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A new species of the genus *Sinopanorpa* Cai & Hua, 2008 from Hubei Province, China (Mecoptera: Panorpidae)

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Baokang; Panorpidae;
China; scorpionfly;
Hubei; *Sinopanorpa*;
Mecoptera; *baokangensis*;
new species; taxonomy.

Abstract. – In this paper, a new species of the scorpionfly genus *Sinopanorpa* Cai & Hua, 2008, *Sinopanorpa baokangensis* Wang, **sp. nov.** is described from Baokang County (China: Hubei Province). The key to species is updated, and a distributional map is provided for four species in *Sinopanorpa*. Their systematic implications are briefly discussed.

Wang J.-S., 2021. – A new species of the genus *Sinopanorpa* Cai & Hua, 2008 from Hubei Province, China (Mecoptera: Panorpidae). *Faunitaxys*, 9(29): 1 – 6.

ZooBank: <http://zoobank.org/09BB2BC6-24F0-4AEA-83B7-933D1D2C2ABD>

Introduction

The scorpionfly genus *Sinopanorpa* Cai & Hua, 2008 was erected for three Chinese-endemic species (Cai et al., 2008). The type species, *Sinopanorpa tincta* (Navás, 1931) is recorded from southern Gansu, northern Sichuan and Shaanxi Provinces (Navás, 1931; Cheng, 1949, 1957; Chou et al., 1981; Hua & Peng, 2005; Cai et al., 2008). *Sinopanorpa digitiformis* Huang & Hua, 2008 and *Sinopanorpa nangongshana* Cai & Hua, 2008 can be found from Shennongjia (Hubei Province) and Nangong Mountain (Shaanxi Province), respectively.

Recently, a set of new materials of scorpionflies was collected from Baokang County (China: Hubei Province) and donated by Mr. Mao Ye. These specimens can be readily assigned to the genus *Sinopanorpa* but represent an undescribed species. Herein, I provide illustrations and descriptions of this new species. A key to species and a distributional map are also presented for all four species of *Sinopanorpa* from China.

Material and methods

All the materials examined in this study are deposited in the Biological Science Museum, Dali University (DALU), China. Adult scorpionflies were caught with a collecting net, preserved in 95% ethanol or pinned. Photographs of the insects were taken with a Canon PowerShot G15 digital camera (Fig. 1), Nikon D7000 digital camera in conjunction with a Nikkor AF-S Micro 105 mm f/2.8 lens (Fig. 2, 3, 4A), or a Canon MP-E 65 mm f/2.8 1–5× macro lens with a handmade mount adapter (Fig. 4B–E, 5). The measurements follow Wang & Gong (2021). The distribution map was obtained from Maps-For-Free (<https://maps-for-free.com>) and modified with Adobe Illustrator CC. All pictures were adjusted and grouped with Adobe Photoshop CC. The terminology follows Wang & Hua (2021).

The following acronyms are applied in the main text:

A1: First abdominal segment (and so forth for other segments);

AbL: Abdomen length;

AtL: Antenna length;

BL: Body length;

FL: Forewing length;

FW: Forewing width;

HL: Hindwing length;

HW: Hindwing width;

S1: First sternum (and so forth for other sterna);

T1: First tergum (and so forth for other terga).

Results

Order **Mecoptera** Packard, 1886

Suborder **Pistillifera** Willmann, 1987

Superfamily **Panorpoidea** Latreille, 1802

Family **Panorpidae** Latreille, 1802

Subfamily **Panorpinæ** Latreille, 1802

Genus ***Sinopanorpa*** Cai & Hua, 2008

Sinopanorpa baokangensis Wang **sp. nov.**

(Chinese vernacular name: 保康华蝎蛉)

(Fig. 1-5)

ZooBank: <http://zoobank.org/30FA3B17-BAEF-4905-8A97-616426E9BB05>

Holotype, ♂ (DALU), CHINA: Hubei Province, Baokang County, Maping Village near the Nan-Shi Road, 31°37'53.43"N, 111°21'16.56"E, 1200 m, 28.V.2017, leg. Mao Ye.

Paratypes, 5 ♂ & 18 ♀ (DALU), same data except V–VII.2017.

Diagnosis. – The new species can be readily distinguished from its congeners by the following characters:

1) male gonostylus with greatly developed and unfurcated basal process;

2) male paramere bearing tuft of long spines at middle of inner margin;

3) female medigynium with posterior arms stout apically and slightly longer than half length of main plate.

Etymology. – The new species is named after the type locality, Baokang County. Adjective.

Description of the male

Measurements (mm). – AtL 13.0–13.8, AbL 16.5–19.0, BL 20.0–24.0, FL 16.0–17.5, FW 4.1–4.2, HL 15.0–16.2, HW 3.9–4.1.

Head (Fig. 2). – Vertex unevenly dark brown, rostrum dark yellowish brown. Antennae with scape, pedicel and few basal flagellomeres yellowish brown, other parts dark brown.

Thorax (Fig. 2). – Pronotum dark yellowish brown with 5 stout setae on each side of anterior margin. Meso- and metanotum black. Pleura and legs yellowish brown.

Wings (Fig. 2). – Membrane tinged with deep yellow, markings sooty brown. Veins yellowish brown. Pterostigma indistinct. Apical and pterostigmal band, marginal spot, and anterior half of basal band light and watermark-like; posterior half of basal band broadening backward and much denser than anterior half.

Abdomen (Fig. 2, 4A). – T1–T4 dark brown to black. Notal organ on posterior margin of T3 slightly produced and reaching acute postnotal organ on T4. T5 dark yellowish brown. A6 yellowish brown with black textures on lateral surface, slightly tapering towards beveled apex; basal 1/3 of T6 with a stout process bearing tuft of long, yellow setae. A7 and A8 yellowish brown with black textures laterally. A7 greatly constricted and stalk-shaped in base, A8 slightly longer than A7 and less constricted basally.

Male genitalia (Fig. 4B–E). – Genital bulb ovoid, yellowish brown. Epandrium (T9) long and broad, tapering towards apex, and slightly emarginated in a V-shape terminally. Cerci slender and clavate. Hypandrium (S9) with extremely short basal stalk and split into pair of hypovlaves. Hypovalves broad, reaching apex of gonocoxites, and bearing long setae along inner margin. Gonocoxites stout, with apices nearly truncated. Gonostylus approximately as long as gonostylus, sickle-shaped, with median tooth subtriangular and indistinct, and basal process greatly developed. Tuft of long setae located basal to basal process. Basal process with basal half trapezoidal and distal half thinner and greatly curved. Paramere slender, slightly bended at middle, extending beyond middle of basal process of gonostylus, bearing tuft of long, stout spines at middle of inner margin, and row of short bristles along distal half of inner margin. Aedeagus short, with dorsal processes slightly produced.

Description of the female

Measurements. AtL 12.0–14.2, AbL 12.0–16.0, BL 14.0–20.0, FL 15.5–18.0, FW 4.1–4.3, HL 13.8.0–16.5, HW 3.9–4.2.

Habitus (Fig. 3) similar to that of males except wing markings usually denser.

Female genitalia (Fig. 5). Subgenital plate oval with rounded apex, and bearing several long setae in distal portion. Medigynium with main plate rounded, posterior arms stout and shorter than half length of main plate, and axis slender and longer than twice length of main plate. Apodemes of axis mostly aligned but slightly divergent at base.

Distribution (Fig. 6). – CHINA: Hubei Province: Baokang County.

Discussion. – Three previously known species of *Sinopanorpa* are recorded from the Minshan, Qinling, and Bashan Mountains (Fig. 6). Cai et al. (2008) claimed that *Sinopanorpa* can be differentiated from *Panorpa* by a combination of some distinct features, such as the trifurcated R₂ veins, the deeply yellow wings, the basally stalk-shaped male seventh abdominal segment (A7), and the two-hook bearing basal process in the greatly elongated male gonostylus (Cai et al., 2008). However, these characters can also be observed in many species of *Panorpa* and even other genera of Panorpidae. For example, *Neopanorpa appendiculata* (Westwood, 1841) and *Panorpa japonica* Thunberg, 1784 bear trifurcated R₂; *Panorpa sextaenia* Zhou & Bao, 2002 holds deep yellow wings; members in

the genera *Dicerapanorpa* Zhong & Hua, 2013 and *Megapanorpa* Wang & Hua, 2019 have basally stalk-shaped A7; and *Panorpa longititilana* Issiki, 1929 and *Panorpa rantaisanensis* Issiki, 1929 share similar abdominal and genital morphology to *Sinopanorpa* spp. These facts suggest that the generic definition of *Sinopanorpa* was possibly based on homoplasious traits. In a recent study, Wang & Hua (2021) indicated that aside from these ambiguous characters, the members of *Sinopanorpa* can be recognized by the A6 abruptly tapering towards a conical apex and bearing dense setae on the middle of T6 in the males, and the extremely thin and elongated axis in the female medigynium. In the current study, the new species *Sinopanorpa baokangensis* Wang, sp. nov. conforms the general morphology of *Sinopanorpa*, except the unfurcated basal process of the male gonostylus.

In both morphological and molecular phylogenetic analyses, *Sinopanorpa* is closely related to some species groups of the genus *Panorpa*, the same condition as *Cerapanorpa* Gao & Hua, 2016, *Dicerapanorpa* Zhong & Hua, 2013, *Megapanorpa* Wang & Hua, 2019, rendering the genus *Panorpa* a large paraphyletic group (Hu et al., 2015; Miao et al., 2019; Wang & Hua, 2021). Therefore, in order to maintain monophyletic taxa, these genera should be synonymized with *Panorpa*; otherwise, more genera should be erected for some monophyletic species groups of *Panorpa* (Wang & Hua, 2021). Systematically, *Sinopanorpa* belongs to the subfamily Panorpinae, and share a close relationship with the *Panorpa deceptor* and the *Panorpa stigmalis* groups (Wang & Hua, 2021). By the dense setae on the middle of male T6, the extremely shortened male aedeagus, and the thin axis in female medigynium, the *Panorpa stigmalis* group is most likely the sister group of *Sinopanorpa* but lacking support from molecular data (Hu et al., 2015; Miao et al., 2019; Wang & Hua, 2021). Further research is expected to decipher the evolutionary history and phylogenetic implications of *Sinopanorpa*.

Acknowledgement

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Fig. 1. Habitus of *Sinopanorpa baokangensis* Wang, **sp. nov.**

A) Male adult perched on leaves. B) Female adult perched on a leaf. C) Male adult feeding a dead caterpillar. D) Female adult feeding a dead bug.

Key to four species of *Sinopanorpa* Cai & Hua, 2008

1. Male gonostylus with basal process unfurcated; female medigynium with stout posterior arms longer than half length of main plate *Sinopanorpa baokangensis* Wang, **sp. nov.**
- Male gonostylus with basal process bifurcated; female medigynium with acute posterior arms shorter than half length of main plate 2
2. Body mostly dark brown; paramere exceeding median tooth of gonostylus; female medigynium with posterior portion wider than half width of main plate *Sinopanorpa nangongshana* Cai & Hua, 2008
- Body mostly yellowish brown; paramere not exceeding median tooth of gonostylus; female medigynium with posterior portion narrower than half width of main plate 3
3. Basal process of male gonostylus with distal tooth smaller than basal tooth; paramere with long comb-like spines on inner margin; female medigynium with apodemes of axis greatly divergent at base *Sinopanorpa tincta* (Navás, 1931)
- Basal process of male gonostylus with distal and basal tooth approximately same sized; female medigynium with apodemes of axis slightly divergent *Sinopanorpa digitiformis* Huang & Hua, 2008

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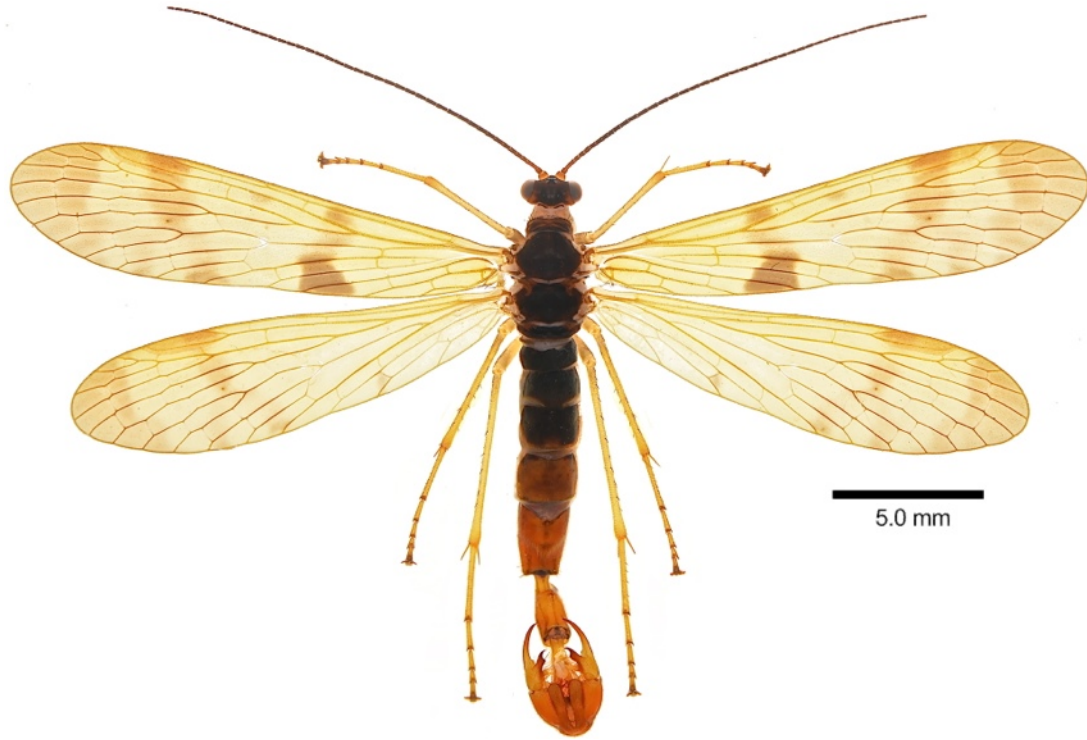


Fig. 2. Male habitus of *Sinopanorpa baokangensis* Wang, sp. nov., dorsal view.



Fig. 3. Female habitus of *Sinopanorpa baokangensis* Wang, sp. nov., dorsal view.

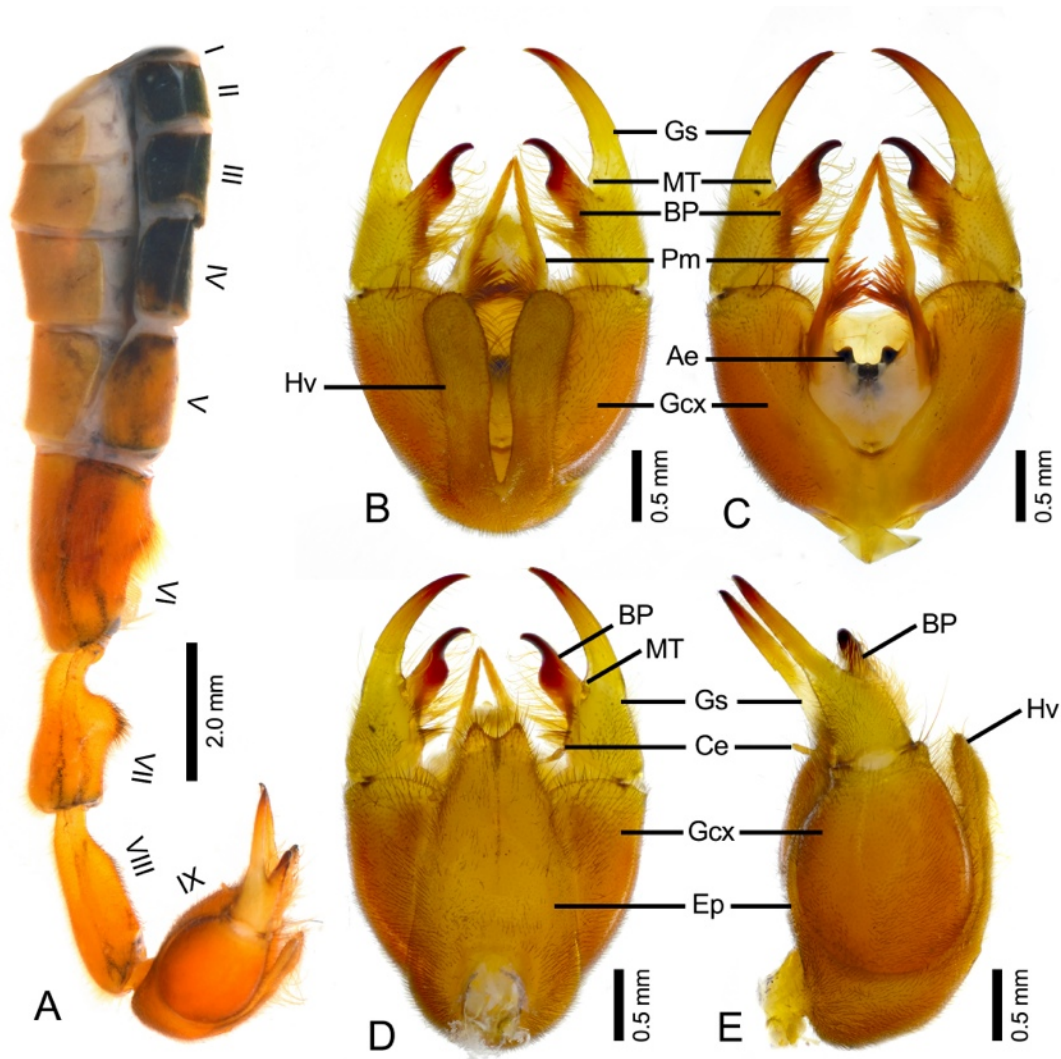


Fig. 4. Male abdomen and genitalia of *Sinopanorpa baokangensis* Wang, **sp. nov.**

A) Abdomen, lateral view. B, D, E) Genital bulb, ventral, dorsal and lateral views. C) Genital bulb with hypandrium removed, ventral view. Ae, aedeagus. BP, basal process. Ce, cercus. Ep, epandrium. Gcx, gonocoxite. Gs, gonostylus. Hv, hypovalve. MT, median tooth. Pm, Paramere.

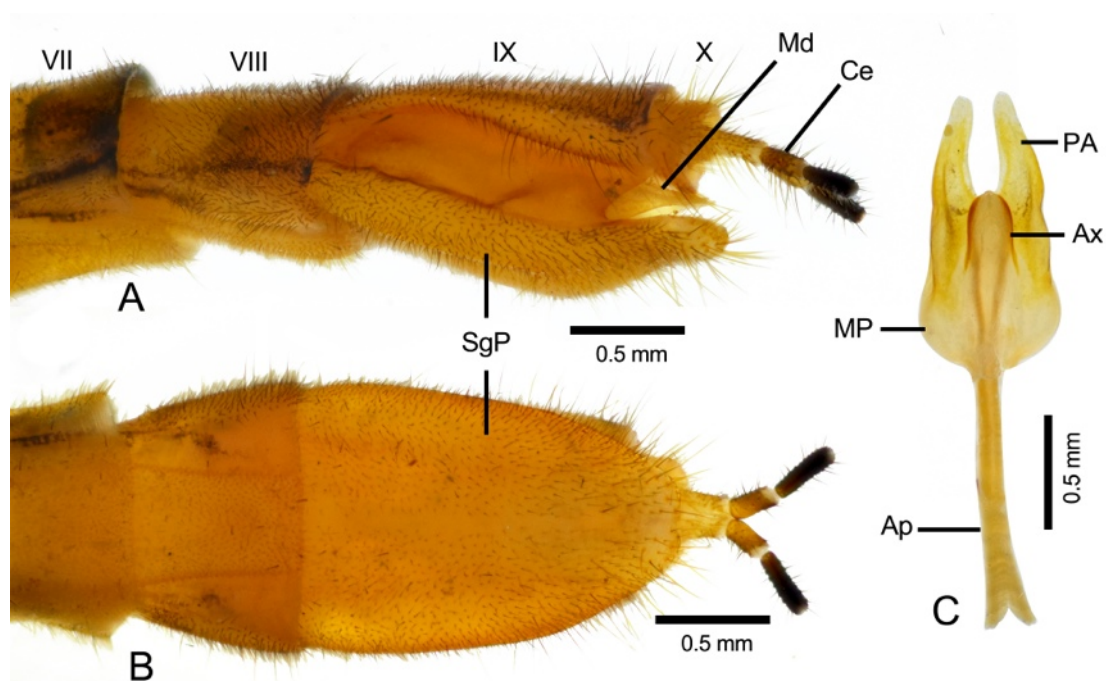


Fig. 5. Female genitalia of *Sinopanorpa baokangensis* Wang, **sp. nov.**

A, B) A7–A11, lateral and ventral views, respectively. C) Medigynium, ventral view. Ap, apodeme. Ax, axis. Ce, cercus. Md, medigynium. MP, main plate. PA, posterior arm. SgP, subgenital plate.

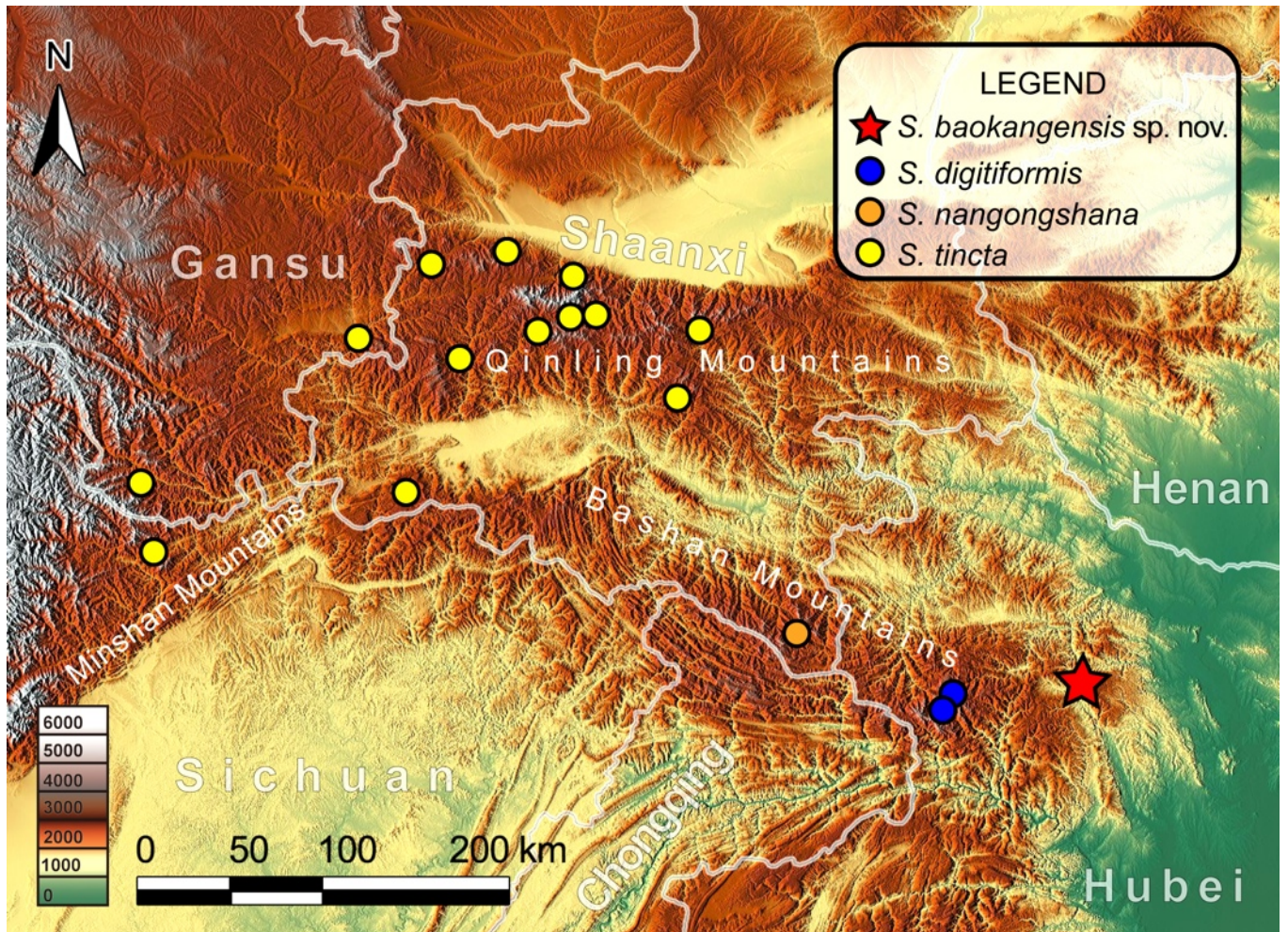


Fig. 6. Distribution of *Sinopanorpa* spp.

Résumé

Wang J.-S., 2021. – Une nouvelle espèce du genre *Sinopanorpa* Cai & Hua, 2008 de la province d’Hubei, Chine (Mecoptera: Panorpidae). *Faunitaxys*, 9(29): 1 – 6.

Dans cet article, un nouveau mécoptère du genre *Sinopanorpa* Cai & Hua, 2008, *Sinopanorpa baokangensis* Wang, sp. nov. est décrit du Baokang (Chine: Province d’Hubei). La clé des espèces est mise à jour, et une carte de répartition des quatre espèces de *Sinopanorpa* est établie. Leur positionnement systématique est abordé.

Mots clés. – Baokang, Chine, Hubei, Mecoptera, espèce nouvelle, Panorpidae, *Sinopanorpa*, *baokangensis*, taxonomie.

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Faunitaxys

Volume 9, Numéro 29, Septembre 2021

SOMMAIRE

Une nouvelle espèce du genre *Sinopanorpa* Cai & Hua, 2008 de la province d'Hubei, Chine (Mecoptera: Panorpidae).

Ji-Shen Wang 1 – 6

CONTENTS

A new species of the genus *Sinopanorpa* Cai & Hua, 2008 from Hubei Province, China (Mecoptera: Panorpidae).

Ji-Shen Wang 1 – 6

Illustration de la couverture : *Sinopanorpa baokangensis* Wang, **sp. nov.**, adulte mâle dans son milieu naturel.

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