

# The genus *Nipponopius* Fischer (Hymenoptera, Braconidae, Opiinae) new for China, with description of a new species

Tong Zhou<sup>1</sup>, Cornelis van Achterberg<sup>1</sup>, Zi-Sheng Guo<sup>1</sup>

<sup>1</sup> Shaanxi Key Laboratory for Animal Conservation / Key Laboratory of Resource Biology and Biotechnology in Western China, College of Life Sciences, Northwest University, 229 North Taibai Road, Xi'an, Shaanxi 710069, China

Corresponding author: Zi-Sheng Guo ([zishengguo@nwu.edu.cn](mailto:zishengguo@nwu.edu.cn))

---

Academic editor: G. Broad | Received 11 January 2017 | Accepted 18 April 2017 | Published 30 June 2017

---

<http://zoobank.org/C55DE47E-92C0-489D-9E7C-7FF93B7D55B0>

---

**Citation:** Zhou T, van Achterberg C, Guo Z-S (2017) The genus *Nipponopius* Fischer (Hymenoptera, Braconidae, Opiinae) new for China, with description of a new species. *Journal of Hymenoptera Research* 57: 123–134. <https://doi.org/10.3897/jhr.57.11766>

---

## Abstract

*Nipponopius glabricaudatus* sp. n. from Shaanxi and Ningxia (NW China) is described and illustrated (Hymenoptera: Braconidae: Opiinae). A key to the species of *Nipponopius* Fischer, 1963, is added and for the first time the male is described and illustrated. The genus is reported for the second time from outside Japan and is new for China. The position of *Nipponopius* Fischer is discussed and it is accepted as a valid genus.

## Keywords

Braconidae, Opiinae, *Nipponopius*, new species, Palearctic, China, Shaanxi, Ningxia, Japan

## Introduction

*Nipponopius* Fischer, 1963, belongs to the large subfamily Opiinae (Hymenoptera, Braconidae), with 2,063 valid species in 39 genera according to Yu et al. (2016). It is a common group containing generally small (2–5 mm) parasitoid wasps, but *Nipponopius* Fischer is rarely collected. Opiinae occur worldwide and the world fauna has been reviewed by Fischer (1972, 1977, 1986, 1987). Wharton (1988, 1997), van Achterberg

(1997, 2004a, 2004b), van Achterberg and Salvo (1997), van Achterberg and Chen (2004) and Tan et al. (2016) published updates or some additions for the existing keys to the genera of the Opiinae, but the number of genera and the limits of several genera remain still a matter of discussion.

Wharton (1997) synonymised the monotypic genus *Nipponopius* Fischer with *Utetes* Foerster, 1863, because both share the curved basal carinula at the inner side of the hind tibia. We disagree with including all opine species with this character into one large genus *Utetes* Foerster s.l. The resulting group is too diverse and provisional DNA data show that probably several lineages are involved (Li et al. 2013). The morphology of *Nipponopius* Fischer differs distinctly from that of *Utetes* Foerster s.s.; best exemplified by the morphology of the hind leg, the position of the dorsope of the first metasomal tergite and the incised female hypopygium. Therefore, we concur with Tobias (2000) that *Nipponopius* Fischer should be treated as a separate genus.

*Nipponopius* can be recognised from all other opiines by the aberrant legs of both sexes (hind coxa ventrally angularly produced (Figs 9, 19, 20), the second–fourth tarsal segments very robust (Figs 8, 15, 17, 18), the telotarsi enlarged (Figs 8, 15, 17) but less so in males (Fig. 18) and the deeply incised hypopygium of females (Figs 13, 14, 17).

Nothing is known about the biology of *Nipponopius* species, but all Opiinae are solitary koinobiont endoparasitoids of larvae of cyclorrhaphous Diptera. The oviposition may take place in the egg of the host (ovo-larval parasitoid) or in an early instar larva. The parasitoid larva has its final development when the host larva made its puparium and the adult emerges from this puparium. Opiinae may play an important role in the control of dipterous pests as fruit-infesting Tephritidae and mining Agromyzidae.

## Material and methods

The specimens were collected by using a sweep net and directly killed and preserved in 70% alcohol. The specimens were chemically treated with a mixture of xylene + alcohol 96% and amyl acetate, respectively (AXA-method; van Achterberg 2009; van Achterberg et al. 2010). For identification of the subfamily Opiinae, see van Achterberg (1990, 1993), for identification of *Nipponopius* Fischer, see Fischer (1972) and the diagnosis in this paper, for references to the Opiinae, see Yu et al. (2016) and for the terminology used in this paper, see van Achterberg (1988, 1993). Measurements are taken as indicated by van Achterberg (1988): for the length and the width of a body part the maximum length and width is taken, unless otherwise indicated. The length of the mesosoma is measured from the anterior border of the mesoscutum till the apex of the propodeum and of the first tergite from the posterior border of the adductor till the medio-posterior margin of the tergite. Observations and descriptions were made with an Olympus SZX11 stereomicroscope and fluorescent lamps. Photographic images were made with the Keyence VHX-5000 digital microscope. The examined specimens are deposited in the American Entomological Institute, Gainesville, USA (AEI) and in the College of Life Sciences, Northwest University, Xi'an, China (NWUX).

## Systematics

### *Nipponopius* Fischer, 1963

Figures 1–41

*Nipponopius* Fischer, 1963: 283, 1972b: 481; Tobias, 1998: 563. Type species (by monotypy): *Nipponopius incisus* Fischer, 1963 [examined].

**Diagnosis.** Hind tibia with basal carinula (Fig. 41); mandible triangular with two subequal teeth and hardly twisted, without or a weak ventral carina (Figs 10, 26, 36); apex of antenna with distinct spine (Figs 16, 30, 40); mesopleuron with one groove (= precoxal sulcus) and sternaulus absent (Figs 5, 22, 32); postpectal carina absent; vein CU1b of fore wing as long as vein 3-CU1 (Fig. 1) or somewhat shorter (Figs 17, 31); first subdiscal cell of fore wing distinctly widened apically; vein m-cu of fore wing converging to vein 1-M posteriorly and vein 1-M curved (Figs 1, 17, 31); vein 1-SR+M distinctly sinuate; hind coxa submedially angularly produced ventrally (Figs 5, 9, 19, 20); second-fourth tarsal segments of ♀ very robust (Figs 8, 17, 25), but less of ♂ (Figs 18, 35); telotarsi and arolium enlarged (Figs 8, 15, 17, 18); dorsope rather small, removed from lateral margin of first tergite (Figs 7, 23, 34); hypopygium of ♀ large, strongly sclerotized parts deeply incised (Figs 13, 14, 25), basally punctate, laterally and apico-medially with membranous parts.

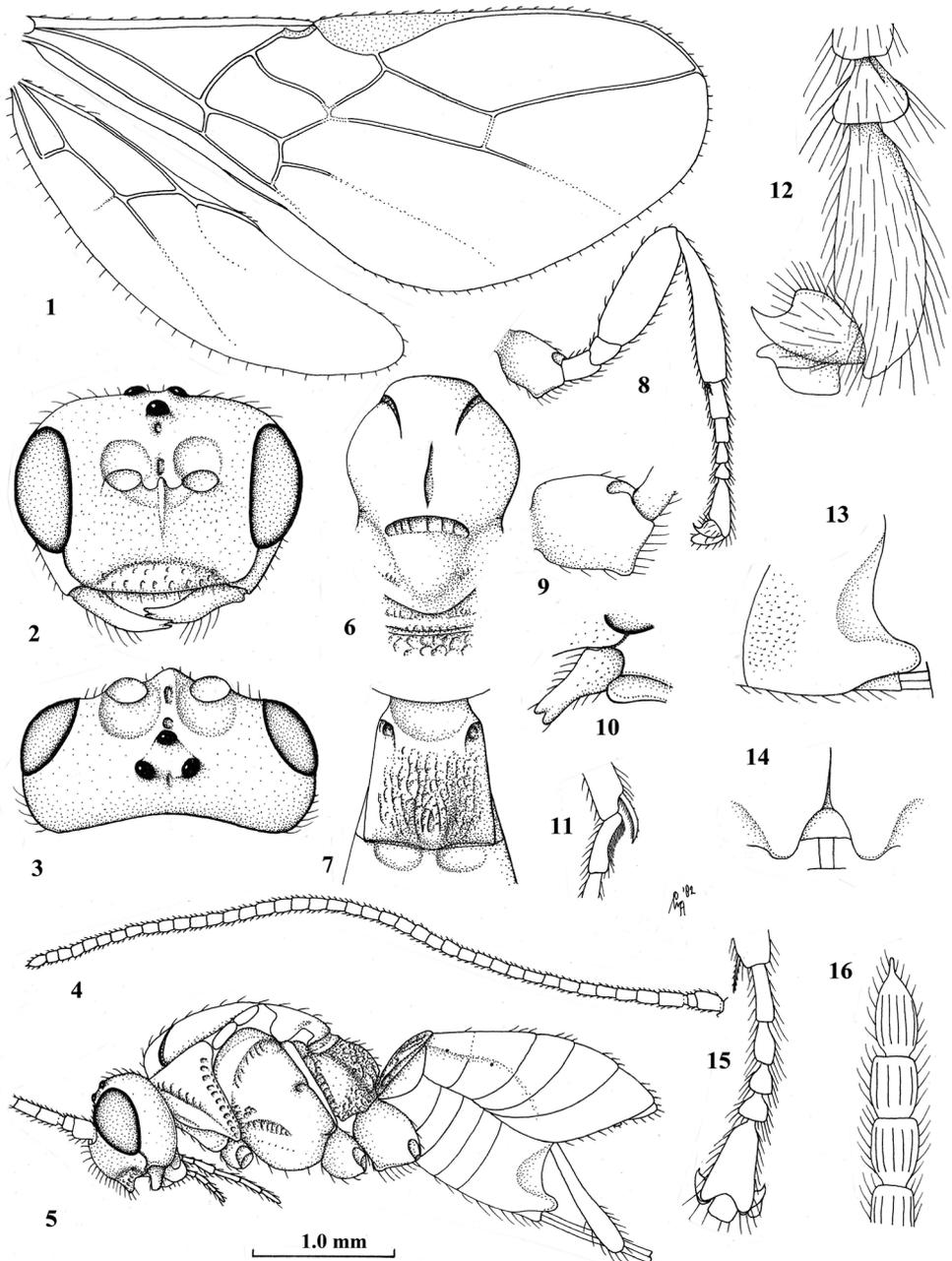
**Notes.** According to Wharton (1997) *Nipponopius* Fischer is a junior synonym of *Utetes* Foerster, 1863, because of the possession of the hind tibial carinula. We agree with Tobias (2000) that *Nipponopius* deserves a separate status, not the least because of the presence of a rather small dorsope removed from the lateral margin of the first tergite (Figs 7, 23, 34), the angularly protruding hind coxa ventrally (Figs 8, 9, 19, 20) and the long vein CU1b of fore wing combined with apically widened first subdiscal cell (Fig. 1), features absent in *Utetes* Foerster s.s.

**Biology.** Unknown.

**Distribution.** East Palaearctic: Japan, Far East Russia, China. Two species.

### Key to species of the genus *Nipponopius* Fischer

- 1 Anterior tentorial pits rather large (Figs 26, 36); precoxal sulcus remain far removed from anterior margin of mesopleuron (Figs 22, 32) and remainder of mesopleuron smooth antero-dorsally; ovipositor sheath glabrous apically (Fig. 25); vein CU1b of fore wing shorter than vein 3-CU1 (Figs 21, 31); first metasomal tergite largely smooth (Figs 23, 24, 34) ..... *N. glabricaudatus* sp. n.
- Anterior tentorial pits small (Fig. 2); precoxal sulcus reaching anterior margin of mesopleuron (Fig. 5) and mesopleuron partly crenulate antero-dorsally; ovipositor sheath distinctly setose apically (Fig. 5); vein CU1b of fore wing as long as vein 3-CU1 (Fig. 1); first tergite rather finely punctate-rugose (Fig. 7)..... *N. incisus* Fischer, 1963



**Figures 1–16.** *Nipponopius incisus* Fischer, ♀, holotype. **1** wings **2** head anterior **3** head dorsal **4** antenna **5** habitus lateral **6** mesosoma dorsal **7** first metasomal tergite dorsal **8** hind leg lateral **9** hind coxa lateral **10** mandible and occipital carina latero-ventral **11** fore tibial spur **12** outer hind claw lateral **13** hypopygium lateral **14** hypopygium ventral **15** hind tarsus dorsal **16** apical segments of antenna.

***Nipponopius glabricaudatus* Zhou & van Achterberg, sp. n.**

<http://zoobank.org/0899D6C7-24E8-4206-9B76-148601CF4CE9>

Figures 17–41

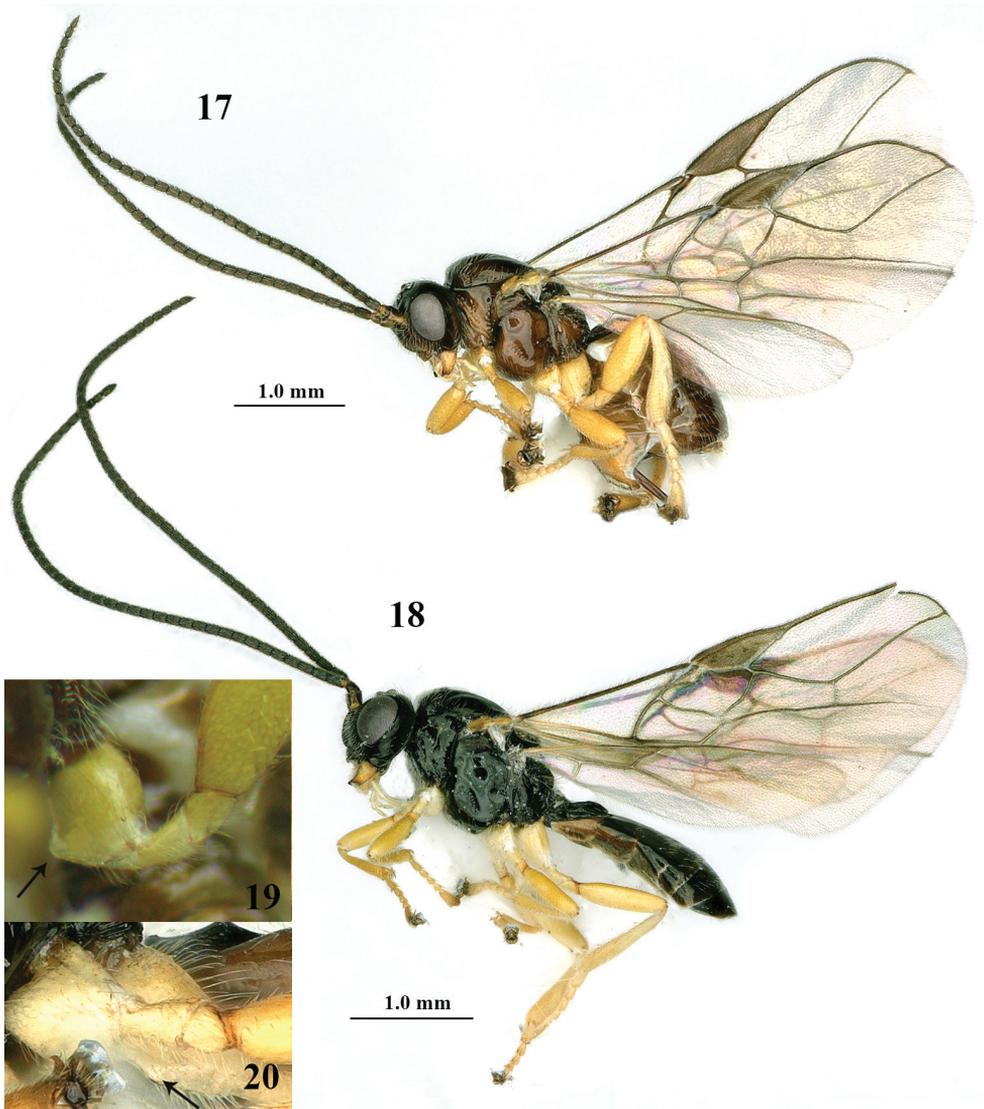
**Type material.** Holotype, ♀ (NWUX), “NW. China: Ningxia, Jingyuan, Mt. Liupan, Erlonghe For[estry] Farm, 23°24'N 106°20'E, c. 1800 m, 2.viii.2015, Jiangli Tan”. Paratype: 1 ♂ (NWUX), “NW. China: Shaanxi, Ningshan, Mt. Qin, Xunyangba, 33°33'N, 108°32'E, c. 1300 m, vii.2014, Jiangli Tan”.

**Diagnosis.** Very similar to the only other known species, *N. incisus* Fischer, but differs especially by the large anterior tentorial pits, the reduced precoxal sulcus, the shorter vein CU1b of fore wing and the apically glabrous ovipositor sheath.

**Description.** Holotype, ♀, length of body 3.1 mm; of fore wing 4.0 mm.

*Head.* Head slightly transverse, width 1.8 times its median length in dorsal view and temple directly narrowed behind eyes (Fig. 27); antenna with 40 segments, 1.1 times as long as fore wing, third segment 1.3 times as long as fourth segment, length of third, fourth and penultimate segments 1.7, 1.5 and 1.8 times their width, respectively (Figs 29, 30); maxillary palp as long as height of head; labial palp segments slender; occipital carina far separated from hypostomal carina and carina dorsally absent; hypostomal carina wide, protruding (Fig. 28); length of eye in dorsal view 2.7 times temple; temple and vertex sparsely punctate and with long setae; stemmaticum weakly convex, with small depression behind stemmaticum; OOL: diameter of ocellus: POL = 28:10:11; frons distinctly depressed behind antennal sockets, glabrous medially, finely punctate and setose laterally; face punctate, medially elevated (Figs 26, 27), extending as a median carina to level of posterior margin of antennal sockets; width of clypeus 3.0 times its maximum height and 0.6 times width of face; anterior tentorial pits rather large (Fig. 26); clypeus moderately convex, punctate and protruding, ventrally slightly curved and thin; hypoclypeal depression narrow (Figs 26, 28); malar suture largely absent; length of malar space 0.5 times basal width of mandible; mandible triangular and with narrow ventral carina (Fig. 28).

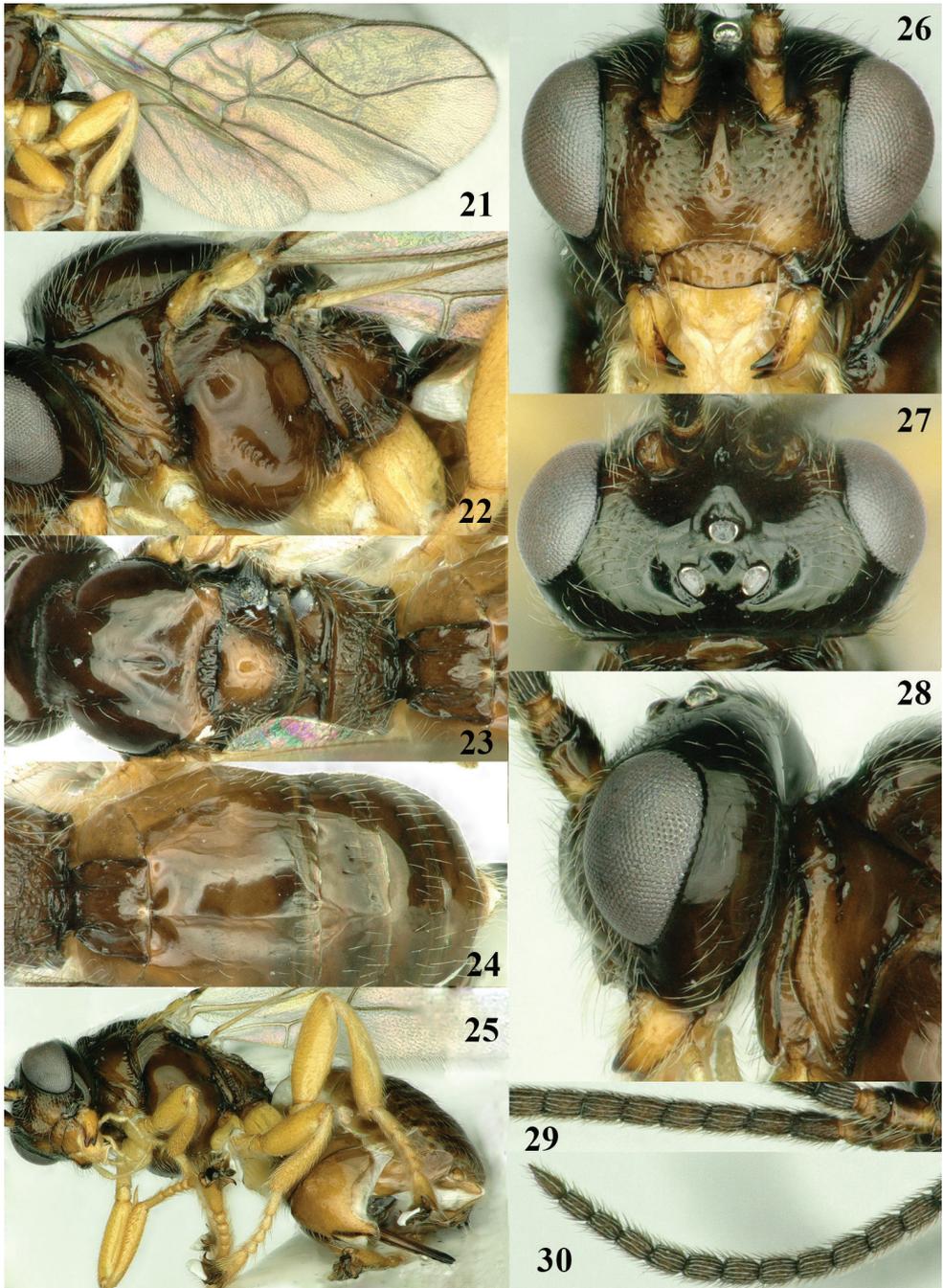
*Mesosoma.* Mesosoma 1.3 times longer than high; dorsal pronope large, elliptical (Fig. 27); pronotal side smooth, only anteriorly and postero-ventrally crenulate (Fig. 22); epicnemial area largely smooth except anterior margin shortly crenulate; precoxal sulcus remain far removed from anterior margin of mesopleuron, moderately wide and distinctly crenulate (Fig. 23); remainder of mesopleuron mostly smooth; episternal scrobe large; pleural sulcus only ventrally finely crenulate (Fig. 22); mesosternal sulcus medium-sized and moderately crenulate, posteriorly smooth; anterior metapleural sulcus crenulate and widened ventrally (Fig. 22), metapleuron largely smooth dorsally, but coarsely reticulate ventrally (Fig. 22); notauli short, crenulated anteriorly and absent posteriorly; medio-posterior depression of mesoscutum long and narrow elliptical; lateral lobes of mesoscutum mostly glabrous, smooth and shiny, with few setae at middle lobe and near notauli; scutellar sulcus deep and with 3 distinct longitudinal carinae, 0.2 times as long as scutellum; scutellum convex, largely smooth except some punctures and with few setae; side of scutellum smooth except some crenulation (Fig. 23); metanotum



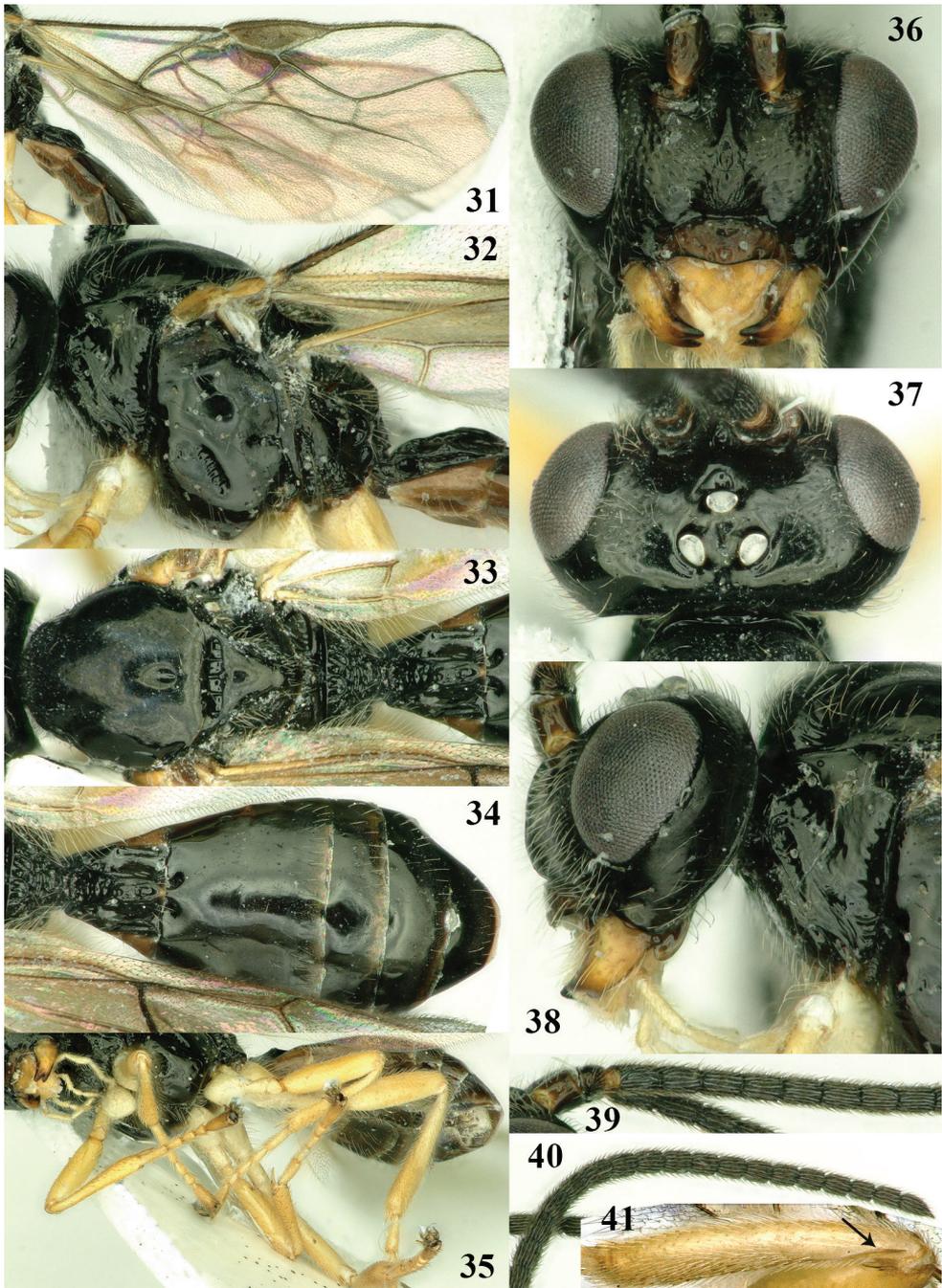
**Figures 17–20.** *Nipponopius glabricaudatus* sp. n., ♀, holotype, but 18 and 20 of ♂, paratype. **17, 18** habitus lateral **19, 20** hind coxa lateral (arrow pointing to coxal protuberance).

smooth except posterior margin shortly crenulate; dorsal surface of propodeum short, punctate-rugose, and with a short medio-longitudinal carina connected to an irregular transverse carina, its posterior surface largely punctate-reticulate (Fig. 23).

*Wings.* Fore wing: pterostigma elliptical; vein r issued just before middle of pterostigma (Fig. 21);  $r:2-SR:3-SR:SR1 = 3:15:21:36$ ; SR1 slightly curved;  $1-CU1:2-CU1 = 1:6$ ; CU1b shorter than 3-CU1; m-cu postfurcal; 1-CU1 hardly widened. Hind wing:  $M+CU:1-M:1r-m = 21:21:14$ ; cu-a straight (Fig. 21).



**Figures 21–30.** *Nipponopius glabricaudatus* sp. n., ♀, holotype. **21** wings **22** mesosoma lateral **23** mesosoma and first metasomal tergite dorsal **24** metasoma dorsal **25** legs and hypopygium antero-ventral **26** head anterior **27** head dorsal **28** head lateral **29** basal antennal segments **30** apical antennal segments.



**Figures 31–41.** *Nipponopius glabricaudatus* sp. n., ♂, paratype. **31** wings **32** mesosoma and first metasomal tergite lateral **33** id. dorsal **34** metasoma dorsal **35** legs antero-ventral **36** head anterior **37** head dorsal **38** head lateral **39** basal antennal segments **40** apical antennal segments **41** inner side of hind tibia lateral (arrow pointing to carinula).

*Legs.* Hind coxa smooth, with long setae, and distinctly protruding ventro-medially (Figs 19, 25); femora widened (Fig. 25); carinula of hind tibia long, sinuate and area behind it largely glabrous (Fig. 41); tarsal claws medium-sized (Fig. 25); length of femur, tibia and basitarsus of hind leg 2.7, 4.6 and 2.0 times their width, respectively.

*Metasoma.* Length of first metasomal tergite 1.1 times its apical width, its surface evenly convex, shiny, largely smooth, with dorsal carinae converging basally and parallel extending to its posterior half (Figs 23, 24), with laterope large and deep (Fig. 22); second suture obsolete; second to sixth tergites smooth and sparsely setose posteriorly; combined length of second and third tergites 0.4 times total length of metasoma (Fig. 24); ovipositor sheath glabrous, sheath 0.16 times as long as fore wing and 0.6 times as long as hind tibia (Fig. 25).

*Colour.* Irregularly dark brown or brown; mandible (except dark brown apices), palpi, tegulae and legs yellow; wing membrane subhyaline; veins M+CU1 and C+SC+R of both wings partly pale yellowish.

*Male.* Fore wing length 3.7 mm, body length 4.1 mm (Fig. 18). Antenna with 47 segments; mesosternal sulcus medium-sized and completely crenulated; propodeum strongly sculptured, its dorsal surface areolate and reticulate posteriorly (Figs 33, 34); hind coxa with a relatively small protuberance ventro-medially (Fig. 20); hind femur and tibia less robust, with its length 3.4 times and 6.5 times their width, respectively (Fig. 35); first metasomal tergite distinctly convex, with relatively strong rugae between dorsal carina anteriorly (Figs 33, 34) and laterope deep (Fig. 32); body generally black or blackish brown, but mandible (except dark apices), palpi, tegulae and legs pale yellow (Figs 18, 35).

**Distribution.** China (Ningxia, Shaanxi).

**Etymology.** The name is derived from “glaber” (Latin for “hairless”) and “cauda” (Latin for “tail”), because of the glabrous ovipositor sheath of the holotype.

### *Nipponopius incisus* Fischer, 1963

Figures 1–16

*Nipponopius incisus* Fischer, 1963: 283, 1972b: 481; Tobias, 1998: 563.

**Type material.** Holotype, ♀ (AEI), “Kami Kochi, Jap[an], 24.vii.1954, Townes Family”, “Holotype”, “*Nipponopius incisus* n. sp., ♀, det. Fischer”, “Type No. 260”, “*Nipponopius incisus* Fischer, Type”.

**Diagnosis.** For the differences see the key to species and the diagnosis of *N. glabri-caudatus* sp. n.

**Redescription.** Holotype, ♀, length of body 4.3 mm; of fore wing 4.8 mm.

*Head.* Temple gradually narrowed behind eyes (Fig. 3); antenna with 41 segments, 1.1 times as long as fore wing, third segment 1.2 times as long as fourth segment, length of third, fourth and penultimate segments 2.2, 1.8 and 1.3 times their width,

respectively (Figs 4, 16); maxillary palp as long as height of head; labial palp segments slender; occipital carina far separated from hypostomal carina and carina dorsally absent; hypostomal carina wide, protruding (Figs 5, 10); length of eye in dorsal view 1.4 times temple; temple and vertex sparsely punctate and with long setae; stemmaticum weakly convex, with small depression behind stemmaticum (Fig. 3); OOL: diameter of ocellus: POL = 25:8:10; frons distinctly depressed behind antennal sockets, glabrous medially, punctulate and setose laterally, with two deep pits in front of anterior ocellus (Fig. 3); face punctulate, medially elevated (Fig. 2), extending as a median carina to level of posterior margin of antennal sockets; width of clypeus 4.0 times its maximum height and 0.7 times width of face; anterior tentorial pits small (Fig. 2); clypeus moderately convex, punctate and protruding, ventrally slightly curved and thin; hypoclypeal depression narrow (Fig. 2); malar suture curved, deep and short; length of malar space 0.7 times basal width of mandible; mandible triangular and with narrow ventral carina (Figs 5, 10).

*Mesosoma* 1.3 times longer than high; dorsal pronope absent, except for transverse groove; pronotal side smooth, only oblique groove and posteriorly crenulate (Fig. 5); epicnemial area and mesopleuron dorsally narrowly crenulate; precoxal sulcus reaching anterior margin of mesopleuron, moderately wide and distinctly crenulate (Fig. 5); remainder of mesopleuron mostly smooth; episternal scrobe large; pleural sulcus largely smooth (Fig. 5); anterior metapleural sulcus crenulate and widened ventrally (Fig. 5), metapleuron largely smooth dorsally, except rugosity ventrally (Fig. 5); notauli short, finely crenulate anteriorly and absent posteriorly; medio-posterior depression of mesoscutum long and narrow droplet-shaped; lateral lobes of mesoscutum mostly glabrous, smooth and shiny, with few setae at middle lobe and near notauli; scutellar sulcus deep and with 6 distinct longitudinal carinae, 0.2 times as long as scutellum; scutellum convex, largely smooth and with few setae; side of scutellum smooth except some indistinct crenulation (Fig. 6); metanotum largely smooth but posterior margin narrowly crenulate; dorsal surface of propodeum coarsely reticulate, and without medio-longitudinal or transverse carinae, its posterior surface hardly differentiated (Fig. 5).

*Wings*. Fore wing: pterostigma elliptical; M+CU1 entirely sclerotized; 1-SR long; r issued just before middle of pterostigma (Fig. 1); r:2-SR:3-SR:SR1 = 3:14:23:41; SR1 straight; 1-CU1:2-CU1 = 2:15; CU1b equal to 3-CU1; m-cu postfurcal; 1-CU1 hardly widened. Hind wing: M+CU:1-M:1r-m = 21:21:14; cu-a straight (Fig. 1).

*Legs*. Hind coxa smooth, with long setae, and angularly protruding ventro-medially (Figs 8, 9); femora widened; tarsal claws robust basally and slender apically (Fig. 12); length of femur, tibia and basitarsus of hind leg 2.6, 5.6 and 2.0 times their width, respectively.

*Metasoma*. Length of first metasomal tergite 1.1 times its apical width, medially strongly convex, shiny, rather finely punctate-rugose, with dorsal carinae only near dorsope, and with laterope deep and elliptical (Fig. 5); second suture obsolescent; second to sixth tergites smooth and their apical half setose; combined length of second and third tergites 0.4 times total length of metasoma (Fig. 5); apical third of ovipositor

sheath distinctly setose, sheath 0.18 times as long as fore wing and 0.8 times as long as hind tibia (Figs 5, 8).

*Colour.* Black; palpi pale yellowish, mandible (except dark brown apices), clypeus, scapus ventrally, annellus, inner orbits above level of antennal sockets, tegulae largely (humeral plate partly dark brown) and legs yellowish-brown; face, temple, metasoma (except first tergite), pterostigma and veins dark brown; wing membrane subhyaline.

**Distribution.** Japan (Honshu, including garden of Imperial Palace in Tokyo; Konishi and Maetô 2000), Far East Russia (Sakhalin oblast).

## Acknowledgements

The second author gratefully acknowledge the kindness of the late Dr Henry K. Townes (AEI, Gainesville) to loan him the holotype of *Nipponopius incisus*. The research was supported jointly by the National Natural Science Foundation of China (NSFC, No. 31201732, 31572300), and the Northwest University Undergraduate Training Program for Innovation and Entrepreneurship, China (No. 2017155).

## References

- Fischer M (1963) Über paläarktische Opiinae (Hym., Braconidae). *Annalen des Naturhistorischen Museums in Wien* 66: 283–305.
- Fischer M (1972) Hymenoptera Braconidae (Opiinae I). (Paläarktische Region). *Das Tierreich* 91: i–xii + 1–620.
- Fischer M (1977) Hymenoptera Braconidae (Opiinae II). (Amerika). *Das Tierreich* 96: 1–1001.
- Fischer M (1986) Neue Bestimmungsschlüssel für paläarktische Opiinae, neue Subgenera, Redeskriptionen und eine neue Art (Hymenoptera, Braconidae). *Annalen des Naturhistorischen Museums in Wien* 88/89: 607–662.
- Fischer M (1987) Hymenoptera Braconidae (Opiinae III) - äthiopische, orientalische, australische und ozeanische Region. *Das Tierreich* 104: 1–734.
- Konishi K, Maetô K (2000) [Ichneumonoida, Evanioidea, Trigonaloidea and Ibaliidae (Hymenoptera) from the Imperial Palace, Tokyo.] *Memoirs of the National Science Museum* 36: 307–323. [in Japanese]
- Li X-Y, van Achterberg C, Tan J-C (2013) Revision of the subfamily Opiinae (Hymenoptera, Braconidae) from Hunan (China), including thirty-six new species and two new genera. *ZooKeys* 268: 1–168. <http://doi.org/10.3897/zookeys.268.4071>
- Tan J-L, Tan Q-Q, van Achterberg C, Chen X-X (2016) A new genus *Carinopius* gen. n. of the subfamily Opiinae (Hymenoptera, Braconidae) from China and Vietnam, with description of a new species. *Zootaxa* 4061(5): 569–574. <http://doi.org/10.11646/zootaxa.4061.5.6>
- Tobias VI (1998) In: Ler PA (Ed.) *Key to the insects of Russian Far East*. 4. Neuropteroidea, Mecoptera, Hymenoptera 3: 1–706. *Dal'nauka, Vladivostok, Opiinae*, 558–655.

- Tobias VI (2000) New data on subfamily Opiinae (Hymenoptera, Braconidae) from the Russian Far East. *Far Eastern Entomologist* 83: 1–16.
- van Achterberg C (1988) Revision of the subfamily Blacinae Foerster (Hymenoptera, Braconidae). *Zoologische Verhandelingen Leiden* 249: 1–324.
- van Achterberg C (1993) Illustrated key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea). *Zoologische Verhandelingen Leiden* 283: 1–189.
- van Achterberg C (1997) Revision of the Haliday collection of Braconidae (Hymenoptera). *Zoologische Verhandelingen Leiden* 314: 1–115.
- van Achterberg C, Salvo A (1997) Reared Opiinae (Hymenoptera: Braconidae) from Argentina. *Zoologische Mededelingen Leiden* 71(18): 189–214.
- van Achterberg C (2004a) New Indo-Australian subgenera and species of the genera *Xynobius* Foerster and *Ademoneuron* Fischer (Hymenoptera: Braconidae: Opiinae). *Zoologische Mededelingen Leiden* 78(20): 313–329.
- van Achterberg C (2004b) *Bitomoides* gen. nov. (Hymenoptera: Braconidae: Opiinae) from Europe. *Zoologische Mededelingen Leiden* 78(21): 331–335.
- van Achterberg C, Chen X-X (2004) Six new genera of Braconidae (Hymenoptera) from China. *Zoologische Mededelingen Leiden* 78(2): 77–100.
- van Achterberg C (2009) Can Townes type Malaise traps be improved? Some recent developments. *Entomologische Berichten Amsterdam* 69: 129–135.
- van Achterberg C, Grootaert P, Shaw MR (2010) Chapter 17. Flight interception traps for arthropods: 423–462. In: Eymann J, Degreef J, Häuser C, Monje JC, Samyn Y, VandenSpiegel D (Eds) *Manual on field recording techniques and protocols for All Taxa Biodiversity Inventories and Monitoring*. ABC Taxa 1/2: 1–652.
- Wharton RA (1988) Classification of the Braconid subfamily Opiinae (Hymenoptera). *Canadian Entomologist* 120: 333–360. <https://doi.org/10.4039/Ent120333-4>
- Wharton RA (1997) Generic relationships of opiine Braconidae (Hymenoptera) parasitic on fruit-infesting Tephritidae (Diptera). *Contributions of the American Entomological Institute* 30(3): 1–53.
- Yu DS, van Achterberg C, Horstmann K (2016) Taxapad 2016, Ichneumonoidea 2015. Database on flash-drive. <http://www.taxapad.com>, Nepean, Ontario, Canada.