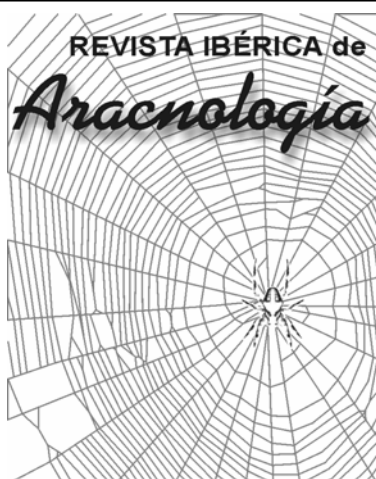




ARTÍCULO:

Redescription of *Mesobuthus martensii martensii* (Karsch, 1879) (Scorpiones: Buthidae) from China

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ARTÍCULO:

REDESCRIPTION OF *MESOBUTHUS MARTENSII MARTENSII* (KARSCH, 1879) (SCORPIONES: BUTHIDAE) FROM CHINA

Jian-Xin Qi, Ming-Sheng Zhu & Wilson R. Lourenço

Abstract:

The buthid scorpion *Mesobuthus martensii martensii* (Karsch, 1879) is redescribed, based on material collected in several regions of China. Modern standard characters such as the trichobothrial pattern and the morphology of the male paraxial organ are illustrated for the first time. The original series used by Simón (1880) to describe *Buthus confucius* (= *Mesobuthus confucius*), is examined, and syntypes are proposed for this junior synonym of *M. martensii*. New data is also added on the ecology and geographical distribution of the species in China.

Key words: Scorpiones, Buthidae, *Mesobuthus*, redescription, China.

Redescripción de *Mesobuthus martensii martensii* (Karsch, 1879) (Scorpiones: Buthidae) de China

Resumen:

Se redescrive el escorpión bútido *Mesobuthus martensii martensii* (Karsch, 1879) a partir de material colectado en varias regiones de China. Se ilustran por primera vez los caracteres habituales modernos, como la estructura tricobotrial y la morfología del órgano paraxial masculino. Se ha examinado la serie original usada por Simón (1880) para describir *Buthus confucius* (= *Mesobuthus confucius*), y se proponen sintipos para este sinónimo posterior de *M. martensii*. Se aportan nuevos datos sobre la ecología y la distribución geográfica de las especies en China.

Palabras clave: Scorpiones, Buthidae, *Mesobuthus*, redescrípción, China.

Introduction

The buthid scorpion *Mesobuthus martensii martensii* was originally described by Karsch (1879) as *Buthus martensii*, based on a single male specimen, presumably collected in Singapore by Prof. de Martens. Subsequently, Simon (1880) described a new species from China, *Buthus confucius*, on the basis of a large series of specimens collected by V. Collin de Planey in the region of Pekin (today Beijing). According to Simon (1880), specimens of the new species were abundant in the rocks of the island of Tchefou and also in the gardens of the summer palace at Pekin. Simon (1880) did not formerly designated types, as he often used to do. Shortly after, Karsch (1881) in a paper dealing with Millepedes and Arachnida from China, suggested without any explanation that *Buthus confucius* might be a synonym of *Buthus martensii*.

Several years later, Wu (1936) reported on two families, four genera and four species of scorpion from China, based mainly on the material deposited in the Chinese Academy of Sciences. Among these species he identified *Buthus martensii*. Kishida (1939) redescribed *Buthus martensii* in a more detailed manner than previously, also including illustrations which were absent from the publications of both Karsch (1879) and Simon (1880). Kishida based his redescription mainly on material collected in the northeast of China. He also suggested that the type specimen of *B. martensii* could not have Singapore as its type locality, and that this claim by Karsch (1879) was almost certainly due to mislabelling.

The genus *Buthus* Leach, comprising species distributed in Africa, the Middle East and Asia, remained undivided for a long period of time. Vachon (1950) decided to divide *Buthus* into several new genera, including *Mesobuthus*. In this genus he accommodated the Asian species including *B. martensii* and *B. confucius* previously included in *Buthus*. For a more detailed history of the genus *Buthus*, see Lourenço (2003).

According to Fet & Lowe (2000), in the Catalog of the Scorpions of the World, *Mesobuthus* now comprises eleven species and twenty one subspecies from the Middle East and Asia. However, some of these are of dubious validity. Four species or subspecies have been recorded from China. Because a global inventory of the Chinese scorpion fauna is now being

compiled by the senior author (JXQ), a new redescription of *Mesobuthus martensii martensii* appears appropriate. Modern standard characters, such as trichobothrial pattern and morphology of the male paraxial organ, are illustrated for the first time here. *Mesobuthus martensii martensii* is a rather common scorpion in eastern regions of China such as Inner Mongolia, Beijing and Liaoning Province. Its presence has also been recorded in Korea, Mongolia and Japan (where it has been introduced). *Mesobuthus martensii martensii* is an important component of the traditional Chinese medicine.

The material used by SIMON (1880) for the description of *B. confucius* has been examined, and is designated here as syntypes (MNHN-RS-2283 – E. Simon collection N° 2797). The status of *M. martensii martensii*, *Mesobuthus martensii hainanensis* (Birula, 1904) and *Mesobuthus eupeus mongolicus* (Birula, 1911), and *Mesobuthus eupeus thersites* (C.L. Koch, 1839) is also discussed.

Taxonomic treatment

Mesobuthus martensii martensii (Karsch, 1879)

Figs. 1 to 18.

Buthus martensii Karsch, 1879: 112-113.

Buthus confucius Simon, 1880: 124-125. (synonymized by Karsch, 1881: 219).

Buthus martensi: Kraepelin, 1899: 25-26.

Buthus martensi: Wu, 1936: 115-117.

Buthus martensii: Kishida, 1939: 51-67, pl. I-IV.

Mesobuthus martensi: Vachon, 1950: 153.

MATERIAL EXAMINED: China: Beipiao of Liaoning Prov., 30 Jul. 2003 (Zhang Feng and Dong Shao-jie), 9♀4♂; Yangquan of Shanxi Prov., 3 May. 2004 (Zhao Sheng-juan), 1♀2juv.; Huhehaote of the Inner Mongolia Autonomous Region, Jul. 1983 (Wu Li-ta), 4♀4♂1juv.; Chicheng of Hebei Prov., 2 Oct. 2002 (Zhang Zhi-sheng), 2♀3juv.; Longhua of Hebei Prov., 14 Jun. 2004 (Lian Wei-guang), 5♀2♂; Handan of Hebei Prov., (collector and date not detailed), 4♀1♂; Laishui of Hebei Prov., 28 Jun. 2004 (Song Jian), 20♀7♂; Xiong of Hebei Prov., 20 Jul. 2004 (Fan Chao-ying), 3♀2♂; Zhuolu of Hebei Prov., 10 Jul. 2004 (Zhang Feng), 21♀5♂; Baligou of Henan Prov., 12 Jul. 2004 (Zhu Ming-sheng), 3♀2♂; all specimens are deposited in the arachnology laboratory, The College of Life Sciences, Hebei University, Peking, China.

(*Buthus confucius* Simon, 1880, MNHN-RS-2283 – Simon collection N° 2797), Island of Tchefou and Peking (Beijing), 1877-1879 (V. Collin de Planey), 28♀16♂, 18 juveniles (herewith designated syntypes).

Obs: The type specimen of *Buthus martensii* Karsch deposited in the ZMB, Berlin, was not available for examination during our study.

DIAGNOSIS: Scorpions of moderate size. Males reaching 53 mm and females 60 mm in total length. General coloration yellowish to reddish-yellow with some darker brownish zones on tergites; metasomal segment V with

a conspicuous dark spot which covers all faces of the segment. Carinae and granulations moderately to weakly marked on carapace, tergites and metasomal segments. Pectinal tooth count 21-26 in males and 17-22 in females. Trichobothrial pattern of type A, orthobothriotaxic; dorsal trichobothria of femur arranged in β (beta) configuration (Vachon, 1974, 1975).

DESCRIPTION based on both males and females.

Measurements in Table I.

Coloration. Basically yellowish to reddish-yellow with some darker confluent zones on tergites; more intense on females. Prosoma: carapace reddish-yellow to light brown; eyes surrounded by black pigment. Mesosoma: reddish-yellow with brownish confluent over tergites I to VI. Metasoma: segments I to V yellowish; segment V with a conspicuous dark spot which covers all faces of the segment; telson yellowish; aculeus reddish-yellow, with a darker extremity. Venter yellowish, except for pectines which are pale yellow. Chelicerae yellowish without any variegated spots; fingers yellowish with reddish teeth. Pedipalps: femur and patella yellowish; chela reddish-yellow; chela fingers with the oblique rows of granules dark, almost blackish. Legs yellowish without spots.

Morphology. Prosoma: Anterior margin of carapace weakly emarginate. Carapace carinae moderately developed; better marked in females; anterior median, central median and posterior median carinae moderate; central lateral and posterior lateral reduced; posterior median carinae terminating distally in a small spinoid process that extends slightly beyond the posterior margin of the carapace. Intercarinal spaces somewhat coarsely granular, more intensely marked in females. All furrows moderately marked. Median ocular tubercle only slightly anterior to the centre of the carapace; median eyes separated by one and a half ocular diameter. Three pairs of lateral eyes. Mesosoma: Tergites I-VI tricarinate. Lateral carinae on I-VI moderate to strong, granular; each carina terminating distally in a spinoid process that extends slightly beyond the posterior margin of the tergite. Median carinae on I weak to moderate; on II-VI moderate to strong, crenulated; terminating distally on each segment in a spinoid process that extends slightly beyond the posterior margin of the tergite. Tergite VII pentacarinate, with lateral pairs of carinae moderate to strong; median carinae present on proximal half, moderate. Intercarinal spaces weakly to moderately granular in males, strongly granular in females. Sternites: Lateral carinae absent from sternite III; weak on sternites IV-V; moderate, finely crenulate on VI-VII. Submedian carinae on sternites III-IV absent; on VI-VII moderate; all carinae more marked in males. Pectines moderately long; pectinal tooth count 21 to 26 in males, 17 to 22 in females. Metasoma: Segments I to III with 10 carinae, crenulated in females, less marked in males; segment IV with eight carinae, crenulate. Dorsal carinae moderate to strong, terminating distally in one or two more enlarged denticles, especially on II to IV. Ventral carinae moderate on segments I to IV. Segment V with

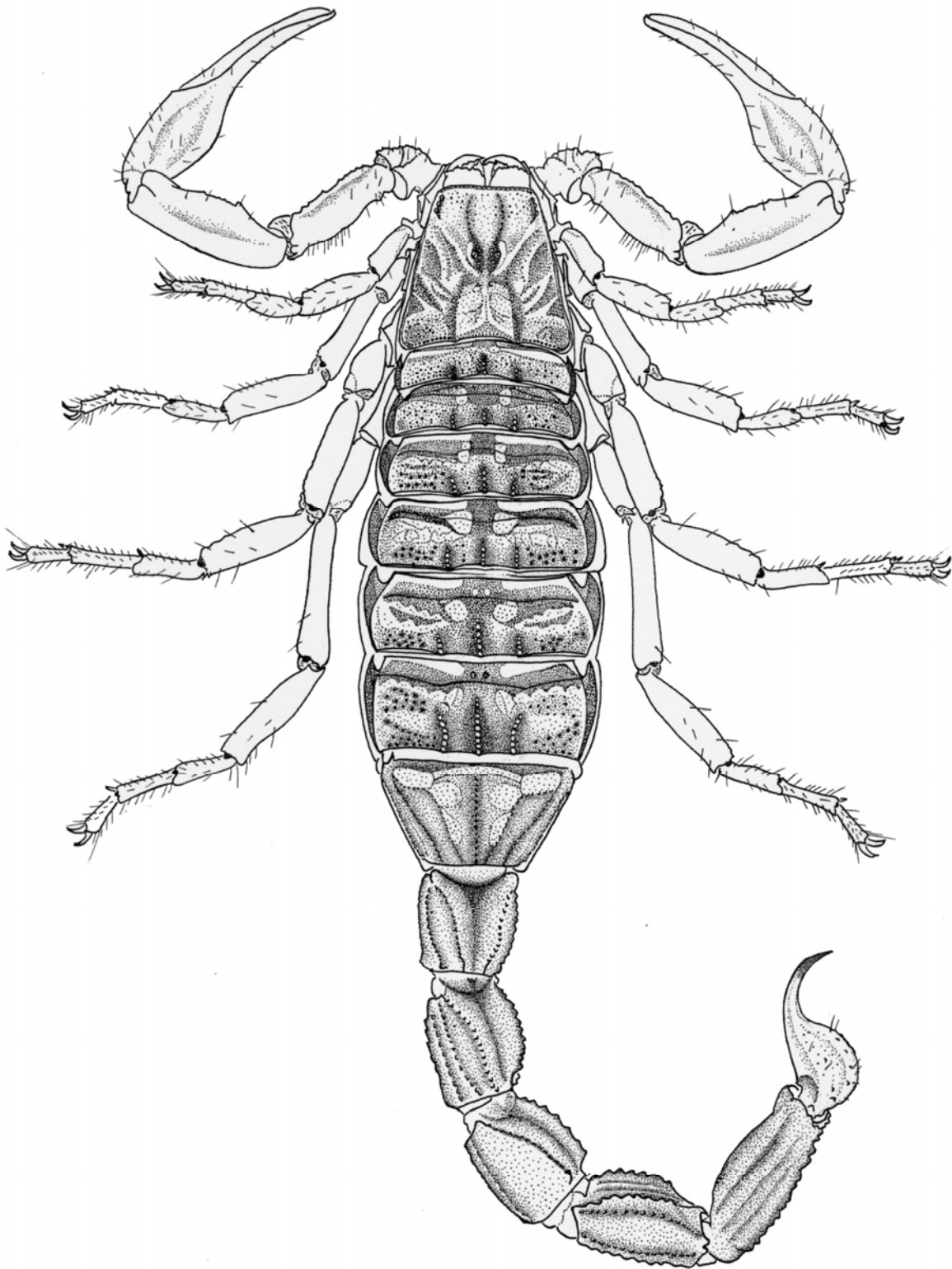
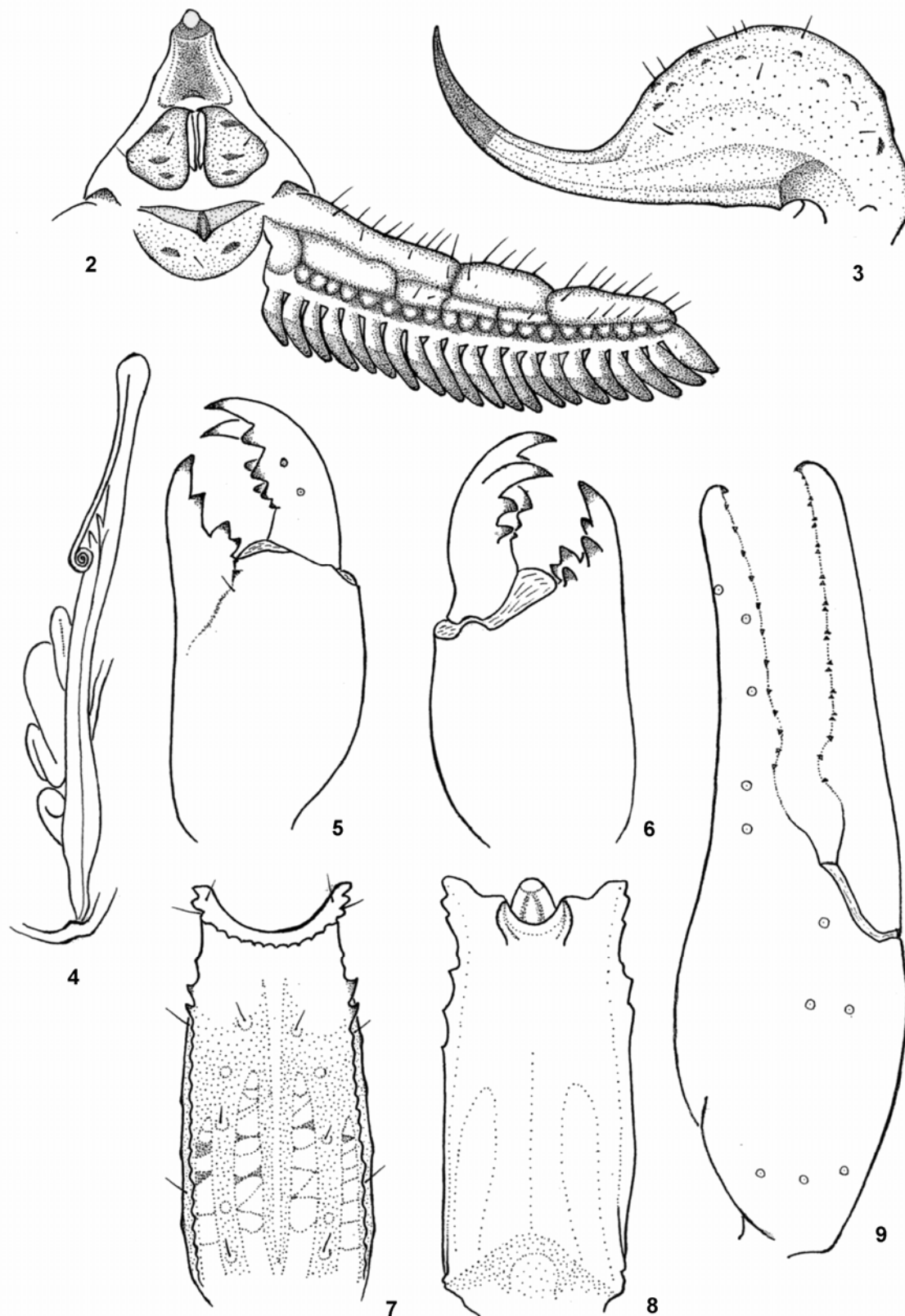
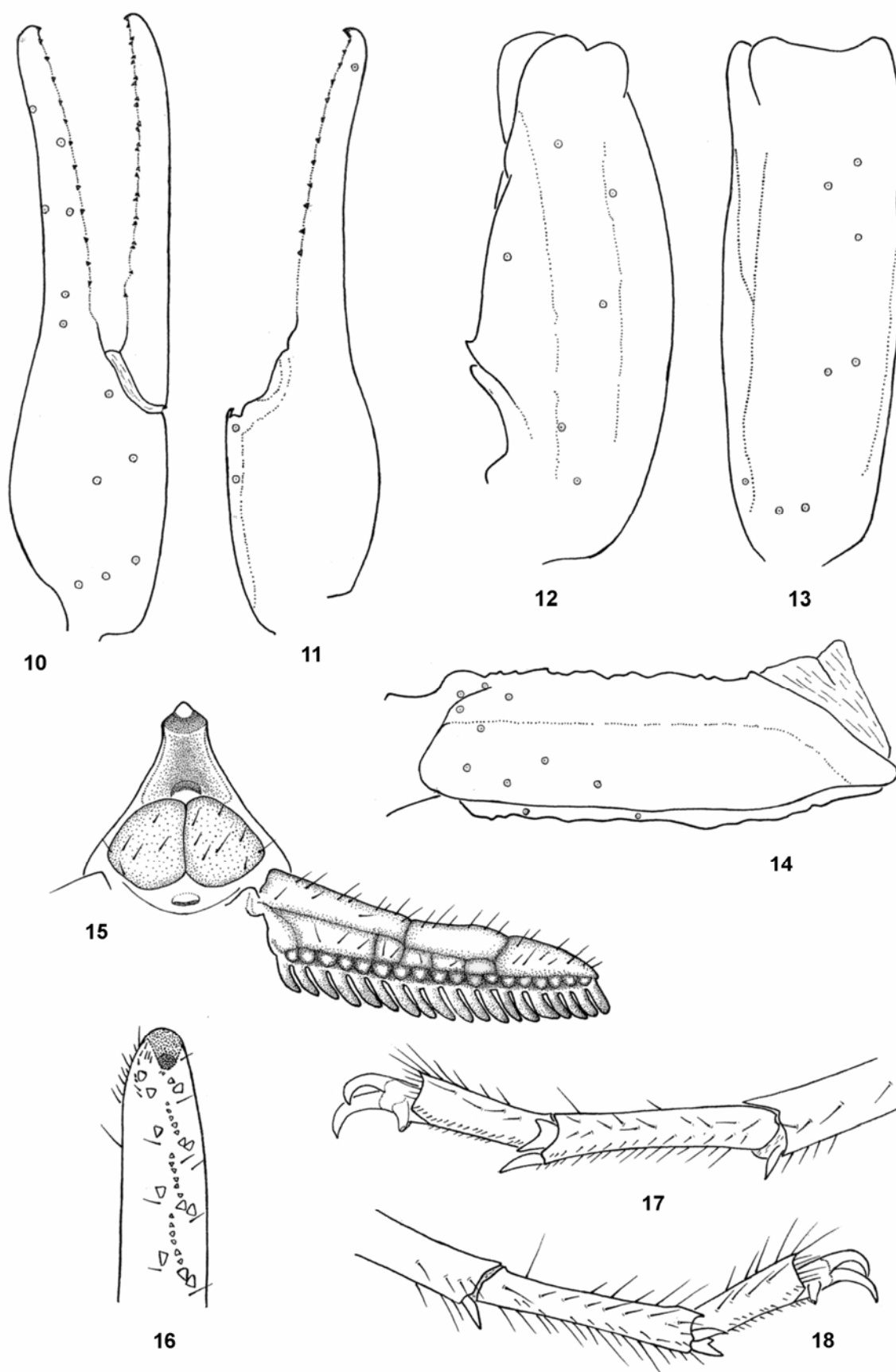


Fig. 1. *Mesobuthus martensii martensii* (Karsch). Female from Liao-ning. Habitus.



Figs. 2-9. *M. martensii martensii*. Male from Liao-ning. 2. Sternum, genital operculum and pecten. 3. Telson, lateral aspect. 4. Paraxial organ. 5-6. Chelicera, dorsal and ventral aspects. 7-8. Metasomal segment V, ventral and dorsal aspects. 9. Chela, dorso-external aspect, showing trichobothria.



Figs. 10-18. *M. martensii martensii*. Female from Liao-ning. **10-14.** Trichobothrial pattern. **10-11.** Chela, dorso-external and ventral-internal aspects. **12-13.** Patella, dorsal and external aspects. **14.** Femur, dorsal aspect. **15.** Sternum, genital operculum and pecten. **16.** Distal edge of movable finger. **17-18.** Legs III and IV, showing pedal and tibial spurs.

five carinae; ventral and ventro-lateral strong with slightly spinoid granules distally. Anal arc with two lateral lobes. Dorsal furrow in all segments moderately developed; smooth in males, weakly granulated in females; intercarinal spaces weakly granular in segments I to IV; segment V with some strong granules. Telson weakly granular, almost smooth; subaculear tubercle absent. Chelicerae, with dentition characteristic of the family Buthidae (see Vachon, 1963), with two very reduced denticles at the base of the ventral aspect of the movable finger. Pedipalps. Femur pentacarinat; all carinae moderately crenulate. Tibia with seven carinae, weak to moderate; dorsointernal carinae with one proximal spinoid granule. Chela slender in females with moderately elongated fingers; males with a more globular chela hand, and fingers shorter than those of females; movable finger with a strong basal tubercle, absent in females; all carinae vestigial. Dentate margins on fixed and movable fingers composed of 12 oblique rows of granules. Trichobothriotaxy: Trichobothrial pattern of Type A, orthobothriotaxic as defined by Vachon (1974). Dorsal trichobothria of femur arranged in β (beta) configuration (Vachon, 1975). Legs: Ventral aspect of tarsi with two rows of setae. Tibial spurs present on legs III and IV, strong; prolateral and retrolateral spurs present in all legs.

Male paraxial organ, as in figure 4.

Table I. Morphometric values (in mm) of male and Female of *Mesobuthus martensii martensii*

	♂♂	♀♀
Total length	51.3	56.9
Carapace:		
length	5.4	6.0
anterior width	2.7	3.3
posterior width	6.2	6.9
Metasomal segment I:		
length	3.7	4.0
width	3.3	3.8
Metasomal segment V:		
length	6.6	6.6
width	2.6	3.1
depth	2.3	2.4
Pedipalp:		
Femur length	4.5	4.8
Femur width	1.1	1.5
Patella length	5.4	5.7
Patella width	2.1	2.3
Chela length	10.1	11.5
Chela width	2.9	2.6
Chela depth	2.4	2.4
Movable finger:		
length	5.0	6.4
Pectinal tooth count	21-21	19-19

VARIATION IN COLORATION. Variation in the colour pattern was observed in scorpions collected in different regions within the global area of distribution. For example, the specimens collected in Longhua in Hebei Province, show very dark brown tergites, while those from Baligou in Henan Province have dark mahogany coloured tergites. In other regions, scorpions may show yellowish to pale yellow tergites.

ECOLOGICAL ASPECTS. *Mesobuthus martensii martensii* is usually found in subtropical arid environments, and on hills with open vegetation formations. It can also be present near human habitations, in gardens, cracks in house's walls and burrows in the ground (Song, 1998; Song *et al.*, 1982).

DISTRIBUTION. *Mesobuthus martensii martensii* has a wide range of distribution in eastern China (see map, Fig. 19), and can be found in Inner Mongolia, Liaoning, Beijing, Hebei, Shandong, Henan, Shanxi, Hubei, Anhui, Jiangsu and Fujian Province. The species is also present in Mongolia, Korea, and in Japan where it was introduced.

Discussion

According to Fet & Lowe (2000), only four species or subspecies of *Mesobuthus* are represented in China: namely, *Mesobuthus martensii martensii*, *Mesobuthus martensii hainanensis*, *Mesobuthus eupeus mongolicus* and *Mesobuthus eupeus thersites*. More recently, Gantenbein *et al.* (2003) synonymized genus *Olivierus* with *Mesobuthus*. Therefore, *Mesobuthus caucasicus* (with its two subspecies, *M. caucasicus intermedius* and *M. caucasicus przewalskii*) should be found in China. During our study, none of the type specimens of these subspecies were examined. Moreover, according to Fet & Lowe (2000) the type of *M. eupeus thersites* is probably lost.

As already mentioned, the composition of this large, predominantly Asian genus is not clear, and several of its species and subspecies have dubious validity (Fet & Lowe, 2000). Only further investigation will authorize a precise definition of the status of Chinese species and subspecies.

Stahnke (1967), presented a redescription of *M. eupeus mongolicus* based on the two female syntypes as well as on specimens collected from Alashan Plateau in Mongolia. From his redescription it appears that *M. martensii martensii* and *M. eupeus mongolicus* are distinct species. Moreover, the geographical distribution of both is different and their respective habitats are not similar either. The western region of Inner Mongolia in which *M. eupeus mongolicus* is distributed, is an arid environment, whereas the eastern part of Inner Mongolia is a wetter grassland environment.

Even if morphological differences can be determined for the Chinese species and subspecies of *Mesobuthus*, these are not sufficiently clear to separate populations precisely, since in many cases these are not stable. Polymorphic species have been defined within the Buthidae (Lourenço, 1988, 1994), and this could be the case for species of *Mesobuthus*. New approaches based on molecular techniques (allozyme and DNA data), will be of great help in the future to clarify the status of the different Chinese populations. These techniques have already shown their importance in clarification of the status of European populations of *Mesobuthus* (Gantenbein *et al.*, 2000).

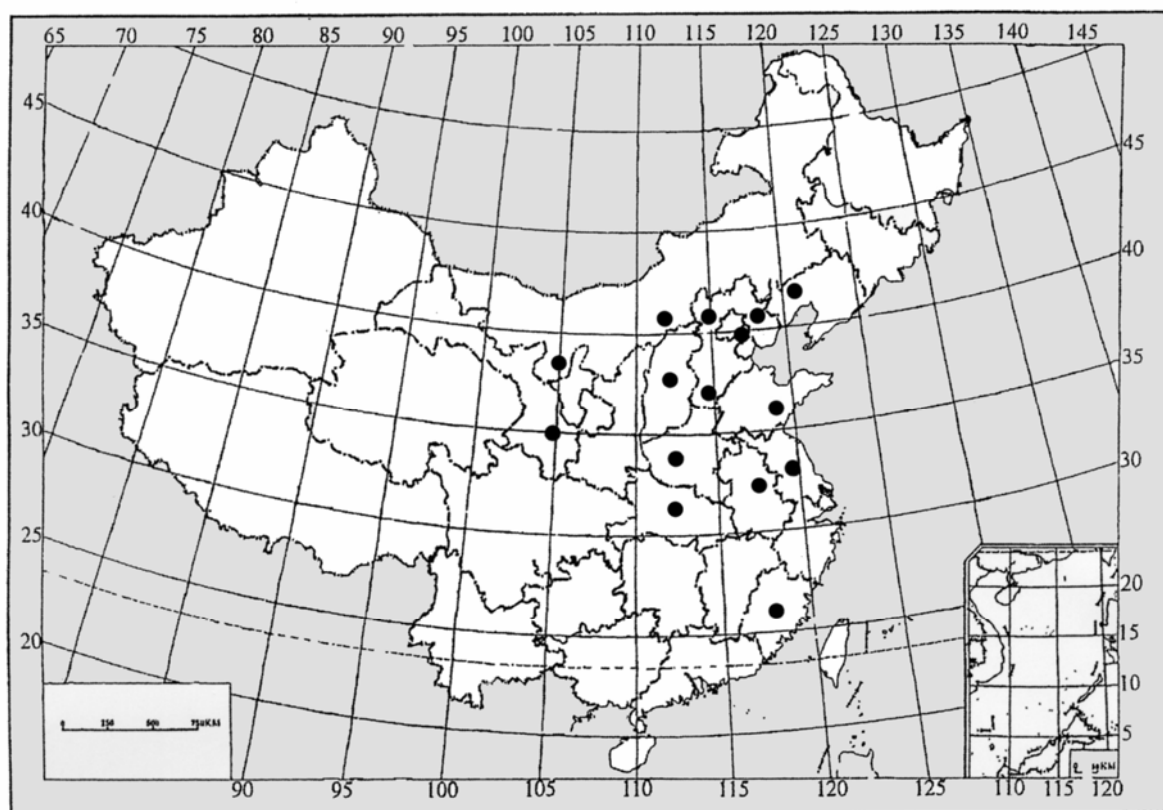


Fig. 19. Map of the distribution of *Mesobuthus martensii martensii* in China.

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