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

František KOVAŘÍK

U Botiče 1/1389, CZ-140 00 Praha 4, Czech Republic

Received August 10, 1995; accepted October 5, 1995
Published December 27, 1995


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 subacicular tubercle, and to the African genus *Buthenoiides*, from which it differs in having 12 (including apical row) cutting edges on the movable fingers of pedipalps. *Lychas krail* 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

*Isemétrus (Isemétrus) maculatus* (De Geer, 1778)

*Scorpio europaean* Linnaeus, 1758: 625; Fabricius, 1793: 435.

*Isemétrus europaean* (Linnaeus) 1758: 6; Pocock, 1899: 835; Pocock, 1900: 46; Pocock, 1902: 38.


*Scorpio americianus* Fabricius, 1793: 434; Herbst, 1800: 60 (syn. by Kraepelin, 1891: 245).

*Lychas americianus* (Fabricius, 1793): 2; Cambrige, 1869: 543.

*Centruroides (Isemétrus) americianus* Peters, 1862: 515.

*Scorpio maculatus* De Geer, 1778: 346; Gervais, 1844: 57.

*Lychas maculatus* (C. L. Koch, 1845): 1; Cambridge, 1869: 543.


*Scorpio dentatus* Herbst, 1800: 55 (syn. by C. L. Koch, 1845: 1).

*Buthus (Isemétrus) filium* Hemprich & Ehrenberg, 1828: pl.1 fig. 3; Hemprich & Ehrenberg, 1829: 352 (syn. Pavesi, 1881: 537).

Atreus filium: Gervais, 1844: 52.

*Lychas paraenesis* (C. L. Koch, 1845: 6 (syn. by Kraepelin, 1891: 245).

*Scorpio (Lycharus) gabonensis* Lucas, 1858: 430 (syn. Pavesi, 1881: 537).

*Scorpio (Lychas) guineensis* Lucas, 1858: 432 (syn. Pavesi, 1881: 537).


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 [sic]) vittatus*: Tkader & 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 (Alorotrichus)* Tikader & Bastawade, 1983: 52 syn. n.
*Lychas (Endotrichus)* Tikader & Bastawade, 1983: 71 syn. n.
*Archisotrichus* Krapež, 1891: 217 (syn. by Pocock 1900: 35).

**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 scutellus* 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 *Hemihydras* with type species *L. (H.) alexandrius* 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*, *Alorotrichus*, 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 macronatus* 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* Kaepelein, 1916
- *= Lychas truncatus* Glauer, 1925
- *= Lychas annulatus* Glauer, 1925
- *asper* (Pocock, 1890): Congo, Zimbabwe, Tanzania, Mozambique
- *asper obscursus* (Kraepelin, 1913): Tanzania, Somalia, Zambia
- *biharensis* Tikader & Bastawade, 1983: India
- *braueri* (Kraepelin, 1897): Seychelles (Praclin Island)
- *burdoi* (Simon, 1882): Tanzania, Kenya, Zimbabwe, South Africa, Congo, Zambia, Malawi
- *? Lychas emilieae* Werner, 1916
- *burdori rhodesianus* Lawrence, 1938: Zimbabwe
- *burdori regulus*us Birula, 1915: Kenya
- *decorata* Basu, 1964: India
- *feae* (Thorold, 1889): Myanmar
- *flavimanus* (Thorold, 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
- *krai* sp. n.: Thailand
- *laevifrons* Pocock, 1897: India
- *marmoreus* (Koch, 1845): Australia, New Guinea
- *= Isometrus hiuberculatus* Pocock, 1891
- *= Lychas marmoreus obscurus* Kraepelin, 1916
- *= Lychas marmoreus nigrescens* Kraepelin, 1916
- *= Lychas marmoreus splendens* Kraepelin, 1916
- *= Lychas jonesae* Glauer, 1925
- *mentaweiensis* Roewer, 1943: Sipora (Mentawei 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 chinesis* Karsch, 1879
- *= Isometrus atomarius* Simon, 1884
- *nigrimanus* (Kraepelin, 1898): Indonesia (Sumatra)
- *nigrissimis* (Pocock, 1899): India
- *nuifer* Basu, 1964: India
- *obstri* Kraepelin, 1913: Tanzania, Somalia, Kenya
- *petidus* (Keyserling, 1887): Fiji (Viti Levu Island)
- *rugosus* (Pocock, 1897): India
- *scaber* Pocock, 1893: India

*Kraepelin (1999) regarded Lychas hosei as a synonym of Lychas flavimanus, but according to Vachon & Lourenco (1985) it is a valid species.*

189
Lychas krali sp. n. (Figs 3-6, Table 1)


**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 Vit 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 macronatus* from Thailand (prov. Kanchanaburi, near river Kwai), Tibia. Fig. 2. *Lychas macronatus* from Thailand (Samut), Tibia. Figs 3-5. *Lychas krali* sp. n. (holotype). Fig. 3. Femur, Fig. 4. Tibia, Fig. 5. Patella. Figs 7-11. *Thaicharma 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 occurring 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.

192
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

<table>
<thead>
<tr>
<th></th>
<th><em>Lychas krali</em> sp. n.</th>
<th></th>
<th><em>Lychas krali</em> sp. n.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>holotype</td>
<td>paratype (No. 5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>male</td>
<td>female</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>length</td>
<td>37.1</td>
<td>36.4</td>
</tr>
<tr>
<td>Carapace</td>
<td>length</td>
<td>4.7</td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>5.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Metasoma</td>
<td>length</td>
<td>23.2</td>
<td>21.9</td>
</tr>
<tr>
<td>segment I</td>
<td>length</td>
<td>2.7</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>segment II</td>
<td>length</td>
<td>3.3</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>segment III</td>
<td>length</td>
<td>3.7</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>segment IV</td>
<td>length</td>
<td>4.3</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>1.8</td>
<td>1.9</td>
</tr>
<tr>
<td>segment V</td>
<td>length</td>
<td>5.3</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>1.7</td>
<td>1.8</td>
</tr>
<tr>
<td>telson</td>
<td>length</td>
<td>4.2</td>
<td>3.8</td>
</tr>
<tr>
<td>Pedipalp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>femur</td>
<td>length</td>
<td>4.3</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>1.2</td>
<td>1.1</td>
</tr>
<tr>
<td>patella</td>
<td>length</td>
<td>4.9</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>1.7</td>
<td>1.6</td>
</tr>
<tr>
<td>tibia</td>
<td>length</td>
<td>7.5</td>
<td>6.5</td>
</tr>
<tr>
<td>manus</td>
<td>length</td>
<td>2.2</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td>finger movable</td>
<td>length</td>
<td>5.4</td>
<td>4.2</td>
</tr>
<tr>
<td>Pectinal teeth</td>
<td></td>
<td>16:15</td>
<td>16:16</td>
</tr>
</tbody>
</table>

*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 shaplanti* 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 graevyi* 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 kralli_ sp. n.

_Lychas feae_ from Myanmar was characterized by Pocock (1900) as having a long tibial spur and black manus, carapace, and tanga. 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.

*Titus mucronatus* C. L. Koch, 1845: 29.

*Isometrus mucronatus* Simon, 1884: 363; Thorrell, 1889: 566; Pocock, 1894: 85.

*Archisometrus mucronatus* Kraepelin, 1899: 46; Pocock, 1894: 85; Wu, 1936: 117.


*Scorpio curvidigitus* Gervais, 1844: 48 (syn. by Thorrell, 1893: 368).

*Archisometrus curvidigitus* Kraepelin, 1891: 223.

*Titus varius* C. L. Koch, 1845: 29 (syn. Thorrett, 1889: 566).

*Isometrus varius* Simon, 1884: 362.


**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 small 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.

*Lycharis scutilus* C. L. Koch, 1845

*Lycharis scutilus* C. L. Koch, 1845: 3; Pocock, 1900: 37.  
*Lycharis scutatus* C.L.Koch, 1845: 163 (syn. by Pocock, 1900: 37).  
*Archisometrus scutatus* Kraepelin, 1899: 44.  


**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 metasoma 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 *Charms* 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 *Butheloides* Hirst, 1925 from northern Africa and *Charms* Karsch, 1879 from India and Sri Lanka (Sissom 1990: 94). *Thaicharmus* gen. n. shares with *Butheloides* telson with subacute tubercle and with *Charms* 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 mahunkai* 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 occurring 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 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

<table>
<thead>
<tr>
<th></th>
<th><em>Thaicharmus mahunkai</em> sp. n.</th>
<th><em>Thaicharmus mahunkai</em> sp. n.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>holotype</td>
<td>paratype</td>
</tr>
<tr>
<td>Total</td>
<td>length</td>
<td>28.9</td>
</tr>
<tr>
<td>Carapace</td>
<td>length</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>3.5</td>
</tr>
<tr>
<td>Metasoma</td>
<td>length</td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>2.3</td>
</tr>
<tr>
<td>segment I</td>
<td>length</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>2.7</td>
</tr>
<tr>
<td>segment II</td>
<td>length</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>2.7</td>
</tr>
<tr>
<td>segment III</td>
<td>length</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>2.5</td>
</tr>
<tr>
<td>segment IV</td>
<td>length</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>width</td>
<td>2.5</td>
</tr>
<tr>
<td>telson</td>
<td>length</td>
<td>3.3</td>
</tr>
<tr>
<td>Pedipalp</td>
<td>femur</td>
<td>length</td>
</tr>
<tr>
<td></td>
<td></td>
<td>width</td>
</tr>
<tr>
<td></td>
<td>patella</td>
<td>length</td>
</tr>
<tr>
<td></td>
<td></td>
<td>width</td>
</tr>
<tr>
<td></td>
<td>tibia</td>
<td>length</td>
</tr>
<tr>
<td></td>
<td></td>
<td>width</td>
</tr>
<tr>
<td></td>
<td>manus</td>
<td>length</td>
</tr>
<tr>
<td></td>
<td></td>
<td>width</td>
</tr>
<tr>
<td>Pectinal teeth</td>
<td></td>
<td>14:15</td>
</tr>
</tbody>
</table>
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 yellowish-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 caudal. 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. Farkaš. 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 buffalo faeces.

_Scorpiops (Euscorpiops) binghamii_ Pocock, 1893

_Scorpiops binghamii_ Pocock, 1893: 327; Pocock, 1900: 74.  
_Scorpiops longimanus binghamii_ Kraepelin, 1913: 161.  
_Scorpiops longimanus binghamii_ Vachon, 1974: 942.  
_Scorpiops (Euscorpiops) longimanus binghamii_ Vachon, 1988: 155.  
_Scorpiops (Euscorpiops) binghamii_ Tikader & Bastawade, 1983: 470.  

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)


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. Patella ventral. Fig. 20. *Liocheles australasiae* from Thailand, Patella 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


*Sicyurus* 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 *Sicyurus aurantiae* Fabricius, 1775. C. L. Koch (1837) described the genus *Sicyurus* with the type species *Sicyrus* [lapsus calami = *Sicyurus*] *complanatus* C. L. Koch, 1837 (= *Liocheles aurantiae* 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 *Sicyurus caudicula* L. Koch, 1867 (= *Liocheles waigiensis* (Gervais, 1844)).

**Liocheles aurantiae** (Fabricius, 1775) (Fig. 20)

*Sicyurus aurantiae* Fabricius, 1775: 399; Fabricius, 1793: 433.


*Sicyurus aurantiae*: C. L. Koch, 1837: 71.


*Sicyurus complanatus* C. L. Koch, 1837: 73 (syn. by Thorell, 1876: 254).


*Sicyurus pistacae* Simon, 1877: 93 (syn. by Kraepelin, 1899: 154).


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)


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


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.

202
Heterometrus (Heterometrus) spinifer spinifer (Hemprich & Ehrenberg, 1828)

Buthus (Heterometrus) spinifer Hemprich & Ehrenberg, 1828: pl. 1, fig. 2.; Hemprich & Ehrenberg, 1829: 352.
Heterometrus (Heterometrus) spinifer spinifer: Couzijn, 1981: 89.
Palamaeus laevigatus Thorell, 1876: 221 (syn. by Couzijn, 1981: 89).


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 solidarius 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.


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

1. A mature, black specimen over 10 cm long .......................................................... Heterometrus .... 1
2. Total length up to 9 cm .......................................................... Heterometrus laoticus
   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 spinifer spinifer
      - Manus much longer than wide. Surface of manus with keels. Patella and femur longer in male than in female. Telson often pale yellow .......................................................... Buthidae .... 3
      2. Pedipalp femur with 10 or more trichobothria, of which 4 or 5 are on the internal aspect (Fig. 9). Telson with subacular 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 subacular tooth or tubercle .......................................................... Thaicharmus mahunkai gen. n., sp. n.
      3. Telson with a small, blunt subacular 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 subacular 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 scutalis
   - 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 macromanus
7. Total length 40 mm or more. Pectinal teeth number 17-19 .......................................................... Isometrus maculatus
   - Total length 23 mm. Pectinal teeth number 12-13 .......................................................... Isometrus viatus

203
8. Number of trichobothria on the lower surface of the patella is 9-13 (Fig. 19) Scorpions 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. Scorpions (Scorpions) 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) Scorpions (Scorpions) farkaci 10
10. Number of trichobothria on the ventral surface of the patella is 10-12 (Fig. 19)
   - Number of trichobothria on the ventral surface of the patella is 13 Scorpions (Euscorpiops) binghamii
11. Carinae on patella and manus distinct and granular, anterior or inner surface of patella armed with a strong, tuber-
     culate 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 (Reddyana) vittatus Pocock, 1900
Lychas kral sp. n.
Lychas macronotus (Fabricius, 1798)
Lychas scutulatus C. L. Koch, 1845
Thaicharmus mahunkai gen. n., sp. n.

Scorpiopsidae Kraepelin, 1905

Scorpions (Scorpions) farkaci Kovarik, 1993
Scorpions (Euscorpiops) binghamii Pocock, 1893
Scorpions (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 (Hempich & Ehrenberg, 1828)

Acknowledgements

I thank the following entomologists Petr Bifek, Jan Farkaš, Roman Hanzal, Jan Horák, David Kral, Vit Kubáň, Jan
Schneider, Miroslav Snížek, Jan Strnad, Milan Veselý (Czech Republic), and Milan Šťiba (Slovakia) for providing
me with specimens collected by them in Thailand, Malaysia, and Vietnam. I would like to express my thanks to Jíří
Zídek (New Mexico Toch, Socorro, USA) for helping me with this paper, and Balázs Farkas (Magyar Természetudományi
Museum in Budapest) for loans of specimens and valuable information.

REFERENCES

CAMBRIDGE O. P. 1869: Notes on some spiders and scorpions from St. Helena, with descriptions of new species. Proc.


