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Two new species of *Xorides* Latreille (Hymenoptera, Ichneumonidae) from China, with notes on biology and a key to species known from China

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Abstract. Two species of *Xorides* Latreille, 1809 are reported parasitizing wood-boring insects in trunks and relatively larger twigs of *Juglans mandshurica* Maxim. in Kuandian Manzu Autonomous County, Liaoning, in the Palaearctic part of China. Two new species are described: *X. juglanse* Sheng, Broad & Sun sp. nov. and *X. kuandianense* Sheng, Broad & Sun sp. nov. One species, *X. sapporensis* (Uchida, 1928), was associated with wood-borers in *J. mandshurica* Maxim. for the first time. A key to the 46 species of *Xorides* Latreille known from China is provided.

Keywords. Xoridinae, new species, key, host, taxonomy.

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Introduction

Xorides Latreille, 1809 is the largest genus of the subfamily Xoridinae Shuckard, 1840 (Hymenoptera: Ichneumonidae), comprising 162 described species (Yu *et al.* 2016; Varga 2019). The relatively large fauna of *Xorides* of China has been discovered gradually, mainly in a series of papers from the corresponding

author's research group, particularly focused on parasitoids of wood-boring insects (Liu & Sheng 1998; Sheng & Wu 1998; Sheng & Huang 1999; Sheng 2002; Sheng & Lin 2004; Sheng & Jiang 2006; Sheng & Wen 2008; Sheng & Hilszczański 2009; Zong & Sheng 2009; Sheng & Sun 2010, 2014; Sheng *et al.* 2012). Prior to this publication 44 species of *Xorides* have been reported from China (Wang & Gupta 1995; Yu *et al.* 2016).

The known hosts of *Xorides* are larvae of wood-boring Coleoptera Linnaeus, 1758, mainly Cerambycidae Latreille, 1802 and Buprestidae Leach, 1815 (Clément 1938; Hilszczański 2000; Hilszczański *et al.* 2005; Sheng & Hilszczański 2009; Sheng & Sun 2010; Hilszczański & Plewa 2011; Sheng *et al.* 2012; Yu *et al.* 2016).

The aim of this work is to identify species of *Xorides* emerged from the trunks and twigs of *Juglans mandshurica* Maxim., describe new species and provide a key to the species of *Xorides* occurring in China.

Material and methods

Institutional abbreviations

- CBDPC = Center for Biological Disaster Prevention and Control, National Forestry and Grassland Administration, P.R. China
FPCQSK = Forest Pest Control and Quarantine Station of Kuandian Manzu Autonomous County, Kuandian, Liaoning, P.R. China
HUM = Hokkaido University Museum, Sapporo, Japan
NHMUK = Natural History Museum, London, UK
ZISP = Zoological Institute of the Russian Academy of Sciences, St Petersburg, Russia
ZSM = Zoologische Staatssammlung München, Munich, Germany

Specimen collection

Rearing parasitoids

In the last eight years, the authors have been exploring in Kuandian and Benxi Manzu Autonomous Counties, Liaoning Province (Sheng *et al.* 2022). Trunks and twigs of naturally infested *Juglans mandshurica* Maxim. (Juglandaceae) were brought to the laboratory and maintained in a large cage at room temperature. Water was sprayed over the trunks and twigs twice a week and emerged insects collected daily. Except the species reported in this paper, main gained species of Ichneumonidae Latreille, 1802 are *Deuteroxorides orientalis* (Uchida, 1928), *Dolichomitus flavicrus* Matsumoto, 2018, *D. juglanse* Sheng & Li, 2022, *Eugalta hubeiensis* He, 1996, *Ischnoceros eutetrphae* Sheng, 2008, *Rhysella approximator* (Fabricius, 1793), *Yezoceryx rishiriensis* (Uchida, 1934) (Gao *et al.* 2017; Sheng *et al.* 2022), also some species of Braconidae Nees, 1811 and Aulacidae Shuckard, 1842. Other gained wood-boring insects mainly belong to Coleoptera: Cerambycidae, Buprestidae and Curculionidae Latreille, 1802.

Direct collection

Parasitoid adults were collected with interception traps (IT) (Li *et al.* 2012) in the forest of the Baishilazi National Natural Reserves in Kuandian, Liaoning, China, which comprises mixed deciduous angiosperms and evergreen conifers, mainly *Acer* spp. (Sapindaceae), *Betula dahurica* Pallas (Betulaceae), *Castanea* spp., *Juglans mandshurica* Maxim. (Juglandaceae), *Larix* spp., *Pinus tabulaeformis* Carr. (Pinaceae), *Quercus wutaishanica* Mayr, *Quercus* spp. (Fagaceae) and *Rosa* spp. (Rosaceae).

Images were taken using a Leica M205A stereo microscope with LAS Montage MultiFocus. Morphological terminology is mostly based on Broad *et al.* (2018). All type specimens are deposited in the Insect Museum, CBDPC.

Results

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Superfamily Ichneumonoidea Latreille, 1802
Family Ichneumonidae Latreille, 1802
Subfamily Xoridinae Shuckard, 1840

Genus *Xorides* Latreille, 1809

Xorides Latreille, 1809: 4.

Type species

Ichneumon indicatorius Latreille, 1806.

Diagnosis

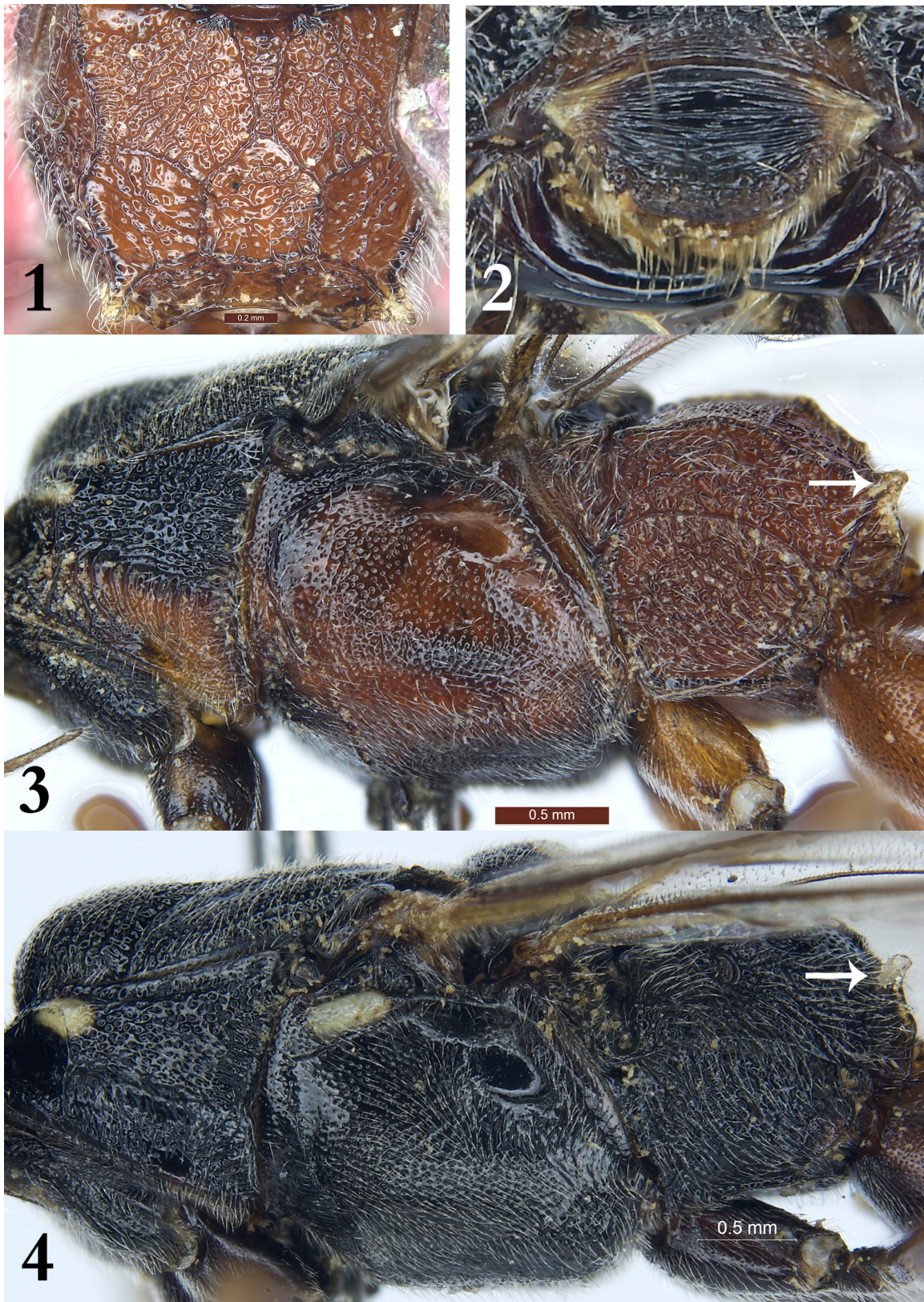
Mandible unidentate (Figs 21–22). Subapical portion of female flagellum elbowed or bent, on the outer profile of the elbow or bend several “peg-like bristles” (Figs 13, 25). Epomia usually strong, dorsally projecting sharply as a tooth (Fig. 26). Fore wing with areolet absent. Front tibia usually thickened. Tarsal claws small, simple. Area superomedia of propodeum (Figs 16, 28) usually complete, hexagonal, or pentagonal. Second tergite with paired oblique baso-lateral grooves (Fig. 18). Lower valve of ovipositor with several almost vertical to distinctly oblique ridges.

Females of *Xorides* have more or less well-developed fore and mid tibial swellings, often accompanied by grooves, which are associated with enlarged subgenual organs used for detecting vibrations; the adult females are thought to detect hosts through vibrational sounding, tapping the wood with the antennal pegs (which are solid cuticle) and detecting potential hosts in galleries or tunnels via differences in the returning ‘echoes’ (Broad & Quicke 2000).

Key to the species of *Xorides* known from China

1. Fore wing with vein 1cu-a opposite or distal to M&RS. Distance between 2rs-m and 2m-cu usually longer than 2rs-m, or 2rs-m almost obliterated 2
 - Fore wing with vein 1cu-a distinctly basal to M&RS. Distance between 2rs-m and 2m-cu shorter than 2rs-m 39
2. Anterior profile of fore trochantellus without tooth 3
 - Anterior profile of fore trochantellus with distinct tooth 32
3. Females 4
 - Males 22
4. Mesosoma and tergites black, without white or yellowish white flecks 5
 - Mesosoma and/or tergites with distinct white or yellowish white flecks, or tergites 1 and 2 red 11
5. Occipital carina absent dorsomedially 6
 - Occipital carina complete 9
6. Area basalis separated from area superomedia by distinct carina. First tergite approximately 3.6 × as long as posterior width *X. longicaudus* Sheng & Wen, 2008
 - Area basalis and area superomedia confluent, without carina between them. First tergite at most 2.5 × as long as posterior width 7

7. Ovipositor sheath approximately 0.6–0.7× as long as fore wing. Fore wing with dark spot under pterostigma *X. furcatus* Liu & Sheng, 1998
 – Ovipositor sheath at least as long as fore wing. Fore wing without dark spot 8
8. Malar space as long as basal width of mandible. First tergite 2.4× as long as posterior width; latero-median carinae strong. Frontal orbit black *X. erigentis* Wang & Gupta, 1995
 – Malar space at most 0.8× as long as basal width of mandible. First tergite 3.1× as long as posterior width; latero-median carinae absent. Frontal orbit white *X. deplanatus* Sheng, 2006
9. Labial palp with apical 3 segments short and very thick; median portion of apical segment strongly subspherically swollen dorsally, apical portion very small and acute. Propodeum with area superomedia and area petiolaris confluent *X. tumidus* Sheng & Wen, 2008
 – Labial palp unspecialized. Propodeum with area superomedia separated from area petiolaris by carina 10
10. Fore and mid tibiae noticeably stout, clavate. Area externa of propodeum with oblique longitudinal wrinkles. Lateral carinae of area basalis combined posteriorly as a median longitudinal carina *X. pissodius* Sheng & Wen, 2008
 – Fore and mid tibiae unspecialized, not noticeably stout and clavate. Area externa of propodeum (Fig. 28) irregularly reticulate. Lateral carinae of area basalis not combined posteriorly as a median longitudinal carina *X. kuandianense* Sheng, Broad & Sun sp. nov.
11. Latero-median carinae of first tergite reaching posterior margin 12
 – Latero-median carinae of first tergite not reaching posterior margin, usually reaching mid-length of tergite 16
12. Mesosoma and tergites usually with yellowish white and red flecks. Antenna with flagellomeres 10–11 (12) white *X. praecatorius* (Fabricius, 1793)
 – Mesosoma without white flecks. Posterolateral portions of tergites 4–6 often distinctly white or yellow. Antenna with at least four flagellomeres white 13
13. Outer profile of hind tibia with strong spines. Tergites black, posterior margins of tergites 2–6 yellow *X. nigrimaculatus* Zong & Sheng, 2009
 – Outer profile of hind tibia without spines. Anterior tergites red, or posterolateral portions of tergites 4–6 white 14
14. Tergites 4–6 without white flecks. Anterior tergites red *X. sepulchralis* (Holmgren, 1860)
 – Tergites 4–6 with large white postero-lateral flecks. Anterior tergites black or red 15
15. Propodeum (Fig. 1), and mesopleuron (Fig. 3) tergite 1 red *X. cinnabarius* Sheng & Hilszczański, 2009
 – Mesosoma, propodeum and tergite 1 black *X. sapporensis* (Uchida, 1928)
16. Frons with dense transverse wrinkles. Fore wing with dark spot beneath pterostigma. Tergites 1–2 red *X. irrigator* (Fabricius, 1793)
 – Frons with fine punctures, without wrinkles. Fore wing without dark spot. Tergites with different colour pattern 17
17. Clypeus without wrinkles. Tergites with or without yellow spots, anterior tergites black 18
 – Clypeus (Fig. 2) with dense transverse wrinkles. Tergites with yellow spots, or anterior tergites red 21



Figs 1–4. 1, 3. *Xorides cinnabarius* Sheng & Hilszczanski, 2009, holotype, ♀ (CBDPC). 2, 4. *X. asiaticus* Sheng & Hilszczanski, 2009, holotype, ♀ (CBDPC). 1. Propodeum, dorsal view. 2. Clypeus. 3–4. Mesosoma, lateral view.

| | |
|---|--|
| 18. Antenna with white or yellowish white ring. Subposterior tergites with wide white spots | 19 |
| – Antenna without white or yellowish ring. Tergites without white spots | 20 |
| 19. Head, mesosoma and tergites 1–2 with large white spots. At least proximal half of hind coxa red. Hind femur with at least proximal 0.7 reddish brown, distally black | |
| <i>X. centromaculatus</i> Cushman, 1933 | |
| – Head, mesosoma and tergites 1–2 and hind coxa entirely black. Proximal half of hind femur almost entirely black, distally brown | <i>X. benxicus</i> Sheng, 2012 |
| 20. Hind wing vein 1-cu longer than cu-a. Lateral portion of face widely white. Gena almost entirely red. Tergite 1 partly brownish red | <i>X. brachylabis</i> (Kriechbaumer, 1889) |
| – Hind wing vein 1-cu shorter than cu-a. Face and gena more or less entirely black, at least without distinct white spots. Tergite 1 almost entirely black | <i>X. ater</i> (Gravenhorst, 1829) |
| 21. Malar space 0.9× as long as basal width of mandible. Tergite 1 1.6× as long as posterior width. Mesopleuron (Fig. 4) with dense punctures and gray setae. Tergites 1–3 red to darkish red; tergites 4–6 largely white posterolaterally | <i>X. asiasius</i> Sheng & Hilszczański, 2009 |
| – Malar space 0.5× as long as basal width of mandible. Mesopleuron smooth, lower portion with weak punctures. Tergite 1 1.2× as long as posterior width. Tergites 1 laterally and subsequent tergites posteriorly yellow | <i>X. asperus</i> Wang & Gupta, 1995 |
| 22. Pterostigma short and wide, 3.0× as long as wide | 23 |
| – Pterostigma narrow and elongate, at least 4.0× as long as wide | 28 |
| 23. Flagellomeres with long setae, which at least as long as or longer than diameter of flagellomere | 24 |
| – Flagellomeres with shorter setae, which are distinctly shorter than diameter of flagellomere | 26 |
| 24. Area basalis of propodeum rectangular, 0.6× as long as area superomedia. Fore and mid tibiae brown to yellowish brown. Eye orbits white | <i>X. hirtus</i> Liu & Sheng, 1998 |
| – Area basalis of propodeum triangular, 0.9× as long as area superomedia. Fore and mid tibiae brownish black. Eye orbits different coloration | 25 |
| 25. Area basalis of propodeum trapezoidal, lateral longitudinal carinae not combined; costula connecting with area superomedia before its middle. Apical portion of each flagellomere not swollen, setae approximately as long as width of flagellomere | <i>X. sapporensis</i> (Uchida, 1928) |
| – Area basalis of propodeum triangular, posterior portion of lateral longitudinal carinae combined; costula connecting with area superomedia at its middle. Apical portion of each flagellomere swollen, with setae approximately 3.5× as long as width of flagellomere | <i>X. benxicus</i> Sheng, 2012 |
| 26. Mesosoma and tergites black | <i>X. praecatorius</i> (Fabricius, 1793) |
| – Mesosoma and tergites at least partly red | 27 |
| 27. Mesosoma black. Tergites 1–2 red | <i>X. irrigator</i> (Fabricius, 1793) |
| – Mesosoma laterally and propodeum at least partly red. Tergites 1–2 black, or posterior margin of tergite 1 slightly red | <i>X. cinnabarius</i> Sheng & Hilszczański, 2009 |
| 28. Latero-median carina of tergite 1 complete, reaching posterior margin of tergite | 29 |
| – Latero-median carina of tergite 1 at most reaching to 0.6 of tergite | 30 |

29. Antenna with white ring. Dorsomedian portion of occipital carina absent *X. sepulchralis* (Holmgren, 1860)
 – Antenna without white ring. Occipital carina complete *X. centromaculatus* Cushman, 1933
30. Face entirely black *X. aculeatus* Liu & Sheng, 1998
 – Face at least partly white 31
31. Face entirely white *X. brachylabis* (Kriechbaumer, 1889)
 – Face with mostly black *X. ater* (Gravenhorst, 1829)
32. Tergite 1 at least 3.5 × as long as posterior width 38
 – Tergite 1 at most 3.2 × as long as posterior width 33
33. Antenna with 23–24 flagellomeres. Malar space as long as basal width of mandible. Ovipositor sheath about as long as body. Tergites 1–2 and anterior half of tergite 3 brown *X. tuqiangensis* Sheng, 1998
 – Antenna with at least 28 flagellomeres. Other characters different 34
34. Propodeum usually without lateral longitudinal carina, if lateral longitudinal carina present anteriorly, then body very long and slender 35
 – Propodeum at least between anterior edge and spiracle with distinct lateral longitudinal carina. Body stout *X. hiatus* Wang & Gupta, 1995
35. Body stout. Tergite 5 (Fig. 5) particularly short as narrow transverse margin. Antenna with white ring. Hind femur black 36
 – Body very slender. Tergite 5 (Fig. 6) not particularly short, approximately 0.35 × as long as posterior width. Antenna without white ring. Hind femur dark brown 37



Figs 5–6. Metasoma. **5.** *Xorides funiuensis* Sheng, 1999, holotype, ♀ (CBDPC). Lateral view. **6.** *X. jakovlevi* (Kokujev, 1903), ♀ (CBDPC). Dorsal view.

36. Occipital carina complete. Lower portion of gena with dense oblique wrinkles and sparse punctures; upper portion of gena with relatively dense punctures. Maxillary and labial palpi dark brown. Fore coxa brown *X. funiuensis* Sheng, 1999
 – Occipital carina absent dorsally. Gena with sparse fine punctures, without wrinkles. Maxillary and labial palpi beige. Fore coxa yellowish brown *X. jiyuanensis* Sheng, 2004
37. Body very slender. Ovipositor sheath 1.3–1.4× as long as fore wing. Hind coxa predominantly red. Hind femur dark brown *X. rusticus* (Desvignes, 1856)
 – Body relatively stout. Ovipositor sheath 1.7–1.8× as long as fore wing. Hind coxa and femur entirely black *X. jakovlevi* (Kokujev, 1903)
38. Gena partly darkish red. Hind coxa and femur entirely red. Tergites 1 and 2 entirely black
 *X. rufipes* (Gravenhorst, 1829)
 – Gena partly yellowish white. Hind coxa blackish red. Hind femur entirely piccous black, at most basal portion red. Basal portion of tergite 1 and median portion of tergite 2 widely white
 *X. immaculatus* Cushman, 1933
39. Posterior transverse carina of mesosternum complete. Subapical curve of female flagellum usually involving 3 flagellomeres 40
 – Posterior transverse carina of mesosternum incomplete. Subapical curve of female flagellum sharply angled between two flagellomeres 44
40. Tergites 1 (Fig. 7) stout, at most 2.5× as long as posterior width. Tergites 4–6 (Fig. 8) very short as narrow transverse margin, hind margins distinctly elevated, white 41
 – Tergites 1 slender, at least 3.0× as long as posterior width. Tergites 4–6 relatively long, hind margins not elevated, entirely black 42
41. Area basalis separated from area superomedia by distinct carina. Area superomedia distinctly convergent anteriorly. Tergite 1 evenly convex, without groove, black. All coxae black
 *X. weii* Sheng, 2002
 – Area basalis and area superomedia confluent, without carina between them. Area superomedia with lateral sides parallel. Apical portion of tergite 1 with deep oblique groove, yellowish brown. Fore and mid coxae yellowish brown; hind coxa reddish brown
 *X. exquisitus ceylonicus* Gupta & Chandra, 1977
42. Head partly black. Mesosoma and tergites partly red *X. exmacularis* Wang & Gupta, 1995
 – Head, mesosoma and tergites entirely black 43
43. Frons with dense transverse wrinkles. Notaulus deep, relatively wide. Vein 2m-cu slightly distal of 2rs-m. Tergite 2 punctate, without wrinkles. Hind leg with femur red and tarsus black
 *X. propinquus* (Tschek, 1869)
 – Frons with fine punctures. Notaulus (Fig. 14) weak, thin. Vein 2m-cu far distal of 2rs-m (Fig. 9), distance between 2rs-m and 2m-cu 1.4× as long as 2rs-m. Tergite 2 (Fig. 18) with longitudinal wrinkles centrally. Hind leg with femur (Fig. 9) brownish black, and tarsus grayish yellow
 *X. juglanse* Sheng, Broad & Sun sp. nov.
44. Front profiles of fore and mid trochantelli without teeth 45
 – Front profiles of fore and mid trochantelli each with one tooth 48
45. Median portion of ovipositor sheath white 46
 – Ovipositor sheath monochrome, black or black-brown 47

46. Metapleuron and propodeum black *X. amissiantennes* Wang, 1997
 – Metapleuron and propodeum red brown *X. propodeum* (Cushman, 1933)
47. Face evenly convex, with weak fine punctures. Tergite 1 2.4× as long as posterior width
 *X. abaddon* (Morley, 1913)
 – Face strongly convex, with rough transverse wrinkle-punctures. Tergite 1 2.0× as long as posterior
 width *X. rufipleuralis* (Cushman, 1933)
48. Body shining metallic blue or purple 49
 – Body not blue or blue-purple, without metallic shiny 52
49. Body shining metallic purple. Wings dark brown, beneath pterostigma with a large hyaline mark ..
 *X. formosanus* (Sonan, 1936)
 – Body shining metallic blue to blue-black. Wings slightly brownish, hyaline, at least at intercubitus
 with darkish brown fleck 50



Figs 7–8. *Xorides weii* Sheng, 2002, holotype, ♀ (CBDPC). **7.** Metasoma, dorsal view. **8.** Posterior portion of metasoma, dorsal view.

50. Mesosoma and tergites blue. Face, orbits, malar space and tegula entirely dark blue. Flagellomeres 10–12 yellow *X. nigricaeruleus* Wang & Gupta, 1995
– Tergites and sometimes mesosoma with white or yellow bands or flecks. Inner orbit white. Tegula white or reddish brown. Flagellomeres without yellow or flagellomeres 10–16 white 51
51. Tegula reddish brown. Posterior bands of tergites 1–2 and posterior margins of tergites 3–5 narrowly yellow. Subapical portion of ovipositor sheath widely white *X. elizabethae* (Bingham, 1898)
– Tegula white. Anterior 0.3 and posterior large fleck of tergite 1 and posterior half of tergite 2 white. Posterior flecks of tergites 3–6 yellowish. Ovipositor sheath without white
..... *X. mindanensis* Baltazar, 1961
52. Mesosoma and propodeum reddish brown. Tergite 2 with oblique grooves, not forming a rhombic shape, sculpture obliquely aciculate *X. citrimaculatus* Wang & Gupta, 1995
– Mesosoma and propodeum black. Tergite 2 with grooves delimiting a large rhombic shape, transversely aciculate *X. albimaculatus* Sheng, 1999

Xorides juglanse Sheng, Broad & Sun sp. nov.

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Figs 9–19

Diagnosis

Antenna with 20 flagellomeres; flagellomeres 16–18 (Figs 9, 13) distinctly stouter, with six projecting “peg-like bristles”. Propodeum (Fig. 16) with rough irregular wrinkles. Tergite 2 (Fig. 18) with basolateral oblique groove and transverse shallow depression slightly beyond middle, medially with dense irregular longitudinal wrinkles. Ovipositor sheath 1.6× as long as hind tibia. Ovipositor slightly down-curved, subapical portion of dorsal valve (Fig. 19) with two distinct tubercles. Head, mesosoma and all tergites entirely black. Flagellomeres 12–15 white. Fore wing irregularly infumate along M&RS and beneath pterostigma.

Etymology

The name of the new species is based on the plant the type series was reared from.

Material examined

Holotype

CHINA • ♀; Liaoning Province, Kuandian Manzu Autonomous County; 18 May 2017; reared from borers in trunks of *Juglans mandshurica* Maxim.; Jun Lü leg.; CBDPC.

Paratypes

CHINA • 3 ♀♀; same locality as for preceding; 30 Aug.–23 Sep. 2021; reared from *Juglans mandshurica* Maxim.; Jun Lü and Cheng-Jia Liao leg.; CBDPC.

Description

Female

MEASUREMENTS. Body length 5.4 to 6.0 mm. Fore wing length 3.7 to 4.2 mm. Ovipositor sheath length 1.7 to 2.0 mm.

HEAD. Face (Fig. 10) approximately 1.8× as wide as long, evenly convex, median portion with irregular wrinkles and sparse fine punctures, laterally densely punctate; upper margin with strong median projection towards frons. Clypeal suture distinct, median portion between anterior tentorial pits straight. Clypeus with distinct uniformly arched sub-basal transverse ridge; apical portion inclined, depressed,



Figs 9–11. *Xorides juglanse* Sheng, Broad & Sun sp. nov., holotype, ♀ (CBDPC). **9.** Habitus, lateral view. **10.** Head, anterior view. **11.** Head, lateral view.

with indistinct punctures. Apical portion of mandible with fine median longitudinal groove. Subocular sulcus distinct. Malar space $1.1\times$ as long as basal width of mandible, with sparse punctures. Gena (Figs 11–12) almost shiny, with strong oblique longitudinal wrinkles. Vertex (Fig. 12) shiny, with uneven punctures. Postocellar line approximately $1.7\times$ as long as ocular-ocellar line. Frons almost flat, with uneven fine punctures. Antenna with 20 flagellomeres; ratio of length from first to fifth flagellomeres: 1.4:1.1:1.0:1.0:1.0; flagellomeres 16–18 (Figs 9, 13) distinctly stouter, with six “peg-like bristles”. Occipital carina complete; genal carina joining hypostomal carina distinctly above base of mandible.

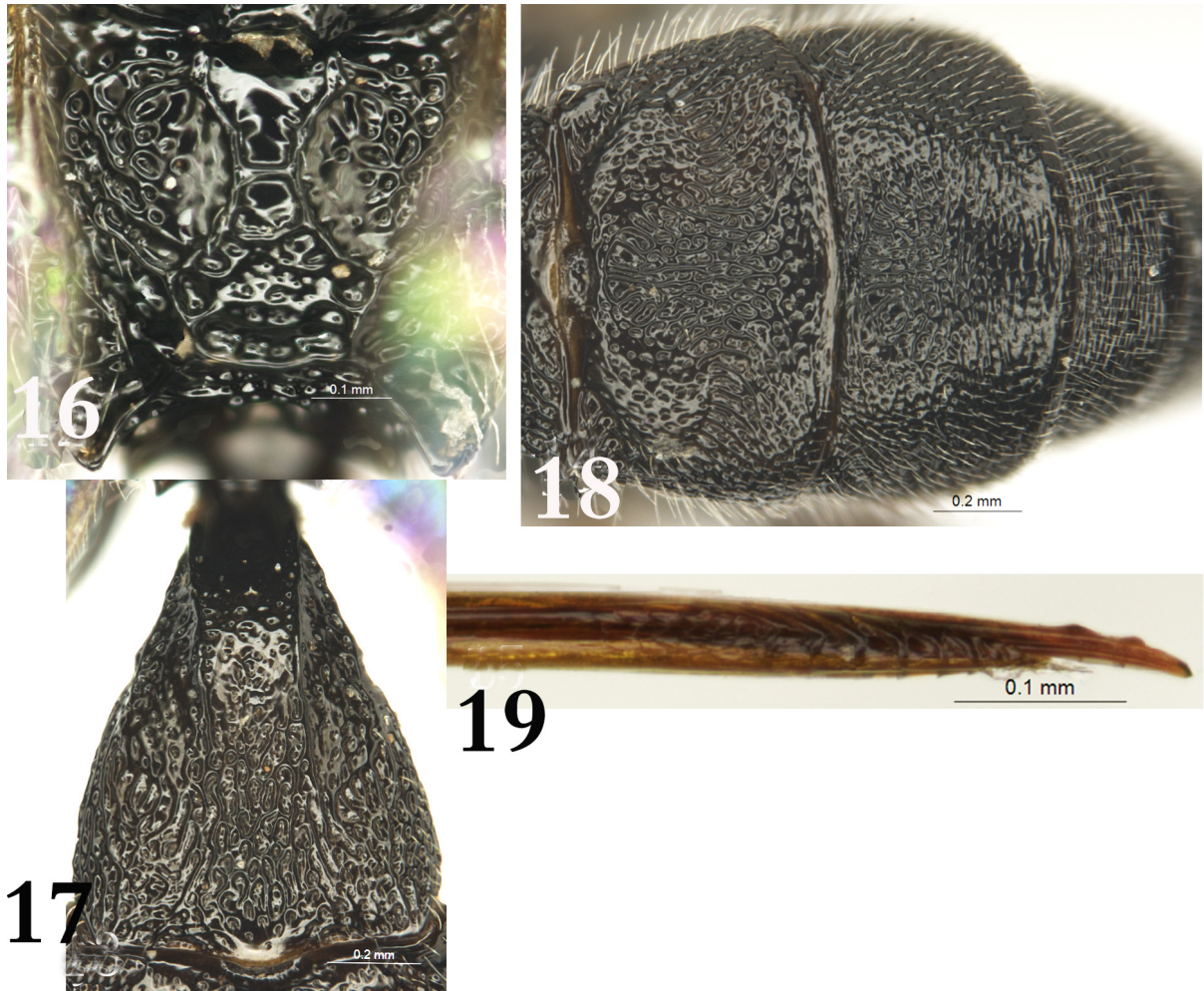
MESOSOMA. Subanterior margin of pronotum (Fig. 15) with longitudinal wrinkles; lateral concavity narrow, with short transverse wrinkles; posterior portion with large dense irregular punctures. Epomia strong. Mesoscutum (Fig. 14) with uneven punctures; punctures in postero-median portion very dense, irregular, strongly coalescent appearing to be rugulose-punctate. Notaulus weak, with short wrinkles. Scutellum (Fig. 14) almost flat, with irregular punctures. Metanotum with transverse ridge-shaped convexity, anterior portion deeply obliquely concave. Mesopleuron (Fig. 15) almost shining, upper anterior portion with denser punctures than lower-posterior portion; speculum relatively large; mesopleural fovea shallow, indistinct. Posterior transverse carina of mesosternum weak, complete.



Figs 12–15. *Xorides juglanse* Sheng, Broad & Sun sp. nov., holotype, ♀ (CBDPC). **12.** Head, dorsal view. **13.** Apical portion of antenna, lateral view. **14.** Mesoscutum and scutellum, dorsal view. **15.** Mesosoma, lateral view.

Metapleuron roughly sculptured, with strong irregular reticulate wrinkles. Juxtacoxal carina absent. Submetapleural carina complete, anterior portion strongly convex. Ventral profiles of fore and mid tibiae slightly incurved, subbasal portions with angled concavities. Front side of front tibia with four spines, apex with three pegs. Ratio of length of hind tarsomeres from first to fifth approximately: 5.6:2.1:1.7:1.0:2.7. Wings slightly gray, hyaline. Fore wing with vein 1cu-a basal to M&RS by approximately $0.4 \times$ length of 1cu-a. Distance between 2rs-m and 2m-cu $1.4 \times$ as long as 2rs-m. Postnervulus intercepted at lower 0.3. Hind wing vein 1-cu $1.5 \times$ as long as cu-a. Propodeum (Fig. 16) in lateral view evenly convex, with almost complete carinae. Area basalis smooth, shiny, anterior portion deeply concave. Area externa with dense irregular punctures. Area dentipara with indistinct oblique wrinkles and irregular punctures. Area superomedia hexagonal, with indistinct transverse wrinkles and sparse fine punctures, connecting to costula slightly behind middle. Areas petiolaris and lateralis with irregular reticulate wrinkles. Apophysis strong. Propodeal spiracle obliquely elliptical.

METASOMA. First tergite (Fig. 17) approximately $1.5 \times$ as long as posterior width, strongly and evenly narrowed to base; anterior portion smooth, shiny; medially with fine punctures; posterior half with longitudinal irregular wrinkles; anterior half of latero-median carina distinct, strong; dorso-lateral carina



Figs 16–19. *Xorides juglansae* Sheng, Broad & Sun sp. nov., holotype, ♀ (CBDPC). **16.** Propodeum, dorsal view. **17.** Tergite 1, dorsal view. **18.** Tergites 2–4, dorsal view. **19.** Apical portion of ovipositor, lateral view.

indistinct; spiracle almost circular, small, located slightly anterior to middle of first tergite. Tergite 2 (Fig. 18) distinctly trapezoidal, $0.7\times$ as long as anterior width, $0.6\times$ as long as posterior width, anteriorly with distinct oblique groove, with a transverse shallow depression slightly posterior to middle; medially with distinct irregular longitudinal wrinkles, unevenly punctate peripherally. Tergites 3 (Fig. 18) and subsequent with distinct brownish gray setae. Tergite 3 slightly dilated medially, approximately $0.5\times$ as long as median (maximum) width; antero-medially with irregular wrinkles, laterally with distinct punctures, posteriorly with fine indistinct wrinkles. Tergite 4 with dense transverse fine wrinkles. Tergites 5–7 almost shiny. Apex of tergite 8 truncate. Ovipositor sheath $1.6\times$ as long as hind tibia. Ovipositor (Figs 9, 19) evenly and weakly down-curved, distally straight; subapical portion of dorsal valve with two distinct tubercles; lower valve with 7 distinct ridges.

COLOUR (Fig. 9). Black, except for following: antenna brownish black, flagellomeres 12 to 15 white; clypeus and mandible dark brown; all coxae almost entirely black; dorsal side of fore tibia brown, ventral side and tarsomeres 1–4 yellowish brown; base of mid tibia, ventral side and tarsomeres 1–4 brown, dorsal side dark brown; hind femur blackish brown, ventrobasal portion of tibia and tarsomeres 1–4 yellowish brown; pterostigma blackish brown, proximally white; veins of wings brownish black.

Male

Unknown.

Biology

Hosts. The unknown (presumably coleopteran) host is a wood-borer of *Juglans mandshurica* Maxim. (Juglandaceae).

Host foodplant. *Juglans mandshurica* Maxim. (Juglandaceae).

Differential diagnosis

The new species is most similar to *X. propinquus* (Tschek, 1869), but can be easily distinguished from the latter by the preceding key, including features of the frons sculpture, width of notauli, fore wing venation, etc.

Xorides kuandianense Sheng, Broad & Sun sp. nov.

[urn:lsid:zoobank.org:act:27CB5FB4-A3E1-4809-B9EC-E65D1FCE7AD9](https://zoobank.org/act:27CB5FB4-A3E1-4809-B9EC-E65D1FCE7AD9)

Figs 20–30

Diagnosis

Fore wing length 6.0 mm. Ovipositor sheath length 6.4 mm. Postocellar line approximately $0.9\times$ as long as ocular-ocellar line. Antenna with 21 flagellomeres, apical portion stout, distinctly thicker than basal flagellomeres; flagellomeres 17–19 (Figs 20, 25) with “peg-like bristles”. Metapleuron strongly reticulate. Juxtacoxal carina absent. Ventral profiles of fore and mid tibiae slightly incurved, subbasally with angled concavities. Propodeum (Fig. 28) entirely coarsely reticulate. Area superomedia with irregular wrinkles. First tergite (Fig. 29) strongly irregularly wrinkled, $1.7\times$ as long as posterior width. Tergite 2 (Fig. 29) rectangular, $0.7\times$ as long as posterior width. Tergite 3 (Fig. 29) with sides distinctly convergent posteriorly. Tergite 7 with indistinct fine transverse aciculae, posterior margin slightly concave medially. Head, mesosoma and metasoma almost entirely black.

Etymology

The name of the new species is based on the type locality.

Material examined

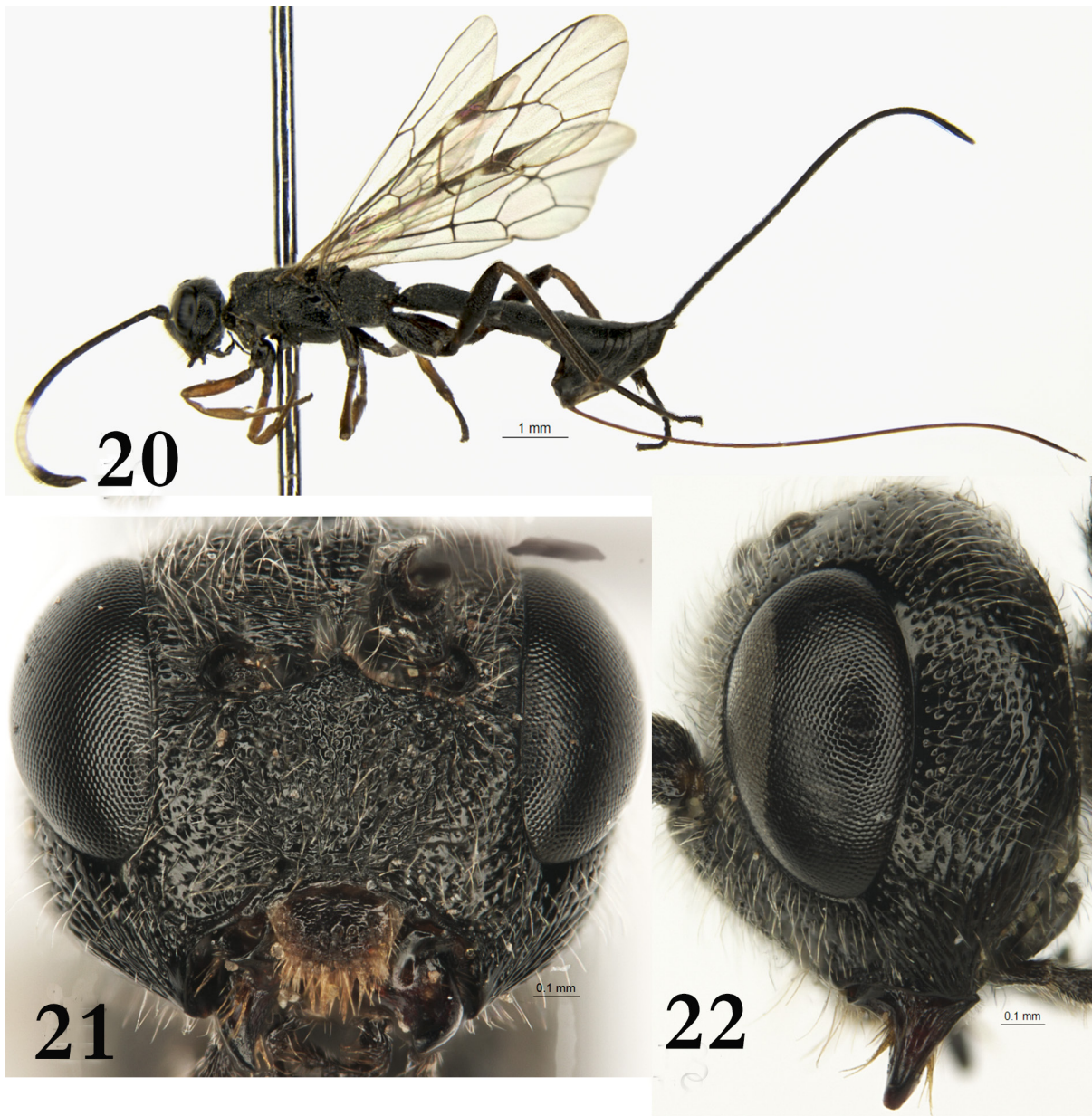
Holotype

CHINA • ♀; Liaoning Province, Kuandian Manzu Autonomous County; 17 May 2017; Tao Li leg.; CBDPC.

Description

Female

MEASUREMENTS. Body (Fig. 20) length approximately 7.8 mm. Fore wing length approximately 6.0 mm. Ovipositor sheath length approximately 6.4 mm.



Figs 20–22. *Xorides kuandianense* Sheng, Broad & Sun sp. nov., holotype, ♀ (CBDPC). **20.** Habitus, lateral view. **21.** Head, anterior view. **22.** Head, lateral view.

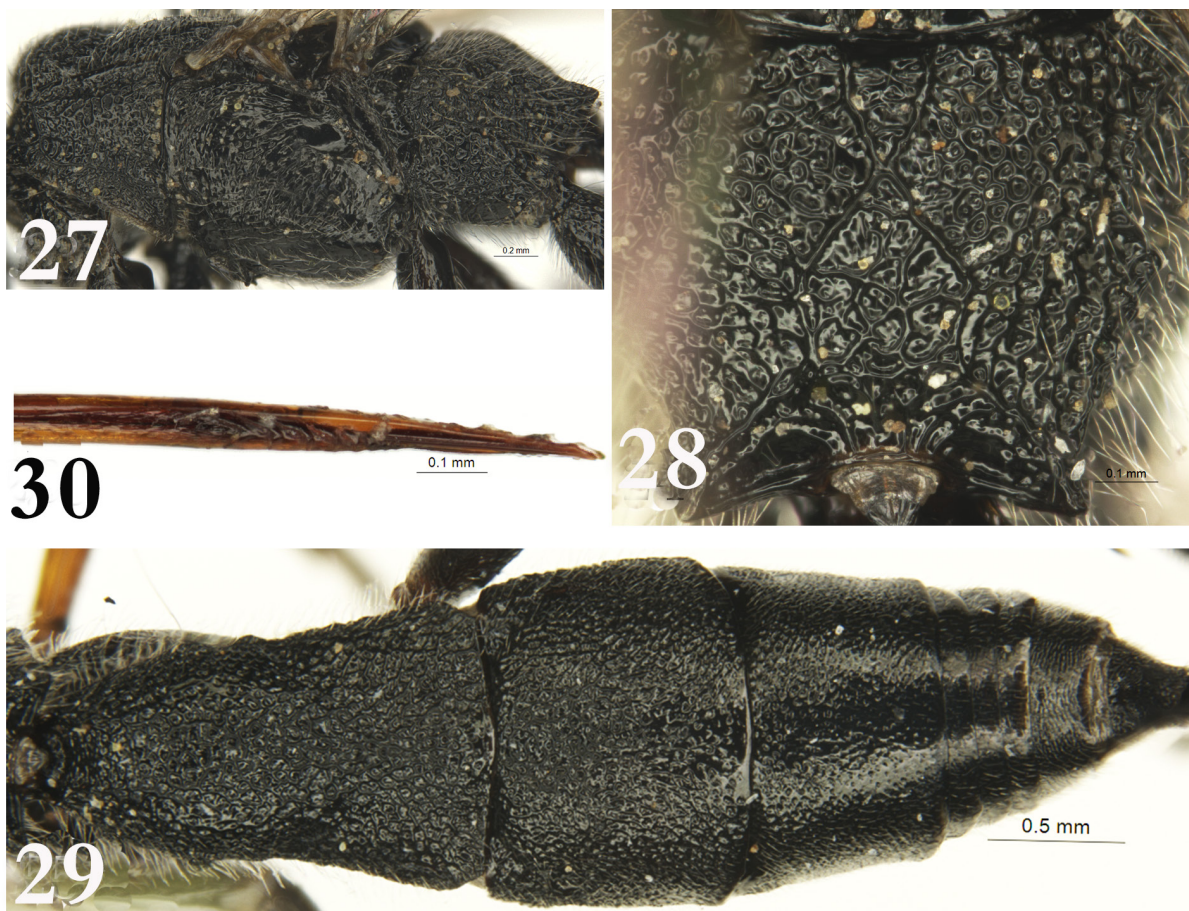
HEAD. Face (Fig. 21) approximately $2.2\times$ as wide as long, slightly evenly convex, median portion with irregular coalescent punctures verging on rugulose-punctate; laterally shiny with distinct punctures; upper margin with strong median projection between antennal sockets. Clypeal suture thin, median portion between anterior tentorial pits almost straight. Clypeus small, almost semicircular, with slightly arched sub-basal transverse ridge; lower portion weakly inclined, depressed, with indistinct punctures. Basal portion of mandible with fine wrinkles. Subocular sulcus distinct. Malar space almost shiny, $0.9\times$ as long as basal width of mandible, with shallow sparse punctures. Gena (Fig. 22) shiny, with uneven punctures, lower portion with oblique longitudinal wrinkles. Vertex (Fig. 23) shiny, with uneven punctures. Stemmaticum densely punctate. Postocellar line approximately $0.9\times$ as long as ocular-ocellar line. Frons (Fig. 24) almost flat, upper portion with dense indistinct punctures, lower portion with dense transverse wrinkles. Antenna with 21 flagellomeres, apical portion distinctly stout; ratio of length from



Figs 23–26. *Xorides kuandianense* Sheng, Broad & Sun sp. nov., holotype, ♀ (CBDPC). **23.** Head, dorsal view. **24.** Head, dorsoanterior view. **25.** Apical portion of antenna, lateral view. **26.** Mesoscutum, dorsal view.

first to fifth flagellomeres: 1.0:1.2:1.4:1.3:1.2; flagellomeres 17–19 (Figs 20, 25) with “peg-like bristles”. Occipital carina complete, joining hypostomal carina far above base of mandible.

MESOSOMA. Anterior margin of pronotum (Fig. 27) with fine oblique reticulate-punctation; lateral concavity shallow, with transverse wrinkles; posterior portion with large irregular punctures. Epomia strong, dorsal end tooth-shaped. Posteromedian portion of mesoscutum (Fig. 26) with irregular transverse indistinct wrinkles, anteriorly and laterally with distinct punctures. Scutellum with uneven punctures, anteromedian portion slightly convex; almost flat, with irregular punctures. Metanotum transversely convex, anterior portion obliquely concave. Mesopleuron (Fig. 27) almost shining, with indistinct oblique longitudinal wrinkles, interspaces with indistinct fine punctures; speculum present, relatively large; mesopleural fovea indistinct. Posterior transverse carina of mesosternum weak, almost complete. Metapleuron rough, strongly reticulate. Juxtacoxal carina absent. Submetapleural carina complete. Ventral profiles of fore and mid tibiae slightly incurved, sub-basally with angled concavities. Ratio of length of hind tarsomeres from first to fifth approximately: 7.0:2.8:1.7:1.0:2.6. Wings slightly brown, hyaline. Fore wing with vein 1cu-a opposite M&RS. Vein 2rs-m obliterated, RS touching M far in front of 2m-cu. Postnervulus intercepted slightly below middle. Hind wing vein 1-cu almost as long as cu-a. Propodeum (Fig. 28) entirely with coarsely reticulate. Area basalis triangular. Area superomedia pentagonal, with irregular wrinkles. Apophysis strong, blunt crenate. Propodeal spiracle elliptical.



Figs 27–30. *Xorides kuandianense* Sheng, Broad & Sun sp. nov., holotype, ♀ (CBDPC). **27.** Mesosoma, lateral view. **28.** Propodeum, dorsal view. **29.** Metasoma, dorsal view. **30.** Apical portion of ovipositor, lateral view.

METASOMA. First tergite (Fig. 29) evenly convex, strongly rugulose-punctate; approximately $1.7\times$ as long as posterior width, evenly narrowed anteriorly; near middle slightly contracted; anterior portion of latero-median carina vestigial; dorso-lateral carina indistinct; spiracle almost circular, convex, located at anterior 0.4 of first tergite. Tergite 2 (Fig. 29) with sculpture as tergite 1, almost ectangular, $0.7\times$ as long as posterior width, basal-laterally with short weak oblique groove. Tergite 3 (Fig. 29) with sides distinctly convergent posteriorly, with uneven punctures, gradually sparser posteriorly; approximately $0.6\times$ as long as anterior width, $0.7\times$ as long as posterior width. Tergites 4–6 almost smooth, shiny. Tergite 7 with indistinct fine transverse aciculate, posterior margin slightly concave medially. Tergite 8 triangular, apex truncate. Ovipositor sheath approximately $2.6\times$ as long as hind tibia. Apical portion of ovipositor (Figs 20, 30) distinctly down-curved; lower valve with weak ridges.

COLOUR (Fig. 20). Black, except for following: apical portion of flagellomere 10, flagellomeres 11–15 and basal portion of flagellomere 16 white; clypeus mostly and mandible black brown; fore and mid femora, tibiae and tarsomeres 1–4 yellowish to reddish brown; hind tibia proximally dark brown, distally brownish black; pterostigma and veins brownish black; pterostigma proximally white.

Male

Unknown.

Differential diagnosis

The new species is similar to *X. pissodius* Sheng & Wen, 2008 in being relatively small, with pterostigma short and wide, and head, mesosoma and metasoma almost entirely black, but can be distinguished from *X. pissodius* by the following combination of characters: postocellar line $0.9\times$ as long as ocular-ocellar line; frons without median longitudinal groove; fore wing with vein 1cu-a opposite M&RS; fore and mid tibiae normal, not stoutly clavate; tergite 2 (Fig. 29) $0.7\times$ as long as posterior width; flagellomeres 11–15 and proximal portion of flagellomere 16 white. In *X. pissodius*: postocellar line is $1.4\times$ as long as ocular-ocellar line; frons with dense transverse wrinkles and a median longitudinal groove; fore wing with vein 1cu-a distinctly distad of M&RS; fore and mid tibiae exceptionally stout, clavate; area petiolaris with indistinct longitudinal wrinkles; tergite 2 as long as posterior width; flagellomeres 9 to 12 white.

Xorides sapporensis (Uchida, 1928)

Diagnosis

Lower portion of gena with longitudinal wrinkles. Postocellar line approximately $1.7\times$ as long as ocular-ocellar line. Frons ventrally with dense transverse wrinkles. Antenna with 20–21 flagellomeres. Pterostigma short and wide, approximately $3\times$ as long as wide. Latero-median carinae of first tergite reaching to hind margin of first tergite. Tergites 2 and 3 posteriorly transversely aciculate. Fore wing beneath pterostigma with ill-defined infumate spot. Mesosoma, femora and tergites 1–3 entirely black. Tergites 4–6 with white posterior, lateral spots in females.

Material examined

CHINA • 3 ♀♀, 3 ♂♂; Kuandian, Liaoning; 2 Jun. 2001; Mao-Ling Sheng leg.; CBDPC • 1 ♀; same locality as for preceding; 6 Jun. 2007; Mao-Ling Sheng leg.; CBDPC • 1 ♀; same locality as for preceding; 11 Sep. 2015; Mao-Ling Sheng leg.; CBDPC • 1 ♀, 3 ♂♂; same locality as for preceding; 3 Feb. 2017; reared from borers in trunks of *Juglans mandshurica* Maxim.; Jun Lü leg.; CBDPC.

Biology

Host. Wood-boring insects in trunks of *Juglans mandshurica* Maxim. (Juglandaceae), previously reared from *Agilus planipennis* Fairmaire, 1888 (Coleoptera: Buprestidae), *Pterolophia alternata* Gressitt,

1938 (Sheng & Sun 2010, 2014; Sheng *et al.* 2022) and *Mesosa curculionoides* (Linnaeus, 1761) (Coleoptera: Cerambycidae) (Yu *et al.* 2016).

Host food. *Juglans mandshurica* Maxim., new host food record; *Robinia pseudoacacia* L., *Fraxinus mandschurica* Rupr. (Sheng & Sun 2010, 2014; Sheng *et al.* 2022).

Discussion

The host of *X. juglanse* sp. nov. is unknown at present although an *Agrilus* sp. (Coleoptera: Cerambycidae) emerged from the same trunks and twigs of *Juglans mandshurica* Maxim. as the holotype and might be a potential host. A species of Curculionidae also emerged from the same pieces of wood but can be discounted as a potential host of *X. juglanse* sp. nov. as these beetles are too small. Wood-boring Cerambycidae reared alongside the paratypes in February 2022 were *Agrilus* sp., *Mesosa myops* Dalman, 1817, and *Menesia flavotecta* Heyden, 1886. Host ranges will be investigated in the future.

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