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Review of Scorpionida from Thailand with descriptions of *Thaicharmus mahunkai* gen. et sp. n. and *Lychas krali* sp. n. (Buthidae)

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Abstract. A list of and a key for all species known and believed to occur in Thailand are given. *Thaicharmus* gen. n. with the type species *T. mahunkai* sp. n is described. The new genus is related to the Indian genus *Charmus*, from which it differs by the presence of a subaculear tubercle, and to the African genus *Butheoloides*, from which it differs in having 12 (including apical row) cutting edges on the movable fingers of pedipalps. *Lychas krali* sp. n. is described and a checklist for all species of the genus *Lychas* is provided. *Lychas mucronatus* is for the first time recorded from South and North Vietnam and *Liocheles australasiae* for the first time from North Vietnam.

TAXONOMIC PART

Isometrus (Isometrus) maculatus (De Geer, 1778)

? Scorpio europaeus Linnaeus, 1758: 625; Fabricius, 1793: 435.
Isometrus europaeus: Lönnberg, 1898: 86; Pocock, 1899: 835; Pocock, 1900: 46; Pocock, 1902: 38.
Isometrus (Raddyanus [sic]*) europaeus*: Tikader & Bastawade, 1983: 286.
Scorpio americus Linnaeus, 1758: 624; Fabricius, 1775: 399 (syn. by De Geer, 1778: 346; Kraepelin, 1891: 245).
Scorpio americanus: Fabricius, 1793: 434; Herbst, 1800: 60 (syn. by Kraepelin, 1891: 245).
Lychas americanus: C. L. Koch, 1845: 2; Cambridge, 1869: 543.
Centrurus (Isometrus) americanus: Peters, 1862: 515.
Scorpio maculatus De Geer, 1778: 346; Gervais, 1844: 57.
Lychas maculatus: C. L. Koch, 1845: 1; Cambridge, 1869: 543.
Isometrus maculatus: Thorell, 1876: 8; Pavesi, 1881: 537; L. Koch, 1885: 6; Thorell, 1888: 405; Oates, 1888: 250; Kraepelin, 1891: 245; Lönnberg, 1897: 185; Kraepelin, 1899: 66; Simon, 1899: 120; Werner, 1902: 599; Kraepelin, 1916: 34; Glauert, 1925: 117; Roewer, 1943: 217; Mello-Leitao, 1945: 241; Glauert, 1963: 183; Probst, 1972: 1; Probst, 1973: 325; L. E. Koch, 1977: 152; Kovařík, 1992: 183.
Isometrus (Isometrus) maculatus: Vachon, 1972: 177; Vachon, 1976: 38; Kovařík, 1994: 202.
Scorpio dentatus Herbst, 1800: 55 (syn. by C. L. Koch, 1845: 1).
Buthus (Isometrus) filum Hemprich & Ehrenberg, 1828: pl.I fig. 3; Hemprich & Ehrenberg, 1829: 352 (syn. Pavesi, 1881: 537).
Atreus filum: Gervais, 1844: 52.
Lychas paraensis C. L. Koch, 1845: 6 (syn. by Kraepelin, 1891: 245).
Scorpio (Lychas) gabonensis Lucas, 1858: 430 (syn. Pavesi, 1881: 537).
Scorpio (Lychas) guineensis Lucas, 1858: 432 (syn. Pavesi, 1881: 537).
? Isometrus sonticus Karsch, 1879: 116 (syn. by Kraepelin, 1891: 245).

COMMENTS. This is a cosmopolitan species more widespread than any other scorpion. It occurs in South America, the Antilles, USA (Florida), Costa Rica, Africa, Madagascar, Pakistan, India, Sri Lanka, China, Myanmar, Thailand, Laos, Cambodia, Vietnam, Malaysia, Indonesia, New Guinea, and Australia (e. g. Vachon 1972: 178).

I have not seen any specimens from Thailand, but Vachon (1972: 178, fig. 21) recorded this species from the Thailand - Myanmar and Thailand - Malaysia border regions.

Isometrus (Reddyanus) vittatus Pocock, 1900

Isometrus vittatus Pocock, 1900: 50.
Isometrus (Reddyanus) vittatus: Vachon, 1972: 177; Vachon, 1976: 39; Kovařík, 1994: 202.
Isometrus (Raddyanus [sic]*) vittatus*: Tikader & Bastawade, 1983: 257.

COMMENTS. This species has been recorded from India (Pocock 1900, Tikader & Bastawade 1983, Vachon 1972), Cambodia, and Laos (Fage 1933, 1936, Vachon 1972), and it is therefore assumed to occur in Myanmar and Thailand as well.

Lychas C. L. Koch, 1845

Pilumnus C. L. Koch, 1837: 38 (nec Leach, 1815: Crustacea); = *Repucha* Francke, 1985: 12 nomen novum (syn. by Francke 1985: 12).
Lychas C. L. Koch, 1845: 1; Kraepelin, 1907: 184; L. E. Koch, 1977: 123; Francke, 1985: 9; Vachon, 1986: 835.
Lychus [sic] Kraepelin, 1907: 193 (Francke 1985: 10).
Lichas [sic] Fage, 1936: 137 (Francke 1985: 9).
Lycas [sic] Hadley, 1974 (Francke 1985: 9).
Lychas (Hemilychas) Hirst, 1911: 464 (syn. by L. E. Koch 1977: 143).
Lychas (Distotrichus) Tikader & Bastawade, 1983: 41 (syn. by Vachon 1986: 848).
Lychas (Alterotrichus) Tikader & Bastawade, 1983: 52 syn. n.
Lychas (Endotrichus) Tikader & Bastawade, 1983: 71 syn. n.
Archisometrus Kraepelin, 1891: 217 (syn. by Pocock 1900: 35).
Archiosometrus [sic] Stahnke, 1972: 128 (Francke 1985: 5).

TAXONOMIC POSITION. L. E. Koch (1977: 123) considered *Lychas* C. L. Koch, 1845 to be a synonym of *Isometrus* Hemprich & Ehrenberg, 1828 and 1829 (figured in 1828 and described in 1829). According to L. E. Koch (1977), the genus *Lychas* was described by C. L. Koch only in 1850.

It is true that C. L. Koch (1845) listed *Lychas maculatus* (= *Isometrus maculatus*) first, *Lychas americanus* (= *Isometrus maculatus*) second, and *Lychas scutilus* only third, although the latter was selected as the type species of the genus *Lychas* C. L. Koch, 1845 in accord with the rules of zoological nomenclature as then defined (Pocock, 1899: 834), and has been used as such since then (Pocock, 1900: 35; Vachon, 1985: 99; Vachon, 1986: 837). The taxonomic position of the genus *Lychas* has been worked out in detail by Vachon (1985).

The genus *Lychas* includes recently 34 species. Its vast distribution and attempts to better understand the relationships among the species have led to dividing the genus into several subgenera. Hirst (1911) erected the Australian subgenus *Hemilychas* with type species *L. (H.) alexandrinus* Hirst, 1911. L. E. Koch (1977) compared Hirst's characters with other species of the genus and concluded that they do not justify subgeneric status.

Tikader & Bastawade (1983) divided *Lychas* into the subgenera *Distotrichus*, *Alterotrichus*, and *Endotrichus*. In discord with the international rules of zoological nomenclature, none of their subgenera has been named *Lychas*. The subgenera are differentiated on distribution of the trichobothria dt, db, et, and est (Figs 1 and 2, Tikader & Bastawade 1983: 41, Vachon 1986: 847, figs 22 - 24). This distinction was doubted by Vachon (1986), because the distribution of these trichobothria varies even intraspecifically. Fig. 2 shows the distribution of trichobothria on the tibia in a male of *Lychas mucronatus* from Thailand (Samut), which would be placed in the subgenus *Distotrichus*. Fig. 1 shows distribution of the pertinent trichobothria on the tibia

in a male of *Lychas mucronatus* from Thailand, prov. Kanchanaburi near river Kwai, which would be placed in the subgenus *Alterotrichus* where the species was indeed placed by Tikader & Bastawade (1983). The figures make it clear that distribution of trichobothria dt, db, et, and est cannot be considered a subgeneric character for the genus *Lychas*.

In the following checklist of the genus *Lychas* the species are ordered alphabetically.

Checklist of the genus *Lychas* C. L. Koch, 1845

albimanus Henderson, 1919: India
alexandrinus Hirst, 1911: Australia
= *Lychas mjöbergi* Kraepelin, 1916
= *Lychas truncatus* Glauert, 1925
= *Lychas annulatus* Glauert, 1925
asper (Pocock, 1890): Congo, Zimbabwe, Tanzania, Mozambique
asper obscurus (Kraepelin, 1913): Tanzania, Somalia, Zambia
biharensis Tikader & Bastawade, 1983: India
braueri (Kraepelin, 1897): Seychelles (Praslin Island)
burdoi (Simon, 1882): Tanzania, Kenya, Zimbabwe, South Africa, Congo, Zambia, Malawi
= ? *Lychas emiliae* Werner, 1916
burdoi rhodesianus Lawrence, 1938: Zimbabwe
burdoi regulosus Birula, 1915: Kenya
decorata Basu, 1964: India
feae (Thorell, 1889): Myanmar
flavimanus (Thorell, 1888): Indonesia (Sumatra)
gravelyi Henderson, 1911: Myanmar
hendersoni (Pocock, 1897): India
*) *hosei* (Pocock, 1891): Malaysia (Sarawak)
infuscatus (Pocock, 1891): Philippines
kamshetensis Tikader & Bastawade, 1983: India
kharpadi Bastawade, 1987: India
krali sp. n.: Thailand
laevifrons Pocock, 1897: India
marmoreus (Koch, 1845): Australia, New Guinea
= *Isometrus bituberculatus* Pocock, 1891
= *Lychas marmoreus obscurus* Kraepelin, 1916
= *Lychas marmoreus nigrescens* Kraepelin, 1916
= *Lychas marmoreus splendens* Kraepelin, 1916
= *Lychas jonesae* Glauert, 1925
mentaweius Roewer, 1943: Sipora (Mentawein Island)
mucronatus (Fabricius, 1798): China, India, Myanmar, Thailand, Laos, Cambodia, Vietnam, Philippines, Malaysia, Indonesia
= *Scorpio curvidigitus* Gervais, 1844
= *Tityus varius* C. L. Koch, 1845
= *Isometrus chinensis* Karsch, 1879
= *Isometrus atomarius* Simon, 1884
nigrimanus (Kraepelin, 1898): Indonesia (Sumatra)
nigristernis (Pocock, 1899): India
nucifer Basu, 1964: India
obsti Kraepelin, 1913: Tanzania, Somalia, Kenya
perfidus (Keyserling, 1887): Fiji (Viti Levu Island)
rugosus (Pocock, 1897): India
scaber Pocock, 1893: India

*) Kraepelin (1899) regarded *Lychas hosei* as a synonym of *Lychas flavimanus*, but according to Vachon & Lourenco (1985) it is a valid species.

scutilus C.L.Koch, 1845 (type species of the genus): Myanmar, Thailand, Malaysia, Indonesia, introduced into Tanzania and Congo
= *Lychas scutatus* C. L. Koch, 1845
= *Isometrus weberi* Karsch, 1882
= *Isometrus messor* Simon, 1884
= *Isometrus phipsoni* Oates, 1888
serratus Pocock, 1890: Mauritius (Round Island)
shelfordi (Borelli, 1904): Malaysia, Indonesia (Kalimantan)
shoplandi (Oates, 1888): Myanmar
tricarinatus (Simon, 1884): India, introduced into West Africa (Slave Coast)
variatus (Thorell, 1876): Australia, New Guinea
= *Isometrus thorelli* Keyserling, 1885
= *Isometrus variatus papuanus* Thorell, 1888
= *Isometrus armatus* Pocock, 1890
= *Lychas marmoreus kimberleyanus* Kraepelin, 1916
= *Lychas spinatus* Kraepelin, 1916
= *Lychas spinatus besti* Glauert, 1925
= *Lychas spinatus pallidus* Glauert, 1925
= *Lychas lappa* Glauert, 1954
tweediei Kopstein, 1937: Malaysia

Lychas krali sp. n. (Figs 3-6, Table 1)

TYPE MATERIAL. Holotype - male and paratypes - 6 females (Nos 1-6) labelled: Thailand, Umphang River, 16° 07' N 99° 00' E, 1000 m above sea level, 28.IV.-4.V.1991, leg. David Král & Vít Kubáň. Tree females (Nos 7-9) labelled Thailand, Lansang, 16° 48' N 98° 57' E, 500 m above sea level, 18.-24.IV.1991, leg. David Král & Vít Kubáň. Two females (Nos 10 and 11) labelled Thailand, Chiang Dao Mtns., 19° 25' N 98° 52' E, 17.-24.V.1991, leg. David Král & Vít Kubáň. One female (No. 12) labelled Thailand, 56 km NW of Chiang Mai, 19° 05' N 99° 25' E, 7.-14.VI.1995, leg. M. Snížek. Holotype and paratypes Nos 6-11 mounted dry, paratypes Nos 1-5 and 12 preserved in 75 % alcohol. Female No. 4 is deposited in the Department of Invertebrate Zoology, National Museum (Natural History), Prague. Holotype and all other paratypes are in the author's collection.

TYPE LOCALITY. Thailand, Umphang River, 16° 07' N 99° 00' E. Individuals rest under bark and in fissures and hollows of trees, and at night emerge on tree trunks and branches. At two localities (Lansang and 56 km NW of Chiang Mai) *Lychas krali* sp. n. was found together with *Lychas mucronatus*.

ETYMOLOGY. Named after the Czech entomologist David Král, who jointly with Vít Kubáň collected most of the type material.

DESCRIPTION. The total length is 35.2 mm in the male holotype and 30.4-39.8 mm in the female paratypes. The habitus is shown in Fig. 6. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. There are 15 and 16 pectinal teeth in the male and 15-18 in the females. For the position and distribution of trichobothria on the pedipalps see Figs 3-5.

Color. The base color is yellow, with well marked black reticulation.

Chelicera is more markedly reticulated in the anterior portion, whereas posteriorly the reticulation is subdued and faint. Carapace is without keels but with large granules. Color is more yellow and black spots farther apart. Present is a black spot around the median eyes, which is characteristic of the genus *Lychas*. The margin of carapace has a black rim.

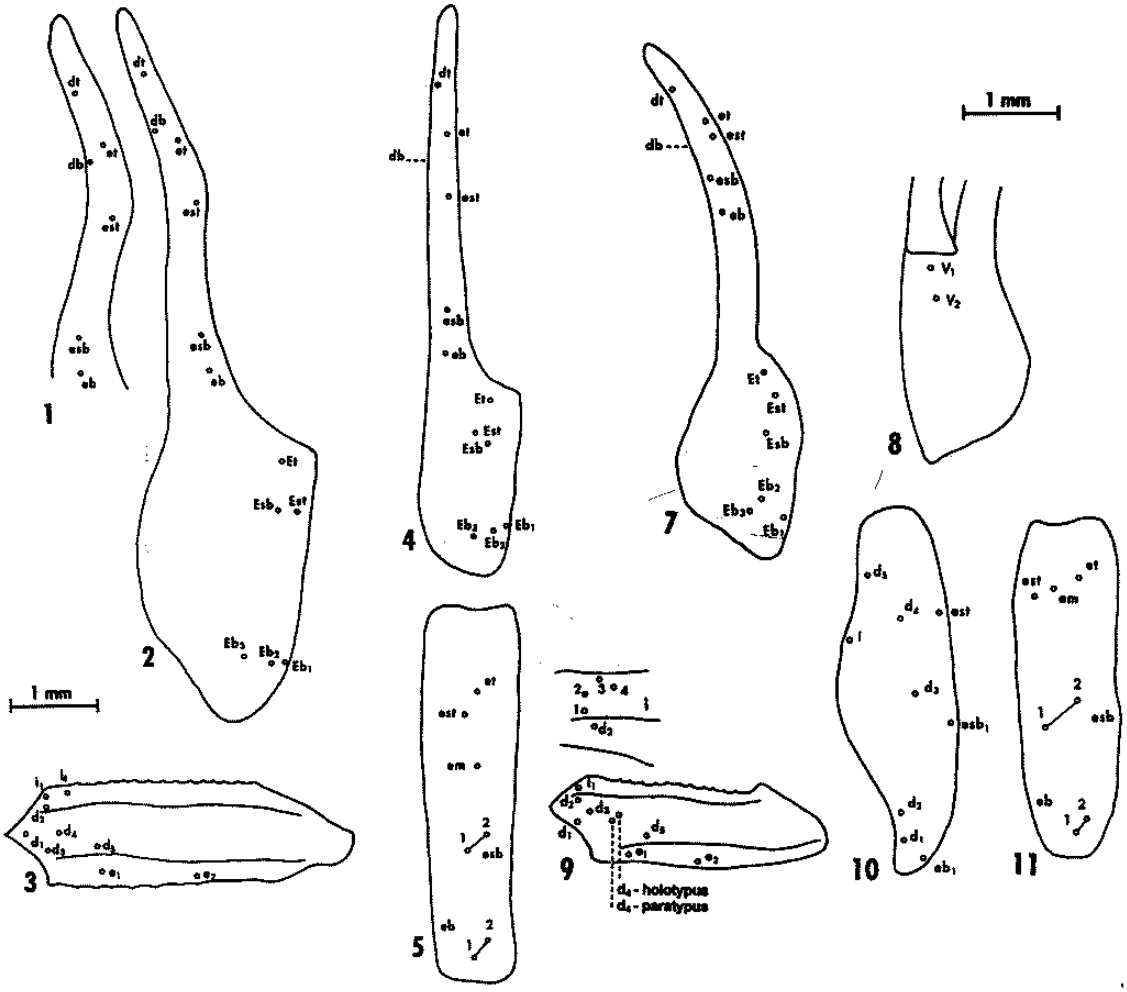
Pedipalps. Femur and patella are dorsally and laterally covered with dense black spots. Ventrally the spots have indistinct borders and colors blend more or less gradually. The lower and inner surfaces of the manus have dark spots in only some specimens (paratype No. 9), whereas in others (e. g. paratype No. 5) these surfaces are pale yellow. However, the dorsal and

lateral sides of the manus are as spotted as the patella. Fingers are light brown but darker than the manus.

The movable fingers of the pedipalps have 6 cutting edges. External lateral granules (Stahnke 1970: 303, No. 111) number 8 (Vachon 1986: 840, figs 2a and 4a).

Mesosoma is also spotted and becomes darker in older specimens. The hind margins of first through sixth segments each bear 6 nearly circular light yellow spots which are symmetrically distributed, with the second spot on each side always smaller than the others. The lower surface of the seventh segment bears 4 keels, but in some specimens only 2 are well developed and in others all the keels are barely discernible.

Legs have the same colors and patterns as the femur and patella of the pedipalps.



Figs 1-5, 7-11. Fig. 1. *Lychas mucronatus* from Thailand (prov. Kanchanaburi, near river Kwai), Tibia. Fig. 2. *Lychas mucronatus* from Thailand (Samut), Tibia. Figs 3-5. *Lychas krali* sp. n. (holotype). Fig. 3. Femur, Fig. 4. Tibia, Fig. 5. Patella. Figs 7-11. *Thaicharmus mahunkai* gen. n., sp. n. (holotype) Fig. 7. Tibia external, Fig. 8. Tibia ventral, Fig. 9. Femur, Fig. 10. Patella dorsal, Fig. 11. Patella ventral. Explanations: First letters: d, dorsal, e, external, i, internal. Second or second plus third letters: b, basal, sb, suprabasal, m, medial, st, subterminal, t, terminal. Numerals distinguish individual trichobothria of the same classification. Designation and description of trichobothria according to Vachon (1974). In Figs 2, 4, 7, and 8 the first capital letters denote trichobothria situated on the manus; the first lower-case letters (Figs 1-3, and 7) denote trichobothria situated on the fixed finger of the pedipalp.

Tibial spur is present on the third and fourth pairs of legs and is well developed. Its size ranges from 0.21 to 0.25 mm on the third legs and from 0.26 to 0.32 mm on the fourth legs.

Metasoma. The segments of the metasoma are yellow to reddish brown. Black spots are less pronounced. The first and second segments bear 10 keels, the third and fourth segments bear 8 keels, and the fifth segment bears only 4 keels. The subaculear tooth is pronounced, pointed, with one row composed of 2 granules in the upper midline and one granule at the tip.

AFFINITIES. The described features distinguish *Lychas krali* sp. n. from all other species of the genus *Lychas*. Features separating the new species from others occuring in Thailand are given in the key below, whereas those separating it from species occurring in Myanmar, Malaysia, Indonesia, and the Philippines are discussed in the following paragraphs.

The length of adult specimens ranges between 30 and 40 mm and separates *Lychas krali* sp. n. from *L. hosei* from Borneo (62 mm, Pocock 1891), *L. tweediei* from the Malay Peninsula (67.5 mm, of which 37.5 mm is the metasoma; Kopstein 1937) and *L. mentaweius* from Sipora (57 mm, Roewer 1943). *Lychas krali* sp. n. differs from these 3 species also in the number of pectinal teeth, 20-21 in *L. hosei* (Pocock 1891), 18-20 in *L. tweediei* (Kopstein 1937), and 23 in *L. mentaweius* (Roewer 1943).

Lychas nigrimanus from Sumatra is 45 mm long and has 15-16 pectinal teeth, but whereas the first segment of the metasoma has 10 keels, the second through fourth segments have 8 keels (Kraepelin 1898). In *Lychas krali* sp. n. the second segment of the metasoma has 10 keels. Another difference is in coloration, *L. nigrimanus* having the femur and patella pale yellow, the manus dark, and the finger pale (Kraepelin 1899).

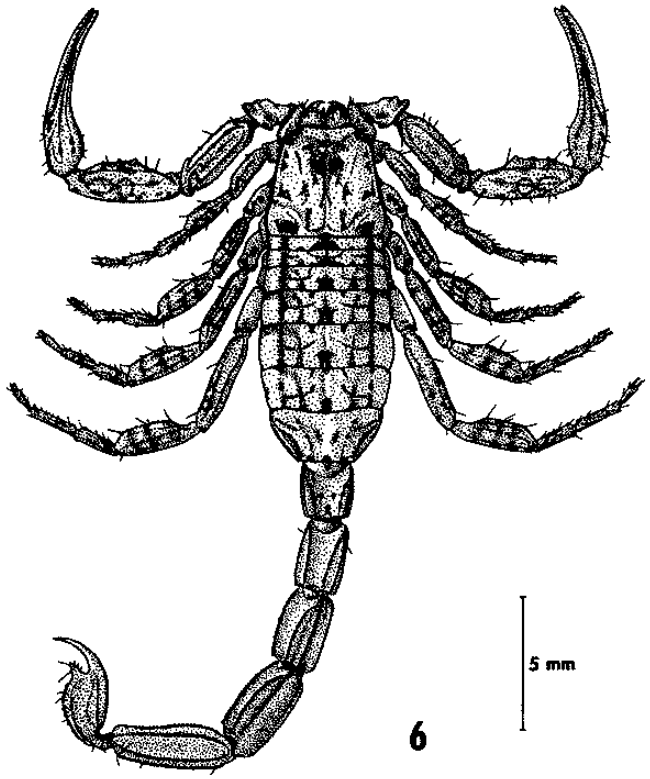


Fig. 6. *Lychas krali* sp. n. (paratype No. 4). Dorsal aspect.

Table 1. Measurements in millimeters of *Lychas krali* sp. n.. Line denoted "pectinal teeth" contains numbers of both left and right teeth separated by a colon

		Lychas krali sp. n. holotype male	*Lychas krali* sp. n. paratype (No. 5) female
Total	length	37.1	36.4
Carapace	length	4.7	5.3
	width	5	4.5
Metasoma	length	23.2	21.9
segment I	length	2.7	2.5
	width	2.3	2.3
segment II	length	3.3	3
	width	2	2
segment III	length	3.7	3.4
	width	1.9	1.9
segment IV	length	4.3	4.2
	width	1.8	1.9
segment V	length	5.3	5
	width	1.7	1.8
telson	length	4.2	3.8
Pedipalp			
femur	length	4.3	3.8
	width	1.2	1.1
patella	length	4.9	4.2
	width	1.7	1.6
tibia	length	7.5	6.5
manus	length	2.2	2.3
	width	1.3	1.2
finger movable	length	5.4	4.2
Pectinal teeth		16:15	16:16

Lychas flavimanus from Sumatra is about 42 mm long (Kraepelin 1899) and its coloration differs from *Lychas krali* sp. n. The femur, patella, and finger of the pedipalps are black, and the manus is yellow or reddish brown (Kraepelin 1899).

Lychas infuscatus from the Philippines is about as long as *Lychas krali* sp. n. but has only 10-11 pectinal teeth (Pocock 1900).

Lychas shoplandi from Myanmar differs from *Lychas krali* sp. n. in having brownish-yellow legs, chelicerae without spots, and 22 pectinal teeth (Oates 1888). Pocock (1900) emphasized its long tibial spur.

Lychas gravelyi has only 12 pectinal teeth (Tikader & Bastawade 1983) and differs in coloration (Tikader & Bastawade 1983: 48), e. g. the metasoma is dark brown to black in contrast to yellow or reddish brown in *Lychas krali* sp. n. Another difference is in the position of trichobothria d5 and e1 on the femur of the pedipalp and trichobothria on the patella of the pedipalp (Figs 3, 5; and Tikader & Bastawade 1983: 51, figs 125, 127). This species, which

occurs in Myanmar and Tikader & Bastawade (1983) do not exclude the possibility of its presence also in India, is the one most similar to *Lychas krali* sp. n.

Lychas feae from Myanmar was characterized by Pocock (1900) as having a long tibial spur and black manus, carapace, and terga. The legs are usually also black. The fingers are yellow according to Pocock (1900) but black according to Kraepelin (1899).

Lychas mucronatus (Fabricius, 1798) (Figs 1-2)

Scorpio mucronatus Fabricius, 1798: 294.
Tityus mucronatus: C. L. Koch, 1845: 29.
Isometrus mucronatus: Simon, 1884: 363; Thorell, 1889: 566; Pocock, 1894: 85.
Archisometrus mucronatus: Kraepelin, 1899: 46; Pocock, 1894: 85; Wu, 1936: 117.
Lychas mucronatus: Pocock, 1900: 36; Werner, 1935: 271; Vachon & Abe, 1988: 16.
Lychas (Alterotrichus) mucronatus: Tikader & Bastawade, 1983: 53.
? Scorpio armillatus Gervais, 1844: 48 (syn. by Kraepelin, 1891: 223).
Scorpio curvidigitus Gervais, 1844: 48 (syn. by Thorell, 1893: 368).
Archisometrus curvidigitus: Kraepelin, 1891: 223.
Tityus varius C. L. Koch, 1845: 29 (syn. Thorett, 1889: 566).
Isometrus varius: Simon, 1884: 362.
Isometrus chinensis Karsch, 1879: 116 (syn. by Kraepelin, 1891: 223).
Isometrus atomarius Simon, 1884: 363 (syn. by Kraepelin, 1891: 223).

MATERIAL. **Thailand**, Chiang Mai, 15.VI.1987, 2 females, leg. C. M. Brandsdetter; Kanchanaburi, prov. Kanchanaburi near river Kwai, 5.IV.1991, 2 males, 3 females, 1 juv., leg. J. Farkač; Lansang, 16° 48' N 98° 57' E, 500 m above sea level, 18.-24.IV.1991, 1 female, leg. D. Král & V. Kubáň; Palong near Fang, 19° 55' N 99° 06' E, 750 m above sea level, 27.V.1991, 1 male, 2 females, leg. D. Král & V. Kubáň; Samut, 1 male, 12.II.1993 [collector unknown]; Sai Buri, 23.-27.IV.1993, 3 females, leg. J. Strnad; Mae Hong Son, Nupa Ah, 30.VI.1993, 1 male, 9 females, leg. J. Schneider; Chiang Dao env. 21.V.-4.VI.1995, 1 male, 2 females, leg. M. Snížek; 56 km NW of Chiang Mai, 19° 05' N 99° 25' E, 7.-14.VI.1995, 6 females, 22 juvs before 1st ecdysis, leg. M. Snížek. **Vietnam**, Saigon, 1988, 1 male, 1 immature female, leg. Jansa; near Binh-Chan, 23.IV.1989, 1 female, leg. M. Snížek; Hanoi, X.-XI.1991, 13 males, 22 females, leg. R. Hanzal, in the author's collection. **Malaysia**, Bali [collector unknown], 1 male deposited in the Department of Invertebrate Zoology, National Museum (Natural History), Prague. **Laos**, Dong Doh, 20.III.1990, 1 juv. after 3rd ecdysis, leg. Kondorosy, deposited in the Department of Zoology, Magyar Természettudományi Museum in Budapest.

COMMENTS. *Lychas mucronatus* was characterized by Roewer (1943) as having 10 keels on the second caudal segment, 2 keels on the underside of the seventh segment of the mesosoma, total length of 50-58 mm, and 21 pectinal teeth. Pocock (1900) gave a total length of 58 mm for the female and 53 mm for the male, and also about 21 pectinal teeth.

Upon examination of a number of specimens I found the keels on the underside of the seventh segment of the mesosoma to be often indistinct, indicated only be several widely spaced granules.

The largest specimens is my collection come from Thailand (Chiang Dao) and are about 55 mm (female) and 62 mm (male) long. Females from Nupa Ah are about 57 mm long. Other specimens from Thailand range from 45 to 50 mm in length. Only one female from Lansang is 40 mm long. Specimens from Vietnam (Hanoi) are 43-55 mm (female) and 43-53 mm (male) long. A smalls immature male from Saigon is 35 mm long.

There are usually 21 and rarely 23 pectinal teeth in the males and 19-22 (most frequently 20) in the females. Only one female from Vietnam (Hanoi) has 18 pectinal teeth and a female from Lansang (Thailand) has 19 and 24 pectinal teeth.

DISTRIBUTION. China (Wu 1936: 117), India, Cambodia (Tikader & Bastawade 1983: 60), Myanmar (Kraepelin 1913: 132), Thailand (Vachon & Abe 1988: 26), Laos (Fage, 1933: 26),

Philippines (Vachon & Abe 1988: 26), Malaysia (Fage, 1933: 26), and Indonesia (Kraepelin 1899: 47). This species is recorded for the first time from Vietnam. In Thailand it is the dominant species of scorpion.

Lychas scutilus C. L. Koch, 1845

Lychas scutilus C. L. Koch, 1845: 3; Pocock, 1900: 37.
Isometrus scutilus: Pocock, 1891: 435.
Lychas scutatus C.L.Koch, 1845: 163 (syn. by Pocock, 1900: 37).
Archisometrus scutatus: Kraepelin, 1899: 44.
Isometrus weberi Karsch, 1882: 184 (syn. by Pocock, 1891: 435).
Isometrus messor Simon, 1884: 371 (syn. by Pocock, 1891: 435).
Isometrus phipsoni Oates, 1888: 248 (syn. by Pocock, 1891: 435).

MATERIAL. **Thailand**, Betong, 4 males, 6 females, IV.1993, leg. J. Strnad & J. Horák. **Malaysia**, Pangkor Island, 2 females, 5.II.1995, leg. S. Bečvář; Kedah, Langkawi Island, 1 male, 4 females, 1 juv., 15.-17.VI.1995, leg. S. & E. Bečvář in the author's collection.

COMMENTS. Length was given by Roewer (1943) as 65 mm and by Pocock (1900) as 65 mm (metasoma 37) in the female and 81 mm (metasoma 57) in the male. According to Roewer (1943) there are 16 and more pectinal teeth.

Males from Thailand (Betong) are 62 mm (metasoma 43 mm) to 85 mm (metasoma 60 mm) long, and females are 48 mm (metasoma 28 mm) to 65 mm (metasoma 39 mm) long. There are 16-19 pectinal teeth in the males and 16-17 in the females.

Males from Malaysia (Kedah) are 71 mm (metasoma 49 mm) long and females are about 60 mm (metasoma 35 mm) long. There are 19 pectinal teeth in the males and 15-18 in the females.

On the underside of the seventh segment of the mesosoma are 4 pronounced keels. The second segment of the metasoma has 8 keels.

DISTRIBUTION. Myanmar, Thailand, Malaysia, Indonesia. Introduced into Tanzania and Congo (Kraepelin 1899: 45). In Thailand and Myanmar this species appears to be confined to the southern regions.

Thaicharmus gen. n. (Figs 7-17, Table 2)

TYPE SPECIES. *Thaicharmus mahunkai* sp. n.

ETYMOLOGY. Denotes affinity to the genus *Charmus* and the geographic distribution.

DESCRIPTION. A combination of characters differentiates this genus from all other genera of the family Buthidae. The basic trichobothrial pattern is alfa (Fig. 9 and Sissom 1990: 70, fig. 3.3), legs III and IV have well developed tibial spurs (Fig. 16), the sternum is subpentagonal (Fig. 13), and the pedipalp manus has 3 Eb trichobothria on the palm (Fig. 7). This complex of characters is exhibited only by the genera *Butheoloides* Hirst, 1925 from northern Africa and *Charmus* Karsch, 1879 from India and Srí Lanka (Sissom 1990: 94). *Thaicharmus* gen. n. shares with *Butheoloides* telson with subaculear tubercle and with *Charmus* a similar habitus (Fig. 12), similar proportions, the same structure of lateral eyes, and coloration; many other similar but also differing features can be seen on the metasoma.

Thaicharmus gen. n. is also characterized by the number and distribution of trichobothria on the pedipalps (Figs 7-11), chiefly by a shift of trichobothrium em toward trichobothria est and et (Fig. 11 and Vachon 1974: fig. 24), 12 (including apical row) cutting edges on the movable

fingers of pedipalps (Fig. 17), and other features included in the description of *Thaicharmus mahuankai* sp. n. below.

AFFINITIES. The most closely related genus *Charmus* is easily distinguished from *Thaicharmus* gen. n. by having only 8 cutting edges on the movable fingers of pedipalps, by the absence of subaculear tubercle on the telson, and by the distribution of trichobothria on the pedipalps, chiefly the position of trichobothria em, est, and et on the patella (Fig. 11 and Sreenivasa- -Reddy 1966: fig. 3, Vachon 1982: fig. 5, and Tikader & Bastawade 1983: figs 393, 413). The fifth segment of the metasoma terminates in a pronounced, broad process that overlaps the telson (Fig. 12). This process is absent in both *Charmus* and *Butheoloides*.

The genus *Butheoloides* is easily distinguished from *Thaicharmus* gen. n. by having 9 (including apical row) cutting edges on movable fingers of pedipalps (Vachon 1950: 173) and by the distribution of trichobothria on the pedipalps, chiefly position of the above noted trichobothria em, est, and et on the patella (Fig. 11 and Vachon 1950: fig. 2). The genus *Butheoloides* occurs in Morocco, Senegal, Mauretania, Republic of Mali, and Ivory Coast.

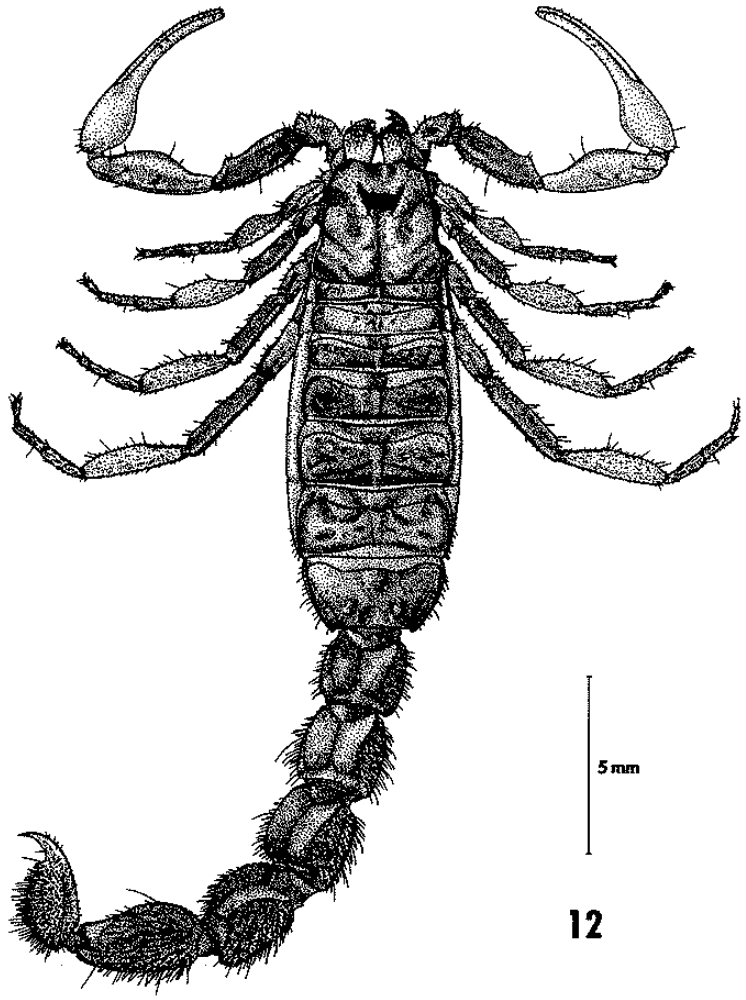


Fig. 12. *Thaicharmus mahunkai* gen. n., sp. n. (holotype). Dorsal aspect.

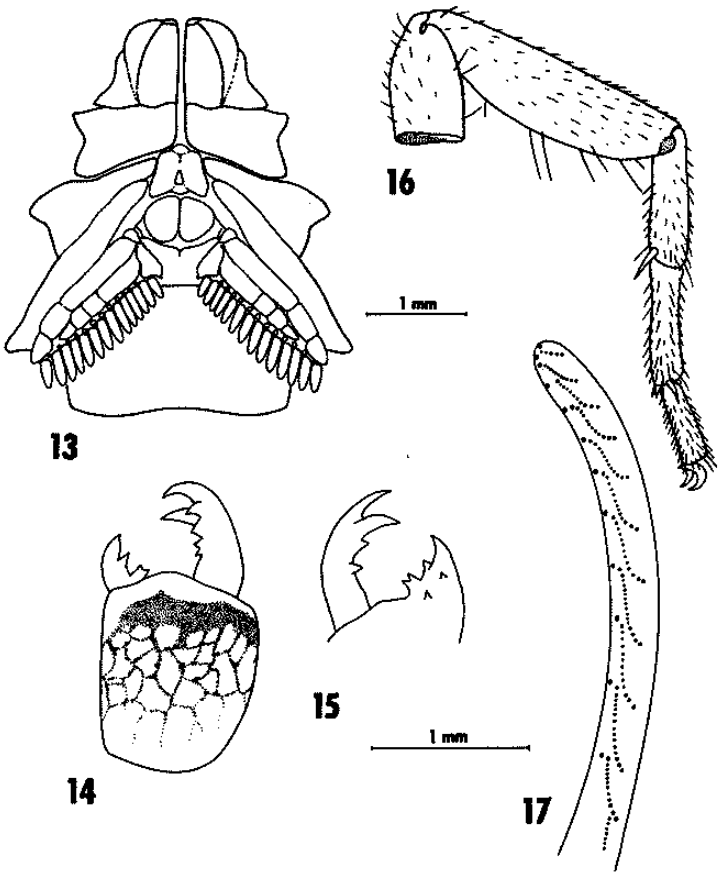
Thaicharmus gen. n. differs from other scorpion genera occuring in Thailand by features given in the key below. Inclusion in the key of genera of the family Buthidae in Sissom (1990: 94) is as follows:

Pedipalp chela with 3 Eb trichobothria on palm:
Telson with distinct subaculear tubercle, carapace granular but lacking distinct carinae 1
- Telson lacking subaculear tubercle, carapace possessing distinct carinae ..... *Charmus*
1. Cutting edges of movable fingers of pedipalps number 9 (including apical row) ..... *Butheoloides*
- Cutting edges of movable fingers of pedipalps number 12 (including apical row) ..... *Thaicharmus* gen. n.

Thaicharmus mahunkai sp. n. (Figs 7-17, Table 2)

TYPE MATERIAL. Holotype and paratype - 2 females preserved in 75% alcohol, labelled: Thailand, Kaeng Krachan (Phetchaburi), Kaeng Krachang National Park, Reservior, 7.II.1994, leg. Mahunka Sándor & L. Mahunka-Papp. Locality No. 59 in Mahunka & Mahunka (1994: 267). The holotype is deposited in the Department of Zoology, Magyar Természettudományi Museum in Budapest. The paratype is in the author's collection.

TYPE LOCALITY. Thailand, Kaeng Krachan (Phetchaburi), Kaeng Krachang National Park. Collected under rocks.



Figs 13-17. *Thaicharmus mahunkai* gen. n., sp. n. (holotype). Fig. 13. Ventral aspect, Fig. 14. Chelicera dorsal, Fig. 15. Chelicera ventral, Fig. 16. Fourth right leg, Fig. 17. Cutting edges of movable fingers.

AFFINITIES. Differential diagnosis of the new species is included in the generic diagnosis, and differentiation from other Thailand scorpions can be found in the key below.

ETYMOLOGY. Named after Sándor Mahunka (Magyar Természettudományi Museum in Budapest), who collected the type material.

DESCRIPTION. The length is 28.9 mm in the holotype and 29.2 mm in the paratype. The habitus is shown in Fig. 12. Measurements of the carapace, telson, segments of metasoma and segments of pedipalps, and numbers of pectinal teeth (Fig. 13) are given in Table 2. There are 14 and 15 pectinal teeth in the holotype and 14 in the paratype. For the position and distribution of trichobothria on the pedipalps see Figs 7-11.

Color. The base color is black. Femur of pedipalp is black, patella of pedipalp is light brown of varying shade, manus of pedipalp is pale yellow, and both fingers are light brown but darker than the manus.

Chelicerae (Figs 14, 15) are yellow, with black reticulation which is better defined in the anterior third.

Table 2. Measurements in millimeters of *Thaicharmus mahunkai* gen. n., sp. n.. Line denoted "pectinal teeth" contains numbers of both left and right teeth separated by a colon

		Thaicharmus mahunkai sp. n. holotype	*Thaicharmus mahunkai* sp. n. paratype
Total	length	28.9	29.2
Carapace	length	3.5	3.4
	width	3.5	3.4
Metasoma	length	16.5	16.2
segment I	length	2.3	2.2
	width	2.5	2.4
segment II	length	2.7	2.3
	width	2.5	2.4
segment III	length	2.7	2.5
	width	2.5	2.4
segment IV	length	2.9	2.6
	width	1.5	2.4
segment V	length	3.7	3.4
	width	2.5	2.4
telson	length	3.3	3.2
Pedipalp			
femur	length	3	2.8
	width	0.9	0.9
patella	length	3.6	3.6
	width	1.3	1.2
tibia	length	5.6	4.9
manus	length	2	1.8
	width	1.2	1.2
finger movable	length	3.6	3.1
Pectinal teeth		14:15	14:14

Carapace is black, without keels, and granulated. The granulation is subdued in the ante-rior portion and around median eyes. In the posterior portion are two larger, oval, symmetrically situated elevated areas separated by a median groove. Four pairs of lateral eyes are situated in a row near the carapace margin.

Legs are pale yellow except for the femur which is always dark gray to black and the patella whose part adjacent to the femur is deep to dark yellow. Most legs have faint black spots on the inner sides. Legs III and IV have well developed tibial spurs (Fig. 16).

Mesosoma has only one median keel. The tergites of the mesosoma are black with a yellow-ish-brown pattern.

Metasoma is black and telson is reddish brown. The segments of the metasoma have only two dorsal keels which are well developed but sparsely granulated. Only in the anterior portions of the keels on segments 3-5 is a row of several irregular granules which are larger on the fourth and largest on the fifth segment. There are 4 such granules on the third segment, 5 on the fourth segment, and 6 on the fifth segment. The dorsal keels are separated by a median groove which is granulated and black, in contrast to the lateral areas which are brown. In all segments the groove opens anteriorly to form a ledge that takes the entire segment width, whereas on the posterior margins the widening of the groove is at first minor and gradually attains a larger area caudad. On the fifth segment this area takes one-half of the surface and its granulation diminishes toward the posterior margin. The lateral and ventral parts of the segments are rounded, lack keels, and are sparsely pitted. Pits are present also on the telson, which has a small and blunt subaculear tubercle located below the aculeus. The fifth segment of the metasoma terminates in a large, broad process that partially overlaps the telson (Fig. 12). The metasoma is sparsely covered with hairs which are longer on the sides and ventrum than on the dorsum. The ventral surface of the telson is more densely hirsute than the preceding segments.

Scorpiops (Scorpiops) farkaci Kovařík, 1993

Scorpiops (Scorpiops) farkaci Kovařík, 1993: 111.

MATERIAL. **Thailand**, prov. Mae Hong Son, Ban Huai Po, 1600-1700 m above sea level, 3 males, 6 mature females, 4 immature females, 4 juvs before the first ecdysis, 2 juvs after the first ecdysis, 9 juvs after the second ecdysis (holotype, paratypes nos 1-27), 10.V.1991, leg. J. Farkač. Female no. 4 is deposited in the Department of Invertebrate Zoology, National Museum (Natural History), Prague. Holotype and all other paratypes are in the author's collection.

COMMENTS. This species is known only from the type material collected in a xeric clearing of a virgin mountain forest at elevations 1600-1700 m; all specimens were found beneath dry bufallo faeces.

Scorpiops (Euscorpiops) binghamii Pocock, 1893

Scorpiops binghamii Pocock, 1893: 327; Pocock, 1900: 74.
Scorpiops longimanus binghami: Kraepelin, 1913: 161.
Scorpiops longimanus benghami: Vachon, 1974: 942.
Scorpiops (Euscorpiops) longimanus benghami: Vachon, 1988: 155.
Scorpiops (Euscorpiops) binghami: Tikader & Bastawade, 1983: 470.
Scorpiops (Euscorpiops) binghamii: Kovařík, 1993: 113.

MATERIAL. **Thailand**, Mae Hong Son distr., Nupa-ah, 1 immature female, 7.-9.V.1992, leg. J. Strnad, in the author's collection.

COMMENTS. This specimen has 19 trichobothria on the external surface of the patella (5 eb, 2 esb, 2 em, 5 est, 5 et), 9 pectinal teeth, and 13 trichobothria on the lower surface of the patella. Vachon (1974 and 1980) regarded this species as a subspecies of *Scorpiops (Euscorpiops) longimanus*. Kraepelin first (1899: 180) considered it a synonym of *Scorpiops montanus* Karsch, 1879, but in 1913 placed it as a subspecies in *Scorpiops longimanus*.

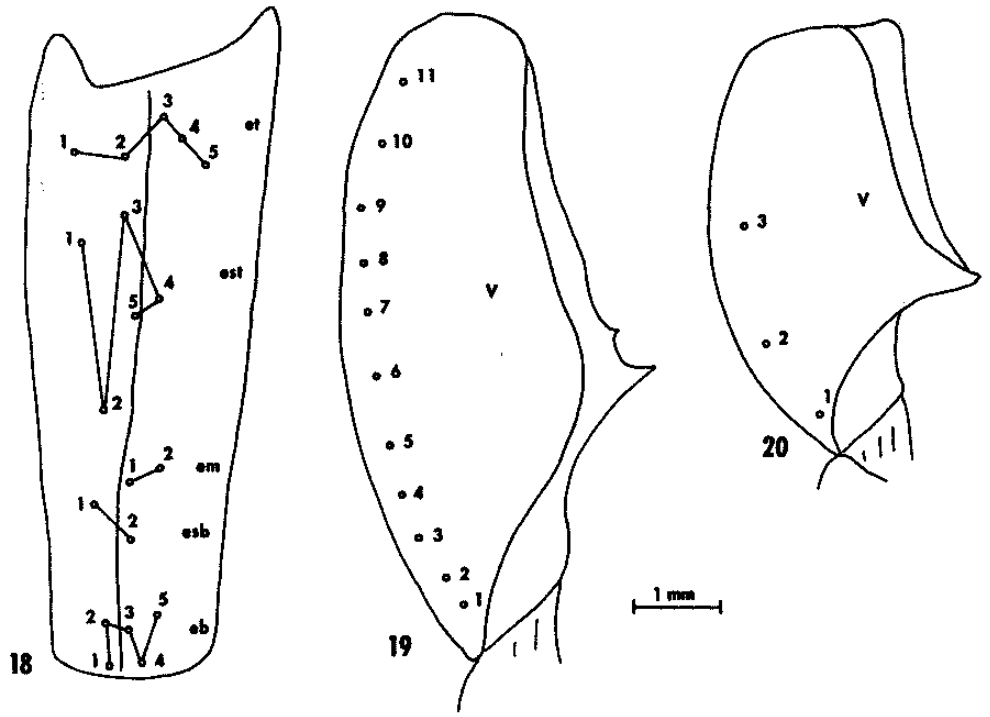
S. (E.) binghamii has been known from Tenasserim Mts. (Myanmar). Its discovery in Thailand (Kovařík 1993) therefore is not surprising.

Scorpiops (Euscorpiops) longimanus Pocock, 1893 (Figs 18-19)

Scorpiops longimanus Pocock, 1893: 326; Kraepelin, 1894: 191; Kraepelin, 1899: 180; Pocock, 1900: 72; Kraepelin, 1913: 160.
Scorpiops (Euscorpiops) longimanus longimanus: Vachon, 1980: 155.
Scorpiops (Euscorpiops) longimanus: Tikader & Bastawade, 1983: 464; Kovařík, 1993: 113.

MATERIAL. **Thailand**, prov. Chiang Mai, Doi Suthep, Pui, 1 male, 1 female, 20.IV.1991, leg. J. Farkač; Doi Chiang Dao, 1800 m above sea level, 1 juv., V. 1991, leg. D. Král & V. Kubáň, in the author's collection.

COMMENTS. These specimens have 19 trichobothria on the external surface of the patella (5 eb, 2 esb, 2 em, 5 est, 5 et) (Fig. 18), and 11 or 12 trichobothria on the lower surface of the patella (Fig. 19). Tikader & Bastawade (1983) found 10 or 11 trichobothria on the lower surface of the patella in specimens from India. Pectinal teeth number 6-8.



Figs. 18-20. Figs 18-19. *Scorpiops (Euscorpiops) longimanus* from Thailand. Fig. 18. Patella external, Fig. 19. Patela ventral. Fig. 20. *Liocheles australasiae* from Thailand, Patellla ventral. Explanations: First letters: e, external, v, ventral. Second or second plus third letters: b, basal, sb, suprabasal, st, subterminal, t, terminal. Numerals distinguish individual trichobothria of the same classification. Designation and description of trichobothria according to Vachon (1974).

This species is known from India, Bangladesh (Tikader & Bastawade 1983: 470), and Thailand (Kovařík 1993: 113). It is therefore likely that it occurs also in Myanmar.

Liocheles Sundevall, 1833

Scorpio (Liocheles) Sundevall, 1833: 31.
Sisyphus [sic] C. L. Koch, 1837: 37 (L. E. Koch, 1977: 160; Francke, 1985: 13).
Ischnurus C. L. Koch, 1837: 37 (syn. by Thorell, 1876: 251; Francke, 1985: 9).
Hormurus Thorell, 1876: 14 (syn. by Karsch, 1880; Francke, 1985: 9).

TAXONOMIC POSITION. Sundevall (1833) described the genus *Liocheles* as a subgenus with the type species *Scorpio australasiae* Fabricius, 1775. C. L. Koch (1837) described the genus *Ischnurus* with the type species *Sisyphus* [lapsus calami = *Ischnurus*] *complanatus* C. L. Koch, 1837 (= *Liocheles australasiae* Fabricius, 1775). Even recent publications (e. g. Tikader & Bastawade 1983: 499) often incorrectly use the generic name *Hormurus* erected by Thorell (1876) with the type species *Ischnurus caudicula* L. Koch, 1867 (= *Liocheles waigiensis* (Gervais, 1844)).

Liocheles australasiae (Fabricius, 1775) (Fig. 20)

Scorpio australasiae Fabricius, 1775: 399; Fabricius, 1793: 433.
Scorpio (Liocheles) australasiae: Sundevall, 1833: 31.
Ischnurus australasiae: C. L. Koch, 1837: 71.
Hormurus australasiae: Thorell, 1876: 251; L. Koch, 1885: 22; Thorell, 1888: 419; Pocock, 1894: 96; Simon, 1893: 328; Thorell, 1894: 1; Kraepelin, 1894: 133; Kraepelin, 1897: 1; Kraepelin, 1899: 154; Simon, 1899: 120; Pocock, 1900: 79; Kraepelin, 1901: 272; Werner, 1902: 603; Kraepelin, 1913: 163; Kraepelin, 1914: 328; Werner, 1916: 91; Kopstein, 1921: 135; Kopstein, 1923: 185; Kopstein, 1926: 111; Giltay, 1931: 9; Fage, 1933: 27; Wu, 1936: 121; Tikader & Bastawade, 1983: 501.
Liocheles australasiae: Simon, 1887: 113; Takashima, 1945: 95; Takashima, 1948: 86; Takashima, 1950: 17; L. E. Koch, 1977: 160; Vachon & Abe, 1988: 27.
Hormurus australasiae suspectus Thorell, 1888: 419; Kraepelin, 1899: 154; Kraepelin, 1913: 163 (syn. by L. E. Koch, 1977: 161).
Ischnurus complanatus C. L. Koch, 1837: 73 (syn. by Thorell, 1876: 254).
Scorpio gracilicauda Guérin-Méneville, 1843: 11 (syn. by Kraepelin, 1899: 154).
Scorpio cumingii Gervais, 1844: 69 (syn. by Kraepelin, 1899: 154).
Ischnurus pistaceus Simon, 1877: 93 (syn. by Kraepelin, 1899: 154).
Buthus brevicaudatus Rainbow, 1897: 107 (syn. by Kraepelin, 1899: 154).
Hormurus boholiensis Kraepelin, 1914: 333 (syn. by L. E. Koch, 1977: 161).
Hormurus caudicula boholiensis: Giltay, 1931: 12 (syn. by L. E. Koch, 1977: 161).

MATERIAL. **Thailand**, prov. Mae Hong Son, Ban Huai Po, 1800 m above sea level, 1 female, 10.V.1991, leg. J. Farkač; prov. Mae Hong Son, Ban Si Lang, 1600-2000 m above sea level, 1 male, 17.-23.V.1991, leg. J. Horák; Doi Chiang Dao Mts., 19° 25' N 98° 52' E, 1000 m above sea level, 17.-24.VI.1991, 1 female, leg. D. Král & V. Kubáň; prov. Mae Hong Son, Huai Sue Tao, 1 male, 1 female, 11.-17.V.1992, leg. J. Strnad; Betong, 2 males, 3 females, IV.1993, leg. J. Horák & J. Strnad. **Vietnam**, Ha Long, 1 female, 6.-7.XI.1988, leg. S. Bečvář, in the author's collection; 18 km S of Da Lat, 19.X.1988, 2 females, 1 juv., leg. Mahunka & Vásárhlyi (Locality No. 332); 35 km NE of Bao Loc, Tung Rieng River, 23.X.1988, 1 female, 3 juvs, leg Mahunka & Vásárhlyi (Locality No. 366); Bao Loc, 27.X.1988, 1 female, 1 juv., leg. Mahunka & Vásárhlyi (Locality No. 402), in the Department of Zoology, Magyar Természettudományi Museum in Budapest. **Malaysia**, Cameron Highlands, 36 females, 18 males, 1992 [collector unknown]; Perak Taiping, 3 juvs, 11.I.1995, leg. S. Bečvář; Kedah, Langkawi Island, 1 female, 15.-17.VI.1995, leg. S. & E. Bečvář; Sarawak, Sebong, 2 males, 7 females, 14 juvs, 9.-20.III.1994, leg. P. Bílek; Sarawak, Rumah Ugap, 14 juvs, 3.-9.III.1994, leg. P. Bílek. **Indonesia**, Borneo, Nanga Sarawai env., Tontang, 1 female, 24.VII.-2.VIII.1993, leg. J. Schneider, in the author's collection.

COMMENTS. According to Vachon & Abe (1988) this is a small scorpion not exceeding 30 mm in total length. Specimens from the Malay Peninsula (Cameron Highlands) reach only 22-26 mm. A female from Malaysia (Kedah) is 33 mm long, and a female from Vietnam is 29 mm long. The largest female in the author's collection, 33.5 mm long, is from Thailand (Ban Huai Po).

The largest specimens, 35 mm, are recorded by L. E. Koch (1977) from Australia. Wu (1936) recorded lengths of 26-31 mm from China.

The number of pectinal teeth is given by Vachon & Abe (1988) as 4-7, by Wu (1936) as 6, and by L. E. Koch (1977) as 8-9 in the male and 4-8 in the female. A female from North Vietnam (Ha Long) has, like most other specimens from Thailand, 6 pectinal teeth. Only the largest female from Thailand (Ban Huai Po) has 4 and 5 pectinal teeth.

Details on South Vietnam localities (Nos 332, 366, and 402) can be found in Mahunka, Oláh & Vásárhelyi (1989).

DISTRIBUTION. China, Korea, India, Myanmar, Thailand, Cambodia, Laos, Vietnam, Philippines, Malaysia, Indonesia, Polynesia, Micronesia, and Australia (e. g. L. E. Koch 1977: 161, Tikader & Bastawade 1983: 505, Fage 1933: 27).

The species has been so far recorded for Vietnam only by L. E. Koch (1977), from southern South Vietnam. The new specimens introduced here are from North Vietnam.

Liocheles nigripes (Pocock, 1897)

Hormurus nigripes Pocock, 1897: 117; Kraepelin, 1899: 155; Pocock, 1900: 80; Kraepelin, 1913: 163; Fage, 1944: 72; Tikader & Bastawade, 1983: 506.

COMMENTS. This species is known from India (Pocock 1900, Tikader & Bastawade 1983) and Laos (Fage 1944). It is therefore reasonable to assume its presence also in Myanmar, Thailand, and Cambodia.

Scorpionidae Peters, 1862

Heterometrus (Heterometrus) laoticus Couzijn, 1981

Heterometrus (Heterometrus) laoticus Couzijn, 1981: 88.

MATERIAL. **Thailand**, Ban Saen near Chonburi, 1 immature male, 3.VI.1991, leg. D. Král & V. Kubáň, breeding F. Kovařík, 6th ecdysis 12.X.1991; Khorat, 180 km NE of Bangkok [purchase from Bangkok], 4 males, 3 females, V.1991, 3 males, 3 females, V.1994, **Cambodia**, Takeo, 1 female, 1984, in author's collection.

COMMENTS. Couzijn (1981) gave the length of both sexes as up to 117 mm. Specimens purchased from Bangkok are 88-122 mm long. In contrast to most other species of *Heterometrus* there is no apparent difference between the male and female in the shape and size of the pedipalps.

DISTRIBUTION. Vietnam, Laos, Cambodia, Thailand (Couzijn 1981: 94). Couzijn (1981) regarded this species as common in Laos and more rare in Thailand, Cambodia, and South Vietnam. For Thailand he recorded only one male from Siam. However, *H. laoticus* must be quite common at suitable localities around Bangkok, because in the city it is sold to tourists in large numbers, with dozens of specimens crowded in each container. Unfortunately only one immature male has been so far collected in nature, from a dry cultivated field.

Heterometrus (Heterometrus) spinifer spinifer (Hemprich & Ehrenberg, 1828)

Buthus (Heterometrus) spinifer Hemprich & Ehremberg, 1828: pl. 1, fig. 2.; Hemprich & Ehremberg, 1829: 352.
Heterometrus (Heterometrus) spinifer spinifer: Couzijn, 1981: 89.
Palamnaeus laevigatus Thorell, 1876: 221 (syn. by Couzijn, 1981: 89).
Heterometrus longimanus (part): Kraepelin, 1894: 41; 1899: 111; Giltay, 1931: 4; Takashima, 1945: 90 (Couzijn, 1981: 89).
Palamnaeus oatesi Pocock, 1900: 98; Giltay, 1931: 4; Takashima, 1945: 94 (syn. by Couzijn, 1981: 89).

MATERIAL. **Thailand**, Betong, 1 male, IV.1993, leg. J. Strnad; Trang-Kao Čong, 1 juv., 10.IX.1993, leg. Veselý; Thaleban, 30 km SW of Satun, 1 male, 20.IX.1993. **Malaysia**, Cameron Highlands, 4 females, 2 juvs, 1992; Jelawang jungle near Dabong, 1 female, 29.VI.1995, leg. S. Bečvář; Pahang/Johor, Endau Rompin n. park, Salendang, 100 m above sea level, 1 male, 28.II.-12.III.1995, leg. M. Štrba & R. Hergovits, in author's collection.

COMMENTS. According to Couzijn (1981), females reach lengths up to 125 mm. The above listed males from Thailand are 115 mm long. Couzijn (1981) described also the subspecies *H. spinifer solitarius* from Sri Lanka.

Because of the differences between specimens from Malaysia (Cameron Highlands) and Thailand, chiefly in the shape of the manus of pedipalps, it is likely that the subspecific taxonomy will need to be further modified. More material from diverse localities is needed, however, for such studies to commence.

DISTRIBUTION. South Vietnam, Cambodia, Thailand, Malaysia.

In Thailand the species apparently occurs only in the south, and in Malaysia it has been recorded only from the mainland. It is absent in Borneo.

Key to species of Scorpionida from Thailand

A mature, black specimen over 10 cm long ..... *Heterometrus* 1
- Total length up to 9 cm 2

1. Manus slightly longer than wide. Surface of manus nearly smooth, without keels. Patella and femur of pedipalps the same in males and females. Telson black ..... *Heterometrus laoticus*
- Manus much longer than wide. Surface of manus with keels. Patella and femur longer in male than in female. Telson often pale yellow ..... *Heterometrus spinifer spinifer*
2. Pedipalp femur with 10 or more trichobothria, of which 4 or 5 are on the internal aspect (Fig. 9). Telson with subaculear tooth (Fig. 6) or tubercle (Fig. 12) ..... Buthidae 3
- Pedipalp femur with 9 or fewer trichobothria, of which only 1 is on the internal aspect. Telson without subaculear tooth or tubercle 8
3. Telson with a small, blunt subaculear tubercle (Fig. 12). Cutting edges of movable fingers of pedipalps number 12 (including apical row - Fig. 17) ..... *Thaicharmus mahunkai* gen. n., sp. n.
- Telson with a pointed subaculear tooth (Fig. 6). Cutting edges of movable fingers of pedipalps number 6 4
4. Tibial spur (Fig. 16) present on legs III and IV ..... *Lychas* 5
- Legs without tibial spur ..... *Isometrus* 7
5. Second segment of metasoma with 8 keels. Ventral surface of seventh segment of mesosoma with 4 keels. Legs, pedipalps, and metasoma without spots. Metasoma much longer in male than in female. Telson in male very long and slender ..... *Lychas scutilus*
- Second segment of metasoma with 10 keels. Legs and pedipalps spotted (Fig. 6) Metasoma of approximately the same length in both sexes 6
6. Total length 30-40 mm. Pectinal teeth number 15-18. Manus of pedipalps of the same color as patella and femur of pedipalps ..... *Lychas krali* sp. n.
- Total length 40-60 mm. Pectinal teeth number 18-24 (most frequently 20-21). Manus of pedipalps bright yellow (with sparse, minute black spots) ..... *Lychas mucronatus*
7. Total length 40 mm or more. Pectinal teeth number 17-19 ..... *Isometrus maculatus*
- Total length 23 mm. Pectinal teeth number 12-13 ..... *Isometrus vittatus*

8. Number of trichobothria on the lower surface of the patella is 9-13 (Fig. 19) ..... *Scorpiops* 9
   - Number of trichobothria on the lower surface of the patella is 3 (Fig. 20) ..... *Liocheles* 11
9. Number of trichobothria on the external surface of the patella is 17 (5 eb, 2 esb, 2 em, 4 est, 4 et). Number of trichobothria on the ventral surface of the patella is 9..... *Scorpiops (Scorpiops) farkaci*
   - Number of trichobothria on the external surface of the patella is 19 (Fig. 18). Number of trichobothria on the ventral surface of the patella is 10-13 (Fig. 19) 10
10. Number of trichobothria on the ventral surface of the patella is 10-12 (Fig. 19) ..... *Scorpiops (Euscorpiops) longimanus*
    - Number of trichobothria on the ventral surface of the patella is 13 ..... *Scorpiops (Euscorpiops) binghamii*
11. Carinae on patella and manus distinct and granular, anterior or inner surface of patella armed with a strong, tuberculate denticle ..... *Liocheles australasiae*
    - Carinae on patella and manus not very distinct, weakly granular to obsolete, anterior or inner surface of patella armed with few very weakly tuberculate granules..... *Liocheles nigripes*

List of Scorpionida from Thailand

Buthidae Simon, 1879

Isometrus (Isometrus) maculatus (De Geer, 1778)
? Isometrus (Reddyanus) vittatus Pocock, 1900
Lychas krali **sp. n.**
Lychas mucronatus (Fabricius, 1798)
Lychas scutilus C. L. Koch, 1845
Thaicharmus mahunkai **gen. n., sp. n.**

Scorpiopsidae Kraepelin, 1905

Scorpiops (Scorpiops) farkaci Kovařík, 1993
Scorpiops (Euscorpiops) binghamii Pocock, 1893
Scorpiops (Euscorpiops) longimanus Pocock, 1893

Ischnuridae Pocock, 1893

Liocheles australasiae (Fabricius, 1775)
? Liocheles nigripes (Pocock, 1897)

Scorpionidae Peters, 1862

Heterometrus (Heterometrus) laoticus Couzijn, 1981
Heterometrus (Heterometrus) spinifer spinifer (Hemprich & Ehrenberg, 1828)

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REFERENCES

Cambridge O. P. 1869: Notes on some spiders and scorpions from St. Helena, with descriptions of new species. *Proc. Zool. Soc. London* **35**: 531-544.
Couzijn H. W. C. 1981: Revision of the genus Heterometrus Hemprich & Ehrenberg (Scorpionidae, Arachnidea). *Zool. Verh. Rijksmus. Nat. Hist. Leiden* **184**: 1-196.
De Geer C. 1778: *Mémoires pour servir a l'histoire des Insectes (tomus 1-7. 1752-1778)*. Stockholm, 456 pp.
Fabricius J. Ch. 1775: *Systema entomologiae*. Flensburg et Leipzig: In officina Libraria Kortii, 832 pp.

FABRICIUS J. CH. 1793: *Entomologia systematica emendata et aucta secundum classes, ordines, genera, species adjectis synonymis, Locis, observationibus, descriptionibus. Tom. II.* Hafniae: Impensis Christ. Gottl. Proft., 519 pp.
FABRICIUS J. CH. 1798: *Entomologiae Systematicae. Supplementum.* Hafniae: Apud Proft et Storch, 572 pp.
FAGE L. 1933: Les Scorpions de l'Indochine Francaise leurs affinités, leur distribution géographique. *Ann. Soc. Entomol. France* **102**: 25-34.
FAGE L. 1936: Nouvelle contribution á l'étude des Scorpions de l'Indochine Francaise. *Bull. Soc. Entomol. France* **41**: 179-181.
FAGE L. 1944: Scorpions et Pédipalpes de l'Indochine Francaise. *Ann. Soc. Entomol. France* **113**: 71-81.
FRANCKE O. F. 1985: Conspectus genericus scorpionorum 1758-1982 (Arachnida, Scorpiones). *Occas. Pap. Mus. Texas Tech. Univ.* **98**: 1-32.
GERVAIS P. M. 1844: Scorpions. Pp. 14-74. In: WALCKENAER C. W. & GERVAIS P. M. (eds.): *Histoire naturelle des Insectes.* Paris: Lib. Encyclop. Roret, Tome 3, 418 pp.
GILTAY L. 1931: Scorpions et Pédipalpes. Résultats scientifiques du voyage aux Indes Orientales néerlanaises. *Mém. Mus. Royal. Hist. Nat. Belg.* **3(6)**: 1-28.
GLAUERT L. 1925: Australian Scorpionidea. Part 1. *J. Proc. Royal Soc. West. Austral.* **11**: 89-118.
GLAUERT L. 1963: Check list of Western Australian scorpions. *West. Austral. Natur.* **8**: 181-185.
GUÉRIN-MÉNEVILLE F. E. 1843: *Iconographie du Regne Animal de G. Cuvier, ou représentation d'aprés nature de l'une des espéces les plus remarquables et souvent non encore figurées, de chaque genre d'animaux.* Paris. 3: 11.
HEMPRICH F. G. & EHRENBERG CH. G. 1828: *Symbolae physicae seu icones et descriptiones Animalium evertebratorum sepositis insectis quae ex itinere per Africam Borealem et Asiam Occidentalem. Decas Prima.* Berolini: Officina Academica, Tab. I. and II.
HEMPRICH F. G. & EHRENBERG CH. G. 1829: Vorläufige Uebersicht der in Nord-Afrika und West-Asien einheimischen Scorpione und deren geographischen Verbreitung, nach den eigenen Beobachtungen. *Gesells. Natur. Freunde Verh.* **1**: 348-362.
HERBST J. F. W. 1800: *Naturgeschichte der Skorpionen. Natursystem der Ungeflügelten Insekten.* Berlin: Bei Gottlieb August Lange, 86 pp.
HIRST A. S. 1911: Descriptions of new scorpions. *Ann. Mag. Natur. Hist.* **8**: 462-473.
KARSCH F. 1879: Skorpionologische Beiträge II. *Mitt. Münch. Entomol. Ver.* **3**: 97-136.
KARSCH F. 1880: Arachnologische Blatter. *Ztschr. Gesam. Naturw.* **53**: 373-409.
KARSCH F. 1882: Ein neuer Skorpion von Salanga. *Berliner Entomol. Ztschr.* **26**: 184.
KOCH C. L. 1837: *Übersicht des Arachnidensystems. Erstes Heft.* Nürnberg: C. H. Zeh'schen Buchhandlung., 39 pp.
KOCH C. L. 1837: Scorpions. Viertes Heft. Pp. 69-74, Fig. 293-295. In: KOCH. C. L.: *Die Arachniden. Vierter Band.* Nürnberg: C. H. Zeh'schen Buchhandlung (1837-1838), 144 pp.
KOCH C. L. 1845: *Die Arachniden. Zwölfter Band.* Nürnberg: C. H. Zeh'schen Buchhandlung, 166 pp.
KOCH L. 1885: *Die Arachniden Australiens nach der Natur beschrieben und abgebildet.* Nürnberg, Part 2, 51 pp.
KOCH L. E. 1977: The taxonomy, geographic distribution and evolutionary radiation of Australo-Papuan scorpions. *Rec. West. Austral. Mus.* **5**: 83-367.
KOPSTEIN F. 1921: Die Skorpione des Indo-Australischen Archipels mit Grundlage der in holländischen Sammlungen, vornähmlich des Rijks-Museums in Leiden, vorhandenen Arten. *Zool. Meded. Leiden* **6**: 115-144.
KOPSTEIN F. 1923: Liste der Skorpione des Indo-Australischen Archipels im Museum zu Buitenzorg. *Treubia* **3**: 184-187.
KOPSTEIN F. 1926: De Schorpioenen van Java. *Trop. Natuur* **7**: 109-118.
KOPSTEIN F. 1937: A new scorpion from the Malay Peninsula. *Bull. Raffles Mus.* **13**: 175-176.
KOVAŘÍK F. 1992: A check list of scorpions (Arachnida: Scorpiones) in the collections of the Zoological Department, National Museum in Prague. *Acta Soc. Zool. Bohemoslov.* **56**: 181-186.
KOVAŘÍK F. 1993: Two new species of the genus Scorpiops (Arachnida: Scorpiones: Vaejovidae) from south-east Asia. *Acta Soc. Zool. Bohem.* **57**: 109-115.
KOVAŘÍK F. 1994: Scorpiops irenae sp. n. from Nepal and Scorpiops hardwickei jendeki subsp. n. from Yunnan, China (Arachnida: Scorpionida: Vaejovidae). *Acta Soc. Zool. Bohem.* **58**: 61-66.
KOVAŘÍK F. 1994: Isometrus zideki sp. n. from Malaysia and Indonesia, and a taxonomic position of Isometrus formosus, I. thurstoni and I. sankariensis (Arachnida: Scorpionida: Buthidae). *Acta Soc. Zool. Bohem.* **58**: 195-203.
KRAEPELIN K. 1891: Revision der Skorpione. I. Die Familie des Androctonidae. *Jahrb. Hamburg.Wissensch. Anst.* **8(1890)**: 144-286.
KRAEPELIN K. 1894: Revision der Skorpione. II. Scorpionidae und Bothriuridae. *Jahrb. Hamburg. Wissensch. Anst.* **11(1893)**: 1-248.
KRAEPELIN K. 1897: Scorpione und Thelyphoniden. *Abh. Senckenb. Naturforsch. Ges.* **23**: 1.
KRAEPELIN K. 1898: Neue Pedipalpen und Scorpione des Hamburger Museums. *Jahrb. Hamburg. Wissensch. Anst.* **15**: 39-44.

KRAEPELIN K. 1899: Scorpiones und Pedipalpi. *Das Tierreich* **8**: 1-265.
KRAEPELIN K. 1901: Catalogue des Scorpions des collections du Muséum d'Histoire naturelle de Paris. *Bull. Mus. Hist. Natur. Paris* **7**: 265-274.
KRAEPELIN K. 1907: Die sekundären Geschlechtscharaktere der Skorpione, Pedipalpen und Solifugen. *Jahrb. Hamburg. Wissensch. Anst.* **25**: 181-225.
KRAEPELIN K. 1913: Neue Beiträge zur Systematik der Gliederspinnen. A. Bemerkungen zur Skorpionenfauna Indiens. *Mitt. Natur. Mus. Hamburg* **30**: 123-167.
KRAEPELIN K. 1914: Die Skorpione und Pedipalpen von Neu-Caledonien und den benachbarten Inselgruppen. Pp. 327-337. In: SARASIN F. & ROUX. J. (eds.): *Nova Caledonia (Zool.)*. Wiesbaden.
KRAEPELIN K. 1916: Results of Dr. E. Mjöberg's Swedish scientific expeditions to Australia 1910-1913. 4. Scolopendriden und Skorpione. *Ark. Zool.* **10**: 1-43.
LINNAEUS C. 1758: *Systema naturae per Regna tria Naturae, secundum Classes, Ordines, Genera, Species, cum Characteribus, Differentiis, Synonymis, Locis. Ed. X, reformata, Tomus 1*. Holmiae: 821 pp.
LÖNNBERG E. 1897: Scorpioner och pedipalperi Upsala Universitets Zoologiska Museum. *Entomol. Tidskr.* **18**: 175-192.
LÖNNBERG E. 1898: A revision of the Linnean type specimens of scorpions and pedipalps in the Zoological Museum of the Royal University of Upsala. *Ann. Mag. Natur. Hist.* **7(1)**: 82-89.
MAHUNKA S., OLÁH J. & VÁSÁRHELYI T. 1989: Report on a collecting trip to Vietnam in 1988. *Folia Entomol. Hung.* **50**: 61-65.
MAHUNKA S. & MAHUNKA-PAPP L. 1994: A report on the first Hungarian zoological collecting trip to Thailand. *Folia Entomol. Hung.* **55**: 263-270.
MELLO-LEITAO C. 1945: Escorpioes sud-americanos. *Arq. Mus. Nac. Rio de Janeiro* **40**: 1-468.
OATES E. W. 1888: On the Indian and Burmese scorpions of the genus Isometrus, with descriptions of three new species. *J. Bombay Soc.* **3**: 244-249.
PAVESI P. 1881: Studi sugli aracnidi africani. II. Aracnidi d'inhambane raccolti da Carlo Fornasini e considerazioni sull'aracnofauna del Mozambico. *Ann. Mus. Civ. Stor. Natur. Giacomo Doria* **16**: 536-560.
PETERS W. 1862: Über eine neue Eintheilung der Skorpione und über die von ihm in Mossambique gesammelten Arten von Skorpionen. *Monatsber. Akad. Wiss. Berlin* **1861**: 507-520.
POCOCK R. I. 1891: On some Old-World species of scorpions belonging to the genus Isometrus. *J. Linn. Soc. Zool.* **23**: 433-447.
POCOCK R. I. 1893: Notes on the classification of scorpions, followed by some observations upon synonymy, with descriptions of new genera and species. *Ann. Mag. Natur. Hist.* **6(12)**: 303-331.
POCOCK R. I. 1894: Scorpions from the Malay Archipelago. Pp. 84-99. In: WEBER M. (eds.): *Zool. Ergeb. einer Reise in Niederländisch Ost-Indien, 3*. Leiden: Verlag von E. J. Brill.
POCOCK R. I. 1897: Descriptions of some new species of scorpions from India. *J. Bombay Soc.* **11**: 102-117.
POCOCK R. I. 1899: On the scorpions, pedipalps and spiders from tropical West Africa represented in the collection of the British Museum. *Proc. Zool. Soc. London* **1899**: 833-885.
POCOCK R. I. 1900: *The Fauna of British India, including Ceylon and Burma. Arachnida*. London: Taylor and Francis, 279 pp.
POCOCK R. I. 1902: *Biologia Centrali-Americana. Arachnida. Scorpiones, Pedipalpi, and Solifugae*. London: Taylor and Francis, 71 pp.
PROBST P. J. 1972: Zur Fortpflanzungsbiologie und zur Entwicklung der Gilftdrusen beim Skorpion Isometrus maculatus (De Geer, 1778) (Scorpiones: Buthidae). *Acta Trop.* **29**: 1-87.
PROBST P. J. 1973: A review of the scorpions of East Africa with special regard to Kenya and Tanzania. *Acta Trop.* **30**: 312-335.
RAINBOW W. J. 1897: The atoll of Funafuti, Ellice Group: Its zoology, botany, ethnology, and general structure. V. The arachnidan fauna. *Mem. Austral. Mus.* **3**: 105-124.
ROEWER C. F. 1943: Über eine neuerworbene Sammlung von Skorpionen des Natur-Museums Senckenberg. *Senckenbergiana* **26**: 205-244.
SIMON E. 1877: Arachnides recueillis aux iles Philippines par MM. G.-A Baer et Laglaise. *Ann. Soc. Entomol. Fr.* **7**: 93-95.
SIMON E. 1884: Arachnides recueillis en Birmanie par M. le chevalier J. B. Comotto et appartenent au Musée Civique d'Histoire Naturelle de Génes. *Ann. Mus. Civ. Stor. Natur. Genova* **20**: 37(361)-48(372).
SIMON E. 1887: Etude sur les Arachnides de l'Asie méridionale faisant partie des collections de l'Indian Museum (Calcutta). I. Arachnides recueillis á Tavoy (Tenasserim) par Moti Ram. *J. Asiat. Soc. Beng.* **56**: 101-117.
SIMON E. 1893: Arachnides de l'Archipel Malais recueillis par MM. M. Bedot et C. Pictet. *Rev. Suisse Zool.* **1893**: 319-328.
SIMON E. 1899: Contribution á la faune de Sumatra. Arachnides recueillis par M. J. L. Weyers, á Sumatra. *Ann. Soc. Entomol. Belg.* **43**: 78-125.

Sissom W. D. 1990: Systematics, biogeography and paleontology. Pp. 64-160. In: Polis G. A. (ed.): *The Biology of Scorpions.* Stanford: Stanford University press, 587 pp.
Sreenivasa-Reddy R. P. 1966: Contribution á la connaissance des Scorpions de l'Inde. I. Charmus indicus Hirst, 1915. *Bull. Mus. Nat. Hist. Natur. Paris* **38**: 247-256.
Stahnke H. L. 1970: Skorpion nomenclature and mensuration. *Entomol. News* **81**: 297-316.
Stahnke H. L. 1972: A key to the genera of Buthidae (Scorpionida). *Entomol. News* **83**: 121-133.
Sundevall C. J. 1833: *Conspectus Arachnidum.* Londini Gothorum. 39 pp.
Takashima H. 1945: Scorpions of eastern Asia. *Acta Arachnol. Tokyo* **9**: 68-106.
Takashima H. 1948: Scorpions of New Guinea. *Acta Arachnol. Tokyo* **10**: 72-92.
Takashima H. 1950: Notes on the scorpions of New Guinea. *Acta Arachnol. Tokyo* **12**: 17-20.
Thorell T. 1876: On the classification of scorpions. *Ann. Mag. Natur. Hist.* **4(17)**: 1-15.
Thorell T. 1876: Études scorpiologiques. *Atti Soc. Ital. Sci. Natur.* **19**: 75-272.
Thorell T. 1888: Pedipalpi e scorpioni dell'Archipelago Malesi conservati nel Museo Civico de Storia Naturale di Genova. *Ann. Mus. Civ. Stor. Natur. Giacomo Doria.* **26**: 327-428.
Thorell T. 1889: Aracnidi Artrogastri Birmani recolti da L. Fea nel 1885-1887. *Ann. Mus. Genova* **27**: 521-729.
Thorell T. 1893: Scorpiones exotici R. Musei Historiae Naturalis Florentini. *Boll. Soc. Entomol. Ital.* **25**: 356-387.
Thorell T. 1894: Scorpiones exotici R. Musei Historiae Naturalis Florentini. *Boll. Soc. Entomol. Ital.* **25**: 356-387.
Tikader B. K. & Bastawade D. B. 1983: Scorpions (Scorpionida: Arachnida). In: *The Fauna of India, Vol. 3.* (Edited by the Director). Calcutta: Zoological Survey of India, 671 pp.
Vachon M. 1950: Quelques remarques sur le peuplement en Scorpions du Sahara á propos d'une nouvelle espéce du Sénegal: Butheoloides monodi. *Bull. Soc. Zool. Fr.* **75**: 170-176.
Vachon M. 1972: Remarques sur les Scorpions appartenant au genre Isometrus H. et E. (Buthidae) á propos de l'espéce Isometrus maculatus (Geer) habitant l'Ilé de Páques. *Cah. Pac.* **16**: 169-180.
Vachon M. 1974: Étude des caractéres utilisés pour classer les familles et les genres de Scorpions (Arachnides). *Bull. Mus. Nat. Hist. Natur. Paris* **140**: 857-958.
Vachon M. 1976: Isometrus (Raddyanus) heimi, nouvelle espéce de Scorpions Buthidae habitant la Nouvelle-Calédonie. *Cah. Pac.* **19**: 29-45.
Vachon M. 1980: Essai d'une classification sous-générique des Scorpions du genre Scorpiops Peters, 1861 (Arachnida, Scorpionida, Vaejovidae). *Bull. Mus. Nat. Hist. Natur. Paris* **2**: 143-160.
Vachon M. 1982: Les Scorpions de Sri Lanka (Recherches sur les Scorpions appartenant ou déposés au Muséum d'Histoire naturelle de Genéve III.). *Rev. Suisse Zool.* **89**: 77-114.
Vachon M. 1986: Étude de la denture des doigts des pédipalpes chez les Scorpions du genre Lychas. *Bull. Mus. Nat. Hist. Natur. Paris* **8**: 835-850.
Vachon M. & Abe T. 1988: Colonization of the Krakatau Islands (Indonesia) by scorpions. *Acta Arachnol.* **37**: 23-32.
Vachon M. & Lourenco W. R. 1985: Scorpions cavernicoles du Sarawak (Borneo). Chaerilus chapmani n. sp. (Chaerilidae) et Lychas hosei (Pocock, 1890) (Buthidae). *Mém. Biospéleol.* **12**: 9-18.
Werner F. 1902: Die Scorpione, Pedipalpen und Solifugen in der zoologisch-vergleichend-anatomischen Sammlung der Universität Wien. *Verh. Zool.-Bot. Ges. Wien* **52**: 595-608.
Werner F. 1916: Über einige Skorpione und Gliederspinnen des Naturhistorischen Museum in Wiesbaden. *Jahrb. Nass. Ver. Natur. Wiesbaden* **69**: 79-97.
Werner F. 1935: Scorpiones, Pedipalpi. *Das Tierreich* 5(IV) **8**: 1-490.
Wu H. W. 1936: A review of the scorpions and whip-scorpions of China. *Sinensia* **7**: 113-127.