

**Revision of V.I. Belizin's type material of *Alloxysta*
(Hymenoptera: Figitidae: Charipinae) deposited
in the Zoological Institute of the Russian Academy of Sciences**

**Ревизия типового материала В.И. Белизина по роду *Alloxysta*
(Hymenoptera: Figitidae: Charipinae), хранящегося
в Зоологическом институте Российской академии наук**

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A revision of the type material of species of the genus *Alloxysta* described by V.I. Belizin deposited in the Zoological Institute of the Russian Academy of Sciences is provided. Six *Alloxysta* species were studied, three of which are valid: *A. aurata* Belizin, 1968, *A. proxima* Belizin, 1962, and *A. salicicola* Belizin, 1973. Valid species are completely re-described and their diagnostic characters are illustrated. Three remaining species are synonymised with other species of this genus: *Alloxysta brevicella* Belizin, 1966 with *A. citripes* (Thomson, 1862), *A. capillata* Belizin, 1962 with *A. castanea* (Hartig, 1841), and *A. contineus* (Belizin, 1962) with *A. victrix* (Westwood, 1833). The characters used to establish these new synonymies are also illustrated.

Проведена ревизия типового материала В.И. Белизина по роду *Alloxysta*, хранящегося в Зоологическом институте РАН. Было изучено шесть видов, из которых валидными являются три: *Alloxysta aurata* Belizin, 1968, *A. proxima* Belizin, 1962 и *A. salicicola* Belizin, 1973. Валидные виды детально переописаны, и их диагностические признаки проиллюстрированы. Остальные три вида, описанные Белизиным, синонимизированы с другими видами этого рода: *Alloxysta brevicella* Belizin, 1966 с *A. citripes* (Thomson, 1862); *A. capillata* Belizin, 1962 с *A. castanea* (Hartig, 1841); *A. contineus* (Belizin, 1962) с *A. victrix* (Westwood, 1833). Даны иллюстрации признаков, используемых для обоснования указанных синонимов.

Key words: Figitidae, Charipinae, *Alloxysta*, Belizin

Ключевые слова: Figitidae, Charipinae, *Alloxysta*, Белизин

INTRODUCTION

Members of subfamily Charipinae are very small wasps (0.8–2.0 mm) with a smooth and shiny body that are widely distributed around the world. Species of Charipinae have very few diagnostic features, and this has always been an obstacle to correctly identify charipine specimens result-

ing in an historical taxonomical chaos. Eight genera are considered as valid within the Charipinae: *Alloxysta* Förster, 1869 (cosmopolitan), *Phaenoglyphis* Förster, 1869 (cosmopolitan), *Lytoxysta* Kieffer, 1909 (North America), *Loboptercharips* Paretas-Martínez et Pujade-Villar, 2007 (Nepal), *Dilyta* Förster, 1869 (cosmopolitan except Australia), *Apocharips* Fergusson, 1986

(Eastern Palaearctic and Neotropics), *Dilapothor* Paretas-Martinez et Pujade-Villar, 2006 (Australia), and *Thoreauana* Girault, 1930 (Australia).

Alloxysta is the most species-rich and widespread genus within subfamily Charipinae. *Alloxysta* species, when known, are biologically characterised as hyperparasitoids of aphids *via* Aphidiinae (Hymenoptera: Ichneumonoidea: Braconidae) and Aphelininae (Hymenoptera: Chalcidoidea: Aphelinidae). This genus includes 111 valid species (Ferrer-Suay et al., 2012), but most of them are only briefly described and their main features are unclear. Thus, *Alloxysta* is a problematic genus where limits between species are not clearly defined. The characters useful to distinguish *Alloxysta* species are only: 1) proportions of antennal flagellomeres; 2) size and shape of radial cell; 3) presence or absence of pronotal carina; and 4) presence or absence of propodeal carina and their shape (Ferrer-Suay et al., 2011). We have studied (Ferrer-Suay et al., unpubl.) several Charipinae collections to revise the type material of many *Alloxysta* species of other authors: Thomson (1862, 1877), Zetterstedt (1838), Hartig (1840, 1841) and Curtis (1838).

We examined the type material of six *Alloxysta* species described by V.I. Belizin and deposited in the Zoological Institute of the Russian Academy of Sciences, namely: *A. aurata* Belizin, 1968, *A. brevicella* Belizin, 1966, *A. capillata* Belizin, 1962, *A. contineus* (Belizin, 1962), *A. proxima* Belizin, 1962 and *A. salicicola* Belizin, 1973. Three of these species are considered valid and are here re-described and illustrated. Remaining three species are synonymised with other species of *Alloxysta*, and the characters used to establish these synonymies are also illustrated.

MATERIAL AND METHODS

To preserve the type material, all specimens were studied using stereomicroscopy. The images were obtained with a Zeiss Dis-

covery V8 compound microscope with an attached INFINITYX-21C digital camera that fed image data to a notebook or desktop computer. The programme DeltaPix View-Pro AZ was then used to merge an image series (typically representing 20 focal planes) into a single in-focus image. The images obtained from microscope slides were taken with a Leitz Dialux 20 microscope with an attached ProRes® C3 digital camera that fed image data to a notebook or desktop computer with the Prog Res Capture Pro 2.7.7 programme.

All material studied is deposited in the Zoological Institute of the Russian Academy of Sciences (Saint Petersburg, Russia; curated by S. Belokobylskij).

The morphological terms follow Paretas-Martínez et al. (2007). Measurements and abbreviations include: F1–F12, first and subsequent flagellomeres. Measures in antennal formula are given by length (width) from the pedicel to F4. The width of the radial cell is measured from the margin of the wing to the beginning of the Rs vein. The transfacial line is the distance between the inner margins of the compound eyes, measured across the face through the antennal sockets. The malar space is the distance from the mouthparts to the ventral margin of the compound eye. Females and males of the species described have similar characters except for those specifically mentioned in the re-descriptions.

RESULTS AND DISCUSSION

Order HYMENOPTERA

Family FIGITIDAE

Subfamily CHARIPINAE

Alloxysta Förster, 1869

Alloxysta aurata Belizin, 1968 (Fig. 1)

Alloxysta aurata Belizin, 1968: 716.

Holotype: female, «Vladivostok, Akademgorodok, M. Kozlov, 9.8.61», «Holotypus *Alloxysta aurata* m V. Belizin det. ♀» (red label).

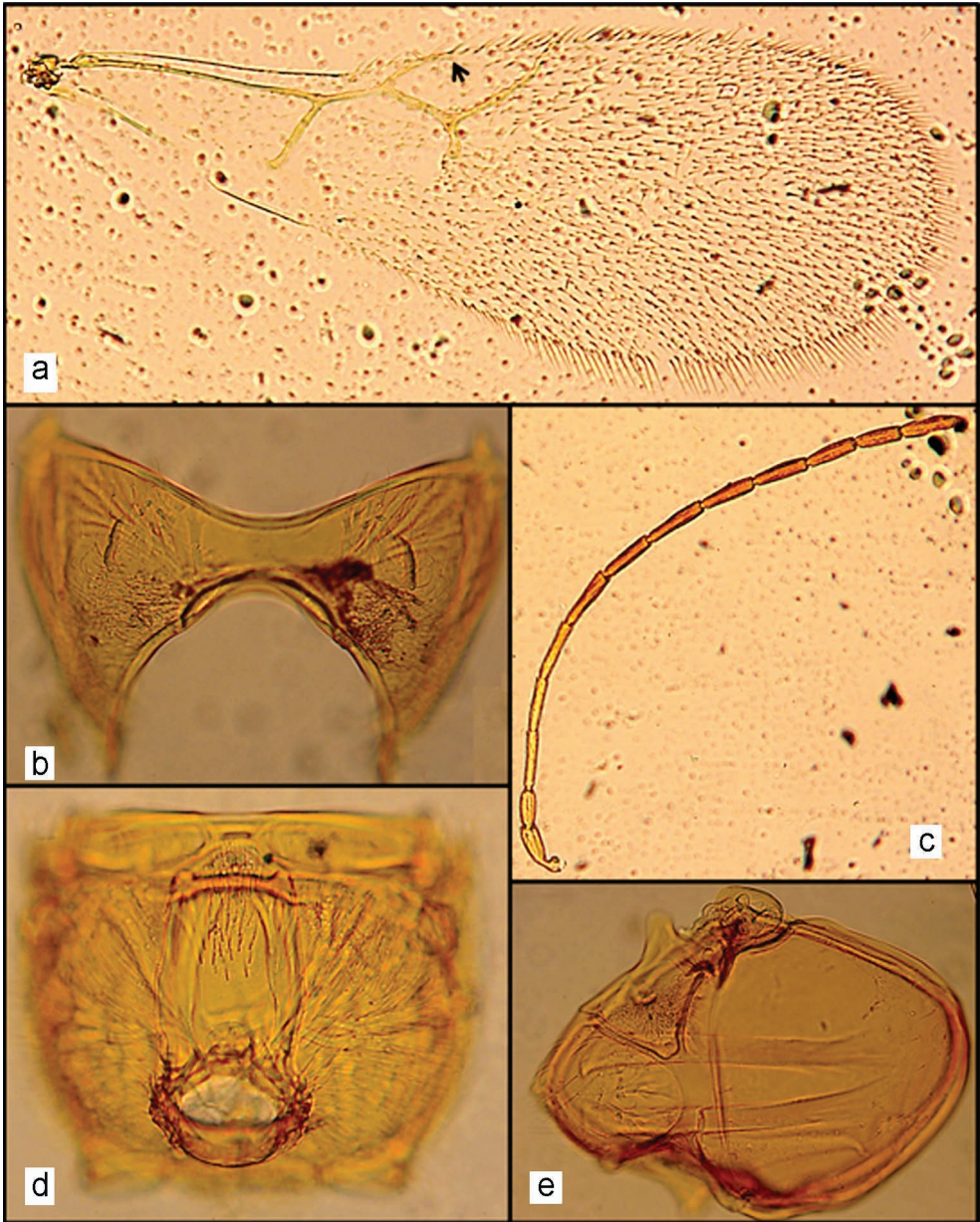


Fig. 1. Holotype of *Alloxysta aurata*: **a**, forewing; **b**, pronotum; **c**, antenna; **d**, propodeum; **e**, mesoscutum.

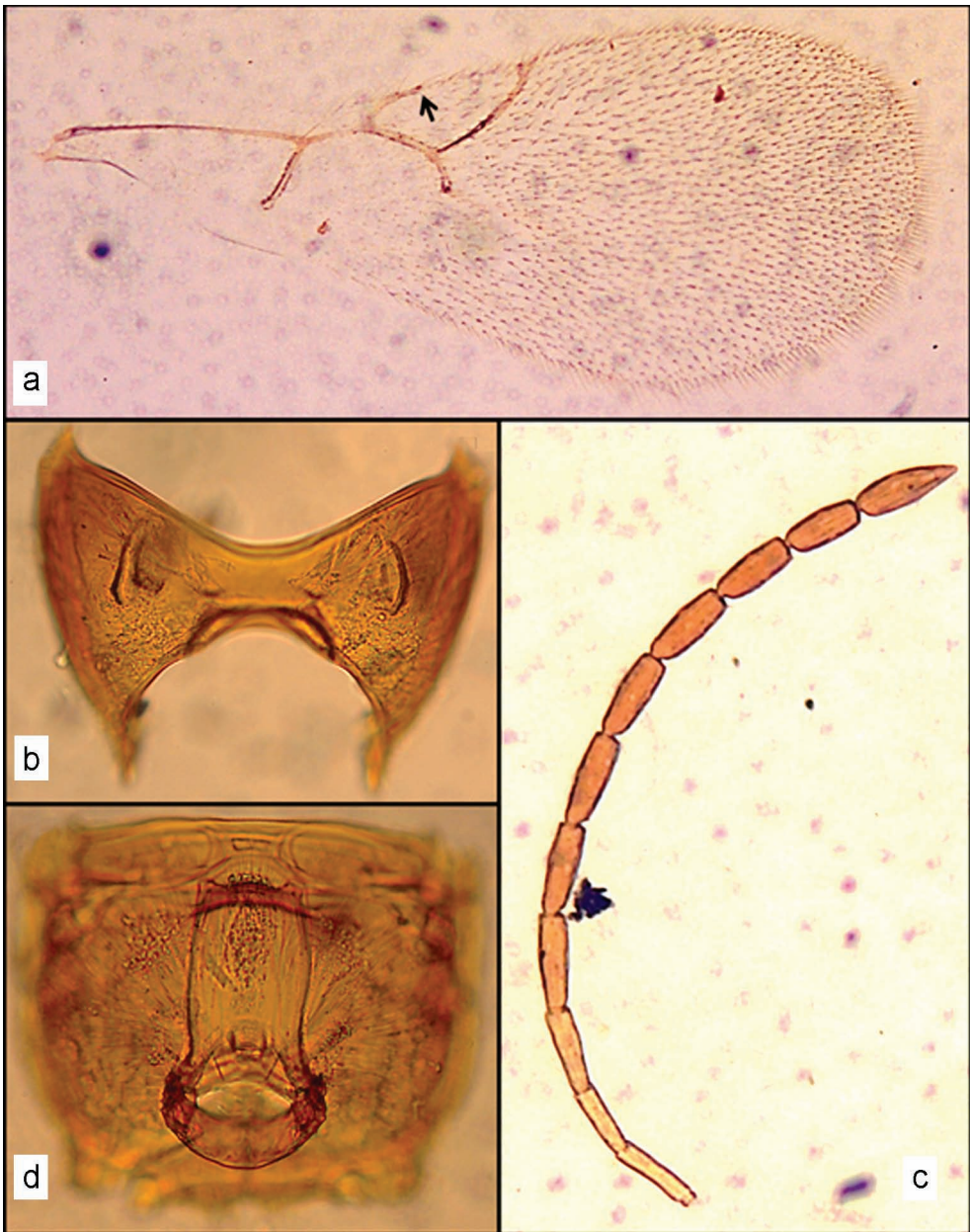


Fig. 2. Holotype of *Alloxysta capillata* (= *Alloxysta castanea*): **a**, forewing; **b**, pronotum; **c**, antenna; **d**, propodeum. All pictures were taken from the type material of *A. capillata*.

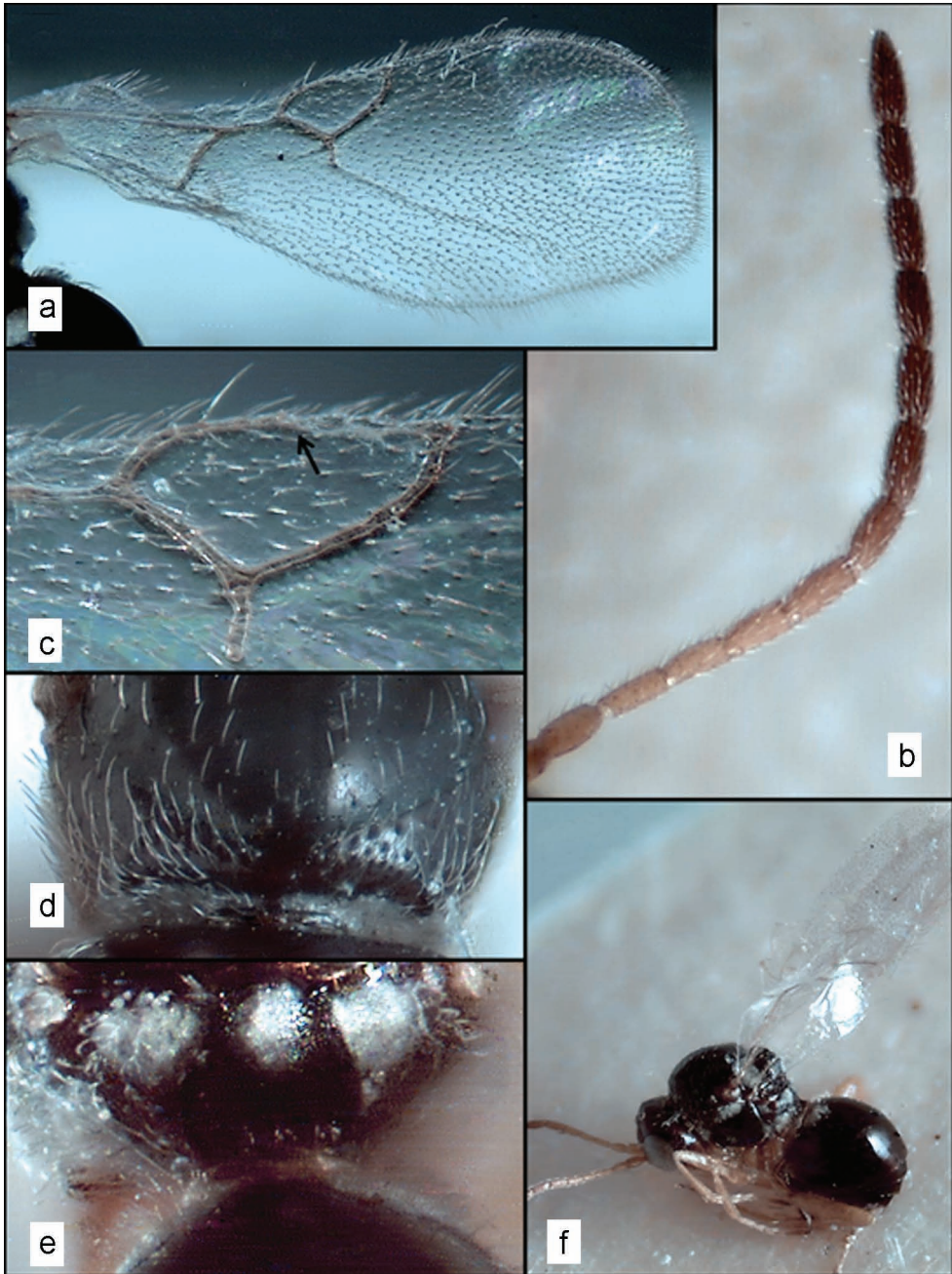


Fig. 3. Holotype of *Alloxysta brevicella* (= *Alloxysta citripes*): **a**, forewing; **b**, antenna; **c**, radial cell; **d**, pronotum; **e**, propodeum; **f**, body.

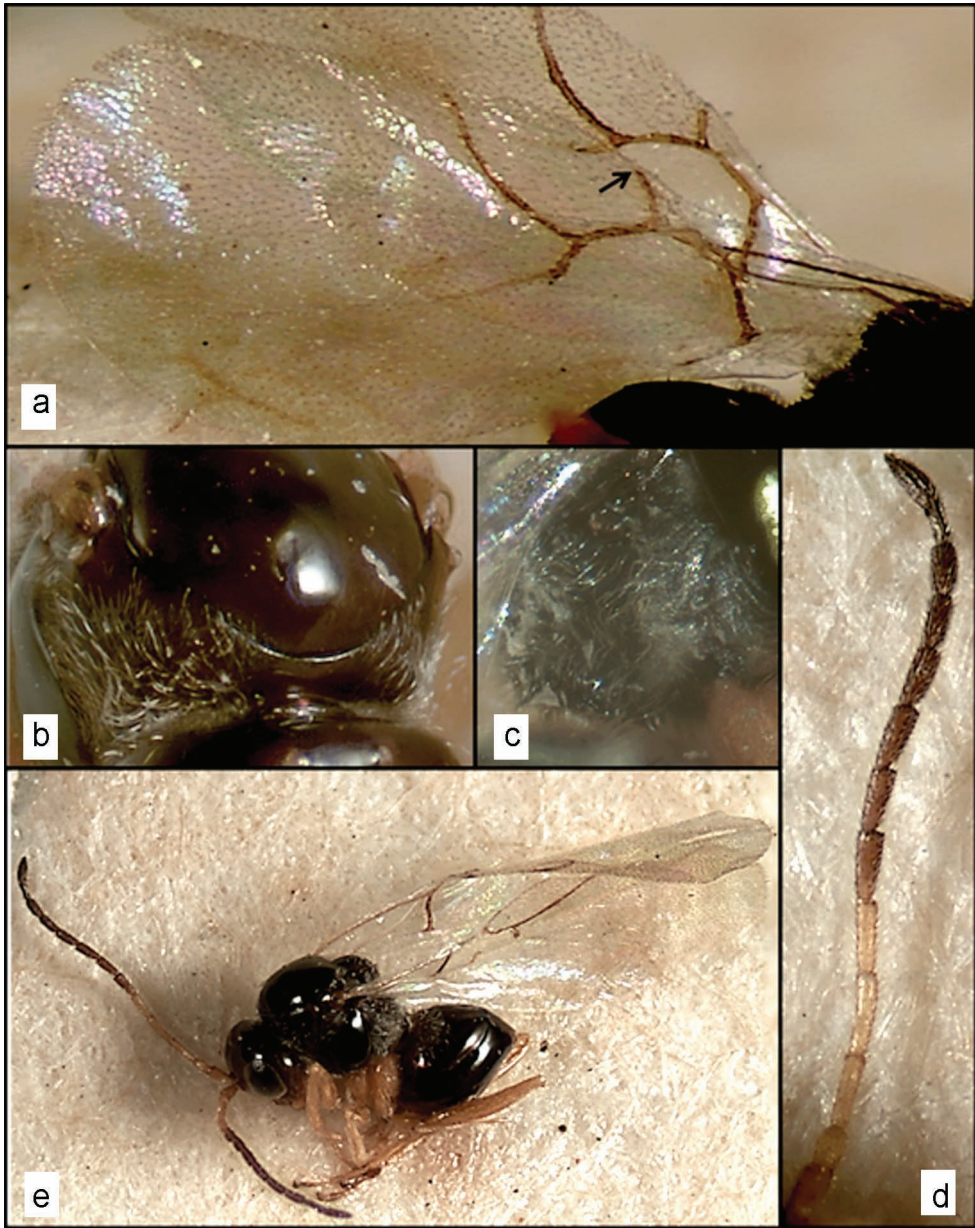


Fig. 4. Holotype of *Alloxysta proxima*: a, forewing; b, pronotum; c, propodeum; d, antenna; e, body.

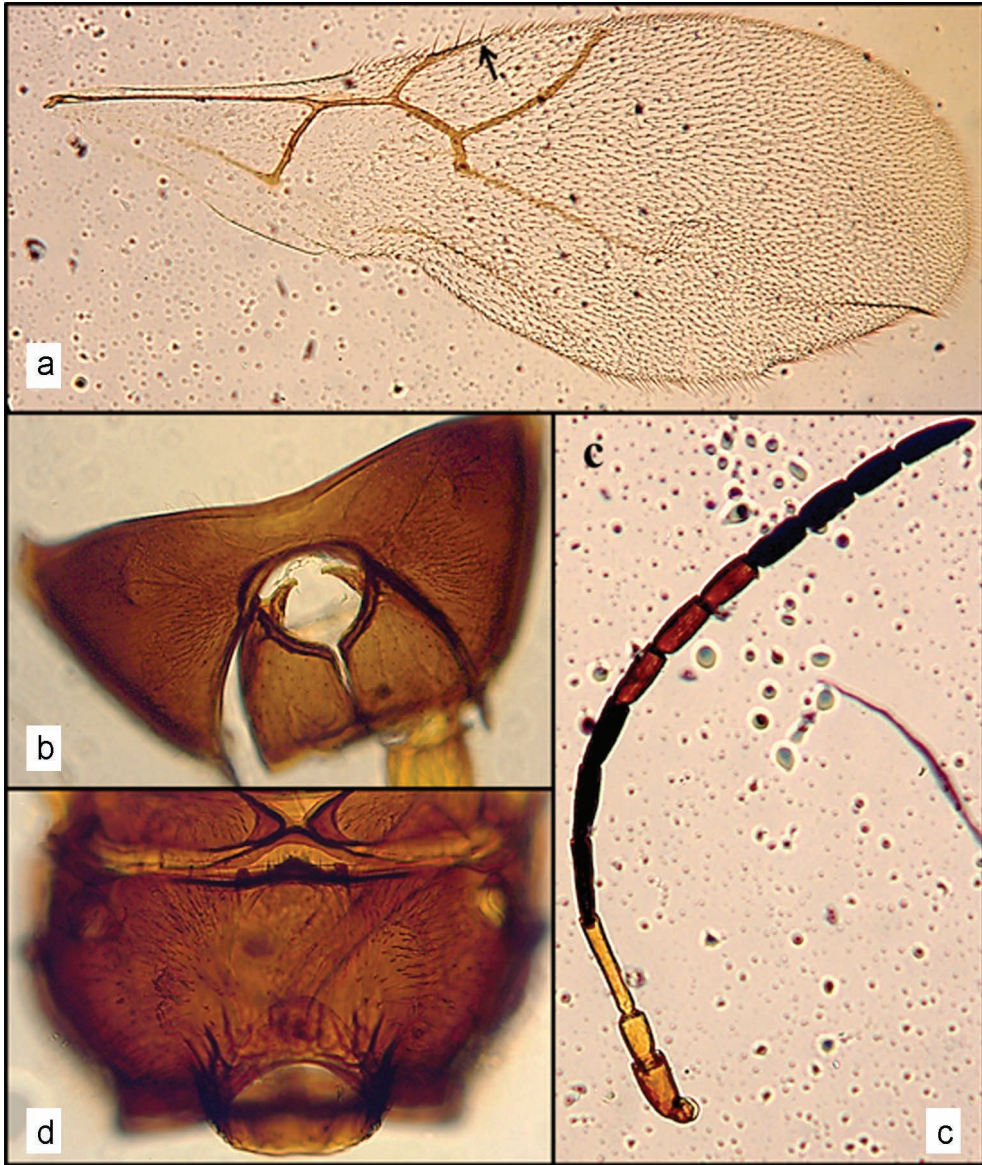


Fig. 5. Holotype of *Alloxysta salicicola*: a, forewing; b, pronotum; c, antenna; d, propodeum.

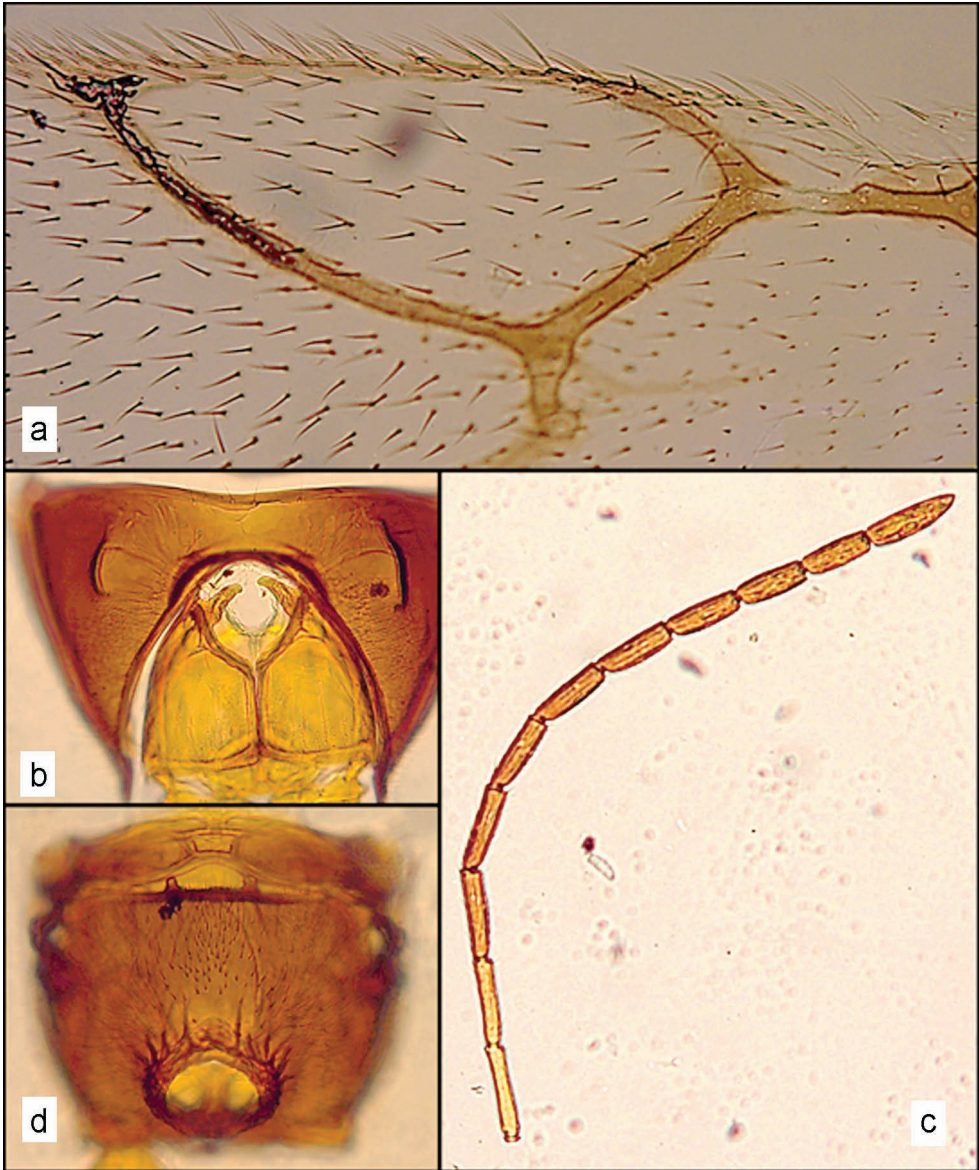


Fig. 6. Holotype of *Alloxysta contineus* (= *Alloxysta victrix*): **a**, radial cell; **b**, pronotum; **c**, antenna; **d**, propodeum.

Diagnosis. *Alloxysta aurata* is morphologically similar to *A. castanea* (Hartig, 1841): both species having the radial cell partially open, the pronotal and propodeal carinae present. These two species differ in the ratio length/width of the flagellomeres that are longer in *A. aurata* (Fig. 1c) than in *A. castanea*; proportions between the flagellomeres, F2 shorter than F3 in *A. aurata* (Fig. 1c) while F2 subequal to F3 in *A. castanea*; size of the radial cell, 3.0 times as long as wide in *A. aurata* (Fig. 1a) and 2.4 times in *A. castanea*.

Re-description (male unknown)

Colouration. Head, mesosoma and metasoma yellowish brown. Scape, pedicel, F1–F3 dark yellow; F4–F11 yellowish brown. Legs dark yellow. Veins yellowish brown.

Head. Transversally ovate, smooth and shiny, slightly wider than high in anterior view. With setae below, between and a few above toruli; no setae on vertex, and many on face. Transfacial line 1.3 times height of compound eye. Malar space 0.5 times height of compound eye.

Antenna. Filiform, 13-segmented (Fig. 1c). All antennomeres with sparse setae. F1–F3 slender and smoother than remaining flagellomeres, F4–F11 with rhinaria, club-shaped. Antennal formula: 2.5 (1.0); 4.0 (0.7); 3.6 (0.7); 4.0 (0.7); 4.0 (0.7); F4–F11 subequal in length, width and similar in shape.

Mesosoma. Pronotum with sparse setae, two carinae present (Fig. 1b). Mesoscutum smooth and shiny, round in dorsal view, with few scattered setae. Scutellum smooth and shiny, with few scattered setae abundant on apex (Fig. 1e). Propodeum with setae, with two carinae forming a plate covered by few setae (Fig. 1d).

Forewing. Longer than body. Covered with dense pubescence; marginal setae present. Radial cell partially open, 3.0 times as long as wide. R1 short and slightly curved; Rs long and curved (Fig. 1a).

Metasoma. Smooth and shiny. Anterior part with an incomplete ring of setae, gla-

brous in center, wider laterally. T3 and T4 clearly distinguished.

Distribution. Russia, Primorskiy Krai (Belizin 1968: 716).

Hosts. Unknown.

Alloxysta castanea (Hartig, 1840)
(Fig. 2)

Xystus castanea Hartig, 1841: 352.

Alloxysta capillata Belizin, 1962: 128. **Syn. nov.**

Holotype of *A. capillata*: female, «Burevestnik, Iturup I., 29.X.56, R. Vasiliev», «Holotypus *Alloxysta capillata* m V. Belizin det ♀» (red label).

Remark. The study of the type material of *A. capillata* evidences that this species is a new synonym of *A. castanea* (Hartig, 1840) as it has the radial cell partially open (Fig. 2a), F1 longer than the pedicel and F2, F2–F4 subequal in length (Fig. 2c), the pronotal and propodeal carinae present (Fig. 2b, d).

Alloxysta citripes (Thomson, 1862)
(Fig. 3)

Allotria citripes Thomson, 1862: 410.

Alloxysta brevicella Belizin, 1966: 6. **Syn. nov.**

Holotype of *A. brevicella*: female, «Kishinev MSSP, 28.IX–2.X.62, Talitskiy», «Holotypus *Alloxysta brevicella* m V. Belizin det ♀» (red label).

Remark. The study of the type material of *A. brevicella* evidences that this species is a new synonym of *A. citripes* (Thomson, 1862) as it has the radial cell small and partially open (Fig. 3c), from pedicel to F3 subequal in length (Fig. 3b), the propodeal carina wide and not protruding, covered by many setae (Fig. 3e), and the pronotal carinae present (Fig. 3d).

Alloxysta proxima Belizin, 1962
(Fig. 4)

Alloxysta proxima Belizin, 1962: 128.

Holotype: female, «Preobrazhenskoe, o. Mednyi, K. Gorodkov, 1959», «Holotypus *Alloxysta proxima* m V. Belizin det ♀» (red label).

Diagnosis. The combination of morphological characters of *A. proxima* clearly differentiates it from other *Alloxysta* spe-

cies, namely: a completely open radial cell, pronotal and propodeal carinae absent.

Re-description (male unknown)

Colouration. Head, mesosoma and metasoma dark brown. Scape, pedicel and F1–F3 dark yellow; F4–F11 yellowish brown. Legs dark yellow. Veins yellowish brown.

Head. Transversally ovate, smooth and shiny, slightly wider than high in anterior view. With setae below, between and a few above toruli. Scarce setae on vertex, many setae on face. Transfacial line and malar space can not be measured due to the position of the type specimen.

Antenna. Filiform, 13-segmented (Fig. 4d). All antennomeres with sparse setae. F1–F3 slender and smoother than remaining flagellomeres, F4–F11 with rhinaria, club shaped. Antennal formula: 2.9 (1.9); 5.0 (1.2); 5.5 (1.3); 4.5 (1.3); 4.5 (1.6); F4–F11 subequal in length, width and shape.

Mesosoma. Pronotum with abundant setae, lacking visible carinae (Fig. 4b). Mesoscutum smooth and shiny, round in dorsal view, with few scattered setae. Scutellum smooth and shiny, with few scattered setae abundant on apex. Propodeum with setae, lacking carinae (Fig. 4c).

Forewing. Longer than body. Covered with dense pubescence; marginal setae present. Radial cell open, 2.3 times as long as wide. R1 short and slightly curved; Rs long and curved (Fig. 4a).

Metasoma. Smooth and shiny. Anterior part with an incomplete ring of setae, glabrous at center, wider laterally. T3 and T4 clearly distinguished.

Distribution. Russia, Sakhalin Province, Mednyi I. (Belizin 1962: 128).

Hosts. Unknown.

***Alloxysta salicicola* Belizin, 1973**
(Fig. 5)

Alloxysta salicicola Belizin, 1973: 36.

Holotype: female, «Severo-Kurilsk, Paramushir I., aphids on Salix, 5.VIII.964» (red label),

«Holotypus *Alloxysta salicicola* m V. Belizin det ♀» (red label).

Diagnosis. *Alloxysta salicicola* is similar to *A. macrophadna* (Hartig, 1841): both species having the radial cell partially open, the pronotal carinae present, and the propodeal carinae absent. These two species can be differentiated by the proportion of flagellomeres: F2–F4 subequal in length in *A. salicicola* (Fig. 5c) while F2 longer than F3 and F3 subequal to F4 in *A. macrophadna*, and size of the radial cell: 2.6 times as long as wide in *A. salicicola* (Fig. 5a) and 3.0 times in *A. macrophadna*.

Re-description (male unknown)

Colouration. Head, mesosoma and metasoma brown. Scape, pedicel and F1 dark yellow; F2–F11 yellowish brown. Legs yellow. Veins yellowish brown.

Head. Transversally ovate, smooth and shiny, slightly wider than high in anterior view. Transfacial line 1.4 times the height of compound eye. Malar space 0.8 times the height of compound eye.

Antenna. Filiform, 13-segmented (Fig. 5c). All antennomeres with sparse setae. F1–F2 slender and smoother than remaining flagellomeres, F3–F11 with rhinaria, club shaped. Antennal formula: 3.0 (1.7); 6.5 (1.0); 5.0 (1.1); 4.5 (1.4); 4.5 (1.4); F4–F11 subequal in length, width and shape.

Mesosoma. Pronotum with numerous setae, two carinae present (Fig. 5b). Mesoscutum smooth and shiny, round in dorsal view, with a few scattered setae. Scutellum smooth and shiny, with scattered setae, abundant on apex. Propodeum with abundant pubescence, lacking carinae (Fig. 5d).

Forewing. Longer than body. Covered with dense pubescence; marginal setae present. Radial cell partially open, 2.6 times as long as wide. R1 short and slightly curved; Rs long and curved (Fig. 5a).

Metasoma. Smooth and shiny. Anterior part with an incomplete ring of setae, glabrous in center and wider laterally. T3 and T4 clearly distinguished.

Remark. The type specimen of *Alloxysta salicicola* is mounted in a slide. For this reason some characters such as the head pubescence cannot be clearly seen.

Distribution. Russia, Sakhalin Province, Kuril Islands, Paramushir I. (Belizin 1973: 36).

Hosts. Aphid from *Salix* sp. (Belizin, 1973: 36).

Alloxysta victrix (Westwood, 1833)
(Fig. 6)

Allotria victrix Westwood, 1833: 495.

Charips contineus Belizin, 1962: 127. **Syn. nov.**

Alloxysta contineus: Pujade-Villar et al., 2010: 288.

Holotype of *C. contineus*: female, «Verkh. tech. r. Bol'shaya, 63 01 N 171 50 E, Gorodkov, 25.VII.959» (red label), «Holotypus *Charips contineus* m V. Belizin det ♀» (red label).

Remark. The study of the type material of *A. contineus* evidences that this species is a new synonym of *A. victrix* (Westwood, 1833). This species has a closed radial cell with 3.0 times as long as wide (Fig. 6a), F1 longer than pedicel and F2, F2–F4 subequal (Fig. 6c), a pronotal carina present (Fig. 6b), and propodeal carinae absent (Fig. 6d).

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