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HERAUSGEBER: PROF. DR. H. STRÜMPEL,
DR. H. DASTYCH, PROF. DR. R. ABRAHAM
SCHRIFTFLEITUNG: DR. H. DASTYCH

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A new species of *Grosphus* Simon, 1880 (Scorpiones, Buthidae) from Central Madagascar

WILSON R. LOURENÇO

(with 9 figures)

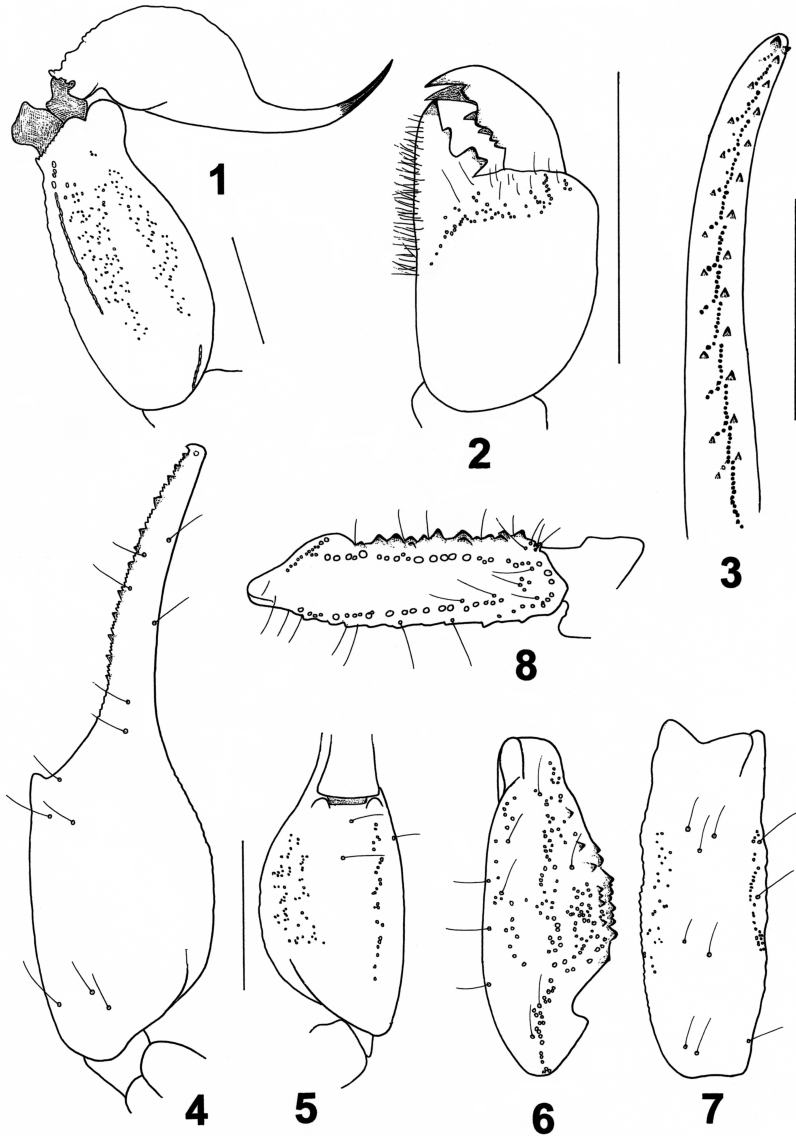
Abstract

A new species of scorpion belonging to the genus *Grosphus* (Buthidae) is described from the Central region of Madagascar. By its general morphology and pattern of coloration it shows clear affinities with species found in the Southwest portion of the island. The discovery of one more new species of *Grosphus* in the island brings further evidence to the existence of patterns of micro-endemism among Malagasy scorpions.

Key words: Scorpiones, Buthidae, *Grosphus rossii* sp. n., Central Madagascar, micro-endemism.

Introduction

As already synthesized in previous publications (Lourenço *et al.* 2007, 2009), the taxonomy of the genus *Grosphus* (Family Buthidae), endemic to Madagascar, is based mainly on two characters – external coloration patterns and, in females, the pectine morphology of the basal middle lamellae. This last character has been considered by scorpion taxonomists to show species-specific features, with little intraspecific variation (Fage 1929). However, recent detailed investigations have shown that in some cases closely related species have similar basal middle lamellae morphology (Lourenço 2003, Lourenço & Goodman 2003, 2006, Lourenço *et al.* 2004, Lourenço *et al.* 2007, 2009).



Figs 1-8. *Grosphus rossii* sp. n. Male holotype: **1.** metasomal segments V and telson, lateral aspect; **2.** chelicera, dorsal aspect; **3.** cutting edge of movable finger with the rows of granules. **4-8.** Trichobothrial pattern: **4-5.** chela, dorso-external and ventral aspects; **6-7.** patella, dorsal and external aspects; **8.** finger, dorsal aspect. (Scale bars = 2 mm).

Based on global size, patterns of coloration, and structure of pectines, *Grosphus* species are tentatively accommodated in different groups of species: (I) *madagascariensis* / *hirtus*, (II) *limbatus* / *bistriatus* (III) *grandidieri* and (IV) *flavopiceus*. While the species of the first group are distributed in most regions of the island, those of group II are largely concentrated in the Southwest region (Lourenço *et al.* 2007). Some exceptions, however, are known for group II with a few species also distributed in the Central and Northwest region.

In the present note, one new species of the *limbatus* / *bistriatus* group is described from the Central region of Madagascar. By its general morphology and pattern of coloration it shows important affinities with species found in the Southwest portion of the island. The discovery of this new species of *Grosphus* brings further evidence to the existence of patterns of microendemism among Malagasy scorpions.

Methods

Illustrations and measurements were produced using a Wild M5 stereo-microscope with a drawing tube and an ocular micrometer. Measurements follow Stahnke (1970) and are given in mm. Trichobothrial notations follow Vachon (1974) and morphological terminology mostly follows Vachon (1952) and Hjelle (1990).

Taxonomic account

Family Buthidae C. L. Koch, 1837
Genus *Grosphus* Simon, 1880

Grosphus rossii sp. n.

(Figs 1-9)

TYPE MATERIAL: Holotype, male. Madagascar, Central region, NE Manandona, S of Antsirabe, in secondary growth forest, under log, 8th August 2004, coll. W. R. Lourenço. Holotype deposited in the Zoologisches Museum Hamburg, Germany (ZMH Acc. No. A10/13).

ETYMOLOGY: Patronym honours Mr. Andrea Rossi from Massa, Italy, for his enthusiastic interest in scorpion taxonomy.

DIAGNOSIS: A scorpion of medium to small size in relation to other species of the genus, with a total length of 43.6 mm. General coloration yellow to pale yellow, without any dark zones on the body and appendages. Anterior margin of the carapace and pedipalps strongly granular. Pectinal teeth count 28-28. Fixed and movable fingers of pedipalp chela with 12-12 oblique rows of granules. Tibial spurs on legs III and IV strong; very long and thin.

RELATIONSHIPS: The morphology of the new species shows it to be related to the *Grosphus limbatus* / *G. bistriatus* group, but it can be readily distinguished from the other species of this group, and in particular from *G. limbatus* (the species also distributed in the Central region of Madagascar) by the following characters: (i) a paler coloration of the body and appendages

yellow to pale yellow, without spots, (ii) granulations on the anterior margin of carapace strongly marked, (iii) carinae on pedipalp femur and patella strongly marked with spinoid granules.

DESCRIPTION: based on male holotype. Measurements follow the description.

C o l o r a t i o n. Basically yellow to pale yellow without any dark zones on the body and appendages. P r o s o m a: carapace yellowish with an anterior reddish zone, forming more or less an inverted triangle; median and lateral eyes surrounded by black pigment. M e s o s o m a: yellowish, without any dark zone. M e t a s o m a: segments I to IV yellowish; V slightly reddish; IV and V without any pigmentation on carinae. Telson pale red without spots; aculeus with reddish-yellow base and dark reddish tip. Venter: sternites, coxapophysis, sternum, genital operculum and pectines pale yellow. Chelicerae pale yellow with pale reddish variegated pigmentation; fingers reddish with dark teeth. P e d i p a l p s yellowish with rows of granules on chela fingers reddish. L e g s pale yellow with some reddish zones on carinae.

MORPHOLOGY. P r o s o m a: Carapace weakly granular, excepted on the anterior zone which is strongly granular; anterior margin with a weak median concavity, almost straight. All carinae weak; furrows moderately developed. Median ocular tubercle anterior to the centre of the carapace; median eyes large and separated by a little more than one ocular diameter. Three pairs of lateral eyes. Sternum sub-triangular in shape. M e s o s o m a I tergites with a weak granulation, almost smooth. Median carina moderately to weakly developed in all tergites. Tergite VII pentacarinata. V e n t e r: genital operculum consisting of two subtriangular plates. P e c t i n e s: pectinal teeth

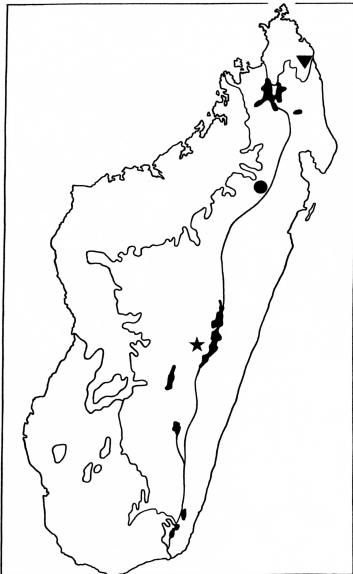


Fig. 9. The type locality of *Grosphus rossii* sp. n. in Madagascar (black star) and the new sites for *G. simoni* Lourenço *et al.* (black circle) and *G. goudoti* Lourenço & Goodman (inverted black triangle).

count 28-28; basal middle lamellae of each pecten not dilated in male. Sternites smooth, with elongated stigmata; some setation is present; VII without carinae. Metasomal segments I and II with 10 carinae, moderately crenulate. Segments III and IV with 8 carinae, moderately crenulate. Segment V with 5 carinae. Dorsal carinae on segments II to IV without posterior spinoid granules. Intercarinal spaces moderately to weakly granular. Telson with a weak granulation over lateroventral and ventral surfaces; its dorsal surface smooth; aculeus weakly curved and slightly shorter than the vesicle; subaculear tooth absent. Cheliceral dentition characteristic of the family Buthidae (Vachon 1963); two basal teeth present on the movable finger, slightly fused; ventral aspect of both fingers and manus with dense, long setae. Pedipalps: femur pentacarinata with strong spinoid carinae; dorsointernal and dorsoexternal carinae of patella with several spinoid granules; ventral face moderately granular; chela without carinae, only the internal face moderately granular. Fixed and movable fingers with 12-12 oblique rows of granules. Trichobothriotaxy: orthobothriotaxy A- α (Vachon 1974, 1975). Legs: tarsus with numerous short thin setae ventrally. Tibial spurs present on legs III and IV; long and thin; pedal spurs present on legs I to IV; moderate to strong.

Female unknown.

Morphometric values (in mm) of the male holotype. Total length, 43.6 (including the telson). Carapace: length, 4.6; anterior width, 3.5; posterior width, 5.2. Metasomal segments. I: length, 3.4; width, 3.1; V: length, 5.7; width, 2.8; depth, 2.5. Telson length: 5.7; vesicle: width, 2.4; depth, 2.2. Pedipalp: femur length, 4.2, width, 1.3; patella length, 4.7, width, 1.8; chela length, 7.5, width, 2.3, depth, 2.2; movable finger length, 4.6.

New records for two *Grosphus* species from the North of Madagascar

(Fig. 9)

Grosphus simoni Lourenço, Goodman & Ramilijaona, 2004

Province de Mahajanga, RS de Marotandrano, Anjiambolo forest, 12 km SSE of Marotandrano (village), along Anjiambolo River, 16°16.8'S, 48°48.1'E, 950 m a.s.l., humid forest. November 2004, coll. V. Soarimalala. 3 males.

Grosphus goudoti Lourenço & Goodman, 2006

Province d'Antsiranana, Mahasoa, September 2001, coll. W. R. Lourenço. 3 males, female.

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Author's address:

Dr. W. R. LOURENÇO, Muséum national d'Histoire naturelle, Département Systématique et Evolution, UMR7205, CP 053, 57 rue Cuvier, 75005 Paris, France (e-mail: arachne@mnhn.fr).