

FIRST RECORD FOR THE GENUS *MESOBUTHUS* VACHON, 1950 IN ISRAEL: *MESOBUTHUS NIGROCINCTUS* (EHRENBERG, 1828), N. COMB. (SCORPIONES: BUTHIDAE) FROM MT. HERMON

VICTOR FET,^{*,*} BRENT E. HENDRIXSON,^b W. DAVID SISSOM,^b AND GERSHOM LEVY^c

^a*Department of Biological Sciences, Marshall University,
Huntington, West Virginia 25755-2510, USA*

^b*Department of Life, Earth, and Environmental Sciences,
West Texas A&M University, Canyon, Texas 79016, USA*

^c*Department of Evolution, Systematics and Ecology,
The Hebrew University of Jerusalem, Jerusalem 91904, Israel*

ABSTRACT

The first record for the genus *Mesobuthus* in Israel is herein reported based on adult specimens of *Mesobuthus nigrocinctus* (Ehrenberg, 1828), n. comb. (Scorpiones, Buthidae) from Mt. Hermon, the southernmost ridge of the Anti-Lebanon range. This species was originally described from a juvenile specimen from Lebanon, and for a long time was considered a synonym of *M. gibbosus* (Brullé, 1832). The species is redescribed, illustrated, and compared to *M. gibbosus*, its closest relative. Some comments on the fauna of Mt. Hermon are included.

INTRODUCTION

No species of *Mesobuthus* has been recorded from Israel, where a diverse scorpion fauna (Levy and Amitai, 1980) is represented by 16 species belonging to 9 genera and 3 families. Except for *Mesobuthus gibbosus* (Brullé, 1832), all other species of this genus, which currently includes 11 valid species (Fet and Lowe, 2000; Gantenbein et al., 2000), are strictly Asian, with their main center of diversity being Central Asia and Iran.

It was not clear until now which species, if any, is found in the Levant. Ehrenberg (in Hemprich and Ehrenberg, 1828; see also Hemprich and Ehrenberg, 1829, 1831) described *Androctonus nigrocinctus* from the mountains near Beirut on the basis of a single juvenile specimen (ZMB 139) (Braunwalder and Fet, 1998). Simon (1872) treated this species (as *Buthus nigrocinctus*) as valid; he studied another specimen collected by Brulerie from Beirut, but this was an adult (67 mm long). Simon observed that *B. nigrocinctus* differs from *Mesobuthus gibbosus* (then *Buthus gibbosus*) in the structure of the metasomal carinae. Kraepelin (1891, 1899), however, synonymized this species with *Buthus gibbosus* (although *B. nigrocinctus* was a senior synonym). All

*Author to whom correspondence should be addressed. E-mail: fet@marshall.edu

subsequent authors have followed this synonymy (Fet and Lowe, 2000), although Birula (1917) listed, under question, Ehrenberg's taxon as a separate species.

Currently, *M. gibbosus* is the only species of *Mesobuthus* Vachon, 1950 recognized to occur in the Mediterranean area. We have recently analyzed new *Mesobuthus* material from the collection of the Hebrew University of Jerusalem (HUJ) that was collected on Mt. Hermon in Israel. We have also studied the holotype (juvenile) specimen of *Androctonus nigrocinctus* Ehrenberg from the Zoölogisches Museums Berlin (ZMB) and comparative material of *M. gibbosus* originating from Macedonia, Greece, and Turkey (a total of eight males and ten females). This analysis revealed that the Mt. Hermon specimens are conspecific with Ehrenberg's type, but differ from *M. gibbosus* in a number of characters that justify species status for this form. Therefore, we revalidate Ehrenberg's species and place it in the genus *Mesobuthus* Vachon, 1950.

TAXONOMY

Mesobuthus nigrocinctus (Ehrenberg, 1828) (Figs. 1–9)

Androctonus (Prionurus) nigrocinctus Ehrenberg in Hemprich and Ehrenberg, 1828, pl. II, fig. 3. Juvenile holotype (ZMB 139) from the "mountains near Beirut", Lebanon, 1825 (F. W. Hemprich and C. G. Ehrenberg).

Androctonus (Prionurus) nigrocinctus: Hemprich and Ehrenberg, 1829:357; Hemprich and Ehrenberg, 1831 (pages unnumbered); Moritz and Fischer, 1980:320.

Buthus nigrocinctus: Simon, 1872:249–250; Birula, 1917:229 (under doubt).

Buthus gibbosus (part): Kraepelin, 1891:51–54; Kraepelin, 1899:23.

?*Mesobuthus* sp.: Kinzelbach, 1984: 56; Kabakibi et al., 1999:79.

?*Mesobuthus gibbosus* ssp. (?): Kinzelbach, 1985: map II, "undescribed subspecies".

REDESCRIPTION

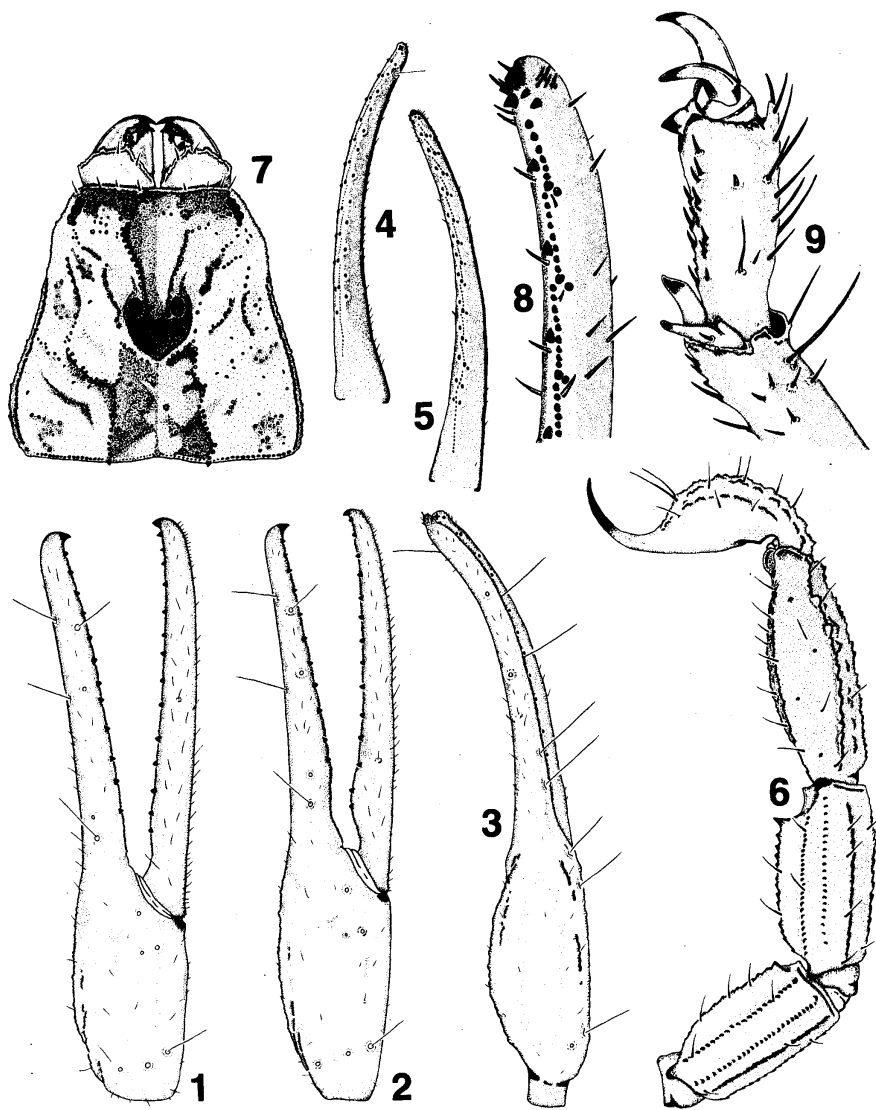
The following redescription is based on the adult male specimen HUJ 2536; morphological nomenclature and measurements utilized are from Sissom (1990).

COLORATION

Almost uniformly yellow-brown, except for anterior edge of carapace (Fig. 7), carapacial carinae (Fig. 7), and tergal carinae, which bear underlying dusky markings; legs slightly lighter than body; dorsal surface slightly darker than underside.

PROSOMA

Anterior margin of carapace weakly emarginate. Carapacial carinae well developed, typical of *Mesobuthus*; central median and posterior median carinae aligned, but not continuous (i.e., a slight gap occurs at their junction); anterior median carinae moderate, granular; central lateral, central median, and posterior median carinae moderate, den-



Figs. 1-9. External morphology of *Mesobuthus nigrocinctus* (Ehrenberg, 1828). Female: 1, right pedipalp chela, lateral (= external) aspect with trichobothrial pattern and absence of scalloping of fingers indicated. Male: 2, right pedipalp chela, lateral aspect with trichobothrial pattern and weak scalloping of fingers indicated; 3, right pedipalp chela, dorsal aspect with trichobothrial pattern and slenderness of palm indicated; 4, cutting margin of right pedipalp chela fixed finger, showing dentition; 5, cutting margin of right pedipalp chela movable finger, showing dentition; 6, metasomal segments III-V and telson, showing carinal structure, left lateral aspect; 7, carapace and chelicerae, dorsal aspect; 8, enlarged view of distal end of right pedipalp chela movable finger, showing terminal dentition; 9, tarsi of right leg III, showing rows of spines, prolateral aspect.

ticulate with the latter terminating distally in a small spinoid process that extends just slightly beyond the posterior margin of the carapace. Intercarinal spaces moderately coarsely granular.

MESOSOMA

Tergites I–VI tricarinate. Lateral carinae on I weak to moderate, granular; on II–VI moderate to strong, crenulate; each carina terminating distally with a spinoid process that extends slightly beyond posterior margin of tergite. Median carinae on I weak to moderate, crenulate; on II–VI moderate to strong, crenulate; on each segment terminating distally with a spinoid process that extends slightly beyond the posterior margin of the tergite. Tergite VII pentacarinata, with lateral pairs moderate to strong, serratocrenulate; median carinae present on proximal one-half, weak to moderate, irregularly granular. Intercarinal spaces coarsely granular. Sternites: lateral margins on sternite III smooth; on IV–VI, weak, finely serrate; on VII moderate, serratocrenulate. Lateral carinae absent on sternite III; faint to weak, smooth on sternites IV–VI; moderate, finely crenulate on VII. Submedian carinae on sternites III–VI absent; on VII moderate, finely serrate. Pectines long, reaching beyond the coxa-trochanter joint of leg IV; pectinal tooth count 28–29.

METASOMA

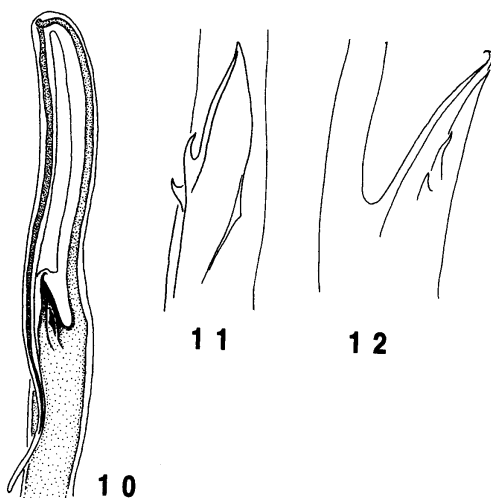
Segments I–IV decacarinata. Dorsolateral carinae strong, coarsely serrate; terminating distally in one to several enlarged denticles, especially on III–IV. Lateral supramedian carinae moderate, crenulate; terminating distally with somewhat enlarged denticle, especially on III–IV. Lateral inframedian carinae on I–III moderate to strong, irregularly crenulate; present on IV on the posterior four-fifths, irregularly crenulate. Ventrolateral carinae moderate to strong, crenulate. Ventral submedian carinae on I–II moderate, smooth to irregularly crenulate; on III moderate to strong, irregularly crenulate; on IV moderate to strong, serratocrenulate. Segment V heptacarinata. Dorsolateral carinae moderate, crenulate. Lateromedian carinae indicated by row of irregularly spaced granules. Ventrolateral carinae moderate to strong, serratocrenulate; granules increasing in size posteriorly with several large distal lobate denticles. Ventromedian carina strong, serratocrenulate. Dorsal furrow of all segments well developed, granular; intercarinal spaces coarsely granular; ventral aspect of segment V with sparsely placed strong, coarse denticles. Anal lobe with three teeth.

TELSON

Ventral aspect with median and paired lateral rows of coarse denticles, these often subspinoid. Subaculear tubercle somewhat elevated, but inconspicuous, flanked by two large setae.

CHELICERAE

With two denticles at the base of the ventral aspect of the fixed finger.



Figs. 10–12. Hemispermatophore of *Mesobuthus nigrocinctus* (terminology according to Lamoral, 1979): 10, ventral aspect of right hemispermatophore; 11, ventral aspect of hemispermatophoric lobes; 12, dorsal aspect of hemispermatophoric lobes.

PEDIPALPS

Trichobothrial pattern orthobothriotaxic, type A (Vachon, 1974); dorsal trichobothria of femur in beta configuration (Vachon, 1975). Femur pentacarinat; all carinae moderate, crenulate. Patella octocarinat; dorsoexternal carinae weak to moderate, smooth to irregularly granular; dorsointernal, dorsal median, externomedian, ventroexternal, and ventromedian carinae moderate, irregularly granular to granular; ventrointernal and inner carinae moderate, crenulate. Chela slender (length/width = 5.35), with elongate fingers. All carinae feebly to weakly granular. Dentate margins composed of 12 oblique rows of granules on the fixed finger (Fig. 4); an apical cluster of four granules at the base of the terminal denticle (Fig. 8) followed by 12 oblique granular rows on the movable finger (Fig. 5). Basal lobe (scalloping) weakly developed. Trichobothria *et* and *est* situated just distal to the fifth, and between the seventh and eighth outer accessory denticle, respectively.

LEGS

Ventral aspect of tarsi with two rows of spines. Tibial spurs present on legs III–IV. Prolateral pedal spur bifurcate (Fig. 9).

Hemispermatophore (Figs. 10–12): typical of genus and family (flagelliform), without distinct pars reflexa (i.e., the flagellum is not secondarily reflexed near its tip); basal and medial lobes uncinat, not swollen at base (Figs. 11,12).

MEASUREMENTS (mm)

Total body length 59.0; carapace length 6.2; pedipalp: femur length 6.5; patella length 7.5; palm length 5.0; width 2.3; fixed finger length 7.3; movable finger length 8.4;

Table 1
Morphometric ratios of pedipalps in *M. nigrocinctus* compared to *M. gibbosus* (abbreviations as in Sissom, 1990: Cl = chela length, Cw = chela width, FFI = fixed finger length)

	<i>M. nigrocinctus</i>			<i>M. gibbosus</i>		
	mean	SD	n	mean	SD	n
<i>females</i>			1			10
Cl/Cw	5.04	–		4.45	0.43	
FFI/Cw	0.66	–		0.66	0.01	
<i>males</i>			4			8
Cl/Cw	5.43	0.07		4.44	0.29	
FFI/Cw	0.65	0.03		0.62	0.02	

total mesosoma length 14.6; mesosomal tergites length: I, 0.9; II, 1.2; III, 1.5; IV, 2.0; V, 2.3; VI, 2.7; VII, 4.0; total metasoma length 38.2; metasomal segments (length/width/depth): I, 4.7/4.0/3.4; II, 5.5/3.6/3.3; III, 6.0/3.6/3.0; IV, 6.5/3.4/3.0; V, 8.0/3.0/2.5; telson length/width/depth 7.5/2.8/2.5.

DIAGNOSIS

Analysis of the specimens from Mt. Hermon and comparison to *M. gibbosus* from across the range of this species (Macedonia, Greece, and Turkey) revealed several consistent morphological differences: (a) the chela (Figs. 1–3) is very slender in both males and females of the Mt. Hermon specimens, and the ratio of length/width is significantly different from that observed in *M. gibbosus* (Table 1); (b) the number of outer accessory denticles on the pedipalp fingers is nearly always 12 on the fixed finger (Fig. 4) and 13 on the movable finger (Fig. 5) in *M. nigrocinctus*, whereas it is 11 on the fixed finger and 12 on the movable finger in *M. gibbosus*; (c) scalloping of the chela fingers is absent in females of *M. nigrocinctus* and weak in males (Figs. 1,2), but is moderately developed in *M. gibbosus* (more pronounced in males); (d) the dorsolateral (= dorsal of Levy and Amitai, 1980) carinae of metasoma I–IV are strong and coarsely crenulate to serrate in *M. nigrocinctus*, and on segments III–IV end in several enlarged spinoid denticles (in *M. gibbosus*, these carinae are moderate and irregularly granular to weakly crenulate); (e) the lateral inframedian carinae (= intermediary crests of Levy and Amitai, 1980) of metasomal segment IV of *M. nigrocinctus* are moderately developed and occur on the distal four-fifths of the segment (Fig. 6); in *M. gibbosus*, they are only weakly developed; (f) the hemispermaphore of *M. nigrocinctus* lacks a pars reflexa on the flagellum (present in *M. gibbosus* and *M. cyprius*; Gantenbein et al., 2000); (g) the basal and medial lobes of the hemispermaphore of *M. nigrocinctus* are uncinatate, each without an enlarged swollen area at its base (in *M. gibbosus* and *M. cyprius*, at least one or both of the lobes are swollen at the base; in some populations of *M. gibbosus*, the termination of these lobes of these species is blunt, rather than sharply pointed; Gantenbein et al., 2000).

VARIATION

Adult females are apparently slightly larger than males, with the adult female measuring approximately 65.0 mm in total length. Other morphometric variation is summarized in Table 1. Some of the specimens of *M. nigrocinctus* have the ventral spines of the leg tarsi more setiform than shown in the male specimen that was illustrated. Male pectinal tooth counts ($n = 5$) ranged from 27 to 31, with variation as follows: there was one comb with 27 teeth, 2 combs with 28 teeth, 2 combs with 29 teeth, four combs with 30 teeth, and one comb with 31 teeth. For females ($n = 2$), counts ranged from 21 to 24, with variation as follows: there was one comb with 21 teeth, one with 22 teeth, one with 23 teeth, and one with 24 teeth.

MATERIAL EXAMINED

LEBANON: "mountains near Beirut", 1824, F.W. Hemprich and C.G. Ehrenberg (holotype, 1 juv., ZMB 139); ISRAEL: Mt. Hermon, 1400 m, 3.v.1979, D. Simon (1 male, HJ 2531); Mt. Hermon, 1700 m, 21.vi.1987, M. Broza (1 male, HJ 2534); Mt. Hermon, 1300 m, 25.iii.1984, M. Broza (1 male, HJ 2535); Mt. Hermon, 1600 m, 21.vi.1987, M. Broza (1 male, 1 juv., HJ 2536); Mt. Hermon, 1400 m, 7.vii.1987, G. Levy (1 female, 1 juv., HJ 2537).

DISTRIBUTION

Known only from the Anti-Lebanon range in Lebanon and Israel.

DISCUSSION

In our opinion, the differences listed above justify a separate species status for the Mt. Hermon form, which will have the valid name *Mesobuthus nigrocinctus* (Ehrenberg, 1828), n. comb.

It was previously accepted (Kinzelbach, 1985; Fet and Lowe, 2000) that the geographical range of *M. gibbosus* extended south to Lebanon and Syria. Given that these earlier records were certainly based on *M. nigrocinctus* (and in part confirmed), there are now no existing collections which actually confirm the presence of *M. gibbosus* in this area. The wide range of *M. gibbosus* includes the southern Balkan Peninsula (Albania, Montenegro, Macedonia, Greece), the entire Aegean Archipelago, and Turkey (Fet and Lowe, 2000). The Cyprus population was recently elevated to a separate new species, *M. cyprius* (Gantenbein et al., 2000).

Mt. Hermon is the southernmost ridge of the isolated Anti-Lebanon mountain range, which rises to 2814 m in Syria north of Israel. *Mesobuthus nigrocinctus* from Mt. Hermon is found thus far only at altitudes from 1300 to 1700 m, in areas with sparse vegetation (rocky terrain with remnants of trees and shrubs that withstand low temperatures and high winds). This habitat, in which *Compsobuthus wernerii schmiedeknechti* and *Scorpio maurus fuscus* are also found, differs from all others in which scorpions have been collected in Israel (Levy and Amitai, 1980). It is not unusual, however, for the other *Mesobuthus* species that have been collected from the Balkans to China. Many of

these have been found in a variety of habitats, some with very harsh climatic conditions in mountainous regions above 2000 m (Fet, 1994; Fet and Lowe, 2000). Other species known only from Mt. Hermon include two theridiid spiders, *Theridion hermonense* and *Steatoda trianguloides*, and a geckonid lizard, *Tenuidactylus (Mediodactylus) amictopholis* (Levy, 1991; Szczerbak and Golubev, 1996). Recent data on reptiles and birds of Mt. Hermon are summarized by Nathan and Werner (1999).

A "*Mesobuthus* sp." was listed for the Anti-Lebanon range in Syria (Homs) by Kinzelbach (1984), and most recently by Kabakibi et al. (1999) from Sarghaya. These records most likely belong to the same species as the Mt. Hermon specimens. If this is confirmed, *M. nigrocinctus* would be distributed throughout the entire Lebanon and Anti-Lebanon ranges.

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- sepositis insectis quae ex itinere per Africam borealem et Asiam occidentalem. Friderici Guilelmi Hemprich et Christiani Godofredi Ehrenberg, medicinae et chirurgiae doctorum, studio novae aut illustratae redierunt. Percensuit et regis iussu et impensis edidit Dr. C.G. Ehrenberg. Decas prima. Berolini ex Officina Academica, Venditur a Mittlero (plates).
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