

# The genus *Sialis* Latreille, 1802 (Megaloptera: Sialidae) in Palaeartic China, with description of a new species

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The species of the genus *Sialis* from Palaeartic China are revised. Three species are described, including *Sialis henanensis* sp. n. A key to the males of the species of *Sialis* from Palaeartic China is presented.

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## 1. Introduction

The megalopteran genus *Sialis* Latreille, 1802 is the largest genus in the family Sialidae, with 54 described species and subspecies, which are predominantly distributed in the Holarctic Region. The adult is characterized by broad wings with the costal region distinctly dilated before the middle, and branched  $R_{2+3}$  and  $R_{4+5}$ . The adult genitalia are highly modified.

The early revisionary works of Weele (1910), Klingstedt (1932a, b), and Ross (1937) were mostly focused on the European and Nearctic *Sialis*. More recent revisions on *Sialis* include, Meinander (1962), Aspöck *et al.* (1980, 2001), Vshivkova (1979, 1985), Hayashi & Suda (1995, 1997), and Liu & Yang (2006).

Currently, there are 22 valid recent species and subspecies of *Sialis* from the Palaeartic Region, with 12 species from the Western Palaeartic Region (Aspöck *et al.* 2001) and 10 species and subspecies from the Russian Far East, China and Japan. Due to its large size, Palaeartic China generally shares many species with other Palae-

artic areas (Zhang 1999). However, the fauna of *Sialis* from Palaeartic China is very poorly known, with only two species (*S. sibirica* McLachlan and *S. longidens* Klingstedt) respectively recorded by Yang (1980) and Hayashi & Suda (1995), while there are five *Sialis* species from Oriental China (Liu & Yang 2006).

In this study a new species of *Sialis* from Palaeartic China is recorded and described. *Sialis sibirica* and *S. longidens* are re-described and re-illustrated based on specimens collected from China in order to compare them to populations outside of China. A key to the males of these three species is also given. Specimens for the present study are deposited in the Entomological Museum of China Agricultural University (CAU), Beijing; Institute of Zoology, Chinese Academy of Science (IZCAS), Beijing; and the Shanghai Entomological Museum, Chinese Academy of Science, (SEMCAS), Shanghai. All type specimens are pinned except the holotype of *Sialis henanensis* sp. n., which is preserved in alcohol. The terminology of the adult genitalia generally follows Contreras-Ramos (2004).

## 2. Systematic part

### 2.1. *Sialis* Latreille, 1802

*Sialis* Latreille, 1802: 290. Type species: *Hemerobius lutarius* Linnaeus, 1758: 550, by monotypy.

*General characters.* Alderflies of small-size (forewing length 9–20 mm). Body blackish, sometimes with head and prothorax orange. Head subquadrate, with compound eyes less prominent; vertex usually with elevated pale marks. Prothorax large and rectangular, about 2.5 times wider than long; meso- and metathorax shorter than prothorax. Wings somewhat shortened, with the costal region distinctly dilated before the middle,  $R_{2+3}$  and  $R_{4+5}$  with two or more branches.

### 2.2. Key to males of *Sialis* from Palearctic China

1. Ninth gonostylus nearly semicircular in lateral view, about 1.5 times as long as ninth tergum; tenth sternum extremely small and simple *sibirica* McLachlan, 1872
- Ninth gonostylus subquadrate in lateral view, as long as ninth tergum; tenth sternum large, with proximal portion expanded laterally 2
2. Tenth tergum short, as long as  $\frac{1}{2}$  of width of ninth tergum, dorsally narrowed in lateral view; tenth sternum short, with median portion expanded laterally *henanensis* sp. n.
- Tenth tergum long, as long as  $\frac{2}{3}$  of width of ninth tergum, not narrowed dorsally in lateral view; tenth sternum elongate, with median portion not expanded *longidens* Klingstedt, 1932

### 2.3. *Sialis henanensis* sp. n. (Figs. 1a, 2)

Material examined. Holotype ♂: CHINA: Henan Province, Luanchuan, Longyuwan, 33°47' N, 111°36' E, 21.V.1999, leg. I. Sivec (CAU).

Diagnosis. Tenth tergum short, as long as  $\frac{1}{2}$  of width of ninth tergum, dorsally narrowed in lateral view; tenth sternum much shorter than tenth tergum, with proximal and median portion expanded laterally.

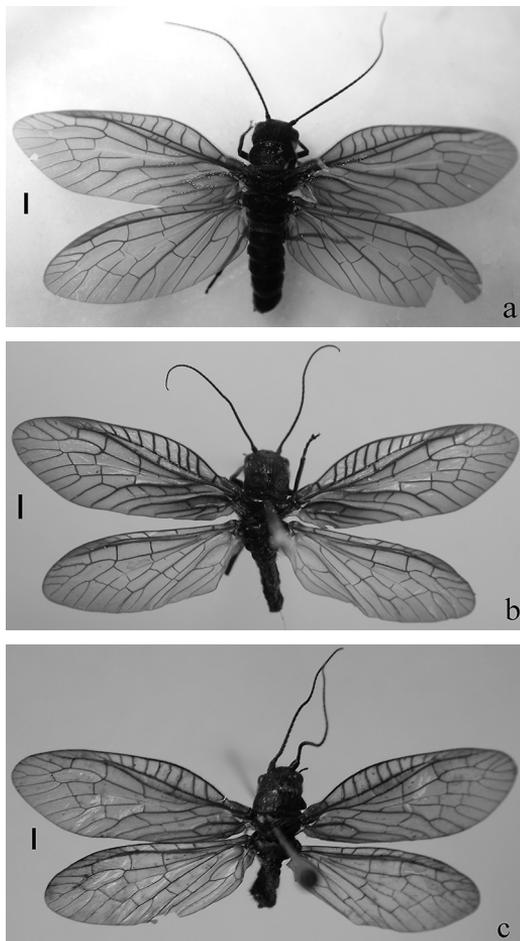


Fig. 1. Species of *Sialis* from Palearctic China. – a. *S. henanensis* sp. n., holotype male. – b. *S. longidens* Klingstedt, male. – c. *S. sibirica* McLachlan, male. Scale lines: 1.0 mm.

Description. Male. Body length about 12 mm; forewing length about 12 mm, hind wing length about 11 mm. Head black, vertex with many yellowish brown elevated marks; antenna and compound eye dark brown. Thorax black, legs dark brown. Wings pale brown, hind wings much paler than forewings; veins dark brown. Abdomen black. Tenth tergum short, as long as  $\frac{1}{2}$  of width of ninth tergum, dorsally narrowed in lateral view (Fig. 2a). Tenth sternum small, unguiform, much shorter than tenth tergum; in caudal view (Fig. 2b) proximal portion and median portion expanded laterally, respectively forming pair of slender lobes, with median lobes slightly shorter and wider; distal half broad with tip strongly nar-

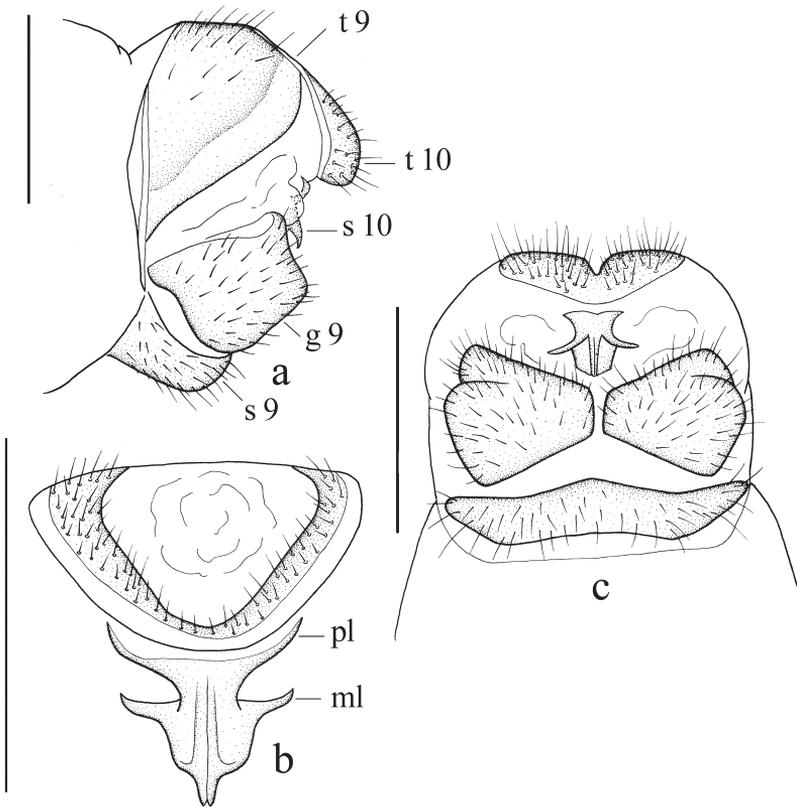


Fig. 2. *Sialis henanensis* sp. n., male. – a. Genitalia, lateral view. – b. Tenth tergum and tenth sternum, caudal view. – c. Genitalia, ventral view. Scale lines: 0.5 mm. (t9, ninth tergum; s9, ninth sternum; g9, ninth gonostylus; t10, tenth tergum; s10, tenth sternum; pl, proximal lobe; ml, median lobe).

rowed. Ninth sternum narrow, arcuate, in ventral view with lateral portions somewhat narrowed (Fig. 2c). Ninth gonostylus broad; in lateral view (Fig. 2a) subquadrate, with dorsal distal corner dorsally produced; in ventral view (Fig. 2c) subtrapezoidal with triangular tip.

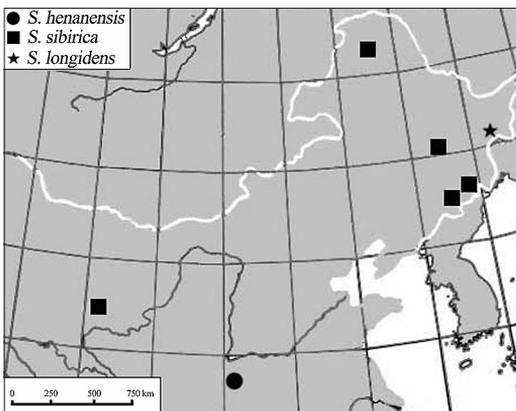


Fig. 3. Distribution map of the *Sialis* species from Palearctic China.

Female. Unknown.

Remarks. The new species appears to be closely related to *Sialis sinensis* Banks in having a similar tenth sternum with its proximal and median portion expanded laterally into two pairs of lobes, but can be separated from *S. sinensis* by the short tenth tergum and the tenth sternum with the median lobes shorter than the proximal lobes. In *S. sinensis*, the tenth tergum is long, and the median lobes are longer than the proximal lobes (Hayashi & Suda 1995).

Etymology. The name ‘*henanensis*’ refers to the type locality of the new species.

Distribution. China (Henan) (Fig. 3).

#### 2.4. *Sialis longidens* Klingstedt, 1932 (Figs. 1b, 4)

*Sialis longidens* Klingstedt, 1932: 1.

Material examined. CHINA: Heilongjiang Province, Hulin, 45°47’N, 132°57’E, 13.VI. 1971, 2 ♂♂ (IZCAS).

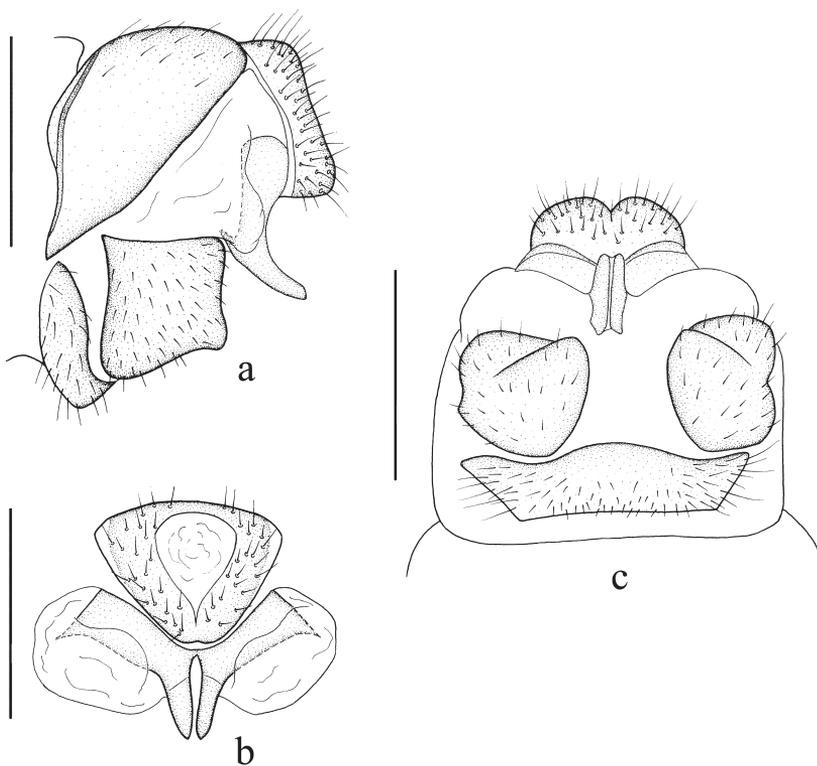


Fig. 4. *Sialis longidens* Klingstedt, male. – a. Genitalia, lateral view. – b. Tenth tergum and tenth sternum, caudal view. c. – Genitalia, ventral view. Scale lines: 0.5 mm.

**Diagnosis.** Tenth tergum as long as  $2/3$  of width of ninth tergum, subquadrate in lateral view; tenth sternum elongate with proximal portion pterygoidly expanded; ninth gonostylus subquadrate with ventroposterior corner angulately prominent.

**Description of Chinese male** (earlier description of this species can be found in Klingstedt 1932a, Vishivkova 1979, Hayashi & Suda 1995). Body length 10–11 mm; forewing length 11–12 mm, hind wing length 10–11 mm. Head black, vertex with many brownish elevated marks; antenna and compound eye blackish brown. Thorax blackish brown, legs brown. Wings pale brown, with forewings much darker on basal half; veins brown. Abdomen black. Tenth tergum as long as  $2/3$  of width of ninth tergum, in lateral view (Fig. 4a) subquadrate with round distal portion. Tenth sternum strongly sclerotized, nearly as long as tenth tergum; proximal half pterygoidly expanded laterally in ventral view (Fig. 4b); distal half long, spine-like, distinctly produced caudally. Ninth sternum narrow, in ventral view with

lateral portions somewhat narrowed (Fig. 4c). Ninth gonostylus broad; in lateral view (Fig. 4a) subtrapezoidal, with ventral posterior corner somewhat angulately prominent; in ventral view (Fig. 4c) subquadrate with outer margin slightly concaved at middle.

**Remarks.** This species was first recorded from China by Hayashi & Suda (1995), but without any specimens from China as the convincing evidence. In this study, two males were found that clearly proves the existence of this species in China. This species appears to be closely related to *Sialis annae* Vshivkova in having a similar tenth tergum and pterygoidly expanded tenth sternum, but can be easily separated from *S. annae* by the ninth gonostylus with the ventroposterior corner angulately prominent. In *S. annae*, the ventroposterior corner of the ninth gonostylus is roundly prominent (Vshivkova 1979).

**Distribution.** China (Heilongjiang) (Fig. 3); Japan, Russia.

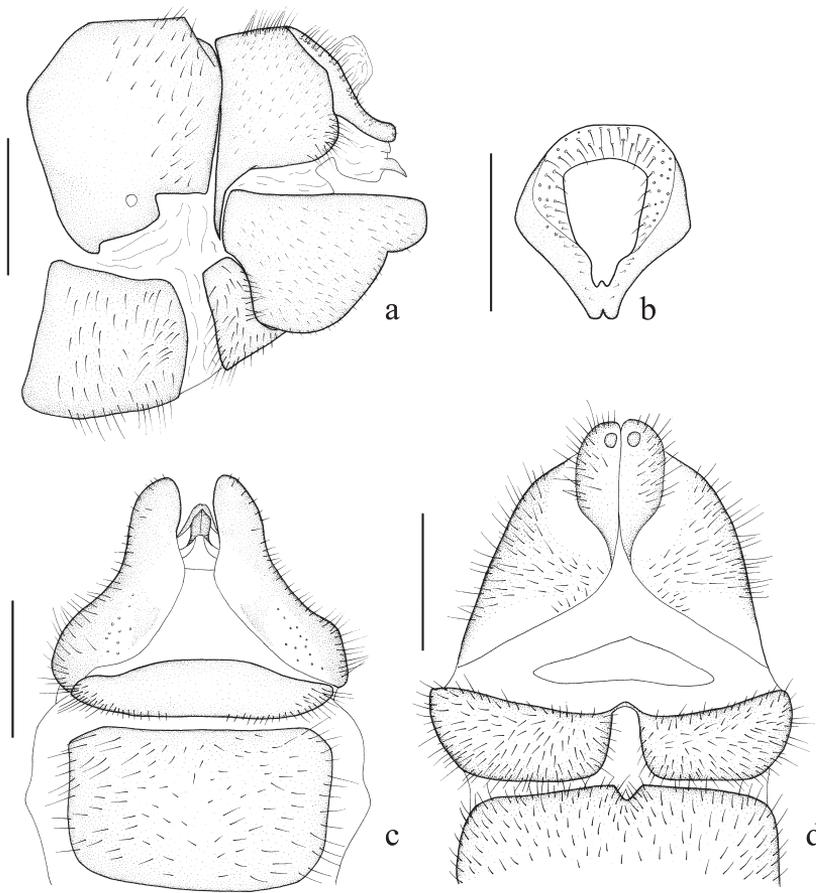


Fig. 5. *Sialis sibirica* McLachlan. – a. Male genitalia, lateral view. – b. Tenth tergum, caudal view. – c. Male genitalia, ventral view. – d. Female genitalia, ventral view. Scale lines: 0.5 mm.

### 2.5. *Sialis sibirica* McLachlan, 1872 (Figs. 1c, 5)

*Sialis sibirica* McLachlan, 1872: 55.

*Sialis frequens* Okamoto, 1905: 112.

Material examined. CHINA: Heilongjiang Province, Yuquan, 45°23'N, 127°09'E, 15.VI.1956, 4 ♂♂, 3 ♀♀ (CAU); Heilongjiang Province, Talin, 52°01'N, 123°40'E, 5.VI.1979, 3 ♂♂, leg. C.Y. Cui (SEMCAS); Heilongjiang Province, Huzhong, 52°01'N, 123°40'E, 12.VI.1979, 1 ♂, leg. C.Y. Cui (SEMCAS); Jilin Province, Manjiang, 41°57'N, 127°37'E, 14/28.VI.1955, 1 ♂, 2 ♀♀, leg. Z.Y. Li (IZCAS); Jilin Province, Changbaishan, Toudao, 42°02'N, 128°08'E, 5/7.VI.1965, 2 ♀♀ (CAU); Jilin Province, Changbaishan, Wenquan, 42°02'N, 128°08'E, 1.VII.1965, 1 ♀ (CAU); Qinghai Province, Huzhu, 36°51'N, 101°08'E, 3.VIII.1975, 1 ♂, leg. Z.G. Xu (CAU).

Diagnosis. Tenth sternum extremely small, divided into paired claws; ninth gonostylus broad, about 1.5 times as long as ninth tergum, nearly semicircular in lateral view with apex distinctly narrowed; female seventh sternum with posterior margin incised medially; female eighth sternum distinctly divided medially.

Description of Chinese specimens (earlier descriptions of this species can be found in Weele 1910, Klingstedt 1932, Vishivkova 1985, Hayashi & Suda 1995). Male. Body length 8–10 mm; forewing length 11–12 mm, hind wing length 10–11 mm. Head black, vertex with many yellowish brown elevated marks; antenna and compound eye dark brown. Thorax black with legs dark brown. Wings pale brown; veins dark brown. Abdomen black. Tenth tergum (Fig. 5a) narrow, directed ventrally, with tip slightly incised in caudal view (Fig. 5b). Ninth sternum narrow, arcuate, in ventral view with lateral portions

somewhat narrowed (Fig. 5c). Tenth sternum (Fig. 5a) extremely small, divided into paired claws, connected with ninth tergum and tenth tergum by large membrane. Ninth gonostylus broad; in lateral view (Fig. 5a) nearly semicircular with apex narrowed, subquadrate.

Female. Body length 9–12 mm; forewings 13–15 mm, hindwings 12–13 mm. Seventh sternum (Fig. 5d) medially with one V-shaped posterior incision. Eighth sternum (Fig. 5d) narrow, band-like, distinctly divided at median portion and only connected on posterior margin.

Remarks. This species appears to be somewhat related to *Sialis japonica* Weele in having a similar ninth gonostylus, but can be easily separated from *S. japonica* by the entirely brownish wings, the caudally produced tenth tergum, and the medially divided female eighth sternum. In *S. japonica*, the basal half of the wings are distinctly darkened, the tenth tergum is less produced, and the female eighth sternum is not divided medially (Hayashi & Suda 1995).

Distribution. China (Heilongjiang, Jilin, Qinghai) (Fig. 3); Japan, Russia, northern Europe.

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