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FURTHER TAXONOMIC CONSIDERATIONS ON THE GENUS *BUTHOSCORPIO* WERNER, 1936 (SCORPIONES, BUTHIDAE), WITH DESCRIPTION OF A NEW SPECIES FROM INDIA

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Abstract: Considerations regarding the taxonomy and distribution of the species belonging to the genus *Buthoscorpio* Werner, 1936 are proposed. A revised redescription is proposed for *Buthoscorpio sarasinorum* (Karsch, 1891) and a new species, *Buthoscorpio indicus* **sp. n.**, is described from north-central India. Even with the description of this new species, *Buthoscorpio* remains a very enigmatic genus with a limited range of distribution in India and Sri Lanka. The total number of known species in this genus is raised to four: three in India and one in Sri Lanka.
Key words: Scorpiones, Buthidae, *Buthoscorpio*, new species, India.

Nuevas consideraciones taxonómicas sobre el género *Buthoscorpio* Werner, 1936 (Scorpiones, Buthidae), y descripción de una especie nueva de la India
Resumen: Se analizan la taxonomía y distribución de las especies del género *Buthoscorpio* Werner, 1936, se redescribe *Buthoscorpio sarasinorum* (Karsch, 1891), y se describe una especie nueva, *Buthoscorpio indicus* **sp. n.**, del norte de la India central. Aún después de describir esta especie nueva, *Buthoscorpio* sigue siendo un género sumamente enigmático, con un área de distribución restringida a la India y Sri Lanka. El número total de especies conocidas de este género se eleva ahora a cuatro: tres de la India y una de Sri Lanka.
Palabras clave: Scorpiones, Buthidae, *Buthoscorpio*, especie nueva, India.

Taxonomy / Taxonomía: *Buthoscorpio indicus* **sp. n.**

Introduction

As already discussed by other authors (Fet & Lowe, 2000; Maqsood Javed *et al*., 2010), the history of the genus *Buthoscorpio* Werner, 1936 (=*Stenochirus* Karsch, 1891) is not precisely simple. In fact, originally the genus *Stenochirus* was created by Karsch (1891) based on a new species, *Stenochirus sarasinorum* Karsch, 1891, from Sri Lanka. Subsequently a second species was described from India, *Buthoscorpio politus* (Pocock, 1899) as *Stenochirus politus* (Pocock, 1899).

The two species were distinguished only by some minor differences, what lead Kraepelin (1913) to suggest that they probably were synonymous. Werner (1936) described *Buthoscorpio laevicauda* also from India, and placed the new species in the family Scorpionidae. The characteristics of *B. laevicauda* called the attention of Vachon (1961) who decided to revise the type specimen of this species. He concluded that *B. laevicauda* was in fact a synonym of *Buthoscorpio politus* (= *Stenochirus politus*). Vachon (1961) proposed a proper redescription for *B. politus* introducing new characters such as the trichobothrial pattern. In this same paper Vachon (1961) recall the difficulties to precisely distinguish the two known species of *Buthoscorpio* (= *Stenochirus*), and also made reference to one specimen collected in Central India and identified by Louis Fage as "*Stenochirus* (aff.) *sarasinorum*."

Some years later, Vachon (1982) in a study of the scorpions of Sri Lanka, proposed some comments about *Buthoscorpio sarasinorum*, based on a single female collected at Mullaittivu. He presented some clear illustrations, in particular of its trichobothrial patter, but has not redescribed the species. In his comments, Vachon (1982) stated again that both species were difficult to diagnose and suggested that they probably were synonymous. It is curious to notice that in this publication Vachon (1982) inverted the characters of the two species. In their fauna of India, Tikader & Bastawade (1983) confirmed the presence of both species in this country. The presence of *B. sarasinorum* in India, however, requires confirmation.

Francke (1985) discovered the homonymy of *Stenochirus* Karsch, 1892 with *Stenochirus* Oppel, 1862 (Crustacea) and proposed a new replacement name, *Pocockius* Francke, 1985. Subsequently, Fet (1997) demonstrated, however, that the junior synonym *Buthoscorpio* Werner, 1936 was an available name, which had priority over *Pocockius*.

More recently other species have been described for the genus *Buthoscorpio*. Two for Pakistan as *Stenochirus*, *S. jinnahii* Amir, Kamaluddin & Jabbar, 2005 and *S. rahmatii* Amir, Kamaluddin & Jabbar, 2005; and one for India, *Buthoscorpio rayalensis* Maqsood Javed, Thulsi Rao, Mirza, Sanap & Tampal, 2010 (Amir *et al*., 2005; Maqsood Javed *et al*., 2010).

As already suggested by Maqsood Javed *et al*. (2010), the validity of two species described from Pakistan is doubtful since their generic assignment is most certainly incorrect. Even without the possibility to examine the type material of the Pakistan species, I totally agree with this opinion. From the descriptions provided by Amir *et al*. (2005), I suspect that these two species were based on representatives of the genus *Hottentotta* Birula, common in Pakistan. The species described by Maqsood Javed *et al*. (2010) from India is most certainly valid, and probably corresponds to '*B. sarasinorum*' previously recorded from India by Tikader and Bastawade (1983).

Research conducted in the collections of the Muséum national d'Histoire naturelle in Paris led to the location of a specimen previously cited by Vachon (1961) and originally identified by L. Fage as "*Stenochirus* (aff.) *sarasinorum*". Moreover, in some of the personal notes of E. Simon (unpublished), I was able to obtain some more precise information about the location in north-central India in which this specimen was originally collected. It seems to be in the state of Madhya Pradesh, between Jabalpur and Khajuraho. The comparative study of this specimen with a new female of *B. sarasinorum* collected in Giritale, Sri Lanka, allowed me to define it as a new species, distinct from *B. sarasinorum*. It shows also some affinities with *B. rayalensis* (not studied at present), but has several distinctive characters. *B. sarasinorum* is redescribed based on the female from Giritale and a new species is described from India.

Material and methods

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

Taxonomic treatement

Genus *Buthoscorpio* Werner, 1836

Taxonomic remarks

(**1**) Very curiously, Vachon (1961) inverted the distribution areas of *B. sarasinorum* and *B. politus*, stating that the first was a continental species whereas the second lived in 'Ceylan' (Sri Lanka). In his second paper (Vachon, 1982) clearly inverted the characters of the two species, stating that *B. sarasinorum* had granulated tergites whereas those of *B. politus* were smooth.

(**2**) Maqsood Javed *et al*. (2010) in their description of *B. rayalensis* proposed diagnostic characters for this species which in fact are common to all the species of the genus. This is the case a median epistome in the anterior edge of the carapace. This character may be reduced, but is always present (Fig. 1-11).

(**3**) Other characters, such as trichobothrial pattern and number of teeth in the pectines are also not exclusive. In fact, as already suggested by Vachon (1982), trichobothrial pattern do not change significantly among the species. Values for pectinal tooth count can also overlap among the species, ranging from 15 to 17 (Fig. 1-11)

In conclusion, it is possible to assume that the genus *Buthoscorpio* is possibly more speciose than it apparently seems to be. The known species are very homogeneous in their morphology, as it occurs in other buthid genera such as *Tityobuthus* Pocock or *Ananteris* Thorell (Lourenço & Duhem, 2010; Lourenço *et al*., 2008). Consequently, other somewhat similar species may yet be discovered.

Buthoscorpio sarasinorum

Fig. 6-12, 21. Table I.

Karsch, 1891: 306; Kraepelin, 1899: 39; Pocock, 1900: 33; Kraepelin, 1913: 131; Vachon, 1982: 83.

REDESCRIPTION based on one female from Giritale.

MATERIAL EXAMINED: One female, Sri Lanka, Giritale, in the vegetation of a small hill behind the Giritale Hotel, at 11:30 pm, 30/V/2006 (Peter Klaas). Deposited in the Muséum national d'Histoire naturelle, Paris.

DIAGNOSIS. Scorpions of standard size in relation to the species of the genus, with 43 mm of total length for the female. Coloration dark, ranging from blackish to blackish-brown; appendages reddish-brown to reddish-yellow. Carapace and tergites totally smooth and lustrous. Anterior margin of carapace with a conspicuous median epistome (generic character). Pedipalps almost smooth and lustrous; patella rounded, smooth anteriorly; chela movable fingers with 11-11 rows of granules. Sternum subpentagonal and flattened. Pectinal tooth count 16-15 ((15-15 for the type specimen and 17-16 for the female studied by Vachon (1982)). For measurements see Table I.

Coloration. Basically blackish-brown; appendages reddish-brown to reddish-yellow. Prosoma: carapace blackish-brown with some paler zones on the posterior margin; eyes surrounded by black pigment. Mesosoma blackish-brown with thin confluent reddish spots over tergites. Metasomal segments blackish-brown to reddish-brown. Vesicle and aculeus dark reddish. Venter reddish yellow excepted for sternites VI-VII which are reddish-brown. Pectines, sternum and genital operculum yellow. Chelicerae reddish with dense reticulated dark spots; fingers and teeth reddish. Pedipalps reddish-brown to reddish-yellow; chela hand and fingers yellowish with variegated spots. Legs yellowish with the four proximal segments brownish and the three most distal yellowish.

Morphology. Carapace smooth and lustrous; carinae absent; anterior margin with a conspicuous median epistome. Furrows moderate to weak. Median ocular tubercle distinctly anterior to the centre of carapace; median eyes separated by slightly less than one ocular diameter. Five pairs of lateral eyes. Sternum subpentagonal and flattened, larger than long. Mesosoma: tergites smooth and lustrous; some minute granulations on VII. Median carina obsolete. Tergite VII pentacarinate but with carinae almost obsolete. Venter: genital operculum longer than large, divided longitudinally and longer than the sternum. Pectines: pectinal tooth count 16-15; basal middle lamellae of the pectines slightly dilated. Sternites smooth and lustrous; presence of two weak lateral furrows on sternites III-VI. Short slit-like spiracles. Metasomal segments rounded with only dorsal carinae moderately marked. Intercarinal spaces punctuated; dorsal depression on segments I to V with a thin but intense granulation. Telson without carinae, punctated; aculeus moderately long and strongly curved; subaculear tooth absent. All segments and telson without any setation. Cheliceral dentition characteristic of the family Buthidae; the basal teeth in the movable finger distinct and not fused (Vachon, 1963). Pedipalps: femur pentacarinate with carinae weakly marked; patella and chela acarinated; internal face of patella smooth; all faces smooth. Fixed and movable fingers with 11-11 oblique rows of granules; extremity of the fingers with three strong accessory granules. Trichobothriotaxy; orthobothriotaxy A-α (alpha) (Vachon, 1974, 1975). Legs: tarsus with very numerous median fine setae and two series of slightly spinoid setae ventrally. Legs III and IV with one strong tibial spur; moderately marked pedal spurs present on all legs.

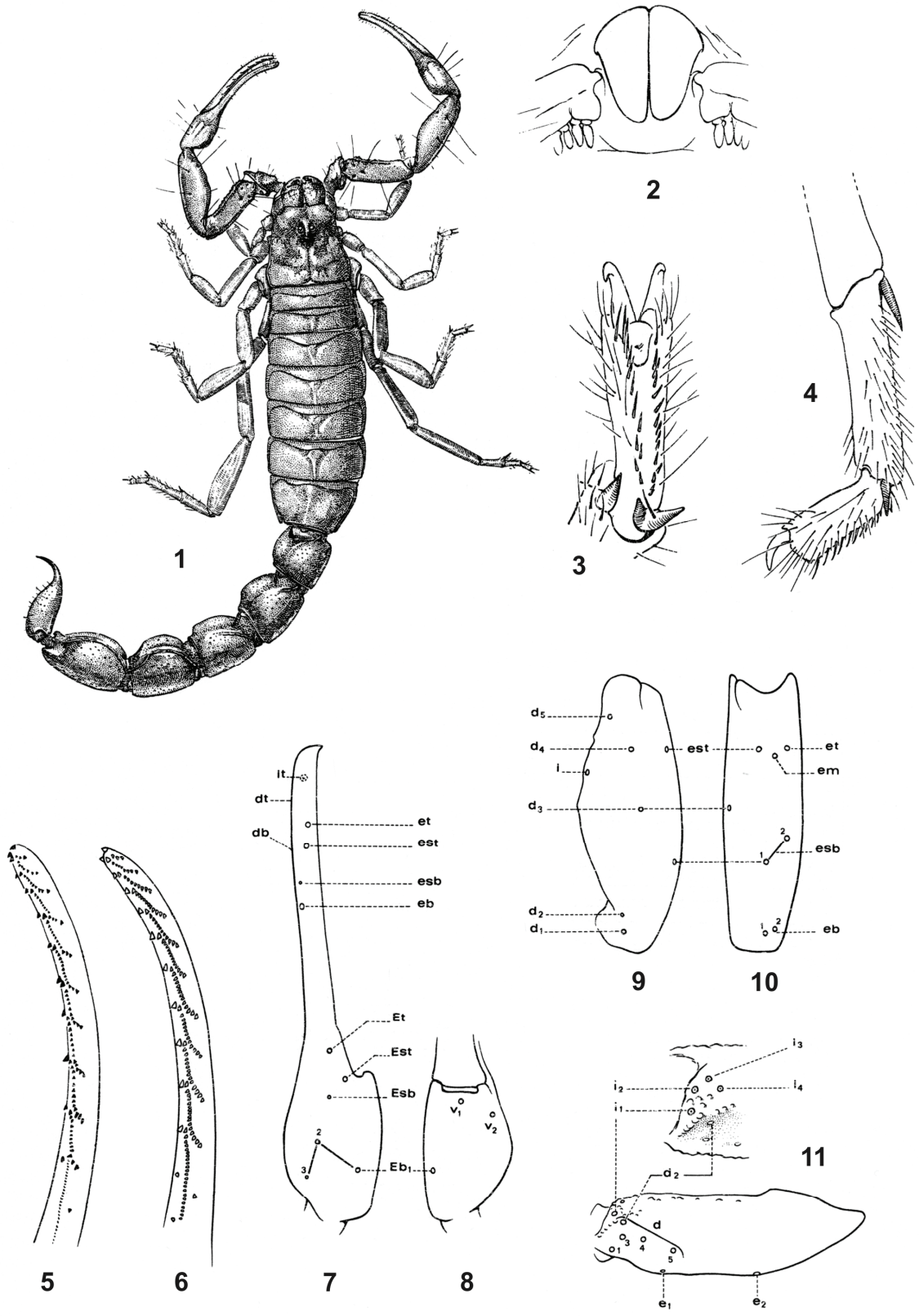

Fig. 1-11. General characteristics presented by the species of the genus *Buthoscorpio*. **1-5.** *Buthoscorpio politus* (type female of *B. laevicauda*). **1.** Habitus. **2.** Genital operculum. **3-4.** Ventral and lateral aspects of leg IV, showing tibial and pedal spurs. **5.** Dentate margin of movable finger, showing the series of granulations. **6-11.** *B. sarasinorum*. **6.** Idem as five. **7-11.** Trichobothrial pattern. **7-8.** Chela, dorso-external and ventral aspects. **9-10.** Patella, dorsal and external aspects. **11.** Femur, dorsal aspect with details of the internal aspect (from Vachon, 1961, 1982).

***Buthoscorpio indicus* sp. n.**
Fig. 13-21. Table I.

MATERIAL EXAMINED: Female holotype. India, north-central region, Madhya Pradesh, between Jabalpur and Khajuraho (according to the notes of E. Simon), 1915 (G. Babault). Deposited in the Muséum national d'Histoire naturelle, Paris.

ETYMOLOGY. The specific name refers to the country India, where the new species was found.

DIAGNOSIS. Scorpions of moderate size in relation to the species of the genus, with 38 mm of total length for the female. Coloration dark, ranging from brownish to reddish-brown; appendages yellowish to reddish-yellow. Carapace and tergites totally smooth and lustrous. Anterior margin of carapace with a moderate to strong median epistome. Telson with the presence of a small to vestigial subaculear tooth. Pedipalps almost smooth and lustrous; patella rounded, smooth anteriorly; chela movable fingers with 11-11 rows of granules. Sternum subpentagonal and flattened. Pectinal tooth count 16-15. For measurements see Table I.

Coloration. Basically brownish to reddish-brown; appendages yellow to reddish-yellow. Prosoma: carapace reddish-brown with some paler zones on the anterior margin; eyes surrounded by black pigment. Mesosoma reddish-brown with confluent reddish-yellow spots and a longitudinal yellowish strip over tergites. Metasomal segments brownish to reddish-brown. Vesicle and aculeus dark reddish. Venter reddish yellow excepted for sternite VII which is reddish-brown. Pectines, sternum and genital operculum yellow. Chelicerae reddish-yellow with reticulated dark spots; fingers and teeth reddish. Pedipalps reddish-yellow; chela hand and fingers yellowish. Legs yellowish; the four proximal segments infuscated.

Morphology. Carapace smooth and lustrous; carinae absent; anterior margin with a moderate to strong median epistome. Furrows moderate. Median ocular tubercle distinctly anterior to the centre of carapace; median eyes separated by one ocular diameter. Five pairs of lateral eyes. Sternum subpentagonal and flattened, larger than long. Mesosoma: tergites smooth and lustrous; some vestigial granulations on VII. Median carina obsolete. Tergite VII pentacarinate but with carinae almost obsolete. Venter: genital operculum longer than large, divided longitudinally and longer than the sternum. Pectines: pectinal tooth count 16-15; basal middle lamellae of the pectines not dilated. Sternites smooth and lustrous; presence of two weak lateral furrows on sternites III-VI. Short slit-like spiracles. Metasomal segments rounded with only dorsal carinae weakly marked. Intercarinal spaces punctuated; dorsal depression on segments I to V with a thin not intense granulation. Telson without carinae, punctated; aculeus moderately long and strongly curved; a small to vestigial subaculear tooth present. All segments and telson without any setation. Chelicer al dentition characteristic of the family Buthidae; the basal teeth in the movable finger distinct but slightly fused (Vachon, 1963). Pedipalps: femur pentacarinate with only vestigial carinae; patella and chela acarinated; internal face of patella smooth; all faces smooth. Fixed and movable fingers with 11-11 oblique rows of granules; extremity of the fingers with three strong accessory granules. Trichobothriotaxy; orthobothriotaxy A-α (alpha) (Vachon, 1974, 1975). Legs: tarsus with very numerous median fine setae and two series of slightly spinoid setae ventrally. Legs III and IV with one strong tibial spur; moderately marked pedal spurs present on all legs.

Table I. Morphometric values (in mm) of a female of *B. sarasinorum* (B sar), the female holotype of *B. indicus* sp. n. and the female holotype of *B. rayalensis* (B ray) (from Javed *et al.*, 2010).

	B sar	*B indicus* sp. n.	*B ray*
Total length	43.3	38.1	43.7
Carapace:			
- length	4.7	4.3	4.4
- anterior width	3.8	3.1	3.2
- posterior width	5.2	4.7	4.8
Mesosoma length	14.5	12.6	17.3
Metasomal segment I:			
- length	2.8	2.5	2.8
- width	3.8	3.7	3.8
Metasomal segment II:			
- length	3.4	2.9	3.1
- width	3.9	3.8	3.8
Metasomal segment III:			
- length	3.6	3.1	3.8
- width	4.2	3.9	3.9
Metasomal segment IV:			
- length	4.0	3.7	3.6
- width	4.2	3.9	4.0
Metasomal segment V:			
- length	5.1	4.6	4.7
- width	4.0	3.8	3.8
- depth	3.2	2.8	-
Telson length	5.2	4.4	4.0
Vesicle:			
- width	2.3	2.2	-
- depth	1.8	1.6	-
Pedipalp:			
- Femur length	4.3	3.7	3.5
- Femur width	1.3	1.0	0.8
- Patella length	5.3	4.5	4.9
- Patella width	1.7	1.4	1.3
- Chela length	7.1	6.4	6.8
- Chela width	1.6	1.1	1.3
- Chela depth	1.8	1.1	-
Movable finger:			
- length	5.2	4.5	5.1

RELATIONSHIPS: By the texture of the tegument the new species shows affinities with *Buthoscorpio sarasinorum* from Sri Lanka. It may also be associated with *Buthoscorpio rayalensis* described from India, but this last species was not examined. The new species can, however, be distinguished from these two species by a number of features: (i) a paler pattern of coloration, (ii) carapace without any granulation, (iii) granulations on tergite VII and on dorsal depression of metasomal segments weak to vestigial, (iv) carapace epistome reduced, (v) a weak to vestigial subaculear tooth, (vi) distinct morphometric values – see Table I.

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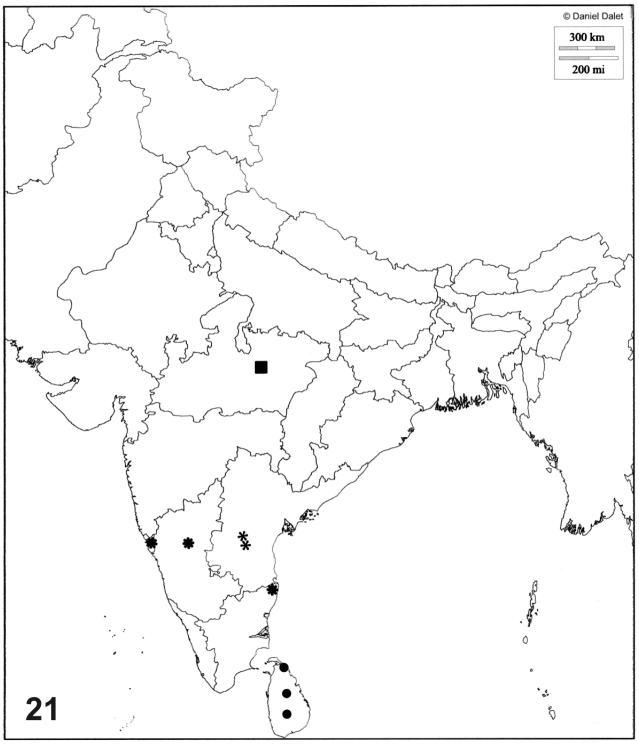

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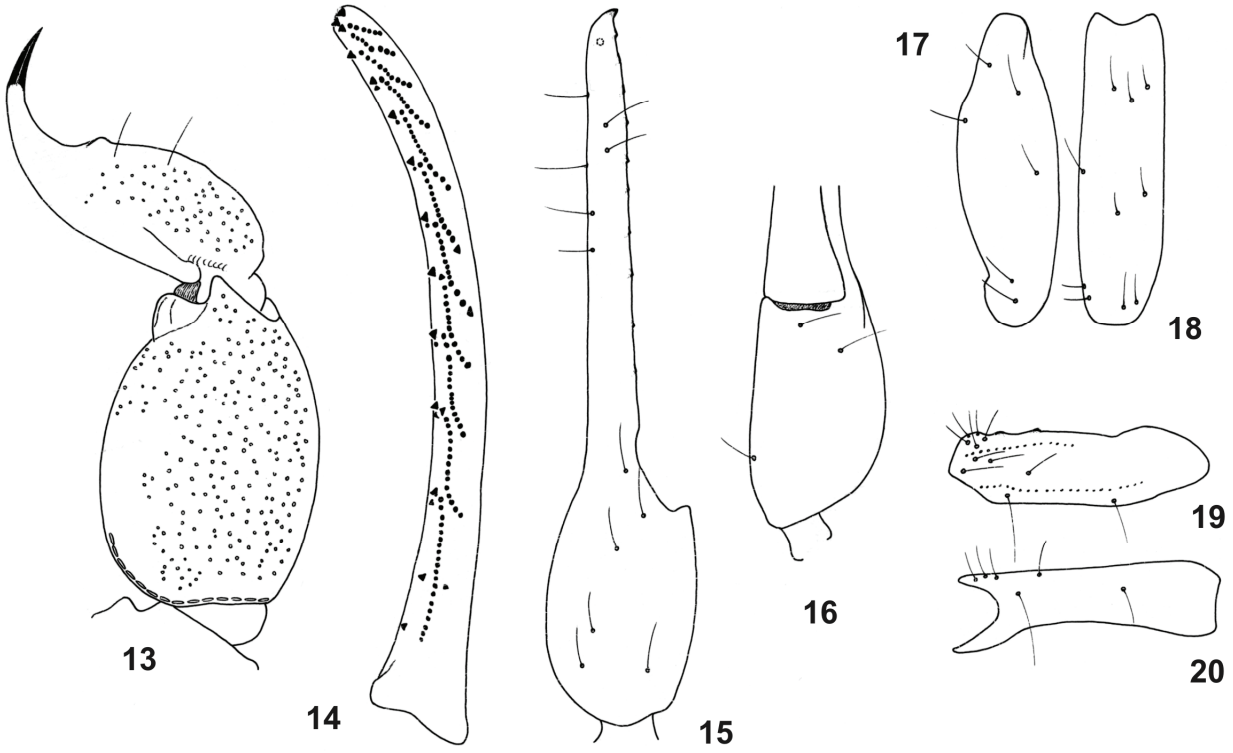

Fig. 12. *Buthoscorpio sarasinorum*, female from Giritale, Sri Lanka, Alive (photo T. Ziegler).

Fig. 13-20 *Buthoscorpio indicus* sp. n. **13.** Metasomal segment V and telson, lateral aspect, showing the small to vestigial subaculear tooth. **14.** Dentate margin of movable finger, showing the series of granulations. **15-20.** Trichobothrial pattern. **15-16.** Chela, dorso-external and ventral aspects. **17-18.** Patella, dorsal and external aspects. **19-20.** Femur, dorsal and external aspects.

Fig. 21. Map of India and Sri Lanka showing the known distribution of the species of *Buthoscorpio*. *B. sarasinorum* (black circle). *B. politus* (black asterisk). *B. rayalensis* (black flower). *B. indicus* sp. n. (black square).

References

AMIR, R., S. KAMALUDDIN & A. JABBAR 2005. Two new species of the genus *Stenochirus* Karsch (Scorpionida: Buthidae: Buthidae) from Pakistan with their relationship, chromatography and electrophoresis of venom. International *Journal of Biology and Biotechnology*, **2**(3): 531-540.

FET, V. 1997. Notes on the taxonomy of some old world scorpions (Scorpiones: Buthidae, Chactidae, Ischnuridae, Scorpionidae). *Journal of Arachnology*, **25**: 245-250.

FET, V. & G. LOWE 2000. Family Buthidae C. L. Koch, 1837. Pp. 54-286. In: Fet, V., W. D. Sissom, G. Lowe & M. E. Braunwalder. *Catalog of the Scorpions of the world (1758-1998).* New York, NY: The New York Entomological Society.

FRANCKE, O. F. 1985. Conspectus genericus scorpionorum 1758-1982 (Arachnida: Scorpiones). *Occasional Papers of the Museum, Texas Tech University*, **98**: 1-32.

HJELLE, J. T. 1990. Anatomy and morphology. Pp. 9-63, In: Polis, G. A. (ed.). *The Biology of Scorpions*. Stanford Univ. Press, Stanford: 587 pp.

KARSCH, F. 1891. Arachniden von Ceylon und von Minikoy gesammelt von den Herren Doctoren P. und F. Sarasin. *Berliner entomologische Zeitschrift*, **36**(2): 267-310.

KRAEPELIN, K. 1913. Neue Beiträge zur Systematik der Gliederspinnen. III. A. Bemerkungen zur Skorpionenfauna Indiens. B. Die Skorpione, Pedipalpen und Solifugen Deutsch-Ost-Afrikas. *Mitteilungen aus dem Naturhistorischen Museum* (2. Beiheft zum *Jahrbuch der Hamburgischen wissenschaftlichen Anstalten*, 1912), **30**: 123-196.

KRAEPELIN, K. 1899. *Scorpiones und Pedipalpi*. pp. 1-265, In: Das Tierreichs, Heft 8 (F.E. Schulze, ed.). Friedlander Verl. Berlin.

LOURENÇO, W. R. & B. DUHEM 2010. Further considerations on the genus *Ananteris* Thorell, 1891 (Scorpiones, Buthidae) in Brazilian Amazonia and description of two new species. *Boletin de la Sociedad Entomologica Aragonesa*, **47**: 33-38.

LOURENÇO, W. R., J. X. QI & S. M. GOODMAN, 2008. The identity of *Tityobuthus baroni* (Pocock, 1890 (Scorpiones, Buthidae) and description of three new species from Madagascar. *Boletin de la Sociedad Entomológica Aragonesa*, **42**: 89-102.

MAQSOOD JAVED, S. M., K. THULSI RAO, Z. A. MIRZA, R. V. SANAP & F. TAMPAL 2010. A new species of scorpion of the genus *Buthoscorpio* Werner, 1936 (Scorpiones: Buthidae) from Andhra Pradesh, India. *Euscorpius*, **98**: 1-11.

POCOCK, R. I. 1899. Descriptions of six new species of scorpions from India. *Journal of the Bombay Natural History Society*, **12**: 262-268.

POCOCK, R. I. 1900. *Arachnida. The Fauna of British India, including Ceylon and Burma*. Published under the authority of the Secretary of State for India in Council. Edited by W. T. Blandford, London. xii, 279 pp.

STAHNKE, H. L. 1970. Scorpion nomenclature and mensuration. *Entomological News*, **81**: 297-316.

TIKADER, B. K. & D. B. BASTAWADE. 1983. Scorpionida, Arachnida. In: Fauna of India. Zoological Survey India Publications, **3**. 670 pp. Calcutta.

VACHON, M. 1952. *Etudes sur les scorpions*. Publications de l'Institut Pasteur d'Algérie, 482pp. Alger.

VACHON, M. 1961. A propos d'un Scorpion de l'Inde: *Buthoscorpio laevicauda* Werner (Famille des Scorpionidae) synonyme de *Stenochirus politus* Pocock, 1899 (Famille des Buthidae). *Bulletin de la Société Zoologique de France*, **86**: 789-795.

VACHON, M. 1963. De l'utilité, en systématique, d'une nomenclature des dents des chélicères chez les Scorpions. *Bulletin Muséum national d'Histoire naturelle*, Paris, 2e sér. **35**(2): 161-166. Paris.

VACHON, M. 1974. Etude des caractères utilisés pour classer les familles et les genres de Scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les Scorpions. *Bulletin Muséum national d'Histoire naturelle*, Paris 3e sér., n° **140**, Zool. 104: 857-958. Paris.

VACHON, M. 1975. Sur l'utilisation de la trichobothriotaxie du bras des pédipalpes des Scorpions (Arachnides) dans le classement des genres de la famille des Buthidae Simon. *Comptes Rendus sommaires de l'Académie des Sciences*, Paris, sér. D **281**: 1597-1599. Paris.

VACHON, M., 1982. Les scorpions de Sri Lanka (Recherches sur les scorpions appartenant ou déposés au Muséum d'Histoire naturelle de Genève III). *Revue suisse de Zoologie*, **89**(1): 77-114. Geneva.

WERNER, F. 1936. Neu-Eingänge von Skorpionen im Zoologischen Museum in Hamburg. *Festschrift zum 60. Geburstage von Professor Dr. Embrik Strand*, **2**: 171-193.