# History of study, updated checklist, distribution and key of scorpions (Arachnida: Scorpiones) from China

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**Abstract:** This review describes the history of taxonomic research on scorpions and provides an updated checklist and key of the scorpions currently known in China. This checklist is based on a thorough review of the extant literatures on scorpion species whose presence has been confirmed in China through field expeditions and examination of scorpion collections, excepting a few members that have no clear distribution or are currently in doubt. Totally, the scorpion fauna of China consists of 53 species and subspecies belonging to 12 genera crossing five families, with 33 species (62.3%) and one genus being recorded as endemic. Additionally, identification key and the distribution of scorpions from China are provided.

**Keywords:** Scorpion; Taxonomy; Checklist; Key; Distribution; China

China is comprised of a vast territory crossing frigid, temperate, and tropical zones, as well as complex topography (80% of which are mountains) including rich rivers, lakes, and diverse climate. These features contribute to China's possession of high species and habitat diversity, making it to be one of 12 megadiversity countries. For example, there are at the least $1.5\times10^4$ species estimated conservatively, which is about 1/10 of the sum of the entire world (88 328, 929 050 species recorded in China and the world respectively, Yu, 2004).

Of these species, Scorpions, though as a small arachnid group, are quite interesting. To date, there are 15 families, 197 genera and 2 069 species recorded in the world (6/20/2013, http://www.ntnu.no/ub/ scorpion-files/index.php). Aristotle (384–322 BC) was the first scorpion researcher who studied zoological information about biogeography of scorpions in the western world (Fet et al, 2009), a search enhanced by the systematics research began by Carl von Linne (1758), who recorded five scorpion species in the tenth edition of *Systema Naturae*, and classified them as the members of the genus *Scorpio* in Insect Aptera (Fet et al, 2002).

Chinese reported scorpions from 2 000 years ago, as the simple information in *Er ya* (published in 221 BC–9 AD) (Wang & Chen, 2007). Scorpions are found in some multifarious ancient books and local chronicles, especially the traditional Chinese medicine books, such as, *Shu ben cao*, *Ben cao tu jing*, *Ben cao jing shu*, and *Ben cao bei yao* (Zhang et al, 2009). However, all of these historical data contained no value on classification. The beginning of Chinese scorpion taxonomy research was started by foreign scientists. Prior to 2003, there were 19 species and subspecies reported in China, as noted by Zhu et al (2004). *Buthus confucius* Karsch (1879) (=*Buthus martensii=Mesobuthus martensii*, belonging to the family Buthidae) was the first species described from China (Zhu et al, 2004). Simon (1880) described a new species, *Buthus confucius* (Buthidae), on the basis of specimens collected in Beijing (cited in Qi et

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al, 2004; Shi & Zhang, 2005). Kraepelin (1899) reviewed the order Scorpiones, including 13 species and subspecies from China. Karsch (1881) also suggested that *Buthus confucius* might be a synonym of *Buthus martensii* (Qi et al, 2004; Shi & Zhang, 2005). Birula (1897, 1911) named three subspecies from China: *Buthus caucasicus intermedius* (Birula, 1897) (=*Mesobuthus caucasicus intermedius*); *Buthus caucasicus przewalskii* (Birula, 1897) (=*Meso-buthus caucasicus przewalskii*); and *Buthus eupeus mongolcus* (Birula, 1911) (=*Mesobuthus eupeus mongolcus*). Birula's descriptions were backward and without normal figures. Birula (1904) described a new subspecies, *Buthus confucius hainanensis* (=*Mesobuthus martensii hainanensis*), based on a single specimen from Hainan Island. Wu (1936) identified two families, four genera and four species of scorpions from China. Kishida (1939) recorded Chinese scorpions and re-described *Buthus martensii*, however, his figures were very inaccurate, and he provided no characteristics of trichobothria. Takashima (1942, 1948, 1951) listed scorpions from Hainan and Shanxi, while Stahnke (1967) redescribed *Mesobuthus eupeus mongolcus*, but did not compare this species with its close relatives. Song et al (1982) finished his research on external morphology, reproductive system, life habits and development of *Buthus martensii*. Kovařík (1994) named a new subspecies of *Scorpiops hardwickii* (Gervais, 1843): *Scorpiops hardwickii jendeki* Kovařík, 1994, and later elevated this subspecies to species in his revision of the family Scorpiopidae ((transferred to Euscorpiidae by Soleglad & Sissom (2001)).

Though an impressive compilation of earlier scholarship, there were many limitations to these earlier studies. Thankfully, the number of research papers on Chinese scorpions increased gradually since the early 21st Century. Zhu et al (2004) published a list of Chinese scorpions based on Fet et al (2000) and Kishida (1939) mainly, listing five families, nine genera, 19 species and subspecies. Qi et al (2004) re-described *Mesobuthus martensii martensii* (Karsch, 1879) and provided the detailed study history of this species. Qi et al (2005) published the first comprehensive report on scorpions from Tibet, the authors discovered eight new species belonging to the family Chaerilidae (with one monotypic genus *Chaerilus*) and the family Euscorpiidae (the genera *Euscorpiops* and *Scorpiops*): *Chaerilus tessellatus* Qi, Zhu & Lourenço, 2005; *Euscorpiops karschi* Qi, Zhu & Lourenço, 2005; *Euscorpiops shidian* Qi, Zhu & Lourenço, 2005; *Euscorpiops vachoni* Qi, Zhu & Lourenço, 2005; *Scorpiops atomatus* Qi, Zhu & Lourenço, 2005; *Scorpiops langxian* Qi, Zhu & Lourenço, 2005; *Scorpiops luridus* Qi, Zhu & Lourenço, 2005; and *Scorpiops pococki* Qi, Zhu & Lourenço, 2005. *Scorpiops petersii* Pocock, 1893 also appeared in this paper which followed on the report of Kishida (1939). Lourenço et al (2005) identified two new species: *Mesobuthus songi* Lourenço, Qi & Zhu, 2005 (=*Hottentotta songi* (Lourenço et al, 2005)), and *Heterometrus tibetanus* Lourenço, Qi, & Zhu, 2005 (belonging to the family Scorpionidae). Shi & Zhang (2005) summarized the research history of taxonomy of the family Buthidae and listed eight species and subspecies, four genera in China: *Mesobuthus martensii* (Karsch, 1879); *Mesobuthus eupeus* (Koch, 1839) (with two subspecies: *Mesobuthus eupeus mongolicus* (Birula, 1911); *Mesobuthus eupeus thersites* (C. L. Koch, 1839)); *Mesobuthus caucasicus* (Nordmann, 1840) (with two subspecies: *Mesobuthus caucasicus intermedius* (Birula, 1897); and *Mesobuths caucasicus przewaklskii* (Birula, 1897)); *Lychas mucronatus* (Fabricius, 1798); *Isometrus maculates* (DeGeer, 1778); and *Orthochirus scrobiculosus* (Grube,1873). Lourenço & Qi (2006) described one new genus and new species based on specimens from Tibet: *Tibetiomachus* Lourenço & Qi, 2006 (belonging to the family Hemiscorpiidae), *Tibetiomachus himalayensis* Lourenço & Qi, 2006. Bastawade (2006) reported two new species and four new records based on specimens from Zangnan (the South Tibet, China): *Chaerilus dibangvalleycus* Bastawade, 2006; *Chaerilus pictus* (Pocock, 1890); *Chaerilus tricostatus* Pocock, 1899; *Euscorpiops asthenurus* (Pocock, 1900); *Euscorpiops kamengensis* Bastawade, 2006; and *Scorpiops leptochirus* Pocock, 1893. Zhu et al (2007) described a new species of *Euscorpops* from Yunnan: *Euscorpiops yangi* Zhu, Zhang & Lourenço, 2007. Shi et al (2007) reported the geographical distribution of two species of *Mesobuthus*: *Mesobuthus eupeus* and *Mesobuthus martensii*. Zhu et al (2008) summarized the chaerilid scorpions of China, and provided the re-descriptions for *Chaerilus tessellatus* Qi, Zhu & Lourenço, 2005 and *Chaerilus triznai* Kovařík, 2000. They also pointed out that *Chaerilus pictus* (Pocock, 1890), which was described by Qi, Zhu & Lourenço (2005) was misidentified and described it as one new species: *Chaerilus conchiformus* Zhu, Han & Lourenço, 2008. Lourenço & Zhu (2008) discovered a new species

belonging to *Isometrus* (belonging to the family Buthidae): *Isometrus* (*Reddyanus*) *tibetanus* Zhu & Lourenço, 2008. Di & Zhu (2009a, b) described two new species: *Scorpiops lhasa* Di & Zhu, 2009; and *Chaerilus mainlingensis* Di & Zhu, 2009. Zhang & Zhu (2009) analysed the morphological variation of *Mesobuthus martensii* (Karsch, 1879) from Northern China and found that although this species is widespread in northern China, its morphology does not vary significantly and the variation both in males and females is below species level. Di & Zhu (2009c) described the male of *Euscorpiops karschi* for the first time. Di et al (2009) analysed the genus *Chaerilus* Simon, 1877 of China, with a description of the female *Chaerilus tricostatus* Pocock, 1899 for the first time (*Chaerilus assamensis* Kraepelin, 1913 was an erroneous record in this paper). Di & Zhu (2010) provided a redescription of *Scorpiops margerisonae* Kovařík, 2000 and described the female for the first time. Teruel & Rein (2010) transfered *Mesobuthus songi* Zhu, Qi & Lourenço, 2005 to the genus *Hottentotta* (belonging to the family Buthidae): *Hottentotta songi* (Zhu, Qi & Lourenço, 2005). Sun et al (2010) reported a new species of the genus *Mesobuthus* from Xinjiang, China: *Mesobuthus bolensis* Sun, Zhu & Lourenço, 2010, redescribed the characters of *Mesobuthus songi* Lourenço, Qi & Zhu, 2005, and transferred it to genus *Hottentotta* too. Di et al (2010a, b) discovered two new species in Yunnan: *Euscorpiops validus* Di, Cao, Wu & Li, 2010; *Euscorpiops puerensis* Di, Wu, Cao, Xiao & Li, 2010. Sun & Zhu (2010a, b) described new species of the genera *Euscorpiops* and *Mesobuthus* from Yunnan and Xinjiang, China: *Euscorpiops xui* Sun & Zhu, 2010, and *Mesobuthus longichelus* Sun & Zhu, 2010. Lourenço et al (2010) published a new record genus and a new species in China: *Razianus xinjianganus* Lourenço, Sun & Zhu, 2010. Di et al (2011a) reviewed the scorpions from Yunnan, and described a new record species to China: *Euscorpiops kubani* Kovařík, 2004. Di et al (2011b) recorded the *Scorpiops* species distributing in Central China, and provided a key for the Chinese species of the genus. Sun & Sun (2011) reviewed the genus *Mesobuthus* (Scorpiones: Buthidae) in China, and described a new species: *Mesobuthus karshius* Sun & Sun, 2011. Recently, Kovařík (2012a) reported five new species of genus *Chaerilus*, including one new species from China: *Chaerilus wrzecionkoi* Kovařík, 2012. Di et al (2013a) reviewed the scorpions from Hainan Island and listed five species belonging to four genera of two families. Di & Fet (2012, personal communication) questioned the validity of *Mesobuthus martensii hainanensis* in Hainan. Di et al (2013b) analysed the scorpions from Tibet: 26 species of seven genera of five families were recorded in Tibet, all with distribution in south and the north shore of Yarlung Zangbo Jiang.

Given both the earlier literature and the most recent and detailed study, the total count for scorpions in China includes 53 species of 12 genera of five families. Particularly worth noting at four scorpion genera with higher diversity in China than elsewhere: *Chaerilus* (8), *Euscorpiops* (11), *Mesobuthus* (9) and *Scorpiops* (11) with more species.

**Taxonomy**

Phylum: Arthropoda
Subphylum: Chelicerata
Class: Arachnida
Order: Scorpionida

**Family Buthidae C. L. Koch, 1837**

Buthidae: Fet & Lowe, 2000: 54–57; Soleglad & Fet, 2003: 89–91.
Chinese members: six genera, 18 species and subspecies.
Distribution in China (provinces): most areas of China, except Guangdong, Guizhou, Heilongjiang, Hunan, Jiangxi, Jilin, Sichuan, Zhejiang.

**Genus *Hottentotta* Birula, 1908**

*Hottentotta*: Fet & Lowe, 2000: 134–135; Kovařík, 2007: 2–3, 8–10; Sun et al, 2010: 40.
Chinese members: two species.

Distribution in China: Tibet.

**1. *Hottentotta alticola* (Pocock, 1895)**
*Hottentotta* (*Hottentotta*) *alticola minusalta*: Fet & Lowe, 2000: 135.
*Hottentotta* (*Hottentotta*) *alticola nigrifrons*: Fet & Lowe, 2000: 136.
*Hottentotta alticola*: Kovařík, 2007: 10, figs. 21–22; Zhu et al, 2004: 111.
Distribution in China: Unknown.

**2. *Hottentotta songi* (Lourenço, Qi & Zhu, 2005)**
*Mesobuthus songi* Lourenço, Qi & Zhu, 2005: 3–8, figs. 1–17, tab. 1.
*Hottentotta songi*: Teruel & Rein, 2010: 7; Sun et al, 2010: 40–42, figs. 25–29.
Distribution: Tibet (endemic (unique to China)).

**Genus *Isometrus* Ehrenberg, 1828**
*Isometrus*: Thorell, 1876: 8; Sissom, 1990: 101; Fet & Lowe, 2000: 146; Kovařík, 2003: 1–2.
Chinese members: two subgenera, three species.
Distribution in China: Hainan, Taiwan, Tibet.

**Subgenus *Isometrus* Ehrenberg, 1829**
*Isometrus* (*Isometrus*): Fet & Lowe, 2000: 146; Kovařík, 2003: 2.
Chinese members: one species.
Distribution in China: Hainan, Taiwan, Tibet.

**3. *Isometrus* (*Isometrus*) *maculatus*** (DeGeer, 1778)
*Isometrus* (*Isometrus*) *maculatus*: Fet & Lowe, 2000: 147; Kovařík, 2003: 2–4; Zhu et al, 2004: 112.
Di et al, 2013a: 4, 7, figs. 1–29, tabs. 1–2.
*Isometrus* (*Raddyanus*) *europaeus*: Tikader & Bastawade, 1983: 286–292, figs. 824–840.
Distribution: Hainan, Taiwan.

**Subgenus *Reddyanus* Vachon, 1972**
*Isometrus* (*Reddyanus*): Fet & Lowe, 2000: 151; Kovařík, 2003: 5.
Chinese members: two species.
Distribution in China: Hainan, Tibet.

**4. *Isometrus* (*Raddyanus*) *hainanensis* Lourenço, Qi & Zhu, 2005**
*Isometrus* (*Reddyanus*) *hainanensis* Lourenço, Qi & Zhu, 2005: 58, 60, figs. 1–15, 17–19, tab. 1.
Distribution in China: Hainan (endemic).

**5. *Isometrus (Reddyanus) tibetanus* Zhu & Lourenço, 2008**
*Isometrus* (*Reddyanus*) *tibetanus* Zhu & Lourenço, 2008: 268–270, figs.14–26, 32, tab. 1.
Distribution in China: Tibet (endemic).

**Genus *Lychas* C. L. Koch, 1845**
*Lychas*: Tikader & Bastawade, 1983: 40; Kovařík, 1997: 312–314.
Chinese members: two species.
Distribution in China: Guangxi, Hainan, Shanghai (?), Yunnan.

**6. *Lychas mucronatus* (Fabricius, 1798)**

*Lychas mucronatus*: Kovařík, 1997: 341–344, figs. 10, 12, 29, 31, 80–82, 93, 98; Fet & Lowe, 2000: 164–165; Zhu et al, 2004: 112; Di et al, 2013a: 7, 12, 15, figs. 48–69, tabs. 1–2.
Distribution in China: Guangxi, Hainan, Yunnan.

**7. *Lychas scutilus* C. L. Koch, 1845**
*Lychas scutilus*: Kovařík, 1997: 351–352, figs. 41, 47–76, tabs. 1–3; Fet & Lowe, 2000: 166; Zhu et al, 2004: 112.
Distribution in China: Shanghai?
Comments: Fet et al (2000) recorded this species' distribution in China, but they questioned its authenticity. Kovařík & Whitman (2004) reported *Lychas scutilus* C.L. Koch, 1845 in China, and provided the information: "1 ♀ (591), Cina: Shangai, 1878, d. [G.] Branchi. *Note*: È la prima segnalazione per la Cina".

**Genus *Mesobuthus* Vachon, 1950**
*Mesobuthus* Vachon 1950: Sun, Zhu & Lourenço, 2010: 35.
Chinese members: nine species and subspecies.
Distribution in China: the north of the Changjiang River (except Heilongjiang and Jilin), Hainan (?), Shanghai (?).

**8. *Mesobuthus bolensis* Sun, Zhu & Lourenço, 2010**
*Mesobuthus bolensis* Sun, Zhu & Lourenço, 2010: 36, 40, figs. 2–3, 5–11, 14–18, 21–22, tab. 1; Sun & Sun, 2011: 59–60.
Distribution in China: Xinjiang (endemic).

**9. *Mesobuthus caucasicus intermedius* (Birula, 1897)**
*Mesobuthus caucasicus intermedius*: Shi & Zhang, 2005: 475; Sun & Zhu, 2010b: 3–4, 7–8, figs. 2, 11–13; Sun & Sun, 2011: 61–63, figs. 3–4, tab.1.
*Olivierus caucasicus intermedius*: Fet & Lowe, 2000:191; Zhu et al, 2004:113.
Distribution in China: Xinjiang.

**10. *Mesobuthus caucasicus przewalskii* (Birula, 1897)**
*Mesobuthus caucasicus przewalskii*: Shi & Zhang, 2005: 475; Sun & Zhu, 2010b: 4–5, 7–8, figs. 3, 14–16; Sun & Sun, 2011: 60–61, figs. 1–2, tab. 1.
*Olivierus caucasicus przewalskii* (Birula): Fet & Lowe, 2000: 192; Zhu et al, 2004: 113.
Distribution in China: Xinjiang.

**11. *Mesobuthus eupeus mongolcus* (Birula, 1911)**
*Mesobuthus eupeus mongolicus*: Sun & Sun, 2011: 67–70, figs. 7–8, tab. 1; Zhu et al, 2004: 112.
Distribution in China: Gansu, Inner Mongolia (Neimenggu), Ningxia.

**12. *Mesobuthus eupeus thersites* (C. L. Koch, 1839)**
*Mesobuthus eupeus thersites*: Sun & Sun, 2011: 70–72, tab. 1; Zhu et al, 2004: 113.
Distribution in China: Xinjiang.

**13. *Mesobuthus karshius* Sun & Sun, 2011**
*Mesobuthus karshius*: Sun & Sun, 2011: 63–67, figs. 5–6, tab.1.
Distribution in China: Xinjiang (endemic).

**14. *Mesobuthus longichelus* Sun & Zhu, 2010**
*Mesobuthus longichelus* Sun & Zhu, 2010b: 5–10, figs, 1, 4–10, 17–21.
Distribution in China: Xinjiang (endemic).

**15. *Mesobuthus martensii martensii* (Karsch, 1879)**

*Buthus martensi* Karsch: Kraepelin, 1899: 25–26; Wu, 1936: 115–117, fig. 1; Song et al, 1982: 22–25, figs. 1–7; Song, 1998: 508, fig. 30: 1.

*Mesobuthus martensii* (Karsch): Kovařík, 1998: 115; Shi & Zhang, 2005: 474; Shi et al, 2007: 216–223, figs. 1–3, tab. 1; Zhang & Zhu, 2009: 1–17, tabs. 1–8; Sun & Zhu, 2010b: 10.

*Mesobuthus martensii martensii* (Karsch): Fet & Lowe, 2000:178; Qi et al, 2004: 137–143, figs. 1–19, tab. 1; Zhu et al, 2004: 113; Sun & Sun, 2011, 72, fig. 9, tab.1.

Distribution in China: Shi et al (2007) summarized the distribution range of *M. martensii* (Karsch, 1879) in China as the south side of N43°and the north side of the Yangtze River, bordered by the Helan Mountains and the Tengger and Mo Us sand desert in the west and limited by the sea in the east. Kovařík & Whitman (2004) reported *Mesobuthus martensii* (Karsch, 1879) distributed in Shanghai, and the simple information as follows: "2♀♀ (592), Cina: Shangai, 1878, d. [G.] Branchi".

**16. *Mesobuthus martensii hainanensis* (Birula, 1904)**

*Buthusconfucius hainanensis* Birula, 1904: 27; Sun & Sun, 2011: 72.

*Mesobuthus martensii hainanensis*: Fet et al, 2000: 178; Zhu et al, 2004: 113.

Distribution in China: Hainan (endemic ?).

Comments: Di & Fet questioned the facticity of its distribution in Hainan (2012, personal communication). Birula (1904) described this subspecies, but did not provide a detailed description or illustrations; he did not report the gender or discuss relationship between this species and nominotypic *M. martensii*. We have not found any *Mesobuthus* species in Hainan, and we question the authenticity of this record. Birula (1904) studied specimens labeled "Hainan" and collected by Alfred Otto Herz (St. Petersburg, Russia) who conducted entomological expeditions in the 1890s to China, Korea, Japan, and Siam. Herz did indeed visit Hainan; his collections of reptiles and insects from Hainan were among the first ever made by Europeans. Therefore, *M. martensii hainanensis* could be a case of a mistaken label. Shi et al (2007) confirmed the distribution range of *M. martensii* in China by extensive field surveys and predictive models, and considered this species restricted to latitudes south of N43°and the north side of the Yangtze River, bordered by the Helan Mountains and the Tengger and Mo Us sand desert in the west and limited by the sea in the east.

**Genus *Orthochirus* Karsch, 1891**

*Orthochirus*: Kovařík, 2004c; Lourenço & Leguin, 2011a & b.

Chinese members: one species.

Distribution in China: general northwest.

**17. *Orthochirus scrobiculosus* (Grube, 1873)**

*Orthochirus scrobiculosus*: Shi & Zhang, 2005: 475.

Distribution in China: general northwest.

**Genus *Razianus* Farzanpay, 1987**

*Razianus*: Lourenço et al, 2010: 307–308.

Chinese members: one species.

Distribution in China: Xinjiang.

**18. *Razianus xinjianganus* Lourenço, Sun & Zhu, 2010**

*Razianus xinjianganus* Lourenço, Sun & Zhu, 2010: 308–309, 311–312, figs.1–2, tab.1.

Distribution in China: Xinjiang (endemic).

**Family Chaerilidae Pocock, 1893**

Chaerilidae: Fet, 2000a: 323. Kovařík, 2000a: 40–41; Soleglad & Fet, 2003: 92.

Chinese members: one genus, eight species.
Distribution in China: Tibet.

**Genus *Chaerilus* Simon, 1877**
*Chaerilus*: Fet, 2000: 323; Kovařík, 2000a: 38; Kovařík, 2005: 1; Qi et al, 2005: 29; Lourenço & Zhu, 2008: 462.
Chinese members: eight species.
Distribution in China: Tibet.

**19. *Chaerilus conchiformus* Zhu, Han & Lourenço, 2008**
*Chaerilus pictus*: Qi et al, 2005: 34, 38, figs.126–144.
*Chaerilus conchiformus* Zhu, Han & Lourenço, 2008: 38–42, figs.1–29, tab.1.
Distribution in China: Tibet (endemic).

**20. *Chaerilus dibangvalleycus* Bastawade, 2006**
*Chaerilus dibangvalleycus* Bastawade, 2006: figs. 1–16.
Distribution in China: Tibet (endemic).

**21. *Chaerilus mainlingensis* Di & Zhu, 2009**
*Chaerilus mainglingensis* Di & Zhu, 2009b: 97–98, 101, figs. 1–16.
Distribution in China: Tibet (endemic).

**22. *Chaerilus pictus* (Pocock, 1890)**
*Chaerilus pictus*: Fet, 2000: 327; Kovařík, 2000a: 53–54; figs. 21–22, 39, 42–43, tabs. 1–2; Zhu et al, 2004: 113–114.
Distribution in China: Tibet.

**23. *Chaerilus tessellatus* Qi, Zhu & Lourenço, 2005**
*Chaerilus tessellatus* Qi, Zhu & Lourenço, 2005: 30, 34, figs. 109–125; Zhu et al, 2008: 44, 47, figs. 30–44, tab. 1.
Distribution in China: Tibet (endemic).

**24. *Chaerilus tricostatus* Pocock, 1899**
*Chaerilus tricostatus*: Fet, 2000a: 327; Kovařík, 2000a: 61–62, figs. 27–28, tabs. 1–2; Di et al, 2009: 133, 136–137, figs. 1–18, tab. 1.
Distribution in China: Tibet.

**25. *Chaerilus tryznai* Kovařík, 2000**
*Chaerilus tryznai* Kovařík, 2000a: 65–66, figs. 32–33, tabs. 1–2.
*Chaerilus tryznai*: Zhu et al, 2008: 47–48, 50–51, figs. 45–59, tab. 1.
Distribution in China: Tibet (endemic).

**26. *Chaerilus wrzecionkoi* Kovařík, 2012**
*Chaerilus wrzecionkoi* Kovařík, 2012b: 11, 13, figs. 62–77.
Distribution: Tibet (endemic).

**Family Euscorpiidae Laurie, 1896**
Euscorpiidae: Fet & Sissom, 2000: 355; Soleglad & Fet, 2003: 105.
Scorpionidae: Fet, 2000c: 487; Kovařík, 2000b: 154.
Chinese members: two genera, 22 species.
Distribution in China: Yunnan, Tibet.

**Genus *Euscorpiops* Vachon, 1980**
*Euscorpiops*: Fet & Sissom, 2000: 488; Kovařík, 2000b: 154; Kovařík, 2005: 1, 4; Kovařík, 2012a: 1, 3.
Chinese members: 11 species.
Distribution in China: Yunnan, Tibet.

**27. *Euscorpiops asthenurus* (Pocock, 1900)**
*Euscorpiops asthenurus*: Fet & Sissom, 2000: 488.
*Scorpiops asthenurus*: Kovařík, 2000b: 167, figs. 15, 28, 31, tabs. 1–3.
Distribution in China: Tibet.

**28. *Euscorpiops kamengensis* Bastawade, 2006**
*Euscorpiops kamengensis* Bastawade, 2006: 454, 456–457, figs. 17–26.
Distribution in China: Tibet (endemic).

**29. *Euscorpiops karschi* Qi, Zhu & Lourenço, 2005**
*Euscorpiops karschi* Qi, Zhu & Lourenço, 2005: 25, figs. 94–108; Di & Zhu, 2009c: 11, 14–15, figs. 1–27, tab. 1.
Distribution in China: Tibet (endemic).

**30. *Euscorpiops kubani* Kovařík, 2004**
*Euscorpiops kubani* Kovařík, 2004a: 14–16, figs. 1–6, tab. 1.
*Euscorpiops kubani*: Di et al, 2011a: 5–9, figs. 10–28, tabs. 1–2.
Distribution in China: Yunnan.

**31. *Euscorpiops novaki* Kovařík, 2005**
*Euscorpiops novaki* Kovařík, 2005: 4, 6, figs. 8, 11, 15–16, tab. 1.
Distribution in China: Tibet (endemic).

**32. *Euscorpiops puerensis* Di, Wu, Cao, Xiao & Li, 2010**
*Euscorpiops puerensis* Di et al, 2010b: 49–52, 54, 56, 58–59, figs. 1–34, tabs. 1–2.
*Euscorpiops puerensis*: Di et al, 2011a: 9, 12–15, figs. 29–49.
Distribution in China: Yunnan (endemic).

**33. *Euscorpiops shidian* Qi, Zhu & Lourenço, 2005**
*Euscorpiops shidian* Qi, Zhu & Lourenço, 2005: 18, 22, 25, figs. 78–93.
*Euscorpiops shidian*: Di et al, 2011a: 9, 15–19, figs. 50–68, tabs. 1–2.
Distribution in China: Yunnan (endemic).

**34. *Euscorpiops vachoni* Qi, Zhu & Lourenço, 2005**
*Euscorpiops vachoni* Qi, Zhu & Lourenço, 2005: 18, figs. 62–77.
*Euscorpiops vachoni*: Di et al, 2011a: 19–21, figs. 69–72.
Distribution in China: Yunnan (endemic).

**35. *Euscorpiops validus* Di, Cao, Wu & Li, 2010**
*Euscorpiops validus* Di et al, 2010: 14–17, 19, 21, figs. 1–32, tabs. 1–2.
*Euscorpiops validus* Di et al, 2011: 21, figs. 73–91.
Distribution in China: Yunnan (endemic).

**36. *Euscorpiops xui* Sun & Zhu, 2010**

*Euscorpiops xui* Sun & Zhu, 2010: 62, 67, figs. 1–14, tab. 1.
*Euscorpiops xui*: Di et al, 2011a: 21–25, figs. 92–110, tabs. 1–2.
Distribution in China: Yunnan (endemic).

**37. *Euscorpiops yangi* Zhu, Zhang & Lourenço, 2007**
*Euscorpiops yangi* Zhu et al, 2007: 20–22, 25, figs. 1–22, tab. 1.
*Euscorpiops yangi*: Di et al, 2011a: 26–28, figs. 111–117.
Distribution in China: Yunnan (endemic).

**Genus *Scorpiops* Peters, 1861**
*Scorpiops*: Fet & Sissom, 2000: 491; Kovařík, 2000b: 162, 164, 166; Qi et al, 2005: 2; Di & Zhu, 2009a: 40; Di et al, 2011b, 1–2. Kovařík, 2009: 1.
Chinese members: 11 species.
Distribution in China: Hubei, Yunnan, Tibet.

**38. *Scorpiops atomatus* Qi, Zhu & Lourenço, 2005**
*Scorpiops atomatus* Qi, Zhu & Lourenço, 2005: 6, 10, figs. 16–31.
Distribution in China: Tibet (endemic).

**39. *Scorpiops hardwickii* (Gervais, 1843)**
*Scorpiops hardwickii*: Kovařík, 2000b: 175–179, figs.14, 46, 56–57.
*Scorpiops hardwickii hardwickii*: Fet & Sissom, 2000: 492.
Distribution in China: Tibet.

**40. *Scorpiops jendeki* Kovařík, 1994**
*Scorpiops hardwickii jendeki* Kovařík, 1994: 62, figs. 7–13, tab.1; Fet, 2000: 492.
*Scorpiops jendeki*: Kovařík, 2000b: 180, 182, figs. 59–60, tabs. 1–3; Di et al, 2013b: 90, 93–94, figs. 119–135, tab. 3.
Distribution in China: Yunnan (endemic).

**41. *Scorpiops langxian* Qi, Zhu & Lourenço, 2005**
*Scorpiops langxian* Qi, Zhu & Lourenço, 2005: 10, 14, figs. 32–46.
Distribution: Tibet (endemic).

**42. *Scorpiops leptochirus* Pcock, 1893**
*Scorpiops leptochirus* Pocock, 1893: Fet & Sissom, 2000: 493.
Distribution: Tibet.

**43. *Scorpiops lhasa* Di & Zhu, 2009**
*Scorpiops lhasa* Di & Zhu, 2009a: 40–41, 45, 47, figs. 1–33, tab. 1.
Distribution: Tibet (endemic).

**44. *Scorpiops luridus* Qi, Zhu & Lourenço, 2005**
*Scorpiops luridus* Qi, Zhu & Lourenço, 2005: 2, 6, figs. 1–15.
Distribution: Tibet (endemic).

**45. *Scorpiops margerisonae* Kovařík, 2000**
*Scorpiops margerisonae* Kovařík, 2000b: 189, figs. 66, 70, tabs. 1–3; Di & Zhu, 2010: 1–8, figs. 1–23, tabs. 1–2.
Distribution: Tibet (endemic).

**46. *Scorpiops petersii* Pocock, 1893**
*Scorpiops petersii*: Kovařík, 2000b: 192–194, figs. 35, 42, tabs. 1–3; Fet & Sissom, 2000: 494.
Distribution: Tibet.

**47. *Scorpiops pococki* Qi, Zhu & Lourenço, 2005**
*Scorpiops pococki* Qi, Zhu & Lourenço, 2005: 14, figs. 47–61.
Distribution: Tibet (endemic).

**48. *Scorpiops tibetanus* Hirst, 1911**
*Scorpiops tibetanus* Hirst, 1911: 472–473; Kovařík, 2000b: 197, figs. 47, 68–69, tab.1–3; Fet & Sissom, 2000: 495; Di et al, 2013b: 75, 77, 80–81, 83, 85, figs. 102–118, tab. 2.
Distribution: Tibet (endemic).

**Family Hemiscorpiidae Pocock, 1893**
Chinese members: two genera, two species.
Distribution in China: Hainan, Tibet.

**Genus *Liocheles* Sundevall, 1833**
*Liocheles*: Monod & Volschenk, 2004: 677.
Chinese members: one species.
Distribution in China: Hainan.

**49. *Liocheles australasiae* (Fabricius, 1775)**
*Hormurusaustra lasiae*: Wu, 1936: 121–123, fig. 4; Tikader & Bastawade, 1983: 501–505, figs. 1362–1375.
*Liocheles australasiae*: Monod & Volschenk, 2004: 677; Di et al, 2013a: 15–16, 19–21, figs. 70–88, tabs. 1–2.
*Liocheles australasiae australasiae*: Fet, 2000b: 397.
Distribution: Hainan.

**Genus *Tibetiomachus* Lourenço & Qi, 2006**
*Tibetiomachus* Lourenço & Qi, 2006: 291.
Chinese members: one species.
Distribution in China: Tibet.

**50. *Tibetiomachus himalayensis* Lourenço & Qi, 2006**
*Tibetiomachus himalayensis* Lourenço & Qi, 2006: 291, 293–294, figs. 1: 5–14, 2: 5–26.
Distribution: Tibet (endemic).

**Family Scorpionidae Latreille, 1802**
Scorpionidae: Fet, 2000c: 427–428; Soleglad & Fet, 2003: 113–114.
Chinese members: one genus, three species.
Distribution in China: Tibet.

**Genus *Heterometrus* Ehrenberg, 1828**
*Heterometrus*: Fet, 2000d: 431; Kovařík, 2004b: 2, 4; Lourenço et al, 2005: 9.
Chinese members: three species.
Distribution in China: Tibet (?)

**51. *Heterometrus longimanus* (Herbst, 1800)**

*Heterometrus petersii* (Thorell, 1876): Zhu et al, 2004: 114.
Distribution in China: some indeterminate parts.

**52. *Heterometrus tibetanus* Lourenço, Qi & Zhu, 2005**
*Heterometrus tibetanus* Lourenço, Qi & Zhu, 2005: 10–14, figs. 18–34, tab. 1.
Distribution: Tibet (endemic).

**53. *Heterometrus petersii* (Thorell, 1876)**
*Heterometrus petersii* (Thorell, 1876): Zhu et al, 2004: 114.
Distribution in China: some indeterminate parts.

**Key to scorpions from China** (Di & Zhu, 2010; Di et al, 2009, 2010, 2011a, 2011b, 2013a, 2013b; Monod & Volschenk, 2004; Kovařík, 1997, 2000a, 2000b, 2003, 2004a, 2004b, 2005, 2007, 2009, 2012a, 2012b; Prendini, 2000; Soleglad & Fet, 2003; Sun et al, 2010; Sun & Sun, 2011; Zhu & Lourenço, 2005):

1. Orthobothriotaxic pattern type A; ventral aspect of leg tarsus with multiple irregular rows of setae, no trace of spinules (*configuration 2*); dorsal edge of cheliceral movable finger with two basal denticles; hemispermatophore is *flagelliform* (**Buthidae**) ····· 2
1. Orthobothriotaxic pattern type B or C; ventral aspect of leg tarsus with or without irregular setal rows, spinules present medially; dorsal edge of cheliceral movable finger with a *single* basal denticle; hemi-spermatophore is either *fusiform* or *lamelliform* ····· 19
2. Tibial spurs absent on all legs (***Isometrus***) ····· 3
2. Tibial spurs present on legs III & IV ····· 5
3. Trichobothrium *db* of the fixed finger in a distal position in relation to the trichobothria et and est; the distance between external trichobothria of the femur, $e_1$ and $e_2$ being at least two to five times the distance between trichobothria $e_1$ and $d_3$ of the femur (**subgenus *Isometrus***); telson with 2 granules on the ventral surface ····· *Isometrus maculatus*
3. Trichobothrium *db* in a basal position to *et*, situated between et and est; the distance between external trichobothria of the femur, $e_1$ and $e_2$ always less than two times the distance between *e1* and $d_3$ (**subgenus *Reddyanus***) ····· 4
4. Telson with 5 granules on the ventral surface ····· *Isometrus hainanensis*
4. Telson with 2 granules on the ventral surface ····· *Isometrus tibetanus*
5. Telson with subaculear tooth (***Lychas***) ····· 6
5. Telson without subaculear tooth ····· 7
6. In adults, total length of males longer than females, metasomes of males notable elongated ····· *Lychas scutilus*
6. In adults, with similar body and metasome length in both sexes (or males small) ····· *Lychas mucronatus*
7. Metasome with punctuate (***Orthochirus***) ····· *Orthochirus scrobiculosus*
7. Metasome with granule or smooth ····· 8
8. In adults, with smaller body (usually shorter than 20mm), carinae of prosome and mesosome weak (***Razianus***) ····· *Razianus xinjianganus*
8. Medium to large body length (over 30 mm), carinae of prosome and mesosome strong ····· 9
9. Ventrolateral carinae of fifth metasomal segment with all granules more or less equal in size and never lobate (***Hottentotta***) ····· 10
9. Ventrolateral carinae of Metasoma segment V formed of disjunct and unequal granules, often enlarged posteriorly (***Mesobuthus***) ····· 11
10. Movable finger of pedipalp-chela with distinct granules divided into 14–16 rows, pedipalps without intense setation ····· *Hottentotta alticola*
10. Movable finger of pedipalp-chela with distinct granules divided into 13 rows, body and pedipalps covered with very intense setation ····· *Hottentotta songi*

11. Ventrolateral carinae of segment V on metasoma with several markedly large and extroversive lobed granules ····· 12
11. Ventrolateral carinae of segment V on metasoma without markedly large and extroversive lobed granules ····· 14
12. Ventral carinae of segment II and III of metasoma gradually stronger posteriorly ····· 13
12. Ventral carinae of segment II and III of metasoma not stronger posteriorly ····· *Mesobuthus longichelus*
13. Anterior margin of carapace with a very weak median concavity, chelae more robust ····· *Mesobuthus eupeus thersites*
13. Anterior margin of carapace with a very weak median projection or approximately straight, chelae relatively less robust ····· *Mesobuthus eupeus mongolicus*
14. Ventral surface of segment V on metasoma without brown pigment ····· 15
14. Ventral surface of segment V on metasoma with markedly brown pigment ····· 16
15. Surfaces of carapace with relatively dense small granules, tarsus of legs with two long longitudinal rows of setae positioned ventrally ····· *Mesobuthus bolensis*
15. Surfaces of carapace between median carinae almost smooth, but the external surfaces with comparatively dense small granules, tarsus of legs with two short longitudinal rows of setae positioned ventrally ····· *Mesobuthus karshius*
16. Dorsal surfaces of metasomal segments I–IV and each surface of segment V with irregular net-like dark pigmentation ····· 17
16. Only surfaces of segment V on metasoma with irregular net-like dark pigmentation, dorsal surfaces of segments I–IV without net-like pigmentation (*Mesobuthus martensii* (Karsch, 1879)) ····· 18
17. Pectinal teeth number 20–25 in females and 26–30 in males; dentate margins of movable and fixed fingers with 12 and 11 oblique rows of granules respectively ····· *Mesobuthus caucasicus intermedius*
17. Pectinal teeth numbers 15–19 in females and 19–23 in males; dentate margins of movable and fixed fingers with 11 and 10 oblique rows of granules respectively ····· *Mesobuthus caucasicus przewalskii*
18. Distributed on the north side of the Yangtze River ····· *Mesobuthus martensii martensii*
18. Distributed on Hainan Island ····· *Mesobuthus martensii hainanensis*
19. Orthobothriotaxic pattern type B; sternum is type 1; hemispermatophore is fusiform (**Chaerilidae**: ***Chaerilus***) ····· 20
19. Orthobothriotaxic pattern type C; sternum is type 2; hemispermatophore is lamelliform ····· 27
20. Movable finger of pedipalp with 7–8 rows of granules ····· 21
20. Movable finger of pedipalp with 10–14 rows of granules ····· 25
21. Chela length to width ratio in adults 1.6–1.8 ····· *Chaerilus conchiformus*
21. Chela length to width ratio in adults higher than 2.0 ····· 22
22. Ventral side of seventh mesosomal segment with 2 pair of granular carina, anterior margin straight with a median notch ····· 23
22. Ventral side of seventh mesosomal segment with many granules but without carina, anterior margin straight without median notch ····· 24
23. Pedipalp femur short than carapace; 8–9 minute teeth on inner ventral margins of movable and immovable fingers respectively ····· *Chaerilus dibangvalleycus*
23. Pedipalp femur longer than carapace, 7–8 minute teeth on inner ventral margins of movable and immovable fingers respectively ····· *Chaerilus mainlingensis*
24. Manus of pedipalp in male narrow and long. Chela length/width ratio in male higher than 3 ····· *Chaerilus tryznai*
24. Manus of pedipalp in male robust (Fig. 68). Chela length/width ratio in adults lower than 2.6 ····· *Chaerilus wrzecionkoi*
25. Movable finger of pedipalp with 13–14 rows of granules; telson of male rather long and about 4.7 times greater length than width, with obvious sexual dimorphism ····· *Chaerilus pictus*
25. Movable finger of pedipalp with 11–12 rows of granules, telson of male and female without sexual dimorphism, manus lacks 1 dorsal carina ····· 26
26. Carapace, tergites nearly smooth in adults, chelicerae dorsal aspect without granules ····· *Chaerilus tessellatus*
26. Carapace, tergites with many big granules in adults, chelicerae dorsal aspect with granules ····· *Chaerilus tricostatus*

27. Legs with two pedal spurs (though one or more pedal spurs are lost in many troglobitic species); ventral aspect of leg tarsus equipped with moderately developed setal pairs and/or median row of spinules (configuration 5); paraxial organ without reflection of internobasal sperm duct (**Chactoidea**, see Soleglad & Fet, 2003, p. 92–93: Key to the superfamilies of parvorder **Iurida**); chelal fingers equipped with inner accessory denticles (IAD), outer denticles (OD) situated outside of median denticle (MD) row; major variable neobothriotaxy present, types Eu1 and Eu2; chelal palm is flat in appearance, carinae D3 and V2 essentially obsolete, angle formed by carinae D3:D4:D5 greater than 90° (**Euscorpiidae**, see Soleglad & Fet, 2003, p. 94: Key to the families of superfamily **Chactoidea**) ····· 28
27. Legs with one pedal spur (retrolateral spur absent, though this character is reversed in some bothriurid genera); ventral aspect of leg tarsus equipped with pairs of large limbated socketed setae, median spinule row optional (configuration 4); paraxial organ with reflection of internobasal sperm duct (**Scorpionoidea**, see Soleglad & Fet, 2003, p. 92–93: Key to the superfamilies of parvorder **Iurida**) ····· 47
28. Tricho-bothrium $Eb_3$ on external surface of chela is located between trichobothria Dt and Est. Telson vesicle/aculeus juncture with annular ring (***Euscorpiops***) ····· 29
28. Trichobothrium $Eb_3$ on the external aspect of pedipalp chela located basally from trichobothrium Dt. Annular ring at vesicle/aculeus juncture absent (***Scorpiops***) ····· 39
29. Number of trichobothria on external surface of pedipalp patella: 19 (5 *eb*, 2 *esb*, 2 *em*, **5 *est***, 5 *et*) ····· 30
29. Number of trichobothria on external surface of pedipalp patella: 17–19 (5–6 *eb*, 1–2 *esb*, 2 *em*, **4 *est***, 5 *et*) ····· 32
30. Pattern of trichobothria on external surface of pedipalp patella: 19 (6 *eb*, 2 *esb*, 2 *em*, 4 *est*, 5 *et*) ····· *Euscorpiops xui*
30. Pattern of trichobothria on external surface of pedipalp patella: 19 (5 *eb*, 2 *esb*, 2 *em*, 5*est*, 5*et*) ····· 31
31. Number of trichobothria on ventral surface of patella: 7; number of pectinal teeth: 4–5; movable finger longer than carapace and as long as pedipalp femur ····· *Euscorpiops kamengensis*
31. Number of trichobothria on ventral surface of patella: 9; pectinal teeth number 8; movable finger as long as carapace and shorter than pedipalp femur ····· *Euscorpiops novaki*
32. Male pedipalp chela finers strongly scalloped: with a pronounced lobe on the movable finger and a corresponding notch on fixed finger ····· 33
32. Male pedipalp chela fingers slightly scalloped or straight: lobe and corresponding notch reduced to absent ····· 37
33. Chela length to width ratio higher than 2.9 ····· 34
33. Chela length to width ratio lower than 2.9 ····· 36
34. Female pedipalp fingers nearly straight ····· *Euscorpiops asthenurus*
34. Female pedipalp fingers obviously scalloped ····· 35
35. Chela length to width ratio 2.9–3.2, carapace with dense, minute granules, total length over than 50 mm, coloration basically dark brown ····· *Euscorpiops validus*
35. Chela length to width ratio 3.4–3.5, carapace with sparse, nearly equal granules, total length less than 50 mm (small species), coloration basically dark red-brown ····· *Euscorpiops karschi*
36. Chela manus short, stout and rounded ····· *Euscorpiops vachoni*
36. Chela manus flattened dorsoventrally ····· *Euscorpiops puerensis*
37. Chela length to width ratio higher than 3.2 ····· 38
37. Chela length to width ratio lower than 3.2 ····· *Euscorpiops kubani*
38. Number of trichobothria on ventral surface of patella: 11, chela length to carapace length ratio less than 1.4 ····· *Euscorpiops shidian*
38.Number of trichobothria on ventral surface of patella: 10, chela length to carapace length ratio higher than 1.9 ····· *Euscorpiops yangi*
39. Fingers of pedipalps are straight or only slightly flexed in both sexes ····· 40
39. Fingers of pedipalps are flexed (or curved) in both sexes ····· 41
40. Ventral trichobothria on patella number 6 (7 rarely), total length 30–42.1 mm, pectinal teeth number 4–5, chela length to width ratio about 2.2 ····· *Scorpiops jendeki*
40. Ventral trichobothria on patella number 7, total length 40–58 mm, pectinal teeth number 7–9, chela length to width ratio about 3.3–3.5 ····· *Scorpiops leptochirus*

41. Male chela length to width ratio about 1.8–2.2; the manus with same or very similar length and width, fingers of pedipalps are very strongly flexed in the male. Ventral trichobothria on patella number 6–8 ····· *Scorpiops hardwickii* "complex" group (including *S. hardwickii*, *S. langxian*, and *S. pococki*)
41. Manus length to width ratio visibly higher than 1.0 ····· 42
42. Total length more than 65 mm ····· 43
42. Total length less than 65 mm ····· 44
43. Mostly yellowish to yellow in adults, ventral patella of pedipalps with 9 trichobothria ····· *Scorpiops luridus*
43. Mostly red brown in adults, ventral patella of pedipalps with 7 (rarely 6 or 8) trichobothria ····· *Scorpiops petersii*
44. Dorsally flat manus of pedipalps and chela of both sexes with length/width ratio: 2.1–2.2 (mean about 2.1 in males and 2.2 in females), total length 40.0–50.0 mm in adults ····· *Scorpiops margerisonae*
44. Dorsally round manus of pedipalps or at least the chela of one sex with length to width ratio higher than 2.2 or total length higher than 50 mm ····· 45
45. Total length less than 40 mm ····· 46
45. Total length more than 50 mm, chela strong, with length/width ratio: 2.0 in male and 2.5 in female ····· *Scorpiops tibetanus*
46. Chela of pedipalp length to width ratio about 2.6–3.0, dorsal surface of chela of pedipalp coarse ····· *Scorpiops lhasa*
46. Chela of pedipalp length to width ratio lower than 2.5, dorsal surface of chela of pedipalp smooth with luster ····· *Scorpiops atomatus*
47. Median ocular tubercle of carapace shallow, not raised above carapace surface; 2 pairs of lateral eyes; telotarsus with lateral lobes truncated; *Est* located in middle of hand (**Hemiscorpiidae**, see Stockmann & Ythier, 2010, p. 201) ····· 48
47. Median ocular tubercle raised up; 3 pairs of lateral eyes; telotarsus with lateral margins ending in rounded lobes; *Est* located in distal of hand (**Scorpionidae**, see Stockmann & Ythier, 2010, p. 201); pedipalp femur with three trichobothria; patella of pedipalp with 19 trichobothria, three on ventral and 13 on external surface; chela of pedipalp with 26 trichobothria; retrolateral pedal spurs absent; lateroapical margins of tarsi produced into rounded lobes; metasomal segments I to IV with paired ventral submedian carinae; stridulatory organ located on opposing surfaces of pedipalp coxa and first leg; total length 60 to 180 mm (***Heterometrus***, see Kovařík, 2004, p. 2) ····· 49
48. Chela trichobothrium *dt* present (***Liocheles***) ····· *Liocheles australasiae*
48. Chela trichobothrium *dt* absent (***Tibetiomachus***) ····· *Tibetiomachus himalayensis*
49. Chela round and strong ····· *Heterometrus petersii*
49. Chela narrow and long ····· 50
50. Chela manus with weak granules on the dorso-internal aspect ····· *Heterometrus longimanus*
50. Chela manus with strong spinoid granules on the dorso-internal aspect ····· *Heterometrus tibetanus*

## DISCUSSION

The distribution of scorpions is quite well demarcated by very distinct features arising from the geography and topography of China: there are markedly different constituents between east and west, north and south. Only four recorded species can be found living in both East China and Chinese islands (based on recently finished investigations): *Isometrus maculatus* (DeGeer, 1778), *Lychas mucronatus* (Fabricius, 1798), *Liocheles australasiae* (Fabricius, 1775), and *Mesobuthus martensii martensii* (Karsch, 1879); Three species maybe extinct or invalid: *Isometrus hainanensis* Lourenço, Qi & Zhu, 2005, *Lychas scutilus* C. L. Koch, 1845, and *Mesobuthus martensii hainanensis* (Birula, 1904). In Central China, only one species is reported: *Mesobuthus martensii martensii* (Karsch, 1879).

All of the species of genera *Chaerilus*, *Euscorpiops*, *Scorpiops*, and most of *Mesobuthus* live in the west of China, which is unsurprising as Tibet, Yunnan, and Xinjiang are the richest areas of scorpion biodiversity in all of China. Meanwhile, there are only nine species of two genera reported in northern China (including Xinjiang): *Mesobuthus* (eight species) and *Razianus* (one species).

Zhu et al (2004) published a list of Chinese scorpions based on the information of Fet et al (2000) and Kishida (1939), which included 5 families, 9 genera, 19 species and subspecies. Qi et al (2005) discovered eight new species of Chaerilidae (*Chaerilus*) and Euscorpiidae (*Euscorpiops* and *Scorpiops*). Di et al (2011a) reviewed the scorpions of Yunnan, recording eight previously known species and described one new species to China: *Euscorpiops kubani* Kovařík, 2004. Sun & Sun (2011) reviewed the genus *Mesobuthus* (Scorpiones: Buthidae) in China, recorded Nine species and subspecies including a new species: *Mesobuthus karshius* Sun & Sun, 2011. Di et al (2013a, b) reviewed the scorpions from Hainan Island and Tibet: 5 species and 26 species were recorded in Hainan and Tibet respectively.

While not completely exhaustive, this study nonetheless gives an excellent overview on the general situation of scorpion biodiversity in China. At present, 53 scorpion species of 12 genera of 5families are recorded in China, which has greatly helped clarify the characters of biodiversity and distribution of scorpions. This overview—including a history of taxonomic research, an updated checklist and key of the scorpions of China—accordingly is aimed at producing a catalogue of scorpions in China. While the survey on scorpion species diversity in China is not completed yet, we hope that this overview can provide researchers in both mainland China and abroad with enough basic data for taxonomy, fauna, and resources to help further their efforts.

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## References

Bastawade DB. 2006. Arachnida: Scorpionida, Uropygi, Schizomida and Oncopodid Opiliones (Chelicerata). Zool. Surv, India. Fauna of Arunachal Pradesh, *State Fauna Series*, **13**(2): 449-465.

Birula AA. 1897. Miscellanea scorpiologica. II Zur Synonymie der russischen Scorpione. *Annuaire du Muse´e Zoologique de l'Acade´-mie Impe´riale des Sciences de St.-Pe´tersbourg*, **2**: 377-391.

Birula AA. 1904. Miscellanea scorpiologica VI. Ueber einige Buthus-Arten Centralasiens nebst ihrer geographischen Verbreitung. *Annuaire du Muse´e Zoologique de l'Acade´mie Impe´riale des Sciences de St.-Pe´tersbourg,* **9**: 20-27.

Birula AA. 1911. Arachnologische Beiträge I Zur Scorpionen- und Solifugen-Fauna des Chinesischen Reiches. *Revue Russe d'Entomologie,* **11**(2): 195-201.

Cloudsley-Thompson JL. 1990. Scorpions in mythology, folklore and history. *In*: Polis GA. The Biology of Scorpions. Stanford, CA: Stanford University Press, 462-485.

Di ZY, Zhu MS. 2009a. One new species of the Genus *Scorpiops* Peters, 1861 (Scorpiones: Euscorpiidae, Scorpiopinae) from Tibet, China. *Zootaxa,* **2030**: 39-48.

Di, ZY, Zhu MS. 2009b. A new species of *Chaerilus* Simon, 1877 (Scorpiones, Chaerilidae) from China. *Acta Arachnologica,* **58**(2): 97-102.

Di ZY, Zhu MS. 2009c. The male of *Euscorpiops karschi* (Scorpiones: Euscorpiidae, Scorpiopinae) from China (Tibet). *Arthropoda Selecta,* **18**(1/2): 9-16.

Di ZY, Zhu MS. 2010. Redescription of *Scorpiops margerisonae* Kovařík, 2000, with the first record of its female, from China (Scorpiones: Euscorpiidae: Scorpiopinae). *Euscorpius,* **104**: 1-9.

Di ZY, Wu YL, Cao ZJ, Fan LQ, Li WX. 2009. The genus *Chaerilus* Simon, 1877 (Scorpiones: Chaerilidae) in China, with a description of the female *C. tricostatus* Pocock, 1899. *Arthropoda Selecta*, **18**(3/4): 131-138.

Di ZY, Cao ZJ, Wu YL, Li WX. 2010a. A new species of the Genus *Euscorpiops* Vachon, 1980 (Scorpiones: Euscorpiidae, Scorpiopinae) from Yun'nan, China. *Zootaxa,* **2361**: 13-22.

Di ZY, Wu YL, Cao ZJ, Xiao H, Li WX. 2010b. A catalogue of the genus *Euscorpiops* Vachon, 1980 (Scorpiones: Euscorpiidae, Scorpiopinae) from China, with description of a new species. *Zootaxa,* **2477**: 49-61.

Di ZY, He YW, Wu YL, Cao ZJ, Liu H, Jiang DH, Li WX. 2011a. The scorpions of Yunnan (China): updated identification key, new record and redescriptions of *Euscorpiops kubani* and *E. shidian* (Arachnida, Scorpiones). *ZooKeys,* **82**: 1-33.

Di ZY, He YW, Cao ZJ, Wu YL, Li WX. 2011b. The first record of the family Euscorpiidae (Arachnida: Scorpiones) from Central China, with a key of Chinese species of the genus *Scorpiops*. *Euscorpius,* **116**: 1-11.

Di ZY, Cao ZJ, Wu YL, Zhu L, Liu H, Li WX. 2013a. The scorpions of Hainan Island, China (Arachnida: Scorpiones). *Euscorpius,* **153**: 1-22.

Di ZY, Xu XB, Cao ZJ, Wu YL, Li WX. 2013b. Notes on the scorpions (Arachnida, Scorpiones) from Tibet with the redescription of *Scorpiops jendeki* Kovařík, 2000 (Scorpiones, Euscorpiidae) from Yunnan (China). *ZooKeys,* **301**: 51-99.

Fet V. 2000a. Family Chaerilidae Pocock, 1893. *In*: Catalog of the Scorpions of the World (1758–1998). New York: The New York Entomological Society, 323-328.

Fet V. 2000b. Family Ischnuridae Simon, 1879. *In*: Catalog of the Scorpions of the world (1758–1998). New York: The New York Entomological Society, 383-408.

Fet V. 2000c. Family Scorpionidae Latreille, 1802. *In*: Catalog of the Scorpions of the world (1758–1998). New York: The New York Entomological Society, 427-486.

Fet V. 2000d. Family Scorpiopidae Kraepelin, 1905. *In*: Catalog of the Scorpions of the World (1758–1998). New York: The New York Entomological Society, 487-495.

Fet V, Braunwalder ME, Cameron HD. 2002. Scorpions (Arachnida, Scorpiones) described by Linnaeus. *Bulletin of the British Arachnological Socity,* **12**(4): 176-182.

Fet V, Lowe G. 2000. Family Buthidae C. L. Koch, 1837. *In*: Catalog of the Scorpions of the world (1758–1998). New York: The New York Entomological Society, 54-286.

Fet V, Sissom WD. 2000. Family Euscorpiidae Laurie, 1896. *In*: Sissom FWD, Lowe G, Braunwalder M. Catalog of the Scorpions of the world (1758–1998). New York: The New York Entomological Society, 355-380.

Fet V, El-Hennawy H, Braunwalder ME, Cloudsley-Thompson JL. 2009. The first observation on scorpion biogeography by Aristotle. *Boletín Sociedad Entomológica Aragonesa,* **44**: 147-150.

Fet V, Sissom WD, Lowe G, Braunwalder ME. 2000. Catalog of the Scorpions of the World (1758–1998). New York: The New York Entomological Society.

Hirst S. 1911. Descriptions of new scorpions. *Annals and Magazine of Natural History,* **8**(46): 462-473.

Kishida K. 1939. Arachnida of Jehol, Scorpiones. *In*: Report of the first scientific expedition to Mandchoukuo under the leadership of Shigeyasu Tokunage, 1933, 5, 1, **4**(10): 1-66.

Kovařík F. 1994. *Scorpiops irenae* sp. n. from Nepal and *Scorpiops hardwickei jendeki* subsp. n. from Yunnan, China (Arachnida: Scorpionida. Vaejovidae). *Acta Societatis Zoologicae Bohemicae,* **58**: 61-66.

Kovařík F. 1997. Revision of the genera *Lychas* and *Hemilychas*, with descriptions of six new species (Scorpiones, Buthidae)". *Acta Societatis Zoologicae Bohemicae,* **61**: 311-371.

Kovařík F. 2000a. Revision of family Chaerilidae (Scorpiones), with descriptions of three new species. *Serket,* **7**(2): 38-77.

Kovařík F. 2000b. Revision of family Scorpiopidae (Scorpiones), with descriptions of six new species. *Acta Societatis Zoologicae Bohemicae,* **64**: 153-201.

Kovařík F. 2003. A review of the genus *Isometrus* Ehrenberg, 1828 (Scorpiones: Buthidae) with descriptions of four new species from Asia and Australia. *Euscorpius,* **10**: 1-19.

Kovařík F. 2004a. *Euscorpiops kubani* sp. nov. from Laos (Scorpiones, Euscorpiidae, Scorpiopinae). *Acta Musei Moraviae, Scientiae biologicae (Brno),* **89**: 13-18.

Kovařík F. 2004b. A review of the genus *Heterometrus* Ehrenberg, 1828, with descriptions of seven new species (Scorpiones, Scorpionidae). *Euscorpius*, **15**: 1-60.

Kovařík F. 2004c. Revision and taxonomic position of genera *Afghanorthochirus* Lourenço & Vachon, *Baloorthochirus* Kovařík, *Butheolus* Simon, *Nanobuthus* Pocock, *Orthochiroides* Kovařík, *Pakistanorthochirus* Lourenço, and Asian *Orthochirus* Karsch, with descriptions of twelve new species (Scorpiones, Buthidae). *Euscorpius,* **16**: 1-33.

Kovařík F. 2005. Three new species of the genera *Euscorpiops* Vachon, 1980 and *Scorpiops* Peters, 1861 from Asia (Scorpiones: Euscorpiidae, Scorpiopinae). *Euscorpius,* **27**: 1-10.

Kovařík F. 2007. A revision of the genus *Hottentotta* Birula, 1908, with descriptions of four new species (Scorpiones: Buthidae). *Euscorpius,* **58:** 1-107.

Kovařík F. 2012a. *Euscorpiops thaomischi* sp. n. from Vietnam and a key to species of the genus (Scorpiones: Euscorpiidae: Scorpiopinae). *Euscorpius,* **142**: 1-8.

Kovařík F. 2012b. Five new species of *Chaerilus* Simon, 1877 from China, Indonesia, Malaysia, Philippines, Thailand, and Vietnam (Scorpiones: Chaerilidae). *Euscorpius*, **149**: 1-14.

Kovařík F, Whitman S. 2004. Cataloghi del Museo di Storia Naturale dell'Università di Firenze - Sezione di Zoologia «La Specola». XXII. Arachnida scorpiones. Tipi. Addenda (1988–2004) e checklist della collezione (Euscorpiinae esclusi). *Atti Soc. To sc. Sci. nat., Mem., Serie B*, **111**: 103-119.

Kraepelin K. 1899. Scorpiones und Pedipalpi. *In*: *Herausgegeben von der Deutschen zoologischen Gesellschaft.* Berlin: R. Friedlander und Sohn Verlag, 265.

Lourenço WR, Leguin EA. 2011a. Further Considerations on the species of the genus *Orthochirus* Karsch, 1891 from Africa, with description of three new species (Scorpiones: Buthidae). *Euscorpius,* **123**: 1-19.

Lourenço WR, Leguin EA. 2011b. One more new species of the genus *Orthochirus* Karsch, 1891 from Africa (Scorpiones: Buthidae), *Euscorpius,* **135**: 1-6.

Lourenço WR, Qi JX. 2006. Mountain scorpions: a new genus and species from Tibet (China). *Comptes Rendus Biologies,* **329**(4): 289-295.

Lourenço WR, Qi JX, Zhu MS. 2005. Description of two new species of scorpions from China (Tibet) belonging to the genera *Mesobuthus* Vachon (Buthidae) and *Heterometrus* Ehrenberg (Scorpionidae). *Zootaxa,* **985**: 1-16.

Lourenço WR, Qi JX, Zhu MS. 2005. Description of a new species of *Isometrus* Ehrenberg 1828 (Scorpiones, Buthidae) from the Island of Hainan, China. *Boletin de la Sociedad Entomológica Aragonesa,* **36**: 57-63.

Lourenço WR, Sun D, Zhu MS. 2010. *Razianus xinjianganus* sp. nov.: A new record Genus and new species of (Scorpiones, Buthidae) from China. *Journal of Hebei University: Natural Science Edition,* **30**(3): 307-312.

Lourenço WR, Zhu MS. 2008. A new species of the genus *Isometrus* Ehrenberg 1828 from China (Scorpiones, Buthidae). *Acta Zootaxonomica Sinica,* **33**(2): 264-271.

Monod L, Volschenk ES. 2004. *Liocheles litodactylus* (Scorpiones: Liochelidae): An unusual new Licheles species from the Australian wet tropics (Queensland). *Memoirs of the Queensland Museum,* **49**: 675-687.

Prendini L. 2000. Phylogeny and classification of the superfamily Scorpionoidea Latreille, 1802 (Chelicerata, Scorpiones): An exemplar approach. *Cladistics,* **16**(1): 1-78.

Qi JX, Zhu MS, Lourenço WR. 2004. Redescription of *Mesobuthus martensii martensii* (Karsch, 1879) (Scorpiones: Buthidae) of China. *Revista Ibérica de Aracnología,* **10**: 137-144.

Qi JX, Zhu MS, Lourenço WR. 2005. Eight new species of the genera *Scorpiops* Peters, *Euscorpiops* Vachon, and *Chaerilus* Simon (Scorpiones: Euscorpiidae, Chaerilidae) from Tibet and Yunnan, China. *Euscorpius,* **32**: 1-40.

Shi CM, Zhang DX. 2005. A review of the systematic research on buthid scorpions (Scorpiones: Buthidae). *Acta Zootaxonomica Sinica,* **30**: 470-477.

Shi CM, Huang ZS, Wang L, He LJ, Hua YP, Leng L, Zhang DX. 2007. Geographical distribution of two species of *Mesobuthus* (Scorpiones, Buthidae) in China: insights from systematic field surveys and predictive models. *The Journal of Arachnology,* **35**(2): 215-226.

Sissom WD. 1990. Systematics, biogeography and paleontology. *In*: The Biology of Scorpions. California: Stanford University Press, 64-160.

Soleglad ME, Fet V. 2003. High–level systematics and phylogeny of the extant scorpions (Scorpiones: Orthosterni). *Euscorpius*, **11**: 1-175.

Soleglad ME, Sissom WD. 2001. Phylogeny of the family Euscorpiidae Laurie, 1896: a major revision. *In*: Scorpions 2001. In Memorium Gary A. Polis. Bucks: British Arachnological Society, 25-111.

Song DX. 1998. Arachnida Scorpiones. *In*: Pictorial Keys to Soil Animals of China. Beijing: Science Press, 131-132, 507-508.

Song DX, Lv XY, Shang JW. 1982. Morphology and habits of *Buthus martensii*. *Bulletin of Biology,* **1**: 22-25.

Stahnke HL. 1967. Scorpiones. Ergebnisse der zoologischen Forschungen von Dr. Z. Kaszab in der Mongolei. 93. Skorpiones. *Reichenbachia,* **9**(6): 59-68.

Sun D, Sun ZN. 2011. Notes on the genus *Mesobuthus* (Scorpiones: Buthidae) in China, with description of a new species. *The Journal of Arachnology,* **39**(1): 59-75.

Sun D, Zhu MS. 2010a. One new species of scorpion belonging to the genus *Euscorpiops* Vachon, 1980 from Yunan, China (Scorpiones: Euscorpiidae, Scorpiopinae). *Zootaxa,* **2399**: 61-68.

Sun D, Zhu MS. 2010b. A new species of the genus *Mesobuthus* Vachon, 1950 (Scorpiones: Buthidae) from Xinjiang, China. *ZooKeys,* **37**: 1-12.

Sun D, Zhu MS, Lourenço WR. 2010. A new species of *Mesobuthus* (Scorpiones: Buthidae) from Xinjiang, China, with notes on *Mesobuthus songi*. *The Journal of Arachnology,* **38**(1): 35-43.

Takashima H. 1942. The survey on scorpions and Whip amphipods in East Asia (V). *Acta Arachnologica,* **7**(1): 24-30.

Takashima H. 1948. Scorpions of Shansi, North China. *Acta Arachnologica,* **10**(3-4): 112-116.

Takashima H. 1951. Notes on the scorpion of Hainan Island. *Acta Arachnologica,* **12**(3-4): 83-87.

Teruel R, Rein JO. 2010. A new species of *Hottentotta* Birula, 1908 from Afghanistan, with a note on the generic position of *Mesobuthus songi* Lourenço, Qi & Zhu, 2005 (Scorpiones: Buthidae). *Euscorpius,* **94**: 1-8.

Tikader BK, Bastawade DB. 1983. The Fauna of India. Vol. 3. Scorpions (Scorpionida: Arachnida ). Calcutta: Zoo logical Survey of India.

Thorell T. 1876. On the classification of Scorpions. *Annals and Magazine of Natural History,* 4 (17): 1-15.

Wang XL, Chen SM. 2007. The Explaining about How the Words of "Er Ya · Shi Chong" about Name and Thing Were Named. *Journal of Xuzhou Normal University (Philosophy and Social Sciences Edition)*, **l33**(3): 65-69.

Wu HW. 1936. A review of the scorpions and whip-scorpions of China. *Sinensia,* **7**: 113-127.

Yu GY. 2004. The diversity of Chinese insect species. *Contemporary entomological research* (The Entomological Society of China to establish 60 anniversary conference and Academic Symposium), 177-179.

Zhang CB, Fang CW, Liu SJ, Ji KM. 2009. The pharmacognosy and pharmacology research of East Asia scorpion *Mesobuthus martensii*. *Journal of Anhui TCM College,* **28**(2): 57-59.

Zhang L, Zhu MS. 2009. Morphological variation of *Mesobuthus martensii* (Karsch, 1879) (Scorpiones: Buthidae) in Northern China. *Euscorpius,* **81**: 1-17.

Zhu MS, Han GX, Lourenço WR. 2008. The chaerilid scorpions of China (Scorpiones: Chaerilidae). *Zootaxa,* **1943**: 37-52.

Zhu MS, Qi JX, Song DX. 2004. A Checklist of Scorpions from China (Arachn ida: Scorpiones). *Acta Arachnologica Sinica,* **13**(2): 111-118.

Zhu MS, Zhang L, Lourenço WR. 2007. One new species of scorpion belonging to the genus *Euscorpiops* Vachon, 1980 from South China (Scorpiones: Euscorpiidae, Scorpiopinae). *Zootaxa*, **1582**: 19-25.