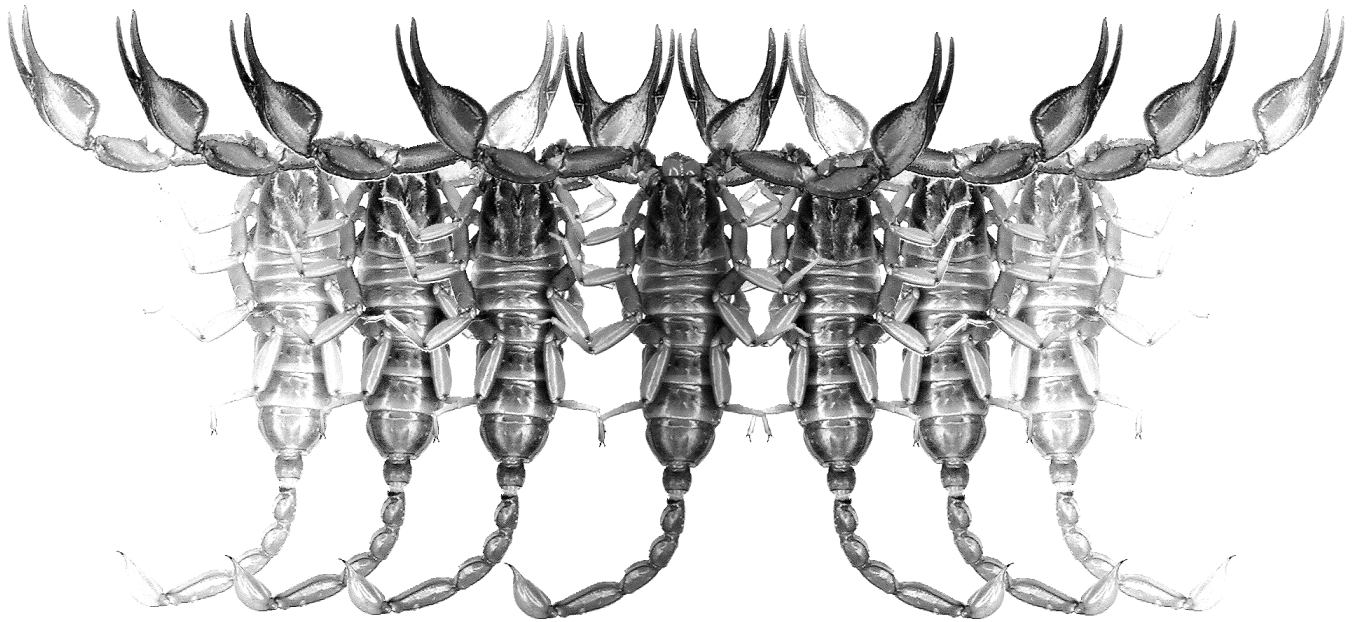


Euscorpius

Occasional Publications in Scorpiology



**First Report on *Hottentotta tamulus* (Scorpiones: Buthidae)
from Sri Lanka, and its Medical Importance**

**Kithsiri B. Ranawana, Nandana P. Dinamithra, Sivapalan Sivansuthan,
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EDITOR: Victor Fet, Marshall University, ‘fet@marshall.edu’

ASSOCIATE EDITOR: Michael E. Soleglad, ‘soleglad@la.znet.com’

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- **OUMNH**, Oxford University Museum of Natural History, Oxford, UK
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First report on *Hottentotta tamulus* (Scorpiones: Buthidae) from Sri Lanka, and its medical importance

Kithsiri B. Ranawana¹, Nandana P. Dinamithra², Sivapalan Sivansuthan²,
Ironie I. Nagasena¹, František Kovařík³ and Senanayake A. M. Kularatne⁴

¹ Department of Zoology, Faculty of Science, University of Peradeniya, Sri Lanka, kithsiri.r@gmail.com

² Teaching Hospital, Jaffna, Sri Lanka

³ P.O. Box 27, CZ-145 01 Praha 45, Czech Republic, www.kovarex.com/scorpio

⁴ Department of Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka

Summary

A scorpion species proved to be lethal to humans was recently recorded from Jaffna Peninsula (9°40'0"N 80°0'0"E, mean annual temperature 26.2°C), in the northern dry zone of Sri Lanka. This species is morphologically different from all other known scorpions in Sri Lanka. The species was identified as *Hottentotta tamulus* (Scorpiones: Buthidae), which is commonly found in Maharashtra, India, the closest mainland to Sri Lanka. Small children and housewives were most of the victims. Soon after sting, the patient develops intense pain at the site of sting followed by numb sensation. Dominant clinical effects include excessive sweating, agitation and palpitation. Blood pressure of the victim goes up, and if not promptly treated leads to acute heart failure. There is a high risk of spreading of this species to the rest of the country due to transport of goods and sand from the area.

Introduction

Research on the invertebrate fauna of Sri Lanka is scarce and very few published works are available. Butterflies seem to be the only arthropod group that has attracted the attention of scientists and laymen during the last century (Woodhouse, 1949; d'Abrera, 1998; Gamage, 2007). Recent work on some other invertebrate groups such as dragonflies (Fonseka, 1998), theraphosid spiders (Samarawickrama et al., 2005), land snails (Morden et al., 2003) and freshwater crabs (Ng & Tay, 2001) could be considered as major attempts to further describe the country's little known invertebrate fauna.

Unlike most other invertebrates, some members of the group Arachnida (especially spiders and scorpions) are medically important arthropods, because of their stings or bites are potentially harmful to humans (Ranawana et al., 2011). In the recent past, scorpions are one of the arachnid groups that have attracted attention from the medical professionals in Sri Lanka as patients who are subjected to scorpion stings in the northern part of Sri Lanka (especially in Jaffna District) develop serious clinical conditions that need to be treated immediately.

Scorpion fauna in Sri Lanka remains poorly studied, although already Pocock (1900) listed 11 scorpion species described from the country under three families, namely Buthidae, Chaerilidae, and Scorpionidae. In recent past several genera has been added to this list, bringing the total count up to 16 species (Lourenço

2002; Lourenço & Huber, 2002; Lourenço, 1997; Lourenço & Huber, 1999; Vachon, 1982; see list below). Further, Kovařík (2003, 2004 and 2009) has reviewed the genera *Isometrus* and *Heterometrus* and compiled a complete list of species belonging to these two genera, including the species found in Sri Lanka. Ecology and distribution of the scorpion fauna of Sri Lanka are poorly known.

For almost three decades, due to the war, the northern territory of Sri Lanka remained inaccessible to medical researchers until 2009. By that time, a consultant physician, Dr. Sivapalan Sivansuthan, working in the Teaching Hospital, Jaffna, has treated many patients stung by scorpions. He also had seen a few deaths due to scorpion envenomations in the hospital. One death was recorded in each year of 2006, 2007 and 2009, and in 2003 deaths of 12 children was recorded. Eighty cases were reported from January, 2012 to date (February 2013), of which 52% were females and 48% were males. Of the 80 treated cases, 30% were children between 3 to 12 years.

Because of the gravity of this problem, he started collecting clinical and epidemiological data of scorpion bite admissions in collaboration with Faculty of Medicine, University of Peradeniya, Sri Lanka.

During past few years, several patients have been admitted to the Teaching Hospital, Jaffna to receive treatments for scorpion stings. At present the scorpion stings are very frequent and about four patients are ad-



Figure 1: *Hottentotta tamulus*, male in its original habitat living in crevices. Sri Lanka, Palali, 9°44'16.83"N 80°05'2.88"E.

mitted to Jaffna Hospital every week due to scorpion stings. The common victims are children and housewives; in many occasions stinging occurs inside houses where scorpions are found even among clothes. Also, these scorpions are found close to human dwelling among leaf litter, logs, and piles of firewood. Often, stinging scorpions are not caught, but some victims come to the hospital bringing a killed or captured scorpion. Dr. S. Sivansuthan in Jaffna Hospital has kept some dead specimens of scorpions brought by the patients and relatives. People in the area called this offending scorpion 'White Scorpion' because of its pale coloration when compared to commonly found 'Black Scorpions' (mainly *Heterometrus* spp., also commonly called a giant forest scorpion) found in the country. The physician reports that, upon bite, the patient develops intense pain at the site of sting followed by benumbed feeling. In severe envenomation cases, the patient develops excessive sweating, agitation and palpitation. The blood pressure shoots up and if not promptly treated, it leads to acute heart failure. These manifestations are attributed to over activation of autonomic nervous system; patients are treated with frequent doses of an alpha-adrenergic blocker, prazosin. Use of this medication was initiated in 2009. Introduction of this treatment based on Indian literature on management of

Indian red scorpion bite has saved many lives with the treatment and monitoring patients as they recover after 24–48 hours. As documented, all 80 victims reported from January 2012 up to date (February 2013) did recover.

Methods and Material

Five live and three dead specimens of scorpions collected in Palali (9° 44' 16.83" N, 80° 05' 2.88" E), Achchuveli (9° 44' 33.66" N 80° 04' 6.15"E) and Karainagar (9° 44' 53.07"N 79° 52' 58.38"E) in Jaffna District (Fig. 2) were brought to the wildlife laboratory of the Department of Zoology, University of Peradeniya, for the identification purpose beginning in August 2012. From these, two males still survive. In the laboratory, the dead specimens were preserved in 70% alcohol, and the live specimens were kept in glass tanks having a sand substrate. The live specimens were fed with insects every other day. Both live and dead specimens were photographed, and a photo catalog of specimens is maintained for comparative work. We carefully examined the external features of the specimens and compared these features with all other species known from Sri Lanka.



Figure 2: Collection sites of the scorpions within the Jaffna Peninsula.

Systematics

Hottentotta tamulus (Fabricius, 1798) (Figures 1–12, Table 1)

Scorpio tamulus Fabricius, 1798: 294.

Hottentotta tamulus: Kovařík & Whitman, 2005: 108; Kovařík, 2007: 76 (complete references and synonymy list until 2007); Teruel & Rein, 2010: 7.

= *Buthus nigrolineatus* Dufour, 1856: 570 (syn. by Kraepelin, 1899: 20).

= *Buthus grammurus* Thorell, 1889: 567; Kraepelin, 1899: 20; Vachon, 1940: 248 (syn. by Pocock, 1900: 23).

= *Buthus tamulus concanensis* Pocock, 1900: 25 (syn. by Kovařík, 2007: 76).

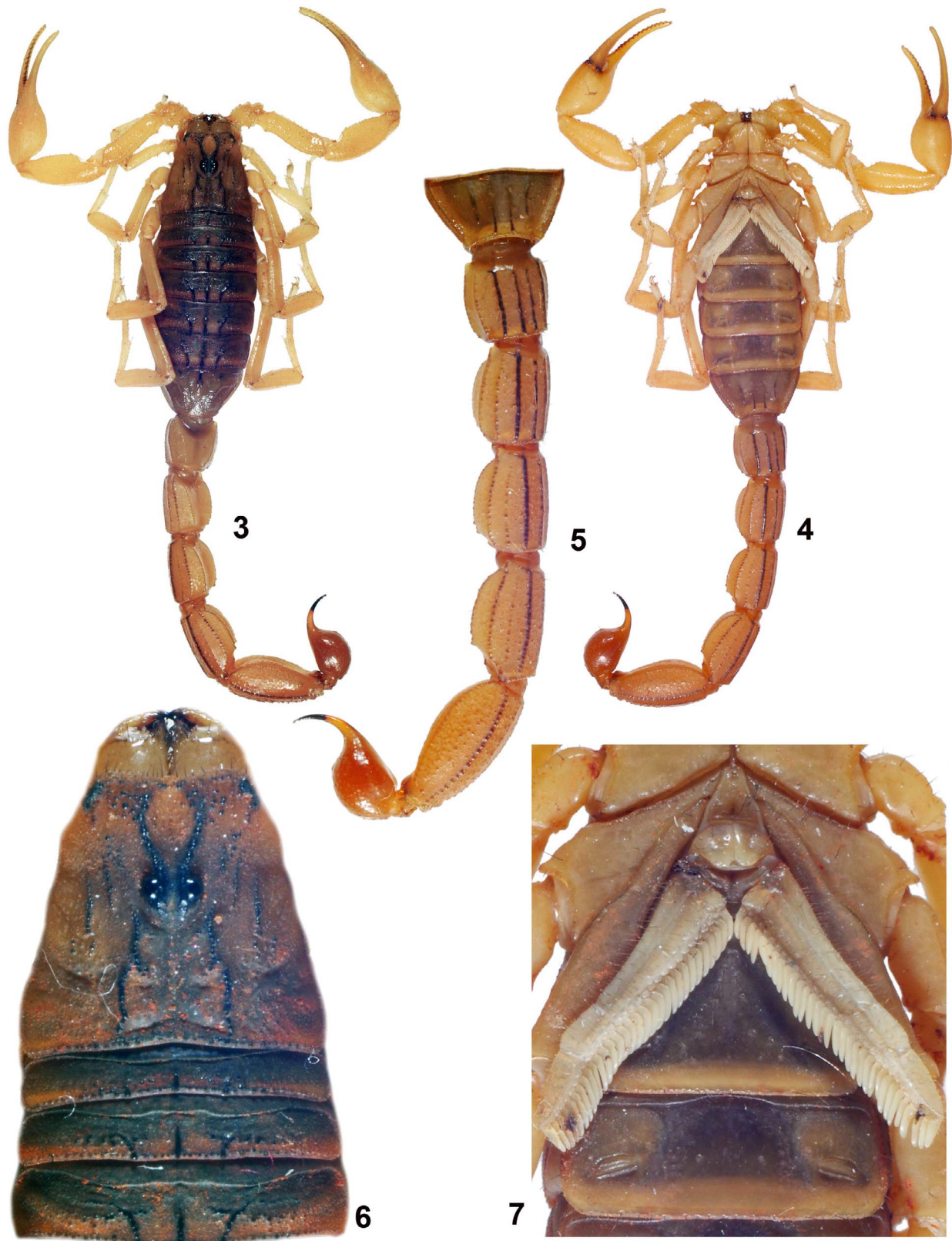
= *Buthus tamulus indicus* Pocock, 1900: 25 (syn. by Kovařík, 2007: 76).

= *Buthus tamulus gujaratensis* Pocock, 1900: 25 (syn. by Kovařík, 2007: 76).

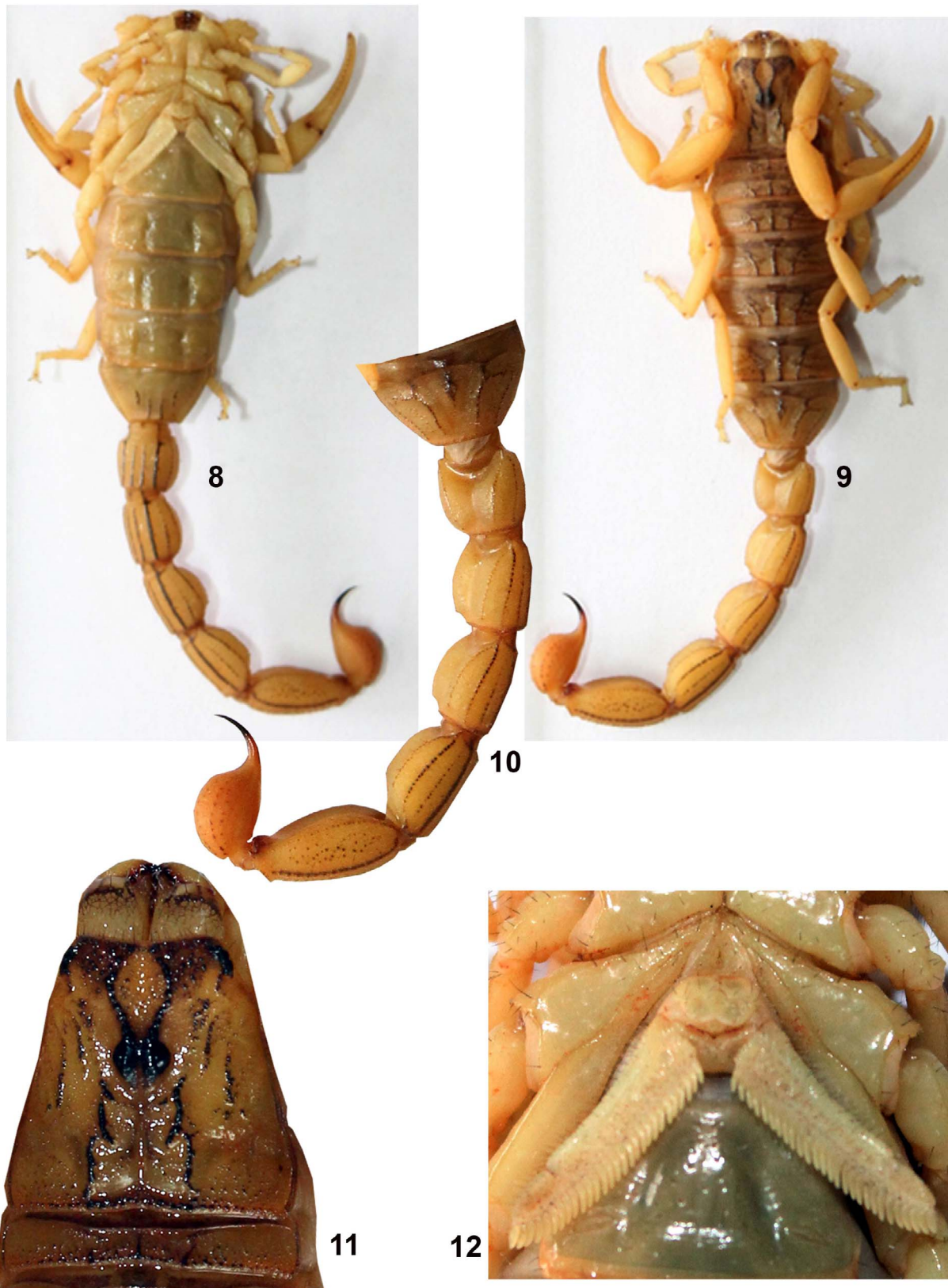
= *Buthus tamulus gangeticus* Pocock, 1900: 25 (syn. by Kovařík, 2007: 76).

TYPE LOCALITY AND TYPE REPOSITORY. “India orientalis”; original type lost. Neotype from India, Maharashtra State, Bombay env., designated by Kovařík, 2007: 76; deposited in National Museum (Natural History) of Prague, Czech Republic.

DIAGNOSIS. Total length 50–90 mm. Trichobothrium *db* on the fixed finger of pedipalp chela situated between trichobothria *et* and *est*, may be level with *est*. Male with fingers proximally twisted, manus of pedipalps wider than female. Pectinal teeth number 30–39 in males (Fig. 7), 27–34 in females (Fig. 12). Chelicerae yellow, reticulate. Pedipalps densely hirsute, legs and metasoma sparsely hirsute. Setae on patella of pedipalps are short. Color uniformly yellow to reddish, mesosoma dark. Ventral carinae on metasomal segments usually black. Femur of pedipalp with 5 carinae. Patella with two or 4 carinae on internal surface, no other carinae. Chela lacks carinae. Movable fingers of pedipalps with 13–15 rows of granules and 5 or 6 terminal granules. Seventh sternite with 4 well marked black carinae. First to third metasomal segments with 10 carinae; fourth metasomal segment with 10 or rarely 8 carinae; fifth segment with 5 or 7 carinae. Metasoma sparsely to densely granulated between carinae. Dorsal surface densely and very finely granulated, often bears two short, inconspicuous marginal carinae. Telson also granulated. Dorsal carinae of metasomal segments bear terminal granules of size approximately equal to preceding granules. First metasomal segments of adult female wider than long (in male usually as long as wide), second metasomal segment longer than wide for both sexes. Second to fourth metasomal segment width ratio about 1.1. Length to width ratio of fourth metasomal segment about 1.5. Telson bulbous, especially in large females.



Figures 3–7: *Hottentotta tamulus*, male. 3–4. Dorsal and ventral views. 5. Metasoma with telson and seventh sternite. 6. Chelicera, carapace and three segments of mesosoma. 7. Pectinal area. Sri Lanka, Palali, 9°44'16.83"N 80°05'2.88"E, FKCP (František Kovařík, private collection, Praha, Czech Republic).



Figures 8–12: *Hottentotta tamulus*, female. 8–9. Dorsal and ventral views. 10. Metasoma with telson and seventh sternite. 11. Chelicera, carapace and one segment of mesosoma. 12. Pectinal area. Sri Lanka, Palali, 9°44'16.83"N 80°05'2.88"E, Department of Zoology, Faculty of Science, University of Peradeniya, Sri Lanka.

	Female		Male	
Carapace, length	9.80		8.35	
Carapace, anterior width	5.25		4.85	
Carapace, posterior width	8.90		7.70	
Mesosoma, length	25.60		17.30	
Metasomal segment I				
Length	4.15		4.70	
Width	5.25		5.15	
Metasomal segment II				
Length	5.45		5.75	
Width	5.15		4.70	
Metasomal segment III				
Length	5.65		5.65	
Width	5.00		4.65	
Metasomal segment IV				
Length	6.40		6.56	
Width	4.85		4.50	
Metasomal segment V				
Length	8.40		8.20	
Width	4.70		4.85	
Metasoma, length	30.05		30.86	
Telson, length	8.75		7.55	
Aculeus, length	3.50		3.60	
Pedipalp	Left	Right	Left	Right
femur	Length	6.75	6.45	6.75
	Width	2.55	2.40	2.05
Patella	Length	8.15	7.95	7.60
	Width	3.10	3.10	2.95
Chela	Length	3.70	3.15	3.25
	Width	2.70	2.45	3.55
Movable finger, length	9.30	8.65	8.20	6.75
Total body length	74.20		64.06	
Pectinal teeth count, left/right	27/28		32/32	

Table 1: Measurements (in mm) of the male and female of *Hottentotta tamulus* from Sri Lanka, Palali, 9°44'16.83"N 80°05'2.88"E. Deposited in Department of Zoology, Faculty of Science, University of Peradeniya, Sri Lanka.

DISTRIBUTION. India, Pakistan, Sri Lanka (first record).

VARIABILITY. The male specimen, pectinal teeth count 32, total length 60–65 mm. Female specimen, pectinal teeth count 27, total length 70–75 mm. Complete set of measurements are given in the Table 1.

Results and Discussion

Preliminary morphological survey of the collected specimens showed that specimens collected from Jaffna possessed 31 pectinal teeth (Fig. 7), while scorpions described so far from Sri Lanka did not possess more than 25 pectinal teeth (maximum recorded in *Lychas ceylonensis* of the family Buthidae; Lourenço & Huber, 1999: 25). This led us to think that this is either a new

species from Sri Lanka or a recent introduction to the country.

Further study of the external anatomical features of the specimens showed some similarities to the species *Hottentotta tumulus*, widespread in India. The taxonomic features of the scorpion were compared with the descriptions given in Kovařík (2007). The comparisons led to the conclusion that the scorpion found in the Jaffna peninsula in Sri Lanka is very similar to *Hottentotta tamulus* redescribed by Kovařík (2007). Since there were no museum specimens of the this species in Sri Lanka, a preserved specimen of this scorpion was sent to František Kovařík in the Czech Republic for the confirmation of the identity of the species. He confirmed the species as *Hottentotta tamulus* (fam. Buthidae) commonly known as Indian red scor-

pion or Eastern red scorpion. This would be the 16th scorpion species (and the seventh genus) recorded from Sri Lanka. The current list of scorpions found in Sri Lanka is given below:

Family Buthidae C. L. Koch, 1837

Buthoscorpio sarasinorum (Karsch, 1892)
*Charmus laneus** Karsch, 1879
*Charmus minor** Lourenço, 2002
Hottentotta tamulus (Fabricius, 1798), **first report**
*Isometrus basilicus** Karsch, 1879
*Isometrus besucheti** Vachon, 1982
*Isometrus garyi** Lourenço et Huber, 2002
*Isometrus loebli** Vachon, 1982
Isometrus thurstoni Pocock, 1893
*Isometrus thwaitesi** Pocock, 1897
*Lychas ceylonensis** Lourenço et Huber, 1999
*Lychas srilankensis** Lourenço, 1997

Family Chaerilidae Pocock, 1893

*Chaerilus ceylonensis** Pocock, 1894

Family Scorpionidae Latreille, 1802

Heterometrus gravimanus (Pocock, 1894)
Heterometrus indus (DeGeer, 1778)
Heterometrus swammerdami Simon, 1872

* endemic species

Pocock (1900) listed records of *H. tamulus* (as *Buthus tamulus*) in India, from Sind in the Northwest and Dehra Dun throughout the whole of Western, Central, and Madura in Southern India and specifically noted the absence of this species in Burma and Ceylon. There is a possibility of introduction of this species to Jaffna from India by movement of goods during IPKF (Indian Peace Keeping Force) occupation in Sri Lanka between 1987 and 1990 or during the 30-year long civil war in northern and eastern regions of the country or through transportation of goods between India and Sri Lanka. Since there is a continuous coastal line around the country and increased transportation in between the northern part and the south of Sri Lanka, there is a risk of spreading this species to the other parts (especially the coastal districts) of the island.

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