

# ELMIDAE:

## 1. Check list and bibliography of the Elmidae of China (Coleoptera)

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### Abstract

All species of Elmidae hitherto recorded from China are listed alphabetically. Four genera (*Graphelmis* DELÈVE, *Indosolus* BOLLOW, *Macronychus* MÜLLER, *Vietelmis* DELÈVE) are recorded for the first time from China. A bibliography including all relevant papers on the Elmidae of China and neighbouring countries is included.

**Key words:** Coleoptera, Elmidae, China, check list, zoogeography

### Introduction

The Elmidae<sup>1</sup>, or riffle beetles, belong to the superfamily Dryopoidea (sensu CROWSON 1978) or Byrrhoidea (sensu LAWRENCE & BRITTON 1994). About 130 genera and more than 1200 species of riffle beetles have been described worldwide. Two subfamilies are currently recognized: Elminae and Larinae.

Riffle beetles are confined more or less to permanent running waters. They prefer the fast flowing reaches (especially shallow riffles or rapids) of streams and rivers, only very few species are found in wave-washed lake shores and a few species are recorded from subterranean waters. Strictly terrestrial representatives, which are not uncommon in other "water beetle families" (e.g. Dytiscidae, Hydrophilidae, Hydraenidae, Dryopidae) are unknown among elmids.

Elmidae are aquatic during the larval and adult stage, only pupation takes place on the shore. Most adults are able to fly, but flight is usually restricted to a short period after emergence from pupation. Many (but certainly not all) species of Elmidae are attracted by light.

Adults and larvae feed on algae, wood and organic debris. Unlike other water beetles such as Dytiscidae or Hydrophilidae they do not swim and they do not need to come to the surface for respiration. Larvae breathe by means of retractile tracheal gills, whereas adults carry with them a so-called plastron, which is a very thin layer of air held by a dense coating of a specialized hydrofuge pubescence, usually found on the beetle's underside and legs. This plastron functions as a physical gill. It is in contact with the air space beneath the elytra, into which the spiracles open. As oxygen is removed from this reservoir by absorption for respiration, it is replaced through diffusion of dissolved oxygen from the surrounding water. This explains why elmids prefer to live in fast flowing, clean forest rivers, which are nearly saturated with dissolved oxygen. Thus Elmidae are gaining increasing recognition as indicators of water quality, water types (MOOG & JÄCH 1995, VERDONSCHOT & al. 1992) and endangered habitats (JÄCH 1994c).

### Acronyms:

CASS Chinese Academy of Sciences, Institute of Applied Ecology, Shenyang  
CWBS China Water Beetle Survey  
NMW Naturhistorisches Museum, Wien

<sup>1</sup> correct original spelling according to ICZN (1995), OPINION 1812

### Check list

Only those species are listed which were reported from China or from border villages (e.g. Kambaiti on the border between Burma and Yünnan; Tatopani on the border between Nepal and Tibet; Lao Cai on the border between Vietnam and Yünnan).

The genera and species are arranged alphabetically.

**1. *Cuspidevia velaris* JÄCH & BOUKAL, 1995**

Distribution: Hong Kong, ? Guangxi (JÄCH & BOUKAL 1995: 302)

**2. *Eonychus dudgeoni* JÄCH & BOUKAL, 1995**

Distribution: Hong Kong (JÄCH & BOUKAL 1995: 304)

**3. *Grouvellinus babai* NOMURA, 1963**

Distribution: Taiwan (NOMURA 1963: 55, JENG & YANG in press).

**4. *Grouvellinus brevior* JÄCH, 1984a**

Distribution: Nepal-Tibet border, Tatopani, ca. 1600 m a.s.l. (JÄCH 1984a: 110); Central Nepal (JÄCH 1984a: 110).

**5. *Grouvellinus carus* HINTON, 1941**

Distribution: "Foochow [= Fuzhou, Fujian]" (HINTON 1941: 71).

**6. *Grouvellinus chinensis* MARAN, 1939**

Distribution: Sichuan, "Chunghwa, Wassuland [= Yin Xiu Wan]" (MARAN 1939: 42).

**7. *Grouvellinus hercules* JÄCH, 1984a**

Distribution: Nepal-Tibet border, Tatopani, ca. 1800 m a.s.l. (JÄCH 1984a: 113).

**8. *Grouvellinus nepalensis* DELEVE, 1970b**

Distribution: Nepal-Tibet border, Tatopani (JÄCH 1984a: 111); Nepal (DELEVE 1970b: 321, JÄCH 1984a: 111).

**9. *Grouvellinus sculptus* BOLLOW, 1940**

Distribution: Kambaiti, east of Myitkyina, Burma-Yünnan border, ca. 2000 m a.s.l. (BOLLOW 1940: 37).

**10. *Grouvellinus sinensis* (GROUVELLE, 1906)**

Distribution: "Yünnan" (GROUVELLE 1906: 126).

**11. *Grouvellinus tibetanus* JÄCH, 1984a**

Distribution: Nepal-Tibet border, Tatopani, ca. 1600 - 2000 m a.s.l. (JÄCH 1984a: 114).

**12. *Jilanzhunchus costatus* JÄCH & BOUKAL, 1995**

Distribution: Guangxi (JÄCH & BOUKAL 1995: 306)

**13. *Leptelmis flavicollis* BOLLOW, 1941**

Distribution: "Süd-China" (BOLLOW 1941: 88).

**14. *Leptelmis formosana* NOMURA, 1962**

Distribution: Taiwan (NOMURA 1962: 48, JENG & YANG 1993: 56).

**15. *Optioservus kubotai* NOMURA, 1958c**

Distribution: Jilin (LI 1992: 88); Japan (NOMURA 1958c: 55); Russia (NOMURA 1958c: 55).

**16. *Potamophilinus bispinosa* (BOLLOW, 1938)**

Distribution: Soling Ho, Yünnan (BOLLOW 1938: 174).

**17. *Potamophilinus foveicollis* (BOLLOW, 1938)**

Distribution: "Wang-lung kum", Guangdong (BOLLOW 1938: 172).

**18. *Pseudamophilus malaisei* BOLLOW, 1940**

Distribution: Kambaiti, east of Myitkyina, Burma-Yünnan border, ca. 2000 m a.s.l. (BOLLOW 1940: 13).

**19. *Simonychus lantau* JÄCH & BOUKAL, 1995**

Distribution: Hong Kong (JÄCH & BOUKAL 1995: 308)

**20. *Stenelmis anytus* HINTON, 1941**

Distribution: "Foochow [= Fuzhou, Fujian]" (HINTON 1941: 83).

**21. *Stenelmis capys* HINTON, 1941**

Distribution: "Foochow [= Fuzhou, Fujian]" (HINTON 1941: 80).

**22. *Stenelmis casius* HINTON, 1941**

Distribution: "Foochow [= Fuzhou, Fujian]" (HINTON 1941: 82).

**23. *Stenelmis consobrina peropaca* REITTER, 1907**

Distribution: "China: Tien-shan [= Tian Shan]" (WU 1933: 346, 1937: 499); Kirgiziya (Tian Shan), Afghanistan, Turkmeniya.

**24. *Stenelmis decipiens* BOLLOW, 1941**

Distribution: Shaowu, Fujian (BOLLOW 1941: 41).

**25. *Stenelmis elfriedeae* BOLLOW, 1941**

Distribution: Guangdong (BOLLOW 1941: 66)

**26. *Stenelmis formosana* JENG & YANG, 1991**

Distribution: Taiwan (JENG &amp; YANG 1991: 244).

**27. *Stenelmis fukiensis* BOLLOW, 1941**

Distribution: Shaowu, Fujian (BOLLOW 1941: 77).

**28. *Stenelmis gaugleri* BOLLOW, 1941**

Distribution: "Süd-China" (BOLLOW 1941: 30).

**29. *Stenelmis grossepunctatus* BOLLOW, 1941**

Distribution: Shaowu, Fujian (BOLLOW 1941: 57).

**30. *Stenelmis klapperichi* BOLLOW, 1941**

Distribution: Shaowu, Fujian (BOLLOW 1941: 43).

**31. *Stenelmis kochi* BOLLOW, 1941**

Distribution: "Süd-China" (BOLLOW 1941: 28).

**32. *Stenelmis kuntzeni* BOLLOW, 1941**

Distribution: "Tsha-jin-shan", north Guangdong (BOLLOW 1941: 73).

**33. *Stenelmis magnofoveola* BOLLOW, 1941**

Distribution: Shaowu, Fujian (BOLLOW 1941: 501).

**34. *Stenelmis priapus* HINTON, 1941**

Distribution: "Foochow [= Fuzhou, Fujian]" (HINTON 1941: 76).

**35. *Stenelmis puberula* REITTER, 1887**

Distribution: "China: Tien-shan [= Tian Shan]" (WU 1933: 346, 1937: 499) - doubtful record; SE Europe, Turkey, Caucasus, Syria, Israel.

**36. *Stenelmis punctulatus* BOLLOW, 1940**

Distribution: "Fukien [= Fujian]" (BOLLOW 1941: 59); N Burma, Washaung (BOLLOW 1940: 26).

**37. *Stenelmis roii* BOLLOW, 1941**

Distribution: "Süd-China" (BOLLOW 1941: 61).

**38. *Stenelmis sauteri* KÔNO, 1936**

Distribution: Taiwan (BOLLOW 1941: 26, JENG &amp; YANG 1991: 236).

**39. *Stenelmis sulmo* HINTON 1941**

Distribution: "Foochow [= Fuzhou, Fujian]" (HINTON 1941: 74).

**40. *Stenelmis szechuanensis* MARAN, 1939**

Distribution: Sichuan, "Chunghwa, Wassuland [= Yin Xiu Wan]" (MARAN 1939: 41, BOLLOW 1941: 63).

**41. *Stenelmis testacea* GROUVELLE, 1892**

Distribution: "Süd-China" (BOLLOW 1941: 21); Bhamo, Burma.

**42. *Stenelmis trisulcata* FAIRMAIRE, 1888**

Distribution: "Peiping [= Beijing]" (WU 1933: 346, 1937: 499), "Süd-China, Tonkin" (BOLLOW 1941: 39).

**43. *Stenelmis troilus* HINTON, 1941**

Distribution: "Foochow [= Fuzhou, Fujian]" (HINTON 1941: 76).

**44. *Stenelmis tros* HINTON, 1941**

Distribution: "Foochow [= Fuzhou, Fujian]" (HINTON 1941: 78).

**45. *Stenelmis vulgaris* NOMURA, 1941**

Distribution: Liaoning (LI 1992: 88); Japan (NOMURA 1958b: 45); Korea (SATÔ 1978: 147).

**46. *Stenelmis wongi* JENG & YANG, 1991**

Distribution: Taiwan (JENG & YANG 1991: 242).

**47. *Zaitzevia babai* NOMURA, 1963**

Distribution: Taiwan (NOMURA 1963: 44).

**48. *Zaitzevia formosana* NOMURA, 1963**

Distribution: Taiwan (NOMURA 1963: 51).

**49. *Zaitzevia parallela* NOMURA, 1963**

Distribution: Taiwan (NOMURA 1963: 46).

**50. *Zaitzeviaria atratula* (GROUVELLE, 1911a)**

Distribution: Yünnan (GROUVELLE 1911a: 253, DELEVE 1970a: 272, JÄCH 1984b: 311).

### Discussion

Numerous species of Elmidae were recorded from neighbouring countries: Japan (BOLLOW 1941, HAYASHI 1970, 1986, JANSSENS 1956, KÔNO 1934, NOMURA 1957a, b, 1958a-c, 1959, 1960, 1961, 1962, 1963, NOMURA & BABA 1961a, b, NOMURA & NAKANE 1958, SATÔ 1960a, b, 1963a, b, 1964a-c, 1965, 1977b, 1982, 1985a, b, SATÔ & GOTÔ 1967, SATÔ & MIYATAKE 1964, SCHÖNFELDT 1888, SHARP 1888, TAKAHASHI & SATÔ 1988), Vietnam (DELEVE 1968, 1970), Burma (BOLLOW 1940, 1941, HINTON 1941), Bhutan (SATÔ 1977a), Nepal (JÄCH 1982, 1984a), North India (CHAMPION 1923, 1927, HINTON 1940), Afghanistan (BERTHELEMY 1979, JÄCH 1990, JANSSENS 1959, 1961, OLM 1976), Kirgiziya (BERTHELEMY 1979, JÄCH 1990), Russia (LAFER 1980, 1989), Korea (SATÔ 1978). Some of them were definitely collected close to the Chinese border (e.g. nine species described from Washaung, resp. Bhamo in northeastern Burma, near the Burma-Yünnan border: *Indosolus nitidus* BOLLOW, 1940, *Grouvellinus punctatostriatus* BOLLOW, 1940, *Potamophilus feae* GROUVELLE, 1892, *Stenelmis birmanica* GROUVELLE, 1892, *Stenelmis collaris* BOLLOW, 1940, *Stenelmis malaisei* BOLLOW, 1940, *Stenelmis reflexicollis* BOLLOW, 1940, *Stenelmis sulcifrons* BOLLOW, 1940, *Zaitzevia malaisei* BOLLOW, 1940). Several species which were described from "Tonkin septentrional" or "Haut Tonkin" (without exact indication of the locality), e.g. *Stenelmis villosocostata* GROUVELLE, 1896 and *Grouvellinus pelacoti* DELEVE, 1970, should also be taken into consideration when dealing with the Elmidae of Yünnan or Guangxi.

The number of *Stenelmis* DUFOUR species described from China (25 spp., 50 %) is comparatively high. However, BOLLOW (1941) described five and HINTON (1941) seven species of *Stenelmis* from Fujian and it is quite probable that some of these are synonyms.

The number of species and genera which do (or until recently did) occur in China must be presumed to be considerably higher than the present knowledge suggests.

About 7000 specimens were collected by the CWBS (deposited in the NMW and CASS) in the years 1992 - 1994. As most of the material has not yet been worked up it cannot be estimated how many species are represented. However, the material contains four genera which were not recorded from China so far (*Graphelmis* DELÈVE, *Indosolus* BOLLOW, *Macronychus* MÜLLER, *Vietelmis* DELÈVE) and several unknown genera, four of which (*Cuspidievia* JÄCH & BOUKAL, *Eonychus* JÄCH & BOUKAL, *Jilanzhunyichus* JÄCH & BOUKAL, *Sinonychus* JÄCH & BOUKAL) are described in this volume (JÄCH & BOUKAL 1995). The genus *Ordobrevia* SANDERSON was recorded

from China by YANG (1994), who also (obviously erroneously) listed *Potamophilus* GERMAR (as a result of a confusion of the names *Potamophilinus* and *Potamophilus*) and *Dryopomorphus* HINTON. The occurrence of the latter in China was confirmed by the CWBS.

As long as the taxonomy of the Chinese genera of Elmidae is understood so poorly - especially those allied to *Stenelmis* and *Zaitzevia* CHAMPION - we refrain from publishing a key to the genera.

Through the activities of the CWBS and the very intense research carried out by D. Dudgeon, about 1500 specimens of Elmidae were collected in Hong Kong in the last decade. They represent at least 9 genera and about 20 species which gives us a rough estimation of the enormous biodiversity of the Chinese elmidae fauna. About 100 species are recorded from the U.S.A. and ca. 40 are known from Europe. The Chinese riffle beetle fauna can be expected to include even more species than are recorded from the U.S.A.

However, Elmidae live in highly vulnerable habitats. Many of the Chinese species are severely endangered and thus it can be expected that numerous species which haven't even been described or discovered yet, may have become extinct in recent years due to increasing environmental pressure.

### Zoogeography

With the exception of *Stenelmis consobrina* and *Stenelmis puberula*, which are widely distributed in the Palearctic Realm, the majority of the 50 species listed above must be considered as endemic to China.

Of the 18 elmidae genera recorded from China, four are so far known only from China (*Cuspidevia*, *Eonychus*, *Jilanzhunyichus*, *Sinonychus*), four are East Palearctic-Oriental (*Dryopomorphus*, *Graphelmis*, *Pseudamophilus* BOLLOW, *Zaitzeviaria*), one is East Palearctic-Nearctic (*Optioservus*), three can be regarded as Oriental (*Indosolus*, *Potamophilinus*, *Vietelmis*), one is Holarctic-Oriental (*Macronychus*), one is East Palearctic-Nearctic-Oriental (*Zaitzevia*), one is widely distributed in the Oriental and Palearctic Realms (*Grouvellinus*), one has an almost worldwide distribution (*Stenelmis*), one has an East Palearctic-Oriental-Ethiopian distribution (*Leptelmis*) and one needs to be revised before its exact distribution can be determined (*Ordobrevia*).

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