elevated to family level by Platnick and Shadab (1974) in a worldwide revision of the group. Soon afterwards, the Stenochilidae was revised by Lehtinen (1982), who described several new species and resurrected several species earlier treated as junior synonyms. In spite of these two revisions, the family remains very poorly known.

Stenochilidae can be easily distinguished from all other spiders by the following characters: Diamond-shaped carapace, elongate foveae constricted in the middle (Figs 2G, 3F; Forster & Platnick, 1984: fig. 310), well-developed anterior lateral spinnerets and strongly or totally (in males) reduced posterior median and posterior lateral spinnerets, and divided prolateral scopulae on tarsi, metatarsi and distal part of tibiae I and II (Platnick & Shadab, 1974). The latest diagnosis of this family and a comparison with the related families Palpimanidae and Huttonidae was provided by Forster & Platnick (1984).

As mentioned above, the Stenochilidae includes 2 genera and 12 species, of which *Stenochilus* includes 3 species and *Colopea* 9 species (Platnick, 2009).

An extensive survey of the spider fauna of the Xishuangbanna rainforest in southern Yunnan was carried out over a period of one year (June 2006 to August 2007) using various collection techniques like fogging, pitfall traps, trunk traps and direct searching. Among the spiders collected there we recognized 10 adult specimens and many juveniles belonging to an undescribed *Colopea* species. It seems to be one of the largest series of specimens of stenochilids ever reported from one locality. This allowed us to study variation in somatic and genitalic structures. While describing the new species, we recognized an additional character of the family that was overlooked by other authors.

MATERIAL AND METHODS

Specimens were examined using a SZX12-Olympus stereomicroscope. Details were studied under an Olympus BX51 compound microscope. All illustrations were made using a drawing tube. Photos were made with an Olympus C7070 wide zoom digital camera mounted on an SZX12-Olympus dissecting scope. Genitalia were examined and illustrated after being cleared in lactic acid, and the vulvae were stained by Amido Black 10B.

All measurements were taken using an Olympus BX51 compound microscope and are given in millimeters. Leg measurements are given as: Total length (femur, patella, tibia, metatarsus, tarsus). Leg segments were measured on their dorsal side.

All types and other material are deposited in the Institute of Zoology, Chinese Academy of Sciences in Beijing (IZCAS) and in the Muséum d'histoire naturelle in Geneva (MHNG). Type specimen photos of the species included in this paper can be viewed on the website <http://www.ChineseSpecies.com>, created and maintained by Li & Wang (2009).

Abbreviations: ALE, anterior lateral eyes; AME, anterior median eyes; CH, clypeus height; OL, opisthosoma length; OW, opisthosoma width; CL, carapace length; CW, carapace width; PLE, posterior lateral eyes; PME, posterior median eyes; TL, total length.

TAXONOMY

Family **Stenochilidae** Thorell, 1873

Genus **Colopea** Simon, 1893

TYPE SPECIES: *Stenochilus pusillus* Simon, 1893 from Luzon, the Philippines, by original designation.

DIAGNOSIS: Species of *Colopea* can be easily distinguished from those of *Stenochilus* by the strongly modified distal segments of legs I-II, the less distinctly undulating carapace margin, and the smaller size (Platnick & Shadab, 1974; Lehtinen, 1982). Males of the two genera differ by the absence of a bulbous apophysis in *Colopea* (one apophysis in *Stenochilus*), while females have almost indistinguishable external genitalic plates.

COMMENTS: In most earlier descriptions of copulatory organs in Stenochilidae a rather uncommon feature was not mentioned. Only Lehtinen (1982) mentioned that in *Colopea* the male bulb has no spermophore (= ejaculatory duct *sensu* Lehtinen, 1982), but just a sac-like structure, which in some males occupies a large part of the bulb (Lehtinen, 1982: figs 25-26, 28-29, 31-33 and Platnick & Shadab, 1974: figs 19-21). In some males this sac is collapsed, seemingly due to the absence of sperm inside. Although Lehtinen (1982) thought that this character is unique, the lack of a spermophore can be found in several other spider families: Most Oonopidae (except *Orchestina* s.l.), at least some Tetrablemmidae, some Orsolobidae, Pholcidae and seemingly some Palpimanidae (Otiothopinae). We had no possibility to study *Stenochilus*, but judging from illustrations in Platnick & Shadab (1974: figs 10-12) it may have a spermophore. The absence of spermophores is a loss that occurred in several families independently.

An additional character often overlooked in *Colopea* is the presence of the same type of hairbrush on the retrolateral side of the female palpal tarsus and on the male cymbium. Such a brush was shown for the female of *C. xerophila* (Lehtinen, 1982: fig. 24).

Although Lehtinen (1982) considered Stenochilidae to be primitive spiders, many characters in this group are strongly derived: Lack of cribellum, lack of claw on female palp, lack of embolus (sclerotised embolus) and spermophore in male palp in *Colopea*, presence of medially constricted fovea on carapace.

DISTRIBUTION: Myanmar, China, Fiji, Indonesia, Malaysia, New Guinea, Philippines, Singapore, Thailand, Vietnam (Platnick & Shadab, 1974; Lehtinen, 1982) and northern Australia, Queensland (Forster & Platnick, 1984).

***Colopea lehtineni* sp. n.**

Figs 1-4

MATERIAL: Holotype, in IZCAS; ♂; primary tropical seasonal rainforest in Menglung Nature Reserve (alt. 744 m, 21°57'N, 101°13'E), Xishuangbanna rainforest, Yunnan Province, China, coll. G. Zheng, 16.II.2007. – Paratypes in MHNG; 1 ♂, 2 ♀, from the type locality, coll. G. Zheng, 25.XII.2006, 12.II.2007. – Paratypes in IZCAS; 2 ♂, 4 ♀; Xishuangbanna Tropical Botanical Garden (alt. 558 m, 21°55' N, 101°16' E), Menglung Town, Mengla County, Yunnan Province, China; coll. G. Zheng, 24.XII.2006, 11.II.2007, 25.XII.2006, 20.VII.2007.

ETYMOLOGY: The specific name is a patronym in honor of Dr Pekka T. Lehtinen; noun (name) in genitive case.

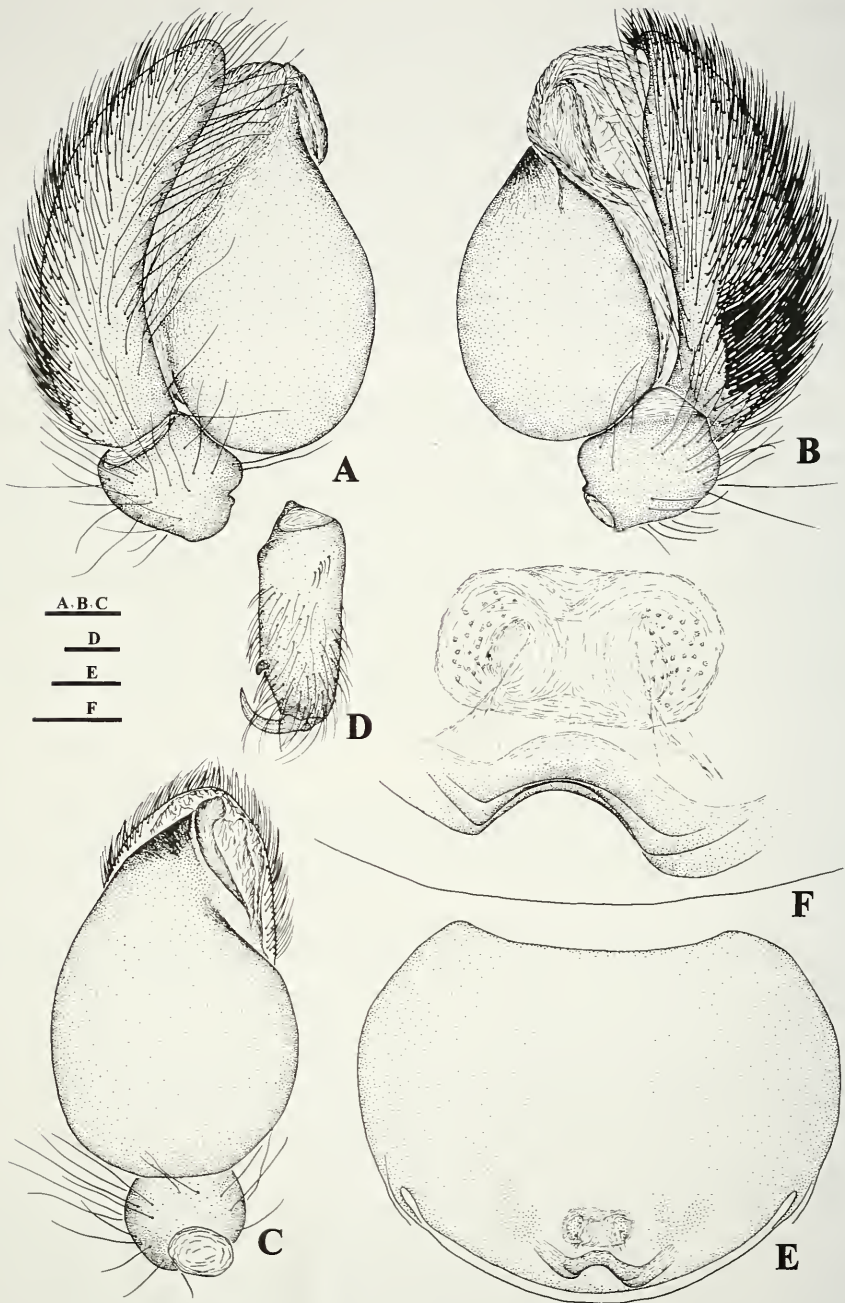


FIG. 1. *Colopea lehtineni* sp. n. (A) Left palp of holotype, prolateral view. (B) Same, retrolateral view. (C) Same, ventral view. (D) Right chelicera of male of holotype, posterior view. (E) Pulmonary plate of female paratype from Xishuangbanna Tropical Botanical Garden, dorsal view. (F) Vulva of same female, dorsal view. Scale bars: A-E = 0.2 mm, F = 0.1 mm.

DIAGNOSIS: The new species resembles *Colopea laeta* (Thorell, 1895) in its genitalia, but can be separated by somatic characters: 1) the carapace in both species has a different microsculpture, with a less granulous cuticle in the new species (Figs 2A, G, 3D, F; cf. Lehtinen, 1982: fig. 6); 2) the posterior part of the fovea in the new species is wide and oval (Figs 2G, 3F), not long and narrow as in *C. laeta* (cf. Lehtinen, 1982: fig. 6); 3) the ocular area in the new species is wide and oval, with the PME oval and slightly elongate (Figs 2F, 3E), while in *C. laeta* the ocular area is almost as long as wide, and the PME are very large and less elongate (cf. Lehtinen, 1982: fig. 6); 4) the new species is smaller than *C. laeta* (carapace 2.44 long in ♂ and 3.22 long in ♀).

The new species has a similar size as *C. xerophila* Lehtinen, 1982 but a different eye arrangement, carapace microsculpture, and scopula on metatarsus and tarsus I (cf. Lehtinen, 1982: figs 5, 19)

The new species can be distinguished from the geographically close *Colopea malayana* Lehtinen, 1982 by its vulva (Figs 1E-F, 2B) and by a distinct dark reddish grey pattern dorsally on the opisthosoma; it differs from *C. virgata* Lehtinen, 1982 by the shape of its vulva and palpal cymbium, by the long and narrow anterior part of the fovea and by the eye arrangement.

DESCRIPTION OF MALE (measurements of holotype): TL 4.55. CL 2.25, CW 1.60; OL 2.30, OW 1.65. Eye measurements: AME 0.11; ALE 0.11; PME 0.11; PLE 0.09; AME-AME 0.08; AME-ALE 0.01; ALE-PLE 0.03; PME-PME 0.10; PME-PLE 0.01. Eye pattern similar to that of *C. malayana*; AME subequal to ALE in size, but circular, four-fifths of their diameter apart; PME oval, subequal to AME in size, almost one diameter apart. CH 0.14. Leg measurements: I 4.70 [1.55, 0.95, 1.20, 0.45, 0.55]; II 4.70 [1.40, 1.00, 1.15, 0.55, 0.60]; III 3.45 [1.05, 0.55, 0.80, 0.50, 0.55]; IV 4.70 [1.45, 0.65, 1.25, 0.80, 0.55]. Leg formula: I-IV-II-III (from longest to shortest), tarsi I-II moderately swollen ventrally (Fig. 3H-I). Carapace chestnut-red, diamond-shaped, moderately granular. Both parts of the fovea distinct, anterior part long, narrow, deep; posterior part oval, wide, deep.

Cheliceral lamina narrow, distally round. Chelicerae with rather thick, blunt, tooth-like gland mound in distal 1/3 (Fig. 1D).

Opisthosoma oval, purplish grey, with distinct dark pattern of transverse stripes and large median band (Fig. 3D).

Retrolateral side of cymbium with distinct brush formed by thickened setae (Figs 1B, 3C). Tip of palpal bulb occupying one-third of bulb length. Bulb thick, its distal ring long and oval. In ventral view (Figs 1C, 3B), upper part of bulb with inverted droplet-shaped, sclerotized structure. Embolus absent. Sperm entering and leaving palp via membranous upper part of bulb next to droplet-shaped structure.

DESCRIPTION OF FEMALE: TL 5.15-6.20. CL 2.45-2.80, CW 1.65-1.90; OL 2.70-3.40, OW 1.80-2.30. Eye measurements: AME 0.10-0.11; ALE 0.13-0.14; PME 0.11-0.13; PLE 0.10; AME-AME 0.05-0.08; AME-ALE 0.01; ALE-PLE 0.03-0.04; PME-PME 0.09-0.13; PME-PLE 0.03. CH 0.13-0.16. Leg measurements: I 4.75-5.85 [1.65-1.95, 0.95-1.20, 1.10-1.40, 0.50-0.60, 0.55-0.70]; II 4.60-5.50 [1.50-1.75, 0.95-1.20, 1.05-1.30, 0.50-0.60, 0.60-0.70]; III 3.40-4.10 [1.10-1.30, 0.55-0.60, 0.70-0.95, 0.45-0.60, 0.55-0.65]; IV 4.70-5.70 [1.35-1.60, 0.70-0.90, 1.30-1.60, 0.80-0.95, 0.55-0.65].

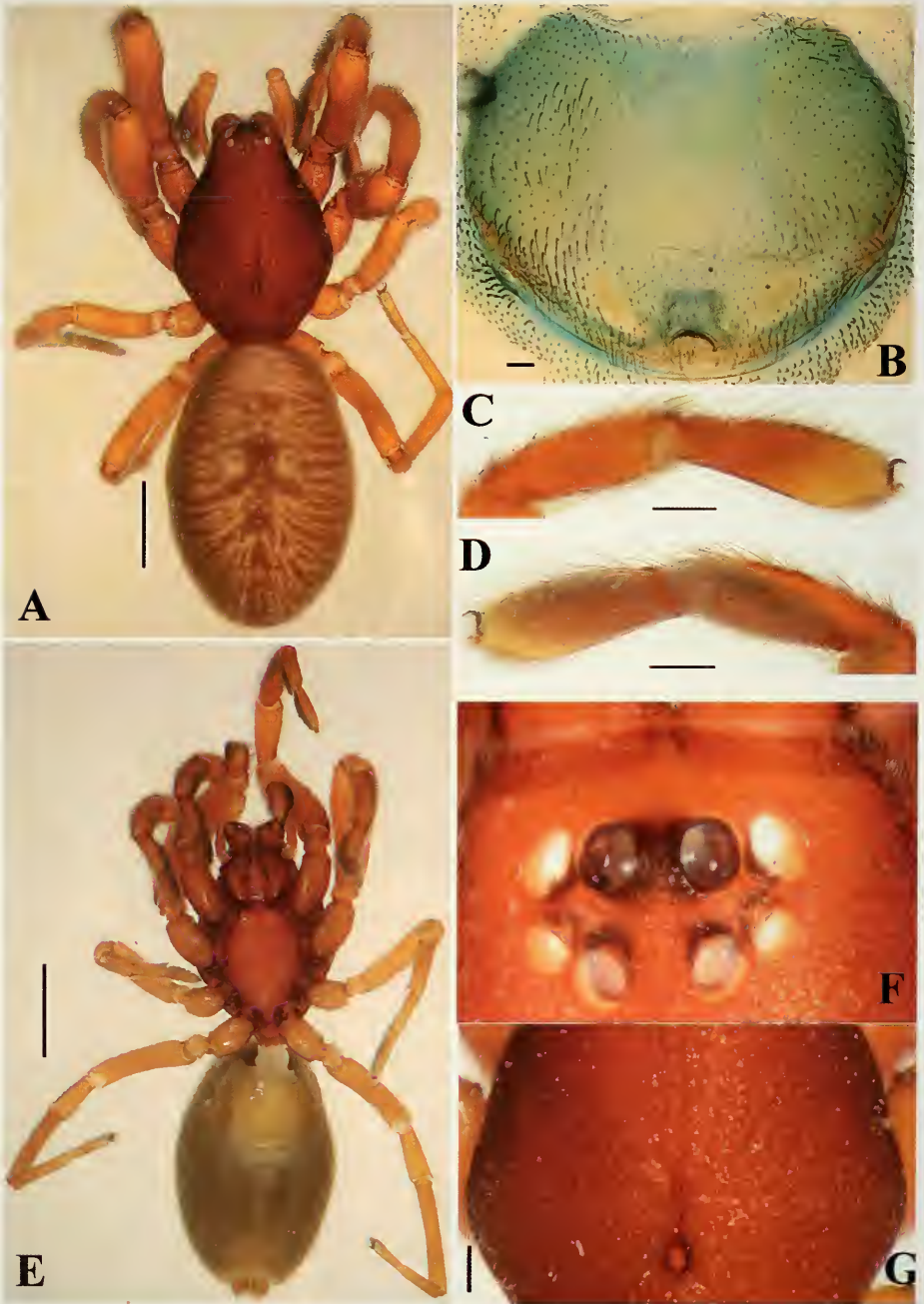


FIG. 2. *Colopea lehtineni* sp. n. female paratype from Xishuangbanna Tropical Botanical Garden. (A) Habitus, dorsal view. (B) Pulmonary plate, dorsal view. (C) Metatarsus and tarsus of leg I, retrolateral view. (D) Same, prolateral view. (E) Habitus, ventral view. (F) Eyes, dorsal view. (G) Fovea, dorsal view. Scale bars: A, E = 1 mm; B, C, D, F, G = 0.2 mm.

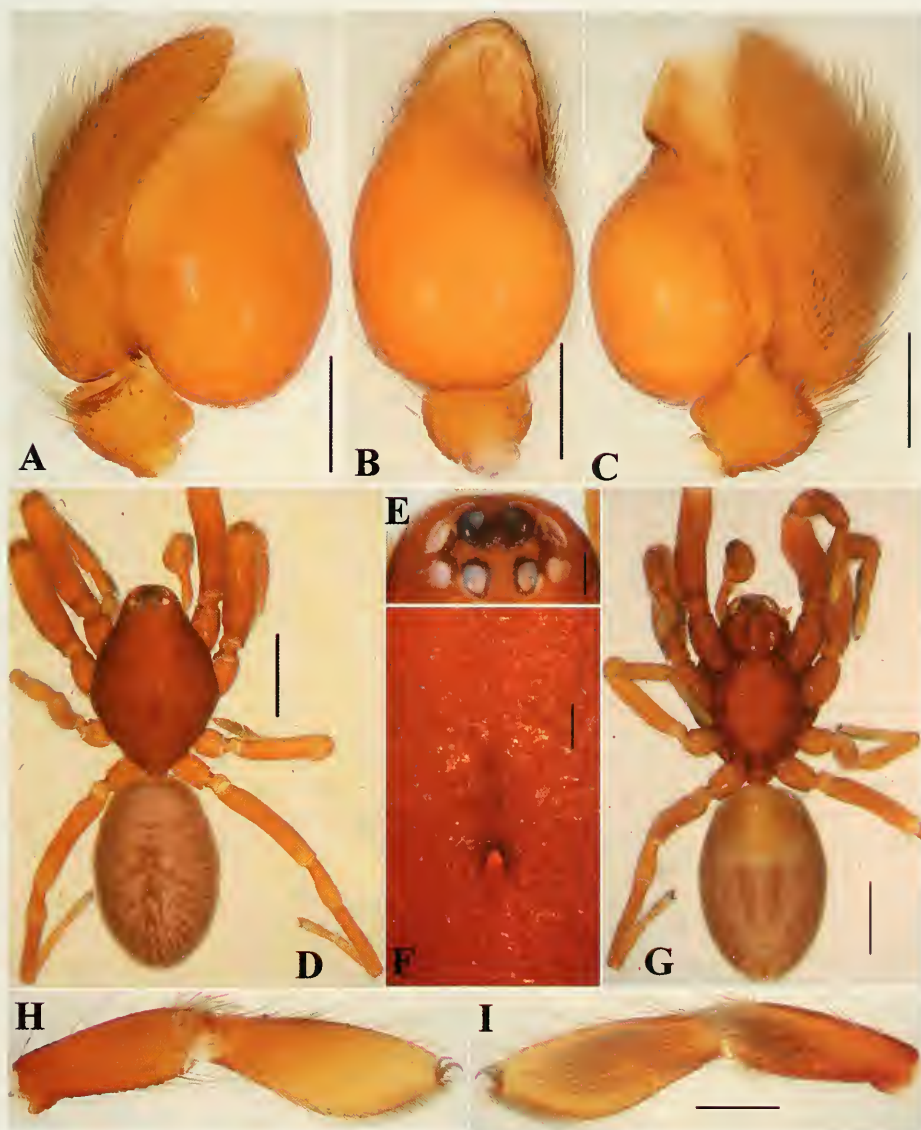


FIG. 3. *Colopea lehtineni* sp. n., male holotype. (A) Left palp, prolateral view. (B) Same, ventral view. (C) Same, retrolateral view. (D) Habitus, dorsal view. (E) Eyes, dorsal view. (F) Fovea, dorsal view. (G) Habitus, ventral view. (H) Metatarsus and tarsus of leg I, retrolateral view. (I) Same, prolateral view. Scale bars: A, B, C, E, F, H, I = 0.2 mm; D, G = 1 mm.

Leg formula: I-IV-II-III. Similar to the holotype in all non-genitalic characters, except tarsi I-II ventrally only slightly swollen (Fig. 2C-D).

Vulva with sclerotized median structure (= vulval tube *sensu* Lehtinen, 1982; not corresponding to a spermatheca) with widely rectangular shape (Figs 1F, 2B).

No traces of spermathecae were found in several females studied by using different methods.

DISTRIBUTION: Xishuangbanna rainforest, Yunnan Province, China.

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HANDLEY, C. O. Jr 1966. Checklist of the mammals of Panama (pp. 753-795). In: WENZEL, R. L. & TIPTON, V. J. (eds). Ectoparasites of Panama. *Field Museum of Natural History, Chicago*, XII + 861 pp.

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