

ARTÍCULO:

DESCRIPTION OF THE MALE OF *HETEROSCORPION* MAGNUS LOURENÇO & GOODMAN, 2002 (SCORPIONES, HETEROSCORPIONIDAE)

Wilson R. Lourenço, Steven M. Goodman,
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Abstract:

In a recent paper concerning scorpions collected in the Daraina forests of northeastern Madagascar a new species of *Heteroscorpion* (Heteroscorpionidae), *H. magnus* Lourenço & Goodman, 2002, was described based on adult females. More recently adult males of *H. magnus* were collected in the region, and are described in this paper. In the previous paper by Lourenço & Goodman (2002), it was suggested that males of *H. magnus* should reach up to 180 mm in total length. One of the males described here is 187 mm in total length, confirming therefore this prediction. These values make *H. magnus* the largest scorpion ever found in Madagascar.

Key words: Scorpiones, Heteroscorpionidae, *Heteroscorpion magnus*, Madagascar.

Taxonomy: *Heteroscorpion magnus* Lourenço & Goodman, 2002, **description of %**

Descripción del macho de *Heteroscorpion magnus* Lourenço & Goodman, 2002 (Scorpiones, Heteroscorpionidae)

Resumen:

En un reciente trabajo sobre los escorpiones colectados en la región de Daraina (Noreste de Madagascar) se describió nueva especie de *Heteroscorpion* (Heteroscorpionidae), *H. magnus* Lourenço & Goodman, 2002, a partir de hembras adultas. Recientemente han sido colectados en la misma región machos adultos de esta especie, los cuales se describen en el presente trabajo. En el trabajo previo (Lourenço & Goodman, 2002) se sugería que los machos de *H. magnus* podrían superar los 180 mm de longitud total. Uno de los machos ahora descritos alcanza los 187 mm, confirmando dicha previsión. Esta cifra convierte a *H. magnus* en el mayor escorpión de Madagascar.

Palabras clave: Scorpiones, Heteroscorpionidae, *Heteroscorpion magnus*, Madagascar.

Taxonomía: *Heteroscorpion magnus* Lourenço & Goodman, 2002, **descripción de %**

Introduction

The results of some recent fieldwork on scorpions conducted in the Daraina forests in the northeastern portion of Madagascar were reported by Lourenço & Goodman (2002). During the first campaign ten scorpions belonging to two different genera, *Heteroscorpion* (Heteroscorpionidae) and *Tityobuthus* (Buthidae) were collected. These scorpions, probably endemic to this region of rather unique transitional forested habitat, have been described as new species to science (Lourenço & Goodman, 2002). The most remarkable aspect of the new species of *Heteroscorpion*, was its overall size, with adult females reaching up to 140 mm in total length. Although the type material was composed of nine specimens, no adult male specimen was known at that time. Adult male total length was extrapolated and suggested to reach about 180 mm. More recently new specimens of *H. magnus* were collected at the terre typica site and among these are two adult males. One of the males reaches 187 mm in total length making it the largest scorpion ever found in Madagascar. The following description of adult male *H. magnus* is based on two specimens.

Aspects of the ecology and biogeography of the Daraina Forest are reported on by Lourenço and Goodman (2002).

Taxonomic Treatment

Family HETEROSCORPIONIDAE Kraepelin, 1905

Genus *Heteroscorpion* Birula

REVISED DIAGNOSIS FOR THE GENUS: Scorpions of large size, with adults reaching 60 to 145 mm in females and 90 to 187 mm in males. Sexual dimorphism strongly

ARTÍCULO:

Description of the male of
Heteroscorpion magnus
Lourenço & Goodman, 2002
(Scorpiones, Heteroscorpionidae)

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marked, mainly by the allometric growth shown in males (Fig. 1-2). 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⁽¹⁾ majorante (+) plethotaxic in one species on the patella and tibia (chela + fixed finger). Hemispermatophore as in Fig. 3. Venomous glands simple. For detailed illustrations see Lourenço and Goodman (2002).

GEOGRAPHIC DISTRIBUTION: Endemic to Madagascar.

***Heteroscorpion magnus* Lourenço & Goodman, 2002**
(Figs. 1-6)

COMPLEMENTARY MATERIAL: Madagascar: Province d'Antsiranana, Forêt d'Ambilondambo, Site d'Andrafia, a 5 km N de Daraina, 13° 09' 853"S, 49° 38' 871"E, 300-550 m. 2 males, 1 female juveniles (MR 0343, 0346, 0347). Forêt de Binara, Site Beamosy, a 2.5 km NNW du village d'Ankijabe, 13° 14.3"S, 49° 37.5"E, 215 m. 1 female juvenile (MR 0154). Forêt de Tsarahitsaka, à 7,7 km NW de Daraina, 13° 08' 929"S, 49° 37,402"E, 250-450 m. 2 adult males (MR 0367, 0368).

DEPOSITORIES: 3 males and 2 females in the Département de Biologie, Animale, Université d'Antananarivo. One male in the Muséum National d'Histoire Naturelle, Paris.

CONFIRMED DIAGNOSIS FOR *H. MAGNUS*. Scorpions of large size, with adults reaching 140 mm in females and 180 mm in males. Coloration, basically reddish-brown with the legs paler than the body. Trichobothriotaxy of type C, neobothriotaxic majorante (+) plethotaxic; patella with 31-40 external trichobothria, and 14-19 ventral trichobothria; tibia (chela + fixed finger) with 12-15 ventral trichobothria. Hemispermatophore as in figure 3. Venomous glands simple.

HABITAT: See description in Lourenço and Goodman (2002).

GEOGRAPHIC DISTRIBUTION: Only known from the type locality.

DESCRIPTION OF THE MALE is based on two adult specimens. Measurements in Table I.

Coloration. Body basically reddish-brown. Prosoma: carapace dark-brown, except the posterior zone that is reddish-brown; some blackish nearby the eyes; furrows paler than the rest of the carapace. Mesosoma: tergites brownish, with the anterior zone lighter than carapace, with two median longitudinal brown-yellowish stripes; sternites III-VI reddish-yellow; sternite VII darker than

the others. Coxapophysis and sternum reddish-brown; genital operculum and pectines yellowish. Metasoma: all segments reddish-brown, with some blackish pigment over dorsal and ventral carinae; vesicle reddish-brown; aculeus reddish-brown at the base and blackish at the extremity. Chelicerae reddish with some variegated dark spots that are masked by the dark coloration; fingers reddish-brown with blackish teeth. Pedipalps: femur, patella and chela dark-reddish-brown with the presence of blackish pigment over the carinae. Legs reddish-brown, with tarsi yellowish; presence of blackish over the carinae.

Morphology. Carapace lustrous and acarinate with some thin to moderate sparse granules; anterior margin with a strongly pronounced concavity; carinae practically absent; posterior furrows strongly pronounced; median ocular tubercle distinctly anterior to the center of the carapace; two pairs of moderate to small lateral eyes, about half the size of median eyes. Mesosoma: sternum pentagonal, higher than wider. Tergites acarinate, smooth and shiny (lustrous) without granulations; tergite VII with several punctuations. Venter: genital operculum formed by two plates which have a semi-oval shape. Pectines: pectinal tooth count 13-13 (see table II for variation); fulcra fused with median lamellae. Sternites smooth and shiny, with two longitudinal parallel furrows on III to VI; spiracles linear and conspicuous. Metasoma with all segments strongly flattened laterally; dorsal carinae smooth on segment I, granular on segments II-V; granulation becomes spiniform on segments III-V; ventral and latero-ventral carinae smooth on segments I-III, granular on IV and intensely spinoid on V; dorsal and ventral surfaces of segment V with a strong spinoid granulation; all intercarinal surfaces weakly granular to smooth. Telson weakly elongated with strongly marked spinoid granules; aculeus proportionally very short and strongly 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 thin to moderate granulation; femur with four carinae, all complete; patella with six carinae complete, and a very strong apophysis on the internal aspect; chela with six 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; movable fingers with a strong proximal apophysis. Trichobothriotaxy of type C; neobothriotaxic + (plethotaxic) (Vachon, 1974); patella with 17/18 ventral and 40/41 external trichobothria; chela with 14/15 ventral trichobothria (see Lourenço & Goodman, 2002 for variation). Legs: tarsi of legs III and IV with three internal and two external spines arranged in three series. One pedal spur present in all legs.

⁽¹⁾ Plethotaxy = Major Neobothriotaxy with a very high number of trichobothria



Fig. 1-2. Adult male of *Heteroscorpion magnus*,
dorsal and ventral aspects.

Table I. Comparative morphometric values (in mm) of the 3 species of *Heteroscorpion*

Character	<i>H. opisthacanthoides</i>		<i>H. goodmani</i>		<i>H. magnus</i>	
	%%	&&	%%	&&	%%*	&&
Total length	142.0	110.0	115.0	63.0	187.2**	144.0
Carapace:						
- length	14.1	14.0	10.2	11.4	15.6	19.4
- anterior width	8.6	8.9	6.2	7.0	9.8	11.6
- posterior width	14.2	14.1	9.3	10.0	16.2	19.6
Metasomal segment I:						
- length	15.6	7.0	10.0	5.4	21.1	10.7
- width	3.8	4.2	2.3	3.1	3.1	4.2
Metasomal segment V:						
- length	23.3	12.3	17.2	10.2	29.1	16.2
- width	2.3	2.6	1.8	2.4	1.8	2.8
- depth	3.2	3.2	2.4	2.6	3.3	3.4
Vesicle:						
- width	4.0	3.4	2.8	3.0	3.1	3.3
- depth	5.2	3.6	3.1	3.0	3.9	4.2
Pedipalp:						
- Femur length	12.4	12.1	10.9	10.7	16.9	18.4
- Femur width	4.5	4.8	3.4	3.6	5.7	7.1
- Patella length	13.8	13.2	10.3	10.7	15.2	18.1
- Patella width	6.3	6.6	4.5	4.7	7.1	9.7
- Chela length	27.4	25.6	20.9	21.5	33.8	39.1
- Chela width	9.5	9.0	6.0	7.5	8.4	11.4
- Chela depth	7.2	6.9	5.0	5.3	6.4	8.2
Movable finger:						
- length	15.2	14.2	11.8	11.9	18.2	19.2

* Values for the adult male described in this paper

** In the paper by Lourenço and Goodman (2002) it was suggested that if allometric values were similar between the *H. magnus* and the other two species of *Heteroscorpion*, adult males of *H. magnus* would reach a total length of 180.0 to 186.0 mm. These values are confirmed at present.

Confirmed key to the species of *Heteroscorpion*

- 1 Scorpions of large size, adults ranging from 110 to 187 mm in total length; coloration reddish-brown; patella with 10 to 19 trichobothria 2
- Scorpions of moderate to large size, adults ranging from 60 to 110 mm in total length; coloration, blackish; patella with 8-9 trichobothria *H. goodmani*

- 2 Adults ranging from 110 to 140 mm in total length; patella with 17-19 external trichobothria *H. opisthacanthoides*
- Adults ranging from 140 to 180 mm in total length; patella with 31-40 external trichobothria .. *H. magnus*

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Table II. Variation in pectinal tooth count in *H. magnus* with addition of the data from the six new specimens

Number of teeth	%%	&&
8	-	1
9	-	2
11	1	3
12	1	7
13	7	-
14	5	1
15	2	-

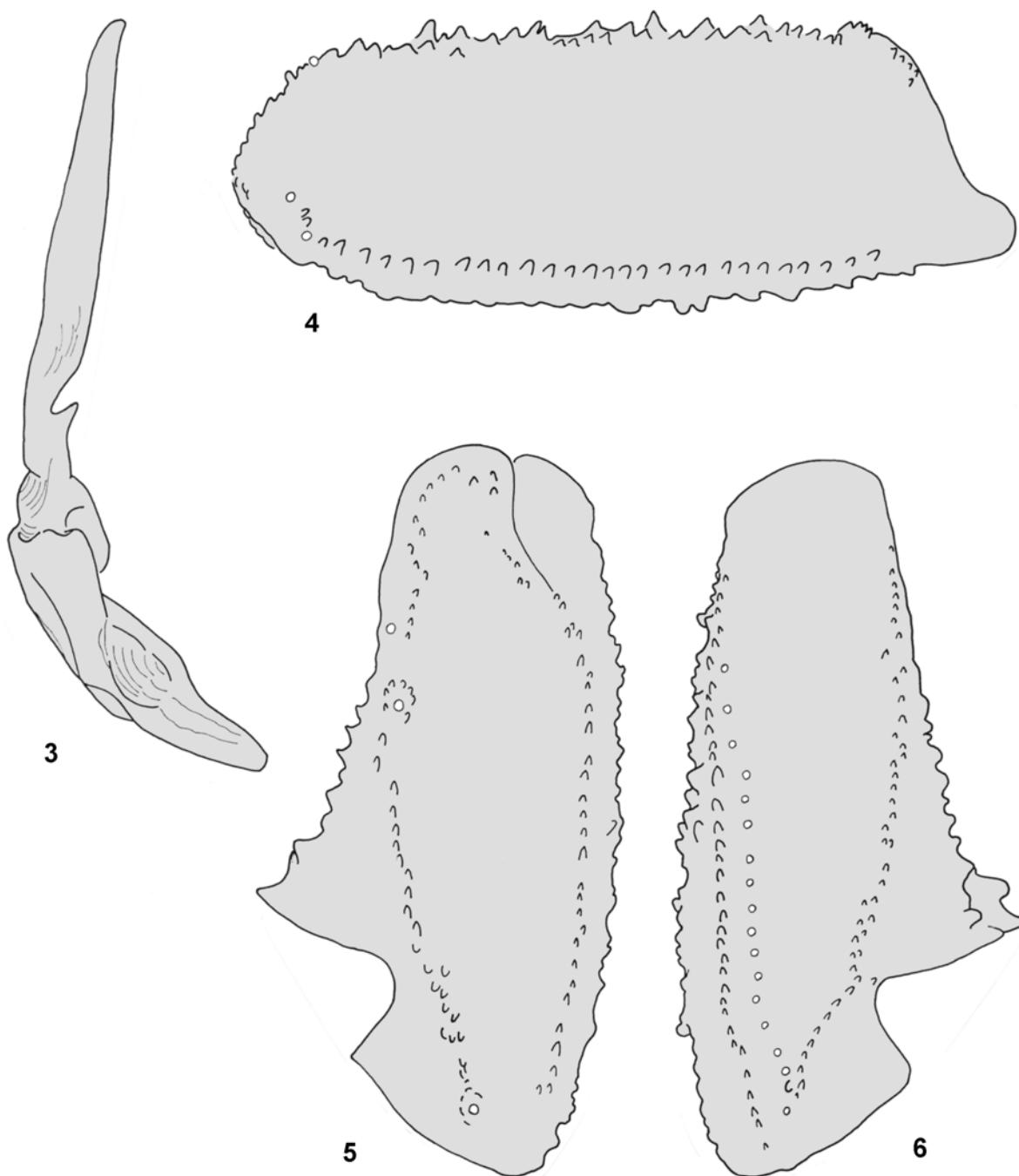


Fig. 3. Hemispermophore, external aspect. Schematic drawing.

Fig. 4-6: Trichobothrial pattern of the male of *Heteroscorpion magnus*. **4.** Femur, dorsal aspect. **5-6.** Patella, dorsal and ventral aspects.

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