

ARTÍCULO:

**Description of a new species of *Heteroscorpion* Birula (Scorpiones, Heteroscorpionidae) from the eastern lowland humid forest of south-eastern Madagascar**

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ARTÍCULO:

## DESCRIPTION OF A NEW SPECIES OF *HETEROSCORPION* BIRULA (SCORPIONES, HETEROSCORPIONIDAE) FROM THE EASTERN LOWLAND HUMID FOREST OF SOUTH-EASTERN MADAGASCAR

Wilson R. Lourenço & Steven M. Goodman

### Abstract:

Recent fieldwork conducted in different regions of Madagascar has resulted in the collection of numerous scorpions, including one specimen belonging to the endemic genus *Heteroscorpion* Birula that was obtained in the lowland humid forest of Midongy-Sud in the southeastern portion of the island. This animal represents a species new to science, which is described herein, and probably endemic to the region where it was collected. The number of species in the genus *Heteroscorpion* is now raised to four, and its distributional range now covers much of the humid forest of eastern Madagascar.

**Key words:** Scorpiones, Heteroscorpionidae, new species, Madagascar.

**Taxonomy:** *Heteroscorpion raselimananai* sp. n.

**Descripción de una nueva especie de *Heteroscorpion* Birula (Scorpiones, Heteroscorpionidae) de los bosques húmedos de las tierras bajas orientales del sureste de Madagascar**

### Resumen:

Recientes trabajos de campo realizados en diferentes regiones de Madagascar han permitido obtener una colección de numerosos escorpiones, incluyendo un espécimen perteneciente al género endémico *Heteroscorpion* Birula que se colectó en el bosque húmedo de las tierras bajas de Midongy-Sud en la zona suroriental de la isla. Este animal, descrito en este trabajo, representa una nueva especie para la ciencia y probablemente es un endemismo de la región donde fue recolectado. El número de especies del género *Heteroscorpion* es ahora de cuatro y su área de distribución cubre una gran parte del bosque húmedo oriental de Madagascar.

**Palabras clave:** Scorpiones, Heteroscorpionidae, nueva especie, Madagascar.

**Taxonomía:** *Heteroscorpion raselimananai* sp. n.

### Introduction

At the beginning of the 20<sup>th</sup>-century, the Malagasy scorpion fauna was composed of two families: the Buthidae C. L. Koch and the Scorpionidae Latreille (subfamily Ischnurinae) with two genera: *Opisthacanthus* Peters and *Heteroscorpion* Birula. The genus *Heteroscorpion* was monotypic at that time and remained so until Lourenço (1996), in the 'Fauna of Madagascar', described a second species, *H. goodmani*, and raised the subfamily Heteroscorpioninae to the rank of family. After the publication of this monograph, faunal inventories in previously unexplored or poorly known areas of the island led to a series of new descriptions, but in most cases these refer to microscorpions. There were some exceptions, with the descriptions of new non-microscorpions of the genus *Palaeocheloctonus* Lourenço (Liochelidae) from the southwest and the already cited *H. goodmani* from the southeast. In both cases these scorpions represent large species, ranging in total length from 65 to 100 mm.

The most remarkable discovery, however, took place in the forested area of Daraina in the northeastern portion of the island. In this region, which is composed of transitional dry and humid forest habitats, a distinct population of *Heteroscorpion* was found in a humid forest area, and described as *H. magnus* by Lourenço and Goodman (2002). The most noteworthy aspect of *H. magnus* is its overall size, with adult females reaching 144 mm and adult males 187 mm in total length (Lourenço *et al.*, 2003), making it the largest scorpion known from the island.

In this paper we described a new species of *Heteroscorpion* from the Province de Fianarantsoa. With the description of this new species, the geographical range of the genus *Heteroscorpion* now includes much of the humid forest zones of the eastern portion of the island.

## Taxonomic Treatment

### Family HETEROSCORPIONIDAE Kraepelin, 1905

NOTE: Soleglad and Fet (2003) proposed several modifications to the familial and generic classification of the group. Among other decisions they downgrade the family Heteroscorpionidae to the subfamily level within the family Urodacidae. Lourenço (1996) was the first author to elevate the Urodacidae and Heteroscorpionidae to family level, a decision that was subsequently justified by Prendini (2000). For practical reasons we maintain here the classification of Lourenço (1996) and Prendini (2000). The senior author hopes to present in the near future some biological evidence to better understand the phylogenetic position of this endemic family to Madagascar.

### Genus *HETEROSCORPION* Birula, 1903

DIAGNOSIS: Scorpions of large size, with adults reaching 60 to 145 mm in females and 90 to 187 mm in males. Sexual dimorphism strongly marked, mainly by the allometric growth shown in males. Two pairs of lateral eyes. Metasomal segments I to IV very flattened laterally with single ventral median carinae. Telson weakly elongated in both sexes. Dentate margin on fingers with numerous granules randomly arranged on their basal 2/3rds, and forming two vestigial parallel series of granules on its distal portion; a few stronger accessory granules may be present. Trichobothriotaxy of type C, neobothriotaxic majorante (+), plethotaxic in one species on the patella and chela (chela + fixed finger). Hemispermaphore (see figures 4-5 in Lourenço & Goodman, 2002). Venomous glands simple.

GEOGRAPHIC DISTRIBUTION. Endemic to Madagascar.

### *Heteroscorpion raselimananai* sp. n.

Figs. 1-7

**TYPE MATERIAL.** One female holotype. Madagascar, Province de Fianarantsoa, W slope Mt. Ambatobe, 1.2 km ENE Ampatramary, 9.5 km NE Midongy-Sud (village), 23° 30.6' S, 47° 03.1' E, 650 m, 12/XI/2003 (S. M. Goodman no. 13961).

**DEPOSITORY:** Holotype in the Field Museum of Natural History, Chicago. No paratype.

**ETYMOLOGY:** The specific name is a patronym in honor of Dr. Achille Raselimanana, herpetologist and Biodiversity Program Officer of WWF-Madagascar. Dr. Raselimanana has participated in many biological inventories over the past decade organized by SMG and his inexhaustible energy and joviality have greatly benefited these different missions.

**DIAGNOSIS:** Scorpion of moderate size, with adult female reaching 70 mm in total length. Coloration, basically blackish with only the tarsi of the legs and the tip of pedipalp fingers paler than the body, yellowish. Body and pedipalps covered with an dense chetotaxy. Trichobothriotaxy of type C, neobothriotaxic majorante

(+); patella with 16 external trichobothria, and eight ventral trichobothria; chela (chela + fixed finger) with six ventral trichobothria. Hemispermaphore unknown. Venomous glands simple.

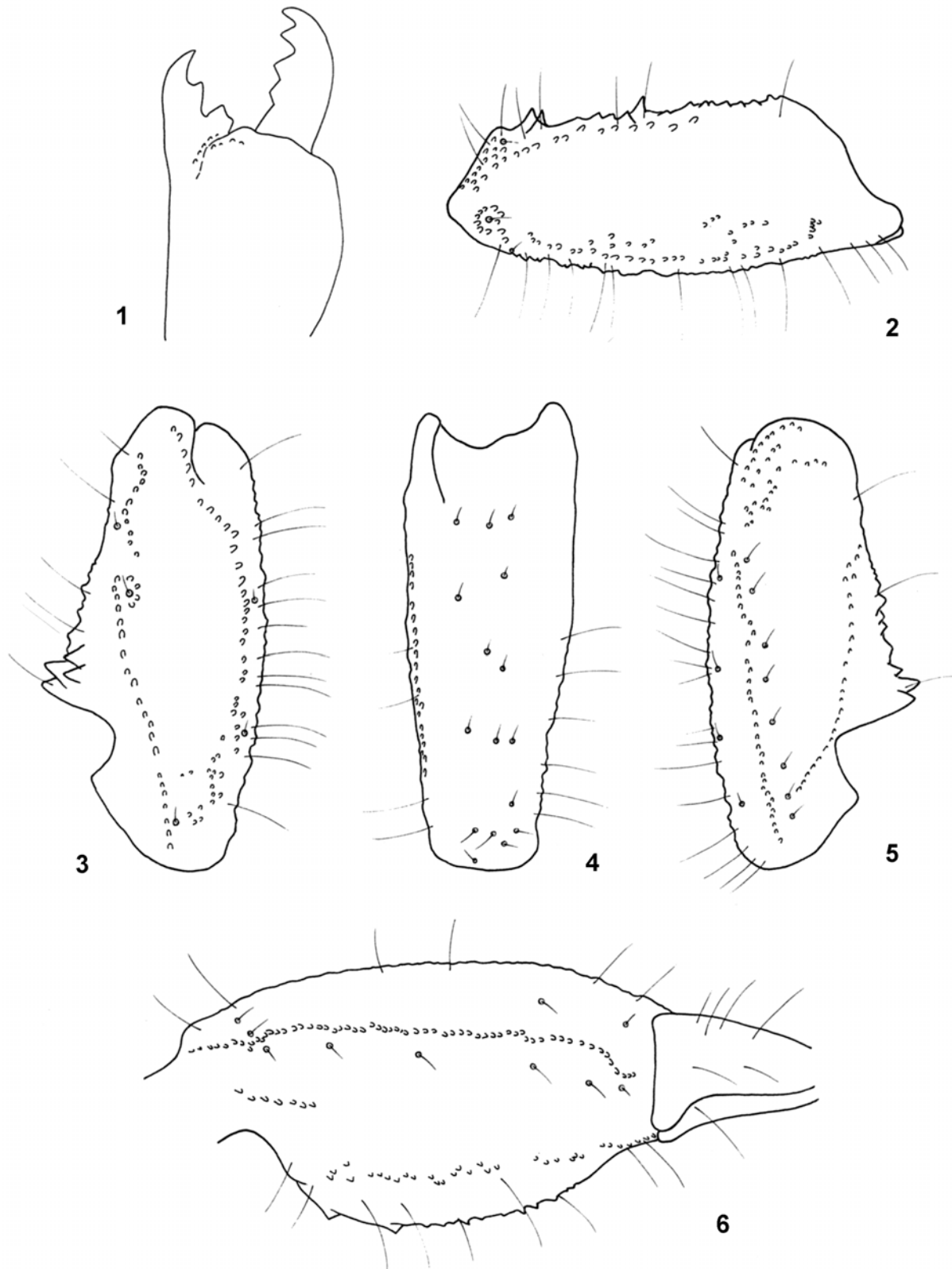
**RELATIONSHIPS:** *Heteroscorpion raselimananai*, can be distinguished from other species in the genus *Heteroscorpion*, and in particular from *H. goodmani* by the following characters: (i) blackish coloration over the body and appendages, with only the tarsi of the legs and the tip of pedipalp finger paler; (ii) strongly developed carinae and granulations on the body and pedipalps; (iii) a distinct trichobothrial pattern, with only six ventral trichobothria on chela hand.

**DESCRIPTION** based on female holotype.

**Measurements** in Table I.

**Coloration.** Body basically blackish. Prosoma: carapace blackish, with the same blackish coloration nearby the eyes. Mesosoma: tergites blackish as the carapace; sternites III-VI reddish brown; sternite VII darker than the others. Coxapophysis and sternum brownish; genital operculum and pectines yellowish. Metasoma: all segments blackish; dorsal and ventral carinae darker than the tegument; vesicle blackish brown; aculeus reddish brown at the base and blackish at the extremity. Chelicerae blackish brown with variegated dark spots; fingers blackish with reddish teeth. Pedipalps: femur, patella and chela blackish with the tip of the fingers reddish yellow. Legs blackish with tarsi yellowish.

**Morphology.** Carapace with a rough tegument and moderate to strong granules; anterior margin with a strongly pronounced concavity; carinae practically absent; posterior furrows strongly pronounced; median ocular tubercle anterior to the center of the carapace; two pairs of moderate to small lateral eyes, about half the size of median eyes. Sternum pentagonal, slightly higher than wider. Mesosoma: tergites almost acarinate with some weak granulations; tergite VII with a more intense granulation. Venter: genital operculum formed by a single plate with a hart shape. Pectines: pectinal tooth count 12-12; fulcra fused with median lamellae. Sternites smooth and shiny, with two longitudinal parallel furrows on III to VI; spiracles linear and conspicuous; sternite VII with two vestigial carinae. Metasoma with all segments flattened laterally; dorsal carinae granular on segment I; granulation becomes spiniform on segments II to V; ventral and latero-ventral carinae granular on segments I to III, spiniform on IV and intensely spinoid on V; ventral surface of segment V with a strong spinoid granulation; all intercarinal surfaces weakly granular to smooth. Telson weakly elongated with some weakly marked granules on ventral and lateral faces; aculeus proportionally short and moderately curved. Cheliceral dentition characteristic of the Scorpionoidea (Vachon, 1963); movable finger with two subdistal teeth of the same size and a basal tooth reduced. Pedipalps with a weak to moderate granulation; femur with four carinae, all complete; patella with six carinae complete, and a very strong double apophysis on the internal aspect; chela with six vestigial



**Fig. 1-6.** *Heteroscorpion raselimananai* sp. n., female holotype. 1. Chelicera, dorsal aspect. 2-6. Trichobothrial pattern. 2. Femur, dorsal aspect. 3-5. Patella, dorsal, external and ventral aspects. 6. Chela, ventral aspect.

Table I. Comparative morphometric values (in mm) of females of the four *Heteroscorpion* species

		<i>Heteroscorpion</i>			
		<i>opisthacanthoides</i>	<i>goodmani</i>	<i>magnus</i>	<i>raselimananai</i>
<b>Total length</b>		110.0	63.0	144.0	73.1
<b>Carapace:</b>	- length	14.0	11.4	19.4	10.4
	- anterior width	8.9	7.0	11.6	6.3
	- posterior width	14.1	10.0	19.6	10.1
<b>Metasomal segment I:</b>	- length	7.0	5.4	10.7	5.5
	- width	4.2	3.1	4.2	2.9
<b>Metasomal segment V:</b>	- length	12.3	10.2	16.2	9.6
	- width	2.6	2.4	2.8	2.1
	- depth	3.2	2.6	3.4	2.4
<b>Vesicle:</b>	- width	3.4	3.0	3.3	2.5
	- depth	3.6	3.0	4.2	2.6
<b>Pedipalp:</b>	- Femur length	12.1	10.7	18.4	10.1
	- Femur width	4.8	3.6	7.1	3.6
	- Patella length	13.2	10.7	18.1	10.2
	- Patella width	6.6	4.7	9.7	4.8
	- Chela length	25.6	21.5	39.1	19.8
	- Chela width	9.0	7.5	11.4	5.8
	- Chela depth	6.9	5.3	8.2	4.8
<b>Movable finger:</b>	- length	14.2	11.9	19.2	10.5

carinae; dentate margin on fingers with numerous granules randomly arranged on their basal 2/3, and forming two vestigial parallel series of granules on its distal portion; presence of a few stronger accessory granules. Trichobothriotaxy of type C; neobothriotaxic (Vachon, 1974); patella with eight ventral and 16 external trichobothria; chela with six ventral trichobothria. Body and pedipalps covered with an intense chetotaxy. Legs: tarsi of legs III and IV with three internal and two external spines arranged in three series.

**GEOGRAPHIC DISTRIBUTION.** Only known from the type locality.

#### HABITAT AND ECOLOGY

The holotype was obtained in lowland forest near the base of Mt. Ambatobe. The animal was found during the day under a large rock and within a few meters of the source of a small and permanently flowing stream. The rock under which the animal was discovered was resting directly on moist, but not water-laden, ground. This was the only scorpion collected during the survey of three sites within the Midongy-Sud area, although

several hundred nights of pit-fall buckets were accrued. Normally this technique, particularly in eastern lowland humid forest, is effective for the capture of scorpions (Lourenço & Goodman, 1999). Another individual of the genus *Heteroscorpion* and presumably *H. raselimananai* sp. n. was observed vertically climbing the trunk of a small tree within the same forest block during the early night hours.

The forest where has been heavily disturbed, particularly at lower altitudes, by quasi-commercial exploitation of trees for lumber and forest products by local people. The collection site is within a forested area a few kilometers outside of the limit of the Parc National de Midongy-Sud and does not have any official protected status. Much of the forest within the park is at higher elevations than the Mt. Ambatobe site and it is uncertain if *Heteroscorpion raselimananai* sp. n. occurs within the protected area. This question can only be resolved through further biological exploration of the region.

The following characters can distinguish the four species belonging to the genus *Heteroscorpion*:

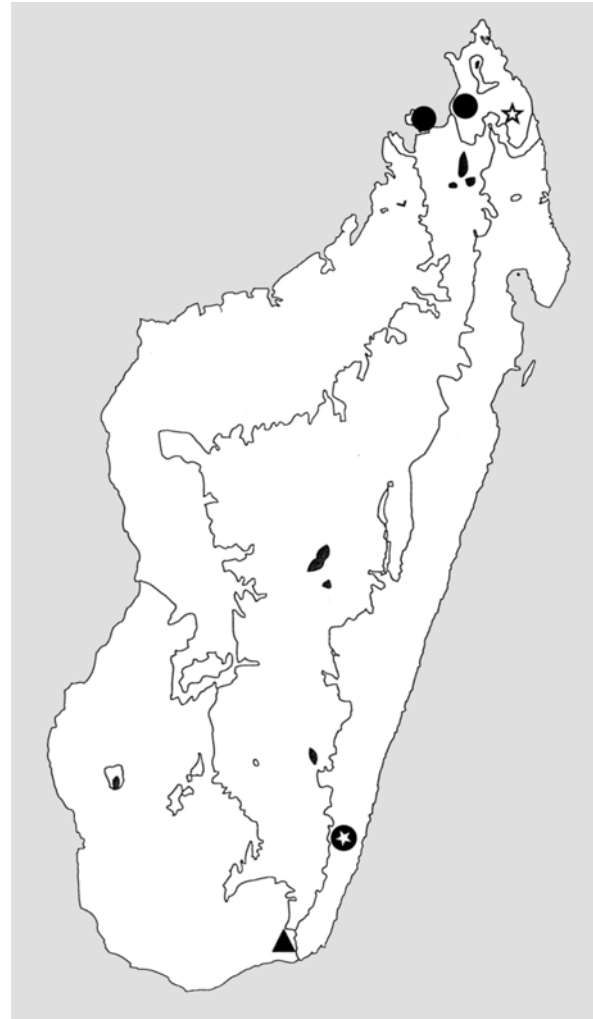
	Color	Adult total length	Trichobothrial pattern
<i>H. opisthacanthoides</i>	reddish	110-180 mm	Patella with 10-11 ventral and 17-19 external Chela with 8-9 ventral
<i>H. goodmani</i>	blackish	60-100 mm	Patella with 8-9 ventral and 17 external Chela with 9 ventral
<i>H. magnus</i>	reddish-brown	145-185 mm	Patella with 14-19 ventral and 31-40 external. Chela with 12-15 ventral
<i>H. raselimananai</i> sp. n.	blackish	70 mm	Patella with 8 ventral and 16 external Chela with 6 ventral

**Key to the species of *Heteroscorpion***

1. Scorpions of large size, adults ranging from 110 to 187 mm in total length; coloration reddish to reddish-brown; patella with 10 to 19 ventral trichobothria . . . . . **2**
- Scorpions of moderate to large size, adults ranging from 60 to 110 mm in total length; coloration, blackish; patella with 8-9 ventral trichobothria . . . . . **3**
2. Adults ranging from 110 to 140 mm in total length; patella with 17-19 external trichobothria . . . . .  
     . . . . . *H. opisthacanthoides*
- Adults ranging from 140 to 187 mm in total length; patella with 31-40 external trichobothria . . . . .  
     . . . . . *H. magnus*
3. Coloration blackish; body and pedipalps with a weak granulation; chela manus with 9 ventral trichobothria . . . . . *H. goodmani*
- Coloration dark blackish; body and pedipalps with a moderate to strong granulation; chela manus with 6 ventral trichobothria . . . . . *H. raselimananai* sp. n.

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**Fig. 7.** Map of Madagascar showing the distribution of the species of the family Heteroscorpionidae. *H. opisthacanthoides* (○), *H. goodmani* (●), *H. magnus* (△) and *H. raselimananai* sp. n. (▲).

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