On the systematic position of *Cacosyndya* Kirby (Hymenoptera: Tenthredinidae) with redescription of *Cacosyndya dimorpha* Freymuth

Meicai WEI[①], Gengyun NIU

College of Life Sciences, Jiangxi Normal University, Nanchang, Jiangxi 330022, China

Abstract: A peculiar sawfly genus from middle Asia, *Cacosyndya* Kirby, 1883 and the type species *Cacosyndya dimorpha* (Freymuth, 1870) are redescribed and illustrated. The systematic position of this genus in Tenthredinidae is discussed. The females in the genus are apterous, the only known apterous Symphytan, but the male is normally winged. *Cacosyndya* is not a member of Fenusinae or Heterarthrinae, but a member of Phymatocerini of Blennocampinae, Tenthredinidae as shown by the structure of the antenna, wing venation and body structure. The relationship between *Cacosyndya* and members of Phymatocerini is briefly discussed.

Key words: apterous sawflies; Blennocampinae; Phymatocerini; taxonomy

愈胸叶蜂属系统学地位评述及二型愈胸叶蜂重新描述（膜翅目：叶蜂科）

魏美才[①]，牛耕耘

江西师范大学生命科学学院，江西 南昌 330022

摘要：重新描述了 1 种中亚分布的特殊叶蜂，即愈胸叶蜂属 *Cacosyndya* Kirby 的模式种二型愈胸叶蜂 *Cacosyndya dimorpha* (Freymuth, 1870)，提供了重要形态特征图，并讨论了该属在叶蜂科内的系统学位置。该属雌虫完全无翅，是膜翅目基部广腰蜂类中唯一的雌虫无翅属种，其雄虫翅正常。基于触角、翅脉和虫体部分特征，指出愈胸叶蜂属不是潜叶蜂亚科或凹颜叶蜂亚科的成员，而是蔺叶蜂亚科的等节叶蜂族成员。文中还简要讨论了本属与等节叶蜂族内的近缘属的鉴别特征。

关键词：无翅叶蜂；蔺叶蜂亚科；等节叶蜂族；分类

Introduction

Freymuth (1870) described a peculiar sawfly genus and species under Tenthredinidae, *Pompholyx dimorpha* Freymuth, 1870, from Tashkent of Russia, now a region of Uzbekistan. The species feeds on fresh green grass (Kuznetzov-Ugamskij 1930). The female of the species is entirely apterous (Fig. 1A) but the male is normal with quite long wings (Fig. 1F). As the name of the genus was occupied by *Pompholyx* Lea, 1852 of Mollusca, Kirby (1883) proposed *Cacosyndya* to replace it. Konow (1905) listed this genus within the tribe “Blennocampides” Konow of Tenthredinidae. Benson (1959) studied this species and thought that it was a member of Tenthredininae rather than Blennocampinae although the genus

Accepted 19 January 2024. Published online 26 August 2024.

① Corresponding author, E-mail: weimc@126.com

shared some characters with Blennocampinae and Selandriinae. In the paper Benson proposed Cacosyndiini under Tenthredininae to place this genus. Smith (1976) thought the genus resembled *Prolatus* Smith in many characters, disagreed with Benson's opinion and placed this genus into Fenusini of Heterarthrinae. This treatment of the genus was followed by Taeger *et al*. (Abe & Smith 1991; Taeger *et al*. 2010). Wei & Nie (1998) also placed *Cacosyndya* into Fenusini but under Fenusinae of Heterarthridae.

During a visit to the Smithsonian Institute in the summer of 2012, the authors examined some specimens of *Cacosyndya dimorpha* and found that it was in fact not a member of Fenusinae or Tenthredininae but of Phymatocerini of Blennocampinae. This result is reported here.

The obsolete original description of the genus and the type species was in Russian with a Latin abstract. No figures of this species have been published beyond an incomplete forewing. Therefore we here redescribe the species and the genus and provide illustrations of female and male.

Material and methods

Specimens were examined with a Leica S8APO dissection microscope. Adult images were taken with a Leica Z16 system (Leica, Wetzlar, Germany). A series of images were edited using Helicon Focus (HeliconSoft, Kharkiv, Ukraine). The picture of male adult was download from ECatSym (Taeger *et al*. 2018). All images were further processed with Adobe Photoshop CS 11.0 (Adobe Systems, San Jose, CA, USA).

The terminology of genitalia follows Ross (1945) and that of venation follows Niu & Wei (2010).

Specimens examined during this study are deposited in the Smithsonian Institute, National Museum of Natural History, Department of Entomology, Washington DC, USA (USNM) and British Museum of Natural History, London, England (BMNH). Specimens compared with *Cacosyndya* are deposited in the Asian Sawfly Museum, Nanchang, Jiangxi, China (ASMN).

Taxonomy

1. *Cacosyndya* Kirby, 1883

Pompholyx Freymuth, 1870: 216. Preoccupied by *Pompholyx* Gosse, 1851 [Rotifera] and Lea, 1852 [Mollusca]. Type-species: *Pompholyx dimorpha* Freymuth. Monotypic.

Cacosyndya Kirby, 1883: 203. Name for *Pompholyx* Freymuth.

Cacosyndia Dalla Torre, 1894: 186. Misspelling.

Redescription. Body small, length 3.5–5 mm. Female entirely apterous (Fig. 1A), body stout; head subquadrate, narrowed behind eyes; clypeus quite broad, anterior margin subtruncate (Fig. 1C); mandibles symmetrically bidentate; palps short, maxillary palp with 5 palpomeres, labial palp with 4 palpomeres; eyes small, inner margins slightly divergent downward, distance between eyes much longer than longest axis of eye; distance between toruli as long as distance between torulus and eye, inner upper margin of toruli distinct; frons hardly defined, frontal wall indistinct (Fig. 1C); ocellar triangle low, POL as long as OCL and both longer than OOL; malar space distinct, shorter than diameter of an ocellus; hind orbit

roundish, occipital carina absent, orbital furrow indistinct; interocellar and postocellar furrows indistinct, lateral furrow deep and weakly divergent backward; antenna slender and filiform, much shorter than body length, scape longer than broad, pedicellum as long as broad, third antennomere about as long as forth one, flagellomeres subequal in length, hairs dense and oblique (Fig. 1D); pronotum narrow, lateral lobe weakly enlarged; mesonotum large, dorsum roundish with faint middle furrow, tegula absent; metanotum short and transverse, not differentiated, cenchrus absent (Figs 1A, 1B); ventral corner of propleuron acute and remote to each other; mesopleuron large and round, ventral marginal carina low but distinct, epicnemium indistinct, anterior margin weakly differentiated; metapleuron broad; abdominal terga microsculptured, first tergum with distinct middle suture, blotch small and transverse, terga 2–8 similar in shape, tergum 9 broadened laterally, tergum 10 small; legs normal, inner spur of fore tibia simple and acute at apex, fore tarsus clearly longer than fore tibia, basitarsus almost as long as following 4 tarsomeres together; middle tibia shorter than tarsus; hind tibia much longer than hind tarsus, tibial spur slightly shorter than apical breadth of tibia, basitarsus slightly longer than following 3 tarsomeres together, pulvillus small; claw small and slender, without basal lobe and inner tooth; cerci short; ovipositor sheath normal, as long as fore tibia, basal sheath longer than apical sheath (Fig. 1B); lancet not dissected; dorsum of body microsculptured, punctures on mesonotum distinct. Male with normal wing and normal thorax; antenna longer than body, flagellum with erect hairs slightly shorter than breadth of each flagellomere; tegula and cenchrus distinct (Fig. 1F); forewing as long as body length, apex of C weakly enlarged, pterostigma elongate; vein R as long as 2r, apex slightly bent down; R+M very short, 2r meeting cell 2Rs near apex, vein 1M much longer than 1m-cu and distinctly convergent with 1m-cu toward pterostigma; cu-a meeting cell 1M at basal 0.4; 2A+3A straight; cell 1R1 longer than broad, 2Rs slightly longer than 1R1+1Rs, apical anal cell slightly shorter than petiole (Fig. 1E); hind wing slightly shorter than forewing, cells R1 and M closed, cell Rs open, anal cell closed and about 1.5 times as long as anal petiole, anal petiole much longer than cu-a; apical margin of subgenital plate round; genitalia not dissected.

Diagnosis. Female apterous, mesonotum and metanotum not differentiated; male wings longer than body; clypeus short and broad; malar space distinct, shorter than diameter of lateral ocellus; maxillary palp with 5 palpomeres; distance between eyes much longer than longest axis of eye; occipital carina absent; pedicellum as long as broad, flagellum very long and slender, flagellomeres subequal in length; claw long and slender, without basal lobe and inner tooth; fore wing with 4 cubital cells, vein 1M much longer than and convergent with 1m-cu; cu-a meeting cell 1M at basal 0.4; 2A+3A straight; hind wing with cells R1, M and A closed, anal petiole much longer than cu-a; epicnemium and suture indistinct.

Remarks. Benson discussed the relationship between *Cacosyndya* and some other taxa of Tenthredinidae mainly based on the male wing structure. He pointed out that the male wing supports *Cacosyndya* being assigned to the Blennocampinae except the apex of vein R (Sc+R in Benson's paper) "kink at its junction with M as is characteristic of the Tenthredininae". However, the kinked apex of vein R is present in many species of Blennocampinae, such as some species of *Bua* and *Amonophadnus*. In fact, the most important diagnosis of Tenthredinidae is the very short vein R together with the kinked apex. *Cacosyndya* differs from members of Tenthredininae in the vein R being quite long and mostly straight, vein 1M distinctly convergent with 1m-cu, antenna very long and flagellomeres subequal in length; the

hind wing with cell Rs open and anal cell with a very long anal petiole, the basal anal cell in forewing open, the mandibles small and simply bidentate, etc. Benson also discussed that the wing showed slight Selandriine features as the recurving of Rs+M at its base and the convergence of M with 1m-cu. However, the base of Rs+M in *Cacosyndya* is all straight, and many genera within Blennocampinae shared a convergence of M with 1m-cu, such as *Tomostethus*, *Aphymatocera*, *Bua*, *Corpilus*, etc.

Smith (1976) stated that "the wing venation of the male corresponds to that of the Fenusini, and the general habitus of the species as well as the simple tarsal claws and long antennae and fore tarsi resemble those of *Prolatus* Smith from western United States. He believed "it belongs to the Fenusini...I see no reason to retain a separate tribe for a modified condition such as aptery in one sex". The erection of Cacosyndiini is really not necessary as *Cacosyndya* is just a normal member of Phymatocerini of Blennocampinae except for the apterous female. But *Cacosyndya* cannot be a member of Fenusini as shown by the following characters: the antenna very long and slender with flagellomeres subequal in length, male flagellomeres with long and erect hairs; vein Sc distinct and much basad apex of vein 1M, cell C broad, vein 1m-cu oblique and directed toward apex of pterostigma; the hind wing with cell M closed. All of these characters are features of Phymatocerini of Blennocampinae. In Fenusini, the antenna are never so slender or longer than the body in male, flagellomere usually gradually reduced in length and never with erect hairs, vein Sc indistinct, cell C very narrow, vein 1m-cu almost erect and directed toward base of pterostigma, and the cell M in hind wing is always open.

Within Phymatocerini of Blennocampinae, *Cacosyndya* is similar to *Bavonia* Pesarini, 2004 from Alps of Europe and *Zaphymatocera* Sato, 1928 from northeastern Asia. Except for the peculiar apterous female, the short and broad clypeus, the extraordinary long and slender male antenna, the quadrate pedicellum, the vein cu-a in forewing meeting cell 1M at basal 0.4, the long and slender claw will easily distinguish *Cacosyndya* from the latter two genera. Besides, *Cacosyndya* also differs from *Zaphymatocera* by the epicnemial furrow indistinct and from *Bavonia* by the wings longer than body, the hind tibia distinctly longer than tarsus, the anal petiole of hind wing much longer than cu-a and the cell 1M clearly higher than long.

Distribution. Uzbekistan.

2. ***Cacosyndia dimorpha* (Freymuth, 1870)** (Fig. 1)

Pompholyx dimorpha Freymuth, 1870: 2178.

Cacosyndia dimorpha: Kirby, 1883: 203.

Cacosyndia dimorpha: Dalla Torre, 1894: 186.

Redescription. Female (Not type, Figs 1A, 1B). Body length 5–6 mm; black; clypeus largely yellow brown, labrum dark brown; prothorax, mesonotum, mesepisternum and cercus largely yellow brown, margins of sheath brownish; legs black, basal third of fore and middle tibiae and basal two thirds of hind tibia whitish, tarsi dark brown; body hairs silver.

Clypeus with shallow, large and sparse punctures; dorsum of head with small punctures, frons faintly sculptured, flagellum distinctly sculptured; dorsum of thorax and abdomen distinctly microsculptured, mesopleuron almost smooth, shiny. Hairs on dorsum of head about as long as diameter of ocellus, and on clypeus and labrum much longer; hairs on flagellum dense and oblique; setae on sheath short and weakly curved.

Clypeus 3.5 times broad than long, anterior margin feebly curved (Fig. 1C); labrum short and transverse, apical margin roundish; malar space about 0.8 times diameter of lateral ocellus;

distance between eyes at toruli level 1.7 times longest axis of eye, inner frons weakly convex; in dorsal view, head distinctly narrowed behind eyes, inner margin of toruli sharply elevated; postocellar area almost as broad as long, weakly convex, lateral furrow broad and deep, weakly divergent backward; POL : OOL : OCL = 40 : 30 : 37 (Fig. 1D); in lateral view frons clearly above top of eyes, top of hind orbit about as broad as eye; antenna as long as abdomen. Pronotum narrow, lateral posterior lobe 2.5 times as long as collar; mesonotum and metanotum as in Fig. 1A; basitarsus 1.1 times longer than following 3 tarsomeres together, claw quite slender. Cerci about 2 times longer than broad; apical sheath 0.85 times as long as basal sheath, apex roundly narrowed (Fig. 1B).

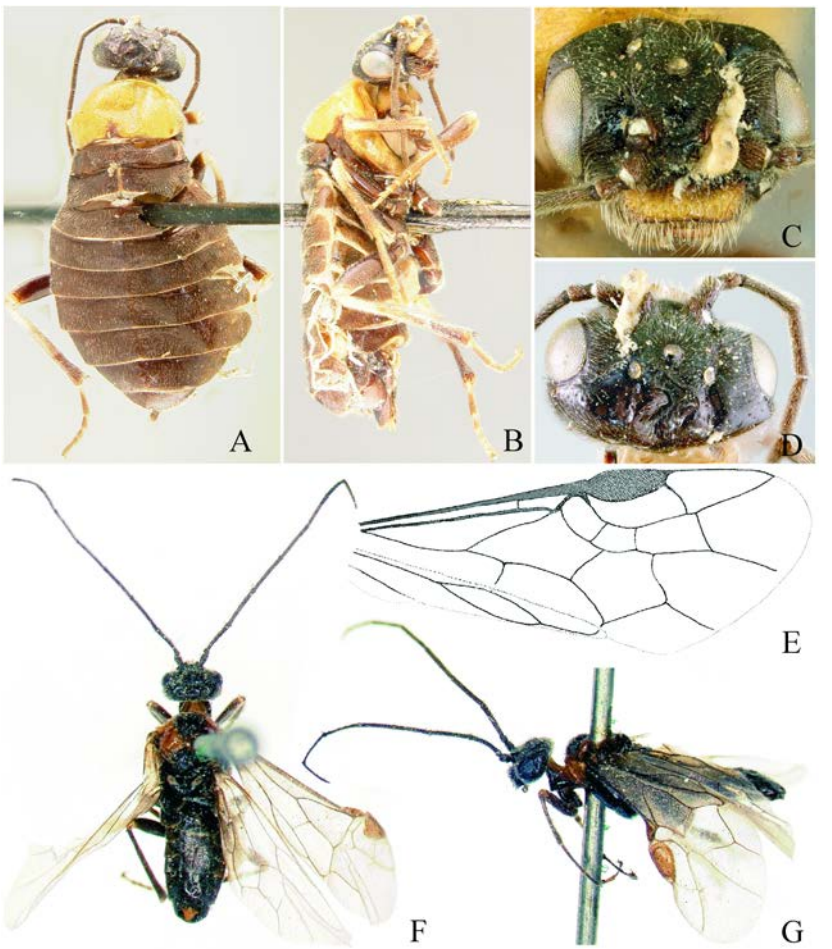

Figure 1. *Cacosyndia dimorpha* (Freymuth, 1870). A–D. ♀; E–G. ♂. A, F. Adult, dorsal views; B, G. Adult, lateral views; C. Head, frontal view; D. Head, dorsal view; E. Forewing; F, G. Syntype of *C. dimorpha* from ECatSym.

Male. Length 3.5–4 mm (Figs 1F, 1G). Body including legs black, pronotum, tegula an mesoscutal lateral lobe reddish brown, each knee pale brown, body hairs silver; wings hyaline, vein C and pterostigma brown. Head small, structures similar to female, clypeus shorter; antenna quite slender and clearly longer than body, each flagellomere with erect hairs about 0.8 times breadth of flagellomere. Fore wing as in Fig. 1E; hind wing with cell M broad, cu-a

meeting cell M at about middle, anal cell 1.85 times longer than anal petiole, anal petiole 2 times longer than cu-a.

Specimens examined. 2♀2♂, Tashkent (USNM); 1♀1♂, Samarkand (BMNH).

Distribution. Uzbekistan.

Acknowledgements

Our cordial thanks are due to Dr. D. R. SMITH and Dr. G. BROAD for their kind help when we visited the Smithsonian Institute, USA in 2012 and the Natural History Museum, UK in 2010. This research was supported by the National Natural Science Foundation of China (32370500; 31172142).

References

Abe M & Smith DR. 1991. The genus-group names of Symphyta (Hymenoptera) and their type species. *Esakia*, 31: 1–115.

Benson RB. 1959. Tribes of the Tenthredinidae and a new European genus (Hymenoptera: Tenthredinidae). *Proceedings of the Royal Entomological Society of London. Series B: Taxonomy*, 28(9-10): 121–127.

Dalla Torre KWv. 1894. *Catalogus Hymenopterorum hucusque descriptorum systematicus et synonymicus. Vol. 1: Tenthredinidae incl. Uroceridae* (*Phyllophaga & Xylophaga*). Sumptibus Guilelmi Engelmann, Lipsiae, 459 pp.

Freymuth EK. 1870. *Pompholyx dimorpha* sp. n. Novaja bezkrylaja forma iz semejstva pilshtchikov (Tenthredinidae) i skolsko drugich novych vidov etogo semejstva (Russ.). *Protocole 47me séance société d'anthropologie Moscow*, 8: 213–225.

Kirby WF. 1883. X. Notes on new or little-known species of Hymenoptera chiefly from New Zealand. *Transactions of the Entomological Society of London*, (2): 199–203.

Konow FW. 1905. *Hymenoptera. Fam. Tenthredinidae. Fasc. 29. In*: Wytsman P (Ed.), *Genera Insectorum*. Brüssel: Bruxelles, p.176.

Kuznetzov-Ugamskij NN. 1930. Notice on *Cacosyndia dimorpha* Freym. (Hymenoptera, Tenthredinidae). *Russkoje entomologitscheskoje obozrenije*, 24(1-2): 59–62.

Niu GY & Wei MC. 2010. Revision of the *Siobla annulicornis*, *acutiscutella* and *sheni* groups (Hymenoptera: Tenthredinidae). *Zootaxa*, 2643: 45–65.

Pesarini F. 2004. Descrizione di Bavonia focarilei, gen. nov., sp. n. di Tenthredinide delle Alpi svizzere meridionali, con osservazioni sulla tribù Phymatocerini (Hymenoptera, Symphyta, Tenthredinidae, Blennocampinae). *Bolletino della Societa Ticinese di Science Naturali*, 92(1-2): 73–82.

Ross HH. 1945. Sawfly genitalia: terminology and study techniques. *Entomological News*, 61(10): 261–268.

Sato K. 1928. The Chalastogastra of Korea (No. 1). *Insecta Matsumurana*, 2: 178–190.

Smith DR. 1976. World genera of the leaf mining sawfly tribe Fenusini (Hymenoptera: Tenthredinidae). *Entomologica Scandinavica*, 7: 253–260.

Taeger A, Blank SM & Liston AD. 2010. World Catalog of Symphyta (Hymenoptera). *Zootaxa*, 2580: 1–1064.

Taeger A, Liston AD, Prous M, Groll EK, Gehroldt T & Blank SM. 2018. *ECatSym–Electronic World Catalog of Symphyta* (*Insecta, Hymenoptera*). Program version 5.0 (19 Dec 2018), data version 40 (23 Sep. 2018). Senckenberg Deutsches Entomologisches Institut (SDEI), Müncheberg. https://sdei.de/ecatsym/ (accessed 14 October 2023)

Wei MC & Nie HY. 1998. Generic list of Tenthredinoidea in new systematic arrangement with synonyms and distribution data. *Journal of Central South Forestry University*, 18(3): 23–31.