

The status of *Kokandia* Yefremova & Kriskovich (Hymenoptera: Eulophidae), with taxonomic notes on some related genera

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The diagnosis of the poorly known genus *Kokandia* Yefremova & Kriskovich, 1995 (based on the single species *K. salsolicola*, a parasitoid of the gall midge *Desertovellum stackelbergi* Mamaev) is clarified and the genus is re-described. This genus is not related to *Omphale* Haliday, 1833 (as it was stated in the original description), because the clypeus is not delimited. The type species of *Kokandia* resembles species of *Closterocerus* Westwood, 1833, in its habitual appearance, but differs by the absence of the subtorular grooves. The main autapomorphy of *Kokandia* is the wide peculiar adocular flange (not seen in any other known genus of the subfamily Entedoninae). Possible relationships of *Kokandia* with the genera *Closterocerus*, *Pediobopsis* Girault, 1913, and *Ionympha* Graham, 1963, are discussed.

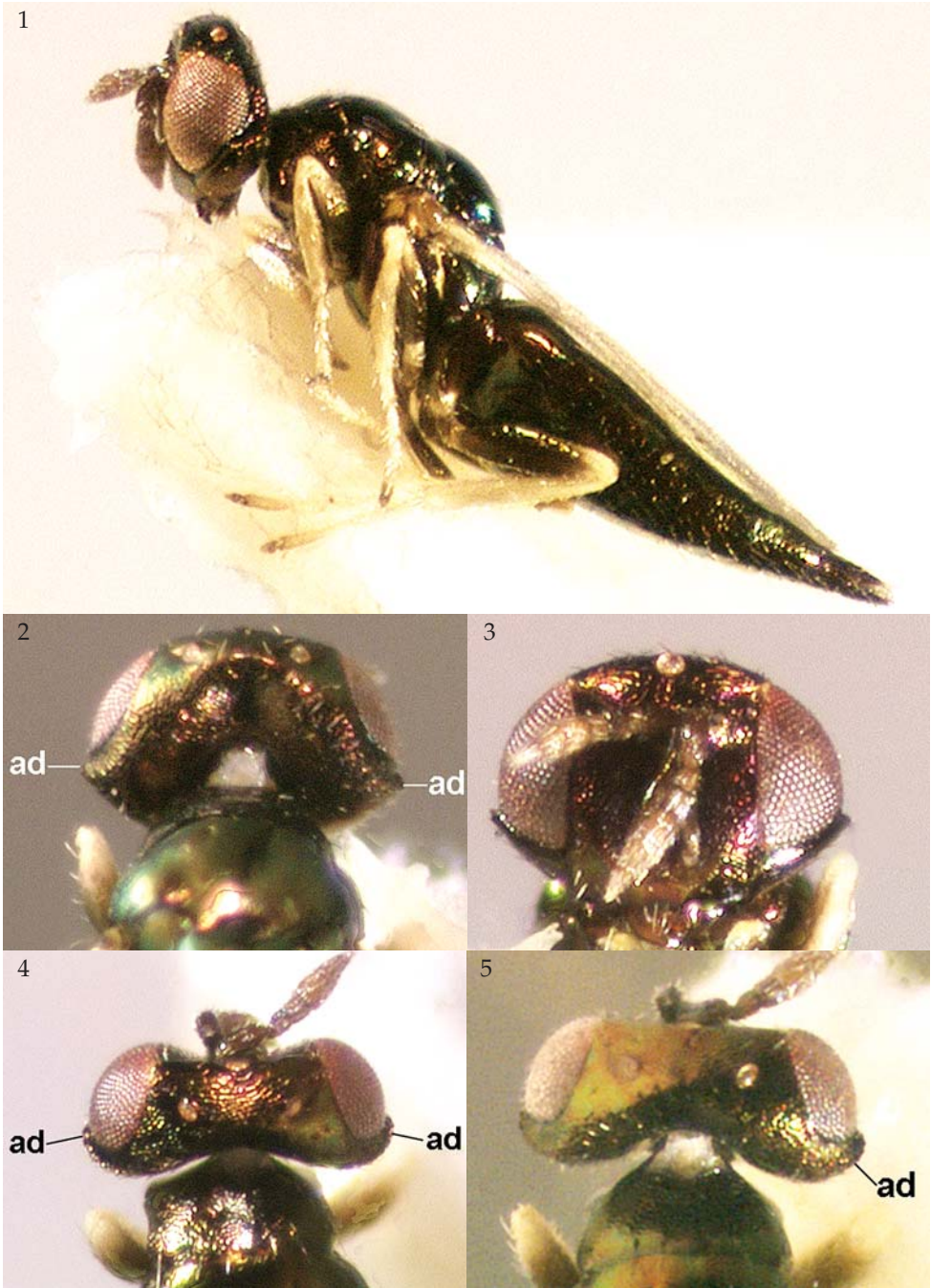
Introduction

The genus *Kokandia* was described by Yefremova & Kriskovich (1995) to include the single species *K. salsolicola*, a parasitoid of the gall midge *Desertovellum stackelbergi* Mamaev causing galls on *Salsola orientalis* S.G. Gmelin (Chenopodiaceae). The authors mentioned that this genus is similar to *Omphale* Haliday, 1833. However, this similarity was not explained. The main character defining *Omphale* and allied species, is the delimitation of the clypeus (Bouček, 1988; Schauff, 1991; Hansson, 1996b; Gumovsky, 2002). However, nothing was mentioned about this character in the original description of *Kokandia*, so that the affinity with *Omphale* remained obscure.

Moreover, it was stated by Yefremova & Kriskovich (1995) that *Kokandia* differs from *Omphale* because of the elongate metasoma of the female (nearly 2.5 times as long as broad), the two-segmented antennal funicle and the three-segmented clava in both sexes. Also the males have no paramerae, which is regarded as being unique for the genus (Yefremova & Kriskovich, 1995).

However, many species of *Omphale* (including the type-species *O. salicis* (Haliday, 1833)) have females with a longer metasoma (3 times as long as broad or more) than it has been recorded for *K. salsolicola*. Moreover, the females of *O. clypealis* (Thomson, 1878) have also a two-segmented funicle and a three-segmented clava.

Thus the status of this genus has remained uncertain and its proper identification was nearly impossible. Moreover, *K. salsolicola* appears of certain practical importance because one of the *Salsola* species, *S. kali* Linnaeus, invaded some regions in the U.S.A. The USDA scientists have made several surveys at Kokand and found several pests of *S. kali* in its area of origin and especially a gall-midge, *Desertovellum stackelbergi*, the host of *Kokandia salsolicola*. The latter species was also present among the parasitoids



Figs 1-5, *Kokandia salsolicola* Yefremova & Kriskovich, ♀, Uzbekistan, Kokand, but 1 of holotype. 1, habitus; 2, head and anterior part of mesosoma, posterior aspect; 3, head, frontal aspect; 4, 5, head and anterior part of mesosoma, dorsal aspect; ad, adocular flange.

reared from *D. stackelbergi*, and several reared specimens were kindly supplied to the author by Drs G. Delvare (CIRAD, Montpellier, France) and R. Sobhian (USDA, Washington, D.C., U.S.A.). Also, the author gained a possibility to examine the type material of *Kokandia* when he visited the Zoological Institute (St. Petersburg, Russia) and the Natural History Museum (BMNH, London, UK). These studies revealed that its type species, *K. salsolicola*, notably differs from its original description.

Material and methods

Specimens examined were borrowed from the following institutions: The Natural History Museum, London, U.K. (BMNH); the Nationaal Natuurhistorisch Museum, Leiden, Netherlands (RMNH); the Schmalhausen Institute of Zoology, Kiev, Ukraine (SIZK); and the Zoological Institute, St. Petersburg, Russia (ZISP).

General morphology pictures were made using a JVC 3-CCD colour videocamera KY-F55B with Auto-Montage software (version 3.02.005).

Genus *Kokandia* Yefremova & Kriskovich, 1995

Kokandia Yefremova & Kriskovich, 1995: 894. Type species (by original designation): *Kokandia salsolicola* Yefremova & Kriskovich, 1995: 894.

Habitus.— Resembles the genus *Closterocerus* Westwood, 1833, in having a short postmarginal vein, a two-segmented funicle, a three-segmented clava, and the head and mesosoma finely sculptured (fig. 1).

Autapomorphies.— Adocular flange with peculiarly protruding flattened area along posterior eye orbit, bearing marginal indentation (fig. 2-5, ad).

It shares characters states with the following genera:

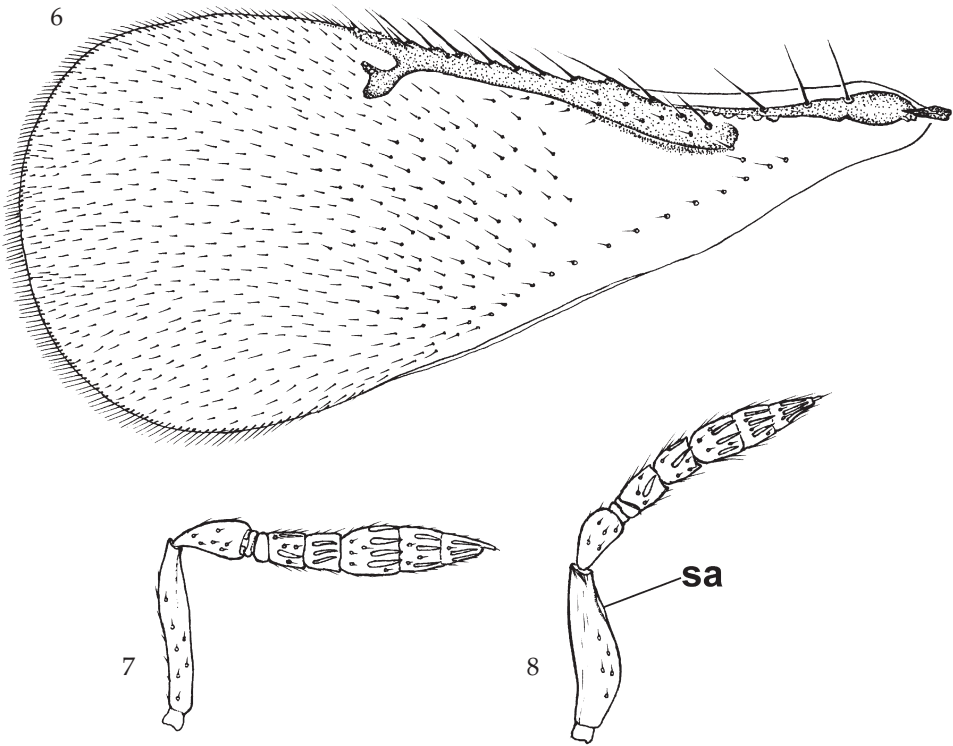
Ionympha Graham, 1963: — Oral fossa with an incision above mandible; pores on male scape concentrated apically.

Omphale Haliday, 1833 and *Pediobopsis* Girault, 1913: — Posterior margin of propodeum somewhat emarginate.

Diagnosis.— Clypeus not delimited; occipital median line absent; tentorial pits absent; frontal sulcus V-shaped; scrobal grooves disconnected (U-shaped), channeled; interscrobal area convex (not flattened); pores on male scape concentrated apically (fig. 8, sa); propleuron not flanged posteriorly; pronotal shoulders absent; axilla bare; mesopleuron without protuberance; metapleuron not toothed; transepimeral sulcus sutured, straight; anterior margin of propodeum straight, posterior margin somewhat emarginate; propodeum with one seta on rather narrow (nearly reduced) supracoxal flange; subcosta of forewing with 3-4 setae; parastigma and base of marginal vein thickened; metasoma without oval membranous areas on first tergite in both sexes; ovipositor stretching along major part of metasoma.

Description.— Body green with weak bronze tint, legs pale except for darkened coxae and femora, in *K. salsolicola* (figs 1-5).

Head.— Frontal sulcus present as V-shaped lines which somewhat widened posteriorly. Ocellar triangle not delimited. Vertexal suture absent. Postero-median vertex evenly curved, occasionally with weakly traced occipital margin. Scrobal grooves



Figs 6-8, *Kokandia salsolicola* Yefremova & Kriskovich, ♀ but 8 of ♂, Uzbekistan, Kokand. 6, fore wing; 7, 8, antenna; sa, sensory area.

sutured, disconnected, area between these grooves somewhat convex. Subtorular grooves absent. Below each torulus, with a weak broad depression. Depressions without distinct limits and their size and form variable. Head regularly pubescent. Tentorial pits absent. Mandibles endodontal, bidentate. Gena nearly straight, weakly convex, somewhat incised above mandible. Clypeal borders not differentiated, its anterior margin weakly protruding. Malar sulcus finely sutured.

Occiput without median line, occipital margin blunt, not carinate (fig. 2). Antennal scape of male somewhat wider than in female (fig. 8), with sensory area restricted apically on ventral margin. Antenna with two anelli in both sexes: first anellus rather narrow, distinctly separated from pedicel and second anellus, the latter wider and closely attached to first funicular segment (figs 7, 8). Flagellum of both sexes with two-segmented funicle and three-segmented clava (figs 7, 8). Pubescence along eye orbits sparse. Posterior margin of eye orbit with a collar extending nearly up to vertex (forming an outstanding flange in air-dried specimens, somewhat less distinct in critical point dried specimens) and its outer margin bearing a weak indentation (figs 2-5: ad). Temple moderately wide.

Mesosoma.— Pronotum (fig. 5) conical, 0.8-0.9 times as long as mesoscutum, evenly rounded, not carinate, with two lateral and six dorsal setae along its posterior margin, also with several sparse setae on its collum; smoothly bent laterally, without any peculiar lateral formations on its lateral panel. Pronotal collum without anterior foveae. Prosternum evenly bent basad. Propleurae widely diverging posteriorly, each propleuron somewhat widened and convex posteriorly, and lateral panel of pronotum weakly depressed where it contacts posterior margin of propleuron.

Mesoscutum and scutellum with very fine sculpture (finely alveolate), nearly smooth. Notauli incomplete, largely reduced: present just by tiny sutures anteriorly. Median area of mesoscutum with two pairs of setae. Axilla wide, bare; axillula flattened. Axillar-scutellar and scuto-scutellar sutures simple, not sulcate. Anterior margin of mesepisternum straight, not interrupting or overlapping prepectus. Scutellum with one pair of setae. Dorsellum smooth, its posterior margin half-circular in shape. Metapleuron shaped as a blunt callus. Transepimeral sulcus sutured, nearly straight.

Propodeum mat to smooth, without any sculpture and grooves, occasionally adspiracular depression somewhat developed. Propodeal spiracle on weak elevation, underneath with short projection and one seta. Propodeal callus with two setae. Postero-medially propodeum somewhat emarginate. Supracoxal flange very narrow (largely reduced), bearing one seta.

Fore wing (fig. 6) 2.2-2.3 times as long as broad in both sexes (not 3 times as stated in the original description). Subcosta of submarginal vein broken in place of its transition to parastigma, bearing 3-4 setae on its dorsal margin; parastigma and base of marginal vein thickened; postmarginal and stigmal veins of fore wing subequal in length. Speculum of fore wing closed.

Metasoma.— Petiole strongly reduced in both sexes. Metasoma without any distinct membranous lateral areas. Ovipositor stretching along major part of metasoma of female. Metasoma of male subpentagonal, male genitalia typical for Entedoninae; paramerae absent, each digital sclerite with two spines.

Biology.— The type (and only known) species is a parasitoid of gall midges (Cecidomyiidae) associated with *Salsola* species (Chenopodiaceae).

Distribution.— Palaearctic (Uzbekistan).

Kokandia salsolicola Yefremova & Kriskovich, 1995
(figs 1-8)

Kokandia salsolicola Yefremova & Kriskovich, 1995: 894.

Type material.— Holotype, ♀ (ZISP), "Uzbekistan, Fergana distr., Ultarma, ex galls *Desertovellum stackelbergi* on *Salsola orientalis*, 21-27.ix.1994. V.A. Krivochatsky" (ZISP); paratypes (BMNH) 12 ♀♀, *ibid.*

Other material.— 10 ♀♀ + 5 ♂♂ (SIZK), "Uzbekistan, Kokand, ex galls of *D. stackelbergi* on *Salsola kali*, 30.VI.2001. R. Sobhian"; 10 ♀♀ + 4 ♂♂ (RMNH), *ibid.*

Biology.— This species is an endoparasitoid of the gall midges *Desertovellum stackelbergi* Mamaev on *Salsola orientalis* S.G. Gmelin (Yefremova & Kriskovich, 1995) and *S. kali* Linnaeus (new record).

Distribution.— Uzbekistan.

Discussion

The characters mentioned above in the re-description of the genus indicate that there is no close relationships between the genera *Kokandia* and *Omphale*, because the clypeus is not differentiated from the rest of the face in the former genus. The only reliable character shared by both genera is the somewhat emarginate posterior margin of the propodeum. However, this character is also shared with the genus *Pediobopsis* Girault, and, probably suggests a relationships on a higher level (e.g., a complex of genera).

The habitus of *Kokandia* is similar to that of the genus *Closterocerus* Westwood. The genus *Closterocerus* in its expanded concept contains rather diverse species (e.g., those previously included in the genera *Asecodes* Förster, 1856, *Neochrysocharis* Kurdjumov, 1912) and is monophyletic by having the distinct, sutured subtorular grooves (Gumovsky, 2001). The subtorular grooves are not recognizable in *Kokandia*, so that there is no strict association between *Kokandia* and *Closterocerus* apart from just the general habitual appearance (as shown by the weak body sculpture, the propodeum with neither plicae nor carinae, the head without a distinct occipital margin). Consequently, there are no character states indicating a close relationships. However, the subtorular grooves may have been reduced secondarily, and *Kokandia salsolicola* may be a derived species of *Closterocerus*. Also, part of the *Closterocerus* species (those treated previously in *Neochrysocharis*) possess the convex interscrobial space, whereas, in general, the remainder of *Closterocerus* species has this area flattened. The possession of the convex interscrobial space also makes *K. salsolicola* similar to *Closterocerus*.

Kokandia may be also confused with the genera *Pediobopsis* Girault, and *Ionympha* Graham. *Pediobopsis* is similar to *Kokandia* in having a similar habitus, and a undelimited clypeus, a two-segmented antennal funicle and a three-segmented clava, no subtorular grooves and a somewhat emarginate posterior margin of the propodeum. *Kokandia* is separated by having no tentorial pits (present in *Pediobopsis*) and the mandible directed downwards (in general, directed inwards in *Pediobopsis*).

Also *Ionympha* and *Kokandia* share a similar habitus (as "soft-bodied" entedonines), an undelimited clypeus, and the long mandibles, the gena incised below the eye (i.e., the oral fossa with emarginations posteriorly), and the sensory pores concentrated on the ventral margin of the antennal scape in male. However, in *Ionympha* the ovipositor is short, reaching only across the apical three tergites (in *Kokandia* almost as long as the metasoma), the second valvifer is stout (Hansson, 1996a; in *Kokandia* long and slender), the mandible is multidentate (in *Kokandia* tridentate), and the subtorular grooves are developed (in *Kokandia* absent). The possession of the subtorular grooves may suggest that *Ionympha* is either the same as *Closterocerus*, or represents the sister taxon of the latter genus.

Conclusions

Kokandia is regarded as a valid genus because *K. salsolicola* does not fit well in any other known genus, and the protruding adocular flange is an uniquely derived character. Further studies are needed to clarify the relationships of the genus. The possession of some peculiar characters (e.g., the incised gena, the elongate mandibles, the

somewhat emarginate posterior margin of propodeum, the weak sclerotization of the body), seem to suggest a relationship with other parasitoids of gall midges (e.g., the genera *Ionympha* and *Pediobopsis*, and some species of *Closterocerus*).

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