

Discovery of *Xestophanopsis* gen. n. from China and taxonomic revision of two species misplaced in *Ceroptres* Hartig, 1840 (Hymenoptera, Cynipoidea: Cynipidae)

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In the present paper, we describe *Xestophanopsis* Pujade-Villar & Wang gen. n. to the tribe Diastrophini based on *Ceroptres distinctus* Wang, Liu & Chen, 2012 and transfer *Ceroptres distinctus* Wang, Liu & Chen, 2012 to *Periclistus* Foerster, 1869 as *Periclistus setosus* (Wang, Liu & Chen, 2012) comb. n. In addition, we report the first record of *Periclistus capillatus* Kovalev, 1968 from China, along with the first report and description of the male. Finally, we provide a taxonomic key to all Eastern Palearctic species of the genus *Periclistus*.

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1. Introduction

Gall wasps (Hymenoptera, Cynipoidea: Cynipidae) are endophytophagous herbivores whose larvae develop in galls on vegetative organs of the host plants, either as gall-inducers, or as inquiline inhabitants of galls induced by other cynipids (Liljeblad & Ronquist 1998, Csóka *et al.* 2005, Péntzes *et al.* 2009, Ronquist *et al.* 2015), while a

few unusual species appear to be seed gallers (Weld 1957, 1959, 1960, Ronquist & Liljeblad 2001, Buffington & Morita 2009). Approximately 1,400 gall wasp species are currently known (Ronquist *et al.* 2015).

The family Cynipidae is currently grouped into 12 tribes based on a recent comprehensive phylogenetic analysis using both morphological and molecular data (Ronquist *et al.* 2015). Several

new tribes, including Diastrophini, have been erected according to the updated classification scheme. Diastrophini is apparently a monophyletic lineage currently consisting of two genera of gall makers, *Diastrophus* Hartig, 1840 and *Xestophanes* Foerster, 1869, previously included in the tribe Aylacini, and two inquiline genera, *Periclistus* Foerster, 1869 and *Synophromorpha* Ashmead, 1903, previously included in the tribe Synergini. As is understood currently, all members of the Diastrophini are associated with Rosaceae host plants.

Compared to the other gall wasps that induce galls on herbaceous or bush host plants, members of *Diastrophus* (on *Rubus*) and *Xestophanes* (on *Potentilla*) differ in having a basal lobe on tarsal claws. *Diastrophus* is widely distributed in the Holarctic (Palaeartic and Nearctic) (Schick *et al.* 2003, Melika 2006, Abe *et al.* 2007) and Neotropical areas (Nieves-Aldrey *et al.* 2013). The 18 currently known species of the genus all induce galls on host plants in the family Rosaceae (*Potentilla*, *Fragaria* and *Rubus*), with one exception, *D. smilacis* Ashmead, 1896, which induces galls on the monocotyledonous *Smilax* (Smilacaceae) (Ashmead 1896, Schick *et al.* 2003). The genus *Xestophanes* is endemic to Europe in the Western Palaeartic and consists of only two known species (Nieves-Aldrey 1994, 2001, Melika 2006). Both *Xestophanes* species are known to induce galls on *Potentilla* (Rosaceae), but were also reported to induce galls on *Sibbaldia* (Rosaceae) (Belizin 1959), although the latter host record needs to be confirmed (Abe *et al.* 2007).

The inquiline members of Diastrophini, *Periclistus* and *Synophromorpha*, differ from other Palaeartic inquiline genera (except *Ceroptres*) in having the metasomal tergite I reduced to a dorsal crescent-shaped scale. *Periclistus* has a Holarctic distribution with 15 known species (Penzés *et al.* 2012, Pujade-Villar *et al.* 2016). All known species of the genus *Periclistus* are associated with galls induced by *Diplolepis* and *Liebelia* (Cynipidae: Diplolepidini) on rose hosts, except one Nearctic species, *P. smilacis* Ashmead 1896, which was reared from galls of *Diastrophus smilacis* in Florida, USA. In the Eastern Palaeartic, five species of the genus are known up to date (Pujade-Villar *et al.* 2016), which are *P.*

mongolicus Belizin, 1973 from Mongolia, *P. capillatus* Belizin, 1968 from Russia (Primorskij Kraj), *P. natalis* Taketani & Yasumatsu, 1973 and *P. quinlani* Taketani & Yasumatsu, 1973 from Japan, and *P. qinghainensis* Pujade-Villar, Wang, Guo & Chen, 2016 from Qinghai Province of China. The genus *Synophromorpha* has a Nearctic and Eastern Palaeartic distribution with six described species (Abe *et al.* 2007), including two species from the Eastern Palaeartic: *S. tobi-asi* Belizin, 1973 (from Tajikistan and Kyrgyzstan, with status uncertain) and *S. taketanii* Abe, 1998 from Japan (Abe *et al.* 2007). Of the six known species of *Synophromorpha*, five are known to be associated with *Diastrophus* galls (Ronquist & Liljeblad 2001) while the remaining species needs to be confirmed, although it is expected to have similar host gall association (Abe 1998, Abe *et al.* 2007). In total, six inquiline species in the tribe Diastrophini are known from the Eastern Palaeartic.

The genus *Ceroptres* Hartig, 1840 is the single member of the tribe Ceroptresini established by Ronquist *et al.* (2015) and is diagnosed by two morphological features: (i) presence of two raised vertical carinae on the lower face and (ii) metasomal tergite 2 free (not fused with metasomal tergite 3) and small (ratio of median length of metasomal tergite 2 to median length of metasomal tergite 3 < 1.0). *Ceroptres* consists of about 24 known species and has a Holarctic distribution (Ronquist *et al.* 2015). All *Ceroptres* species with a host record are associated with cryptic cynipid galls on *Quercus* (Ronquist *et al.* 2015). In Eastern Palaeartic, a total of five species have been reported, including *Ceroptres setosus* Wang, Liu & Chen, 2012 and *Ceroptres distinctus* Wang, Liu & Chen, 2012 (Wang *et al.* 2012).

In a recent effort of systematic survey of the Eastern Palaeartic cynipid inquiline not belonging to Synergini, especially from mainland China, we came to the conclusion that the recently described *Ceroptres setosus* and *C. distinctus* (Wang *et al.* 2012) were erroneously placed based on misinterpretation of key diagnostic features, and that the former should be transferred to the *Periclistus* while the latter represents a new genus in the tribe Diastrophini. In the present paper, we report the discovery of the new genus, make taxonomic corrections and provide full

redescriptions of both *Ceroptres setosus* and *Ceroptres distinctus*. In addition, we report the first record of *Periclistus capillatus* Kovalev, 1968 from China and describe the male of the species for the first time. Finally, we provide an updated taxonomic key to all *Periclistus* species known from the Eastern Palaearctic region.

2. Materials and methods

We follow Liljeblad and Ronquist (1998) and Melika (2006) for morphological terminology, Ronquist and Nordlander (1989) for abbreviations of forewing venation, and Harris (1979) for cuticular surface terminology. The measurements and abbreviations used include: F1–F12, first and subsequent flagellomeres; POL, post-ocellar distance; OOL, the distance between the inner margins of the posterior ocelli; ocellar-ocular distance measured as the distance from the outer edge of the posterior ocellus to the inner margin of the compound eye and LOL, the distance between lateral and frontal ocelli. The length of the radial cell is measured from the conjunction of R1 with 2r to the marginal end of Rs or its projection when the vein does not reach wing margin. The width of the radial cell is measured from the anterior margin of forewing to the conjunction of Rs with 2r.

All pictures were taken using a digital camera (Q-Imaging, Micropublisher 3.3 RTV) attached to a Leica MZ APO stereomicroscope (Wetzlar, Germany) and processed using the software Synoptics AutoMontage version 5.0.

All type specimens and other examined materials are deposited in the Hymenoptera Collection of ZAFU (Hymenoptera Collection in Zhejiang A & F University) and UB (University of Barcelona, JP-V coll.). In addition, the type of *P. capillatus* deposited in ZIN (Zoological Institute of the Russian Academy Sciences, Sant Petersburg, Russia) was also examined.

3. Taxonomy

3.1. *Xestophanopsis* Pujade-Villar & Wang gen. n.

Type species: *Ceroptres distinctus* Wang, Liu & Chen, 2012. Present designation.

Material examined. 3♀, see *Xestophanopsis distinctus* (Wang, Liu & Chen, 2012) **comb. n.** below.

Diagnosis. *Xestophanopsis* gen. n. differs from *Diastrophus* and *Xestophanes* in having 10 very long flagellomeres (11 and shorter in *Diastrophus* and *Xestophanes*), F1 shorter than F2 (equal or longer in *Diastrophus* and *Xestophanes*), radial cell very long, at least 4.0 times as long as broad (at most 3.5 times as long as wide in *Diastrophus* and *Xestophanes*). It further differs from *Xestophanes* in having a strong tarsal tooth (tarsal tooth weak in *Xestophanes*) and from *Diastrophus* in having metasomal tergite II and III fused (tergite II and III not fused in *Diastrophus*) and radial cell partially closed along the margin (opened in *Diastrophus*). *Xestophanopsis* gen. n. differs from *Synophromorpha* and *Periclistus* (inquilinous genera) in having a smooth scutum without piliferous punctures, with very short and very superficial notauli (scutum, if smooth, with piliferous punctures in *Periclistus* and notauli complete and strong, forming deep grooves in *Synophromorpha*). In addition, the new genus also differs from *Periclistus* in having strong facial carinae (with delicate facial carinae in *Periclistus*). Finally, the new genus differs from all *Diastrophini* genera by female F2 being slightly curved and flagellomeres very long.

Description. Lower face with strong radiating carinae starting from clypeus, reaching to compound eyes and antennal sockets. Medial elevated area almost smooth, relatively strongly raised. Clypeus subquadrangular, slightly projected over mandibles. Frons, vertex and occiput smooth and shiny. Antenna with 10 long flagellomeres; F1 shorter than F2; F2 slightly curved (Fig. 1b). Pronotum dorsally long, smooth and shiny, laterally with dense white setae; submedial pronotal depressions deep, transversal, and separated medially; pronotal plate laterally well delimited throughout to scutum, alutaceous, shiny, with some setae. Scutum smooth and shiny; notauli incomplete, very superficial in anterior half; median mesoscutal line absent, or represented by a very short, barely detectable triangle; antero-median parallel lines absent; parapsidal lines present. Mesopleuron smooth and shiny. Scutellum rugose-reticulate and punctate; scutellar foveae present. Forewing pubescent, margin with short cilia; radial

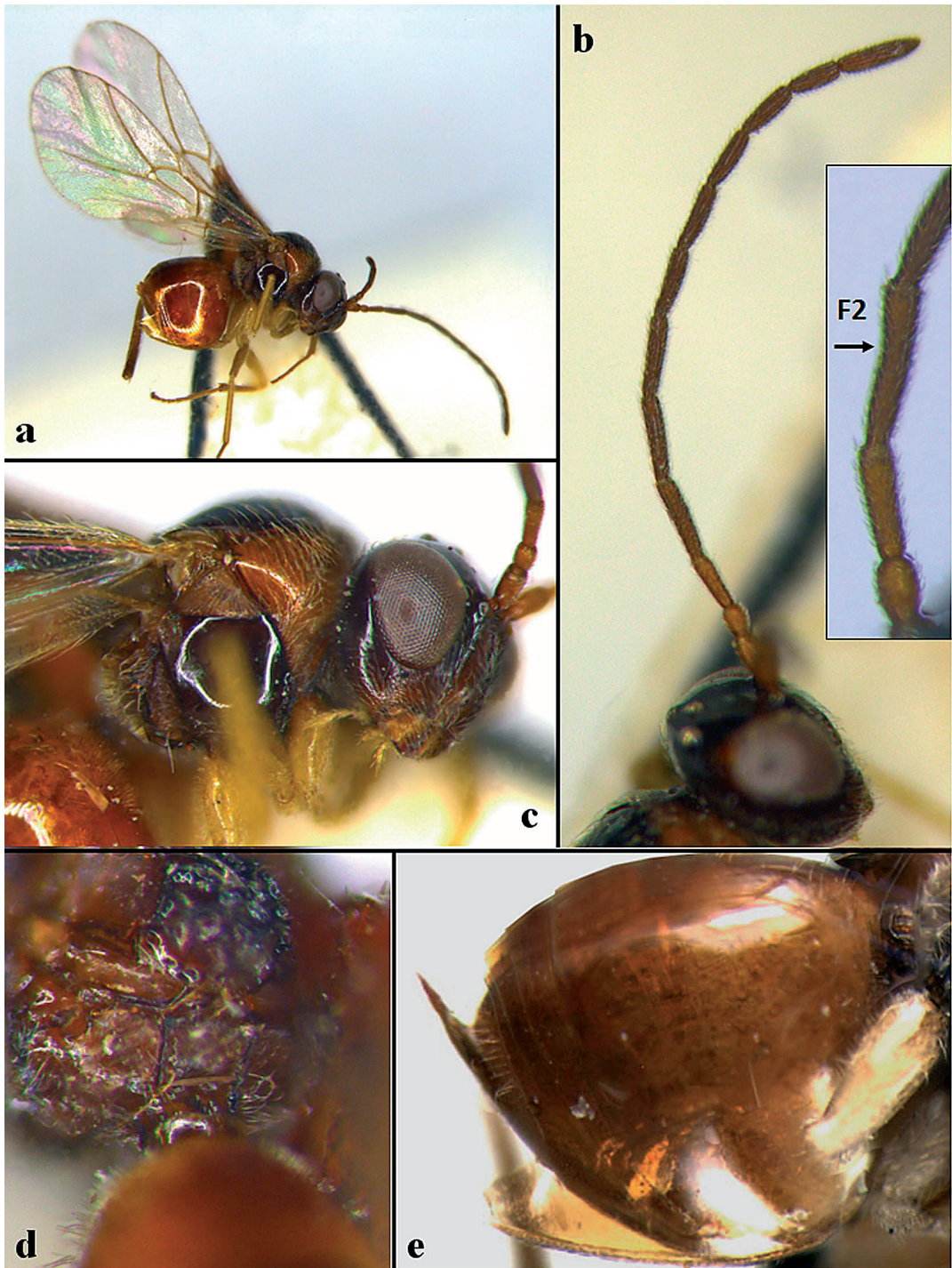


Fig. 1. *Xestophnopsis distinctus* **comb. n.** female. – a. Habitus. – b. Antenna and details of first segments, F2: curvature marked by arrow. – c. Head and mesosoma. – d. Propodeum. – e. Metasoma. e previously published in Wang *et al.* (2012).

cell long, R1 reaching to wing margin and distally slightly curved laterad. Tarsal claws with a strong basal lobe. Metasoma without punctures; first metasomal tergite short, crescent-shaped and smooth; tergites II and III of females fused with a dense patch of white setae antero-laterally; ventral spine of hypopygium short.

Etymology. The name of the new genus refers to its morphological similarities to the Western Palaearctic genus *Xestophanes* Foerster, 1869. Gender is masculine.

Xestophanopsis distinctus (Wang, Liu & Chen, 2012) **comb. n.**

Type material (deposited in ZAFU). Holotype. ♀, China: Zhejiang, Tianmushan, Xianrending (119°34'E, 30°26'N), 20.VI.1999, Zhao Ming-shui leg., Malaise trap, No. 996127. Paratypes. 1♀, same labels as the holotype, No. 996124; the paratype No. 995985 is not *Ceropres distinctus* (see comments below).

Additional material. 1♀, same data as Holotype (not type material, deposited in JP-V coll. UB), No. 996123 (see comments below).

Redescription. Length. Female: 2.1–2.2 mm, male unknown.

Colour. Head largely bright-brown except mandibles dark yellow basal-medially, maxillar and labial palps pale yellow; antenna dark yellow basally and pale brown medio-distally; pronotum dark yellow; mesoscutum and mesopleuron yellowish brown, mesopleural triangle and tegulae dark yellow; legs yellowish; metasoma pale yellow basally and dark yellow apically; wing membrane pale grey and veins of fore wing dark yellow.

Head (Figs 1c, 2b, d). Alutaceous, almost smooth, with sparse silver setae. Head slightly narrower than mesosoma, 1.2 times as broad as high in front view and 2.0 times as broad as long in dorsal view. Gena not expanded behind eye, almost smooth with sparse setae, and without piliferous punctures. Malar space about 1/4 times as long as height of eye. Lower face with sparse silver setae, medial raised area weakly alutaceous, almost smooth, without striae, bordered by two carinae from ventral margin of antennal sockets, and laterally with strong striae irradiating from clypeus, reaching eye and ventral margin of antennal sockets. Clypeus slightly subquadrate, alutaceous with ventral margin slightly curved

ventrally, not emarginated medially; anterior tentorial pits distinct and small; epistomal sulcus and clypeo-pleurostomal lines indistinct. Transfacial distance 0.75 times as long as height of eye; diameter of antennal torulus 1.5 times as long as distance between them. Inner margins of eyes parallel. Frons, vertex and occiput smooth with sparse setae; lateral frontal carina absent. POL: LOL: OOL = 4: 3: 2 and lateral ocellus as wide as OOL.

Antenna (Fig. 1b). 12-segmented, slightly longer than head plus mesosoma; pedicel 1.5 times as long as broad; F1 1.7 times as long as pedicel and around 0.6 times as long as F2; F2 slightly curved; relative lengths of antennal segments: 6: 4: 8: 13(× 2.8): 19: 14: 13: 12: 11(× 3.6): 11: 10: 21. Placodeal sensilla F2–F10.

Mesosoma (Figs. 1c, d, 2d–f). 1.2 times as long as high in lateral view. Pronotum pubescent, without lateral carina; submedian pronotal pits present, transversal, separated by a wide median carina. Mesoscutum largely smooth and shiny, very sparsely setose without punctures. Notauli shallowly impressed posteriorly and absent antero-medially. Anteromedian parallel lines absent, barely visible; median mesoscutal line absent; parapsidal lines present and very short, almost absent. Scutellum slightly wider than long, rugose-reticulate, densely setose, setae longer laterally and posteriorly; scutellar foveae smooth and shiny, separated by a wide median carina. Mesopleuron smooth and shiny, densely pubescent in lower portion; metapleural sulcus reaching mesopleuron in upper three-fourths of its height in lateral view. Propodeum alutaceous, shiny, pubescent; lateral propodeal carinae distinct, straight, slightly convergent posteriorly; area between two lateral carinae alutaceous, dull, with dense setae.

Forewing (Fig. 2a, c). Wing margin ciliated; surface mostly densely setose, sparsely setose in basal portion; radial cell partially opened, 4.0–4.2 times as long as wide, areolet distinct. Vein Rs+M well-marked, less marked before reaching to half of basal vein.

Legs. Tarsal claws with a basal lobe and tooth.

Metasoma (Fig. 1d, e). Shorter than head and mesosoma combined, as long as its maximum height in lateral view. First metasomal tergite short, crescent-shaped and smooth; second and

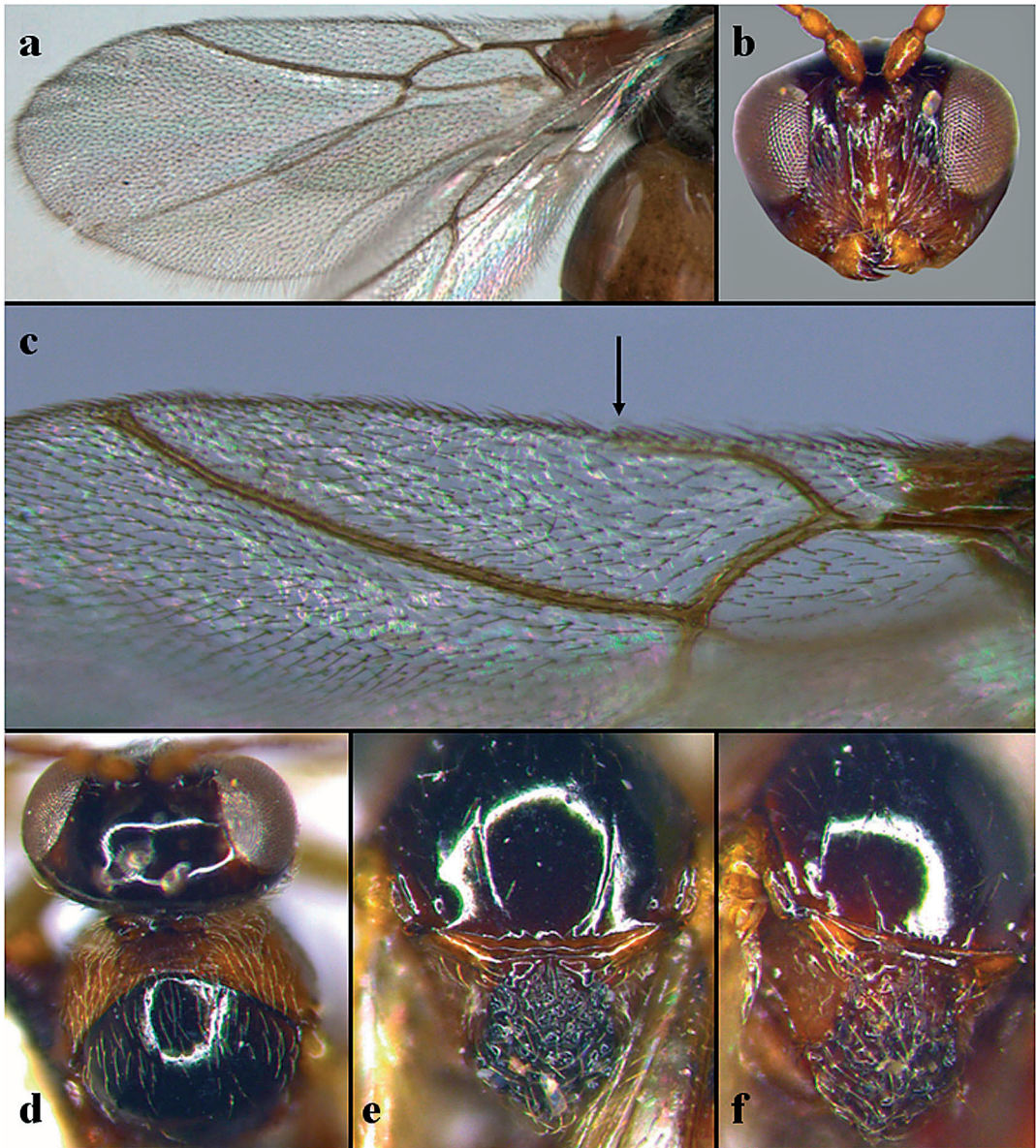


Fig. 2. *Xestophnopsis distinctus* comb. n. female. – a. Wings. – b. Head, frontal view. – c. Details of radial cell, ending of marginal vein shown by arrow. – d. Head and mesosoma, dorsal view. – e. Scutum. – f. Scutellum. a previously published in Wang *et al.* (2012).

third metasomal tergites fused, with a patch of pubescence antero-laterally; subsequent metasomal tergites with few scattered setae and small punctures. Hypopygium with very minute dense punctures, ventral ridge with white setae, prominent part of ventral spine of hypopygium short, as long as broad.

Host. Unknown.

Comments. One specimen (No. 995985, paratype in the original type series) was reported as male in the original description. However, it was found to be a female of a different species. Another specimen (No. 996123) was apparently erroneously labeled as a paratype because it was not included in the original description (the specimen is now deposited in the JP-V coll.).

3.2. *Periclistus* Foerster, 1869

3.2.1. *Periclistus setosus* (Wang, Liu & Chen, 2012) **comb. n.**

Ceroptres setosus Wang, Liu & Chen, 2012

Type material. Holotype. ♀, China: Longwang Mountain (119°24'E, 30°23'N), Anji (Zhejiang Province), 25.VI.1996, Jun-hua He leg., No. 962775. Paratypes. 4♀, China: Shumuyuan, Shenzhou (Fujian Province), 11.IV.1991, Tang Yu-qing leg., Malaise trap, No. 20009978; Hangzhou (Zhejiang Province), 19.V.1995, Jun-hua He leg., No. 966136; Hangzhou (Zhejiang Province), 24.V.1980, Jun-hua He leg., No. 801525; Fatou, Deqing (Zhejiang Province), 27.V.1996, Junhua He leg., No. 954479. All type material deposited in ZAFU.

Diagnosis. The species is morphologically similar to all other Eastern Palaearctic *Periclistus* species (*P. qinghainensis*, *P. capillatus*, *P. natalis* and *P. quinlani*) in having the mesopleuron entirely smooth and shiny, without striae, and mesoscutum smooth or alutaceous and shiny, sparsely finely punctate with setae. *Periclistus setosus* differs from *P. qinghainensis* and *P. capillatus* in having complete notauli (absent in *P. qinghainensis* and incomplete in *P. capillatus*), from *P. capillatus* by having F1 equal to F2, frons and vertex with fine piliferous punctures and smooth and shiny scutum (in *P. capillatus* F1 slightly shorter than F2, frons and vertex without fine piliferous punctures, and scutum partially alutaceous and dull). *Periclistus setosus* differs from the two Japanese species (*P. natalis* and *P. quinlani*) in having a short and partially open radial cell, radial cell 3.0 times as long as wide (4.0 times as long as wide and completely open in *P. natalis* and *P. quinlani*).

Redescription. Length of female 1.8–2.0 mm, male unknown.

Colour. Head largely black with slight reddish tint, except for mandibles yellowish brown, maxillary and labial palps pale yellow; scapus and pedicel pale yellow, flagellomeres dark yellow; mesosoma bright black, tegulae brown; legs pale yellow except coxa dark yellow; metasoma blackish brown; wing membrane pale grey and veins of fore wing dark yellow.

Head (Fig. 3a). Alutaceous with sparse white setae. Head slightly narrower than mesosoma,

1.2–1.3 times as broad as high in front view and 2.0 times as broad as long in dorsal view. Gena with setiferous punctures, not expanded behind eye. Malar space around 0.3 times as long as height of eye. Lower face delicately coriaceous, with sparse white setae and dense delicate striae irradiating from clypeus, reaching eye and ventral margin of antennal sockets; medial raised area weakly coriaceous without striae, bordered by two carinae from ventral margin of antennal sockets. Clypeus slightly subquadrate, alutaceous, ventral margin without medial incision; anterior tentorial pits small and distinct; epistomal sulcus and clypeo-pleurostomal lines indistinct. Transfacial distance around 0.75 times as long as height of eye; diameter of antennal torulus around 1.5 times distance between them. Inner margins of eyes parallel. Frons, vertex and occiput smooth sparsely finely punctate with setae; lateral frontal carina absent. POL: LOL: OOL = 4: 3: 2 and lateral ocellus as wide as OOL.

Antenna (Fig. 3e). 12-segmented, slightly longer than head and mesosoma combined; pedicel subquadrate, 1.4 times as long as wide; F1 1.9 times as long as pedicel and equal to length of F2; relative lengths of antennal segments from F1 to F10 are: 11: 11: 11: 10: 9: 9: 8: 7: 6: 17.

Mesosoma (Fig. 3b–d). 1.3 times as long as high in lateral view. Pronotum pubescent, without lateral carina, submedian pronotal depressions narrow, transversal, separated by a wide median carina. Mesoscutum with setigerous punctures. Notauli complete, deeply impressed, narrow anteriorly and relatively broadened posteriorly. Anteromedian parallel lines present and weakly impressed, extending posteriorly to 1/4 of entire length of mesoscutum; median mesoscutal line present in posterior 1/3 of mesoscutum; parapsidal lines present in posterior 1/3 of mesoscutum. Scutellum slightly wider than long, rugose, with long dense setae; scutellar foveae smooth and shiny, separated by a narrow median carina. Mesopleuron smooth and shiny, pubescent only in lower portion; metapleural sulcus reaching mesopleuron in upper three-fifths of its height in lateral view; metapleuron and propodeum pubescent; lateral propodeal carinae distinct, straight and slightly convergent posteriorly; median propodeal area coriaceous, lateral propodeal areas with dense setae.

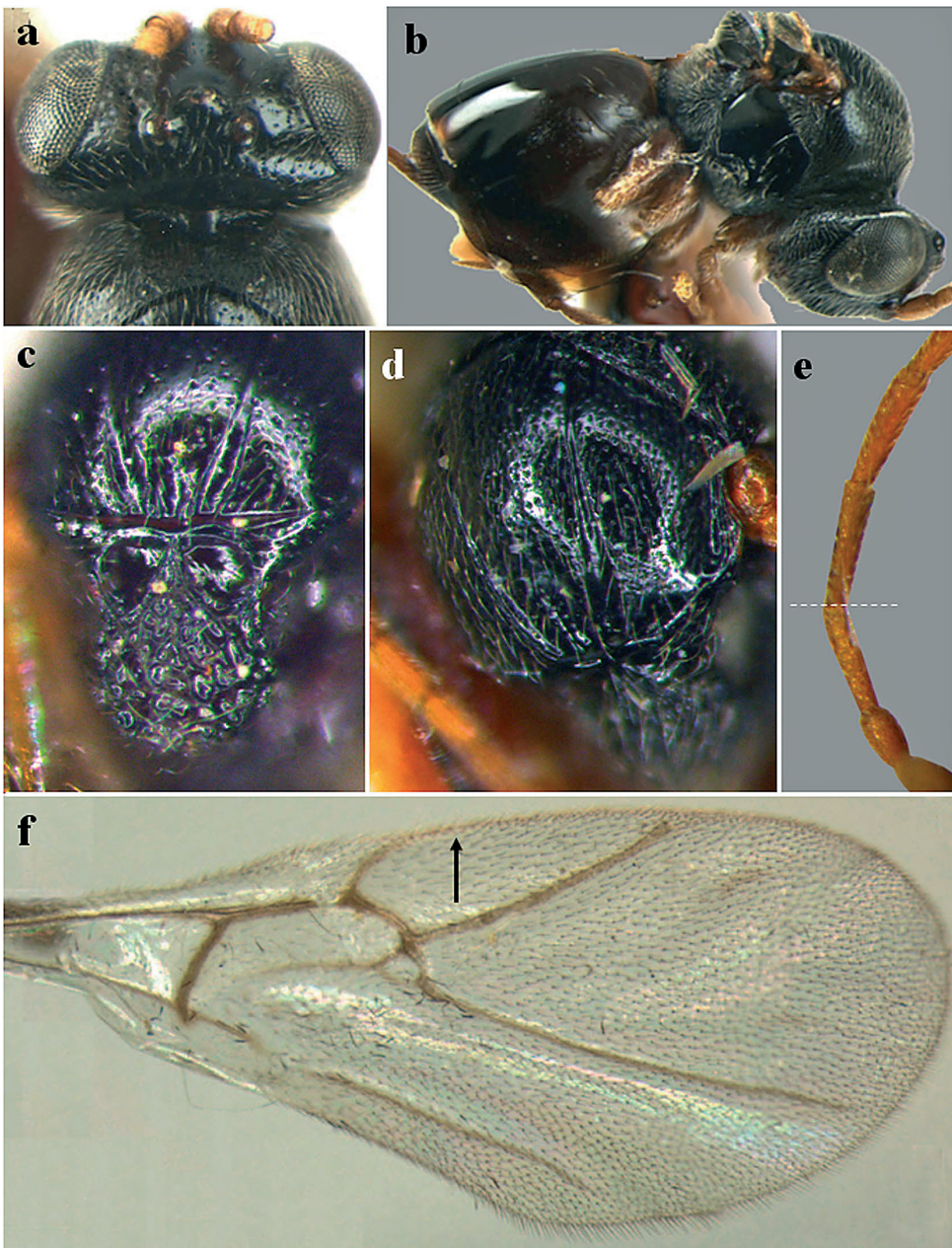


Fig. 3. *Periclistus setosus* **comb. n.** female. – a. Head, dorsal view. – b. Body, lateral view. – c, d. Mesosoma. – e. First segments of antenna. – f. Forewing, ending of marginal vein shown by arrow. a, b and f previously published in Wang *et al.* (2012).

Forewing (Fig. 3f). Margin ciliated; surface densely setose except for sparsely setose basal portion; radial cell partially opened, around 3.0 times as long as broad, areolet distinct. Vein Rs+M well-marked, except pale for proximal 1/4, reaching basal vein slightly posterior from middle.

Legs. Tarsal claws with small basal lobe and tooth.

Metasoma (Fig. 3b). Shorter than head and mesosoma combined, as long as its maximum height in lateral view. First metasomal tergite short, crescent-shaped and smooth; second and

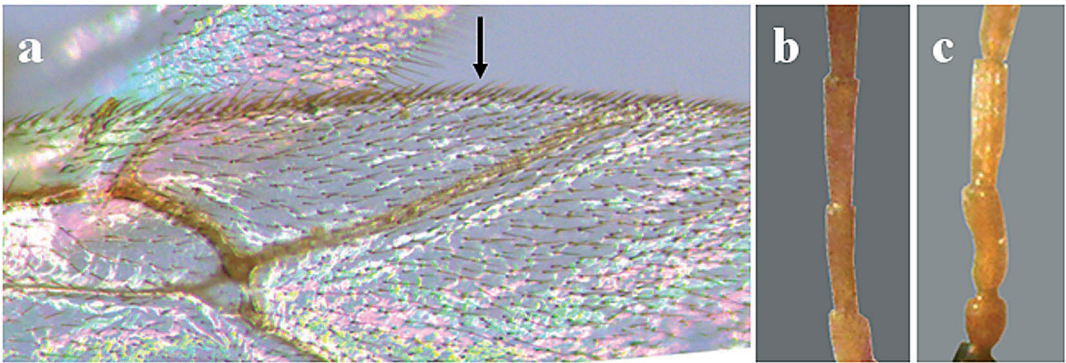


Fig. 4. *Periclistus capillatus*. – a. Radial cell, ending of marginal vein shown by arrow. – b. First segments of female antenna. – c. First segments of male antenna.

third metasomal tergites fused, with a patch of pubescence anterolaterally; subsequent metasomal tergites with scattered setae and small punctures, each small puncture bearing a very fine seta, ventral ridge with white setae, prominent part of ventral spine of hypopygium short, at most as long as broad.

Host. Unknown.

Comments. The new combination of *P. setosus* is well justified. *Periclistus* is a Holarctic genus and all *Periclistus* species with a host record are inquiline of Diplolepidini galls on *Rosa*. A single species of the genus has been previously reported from China (Pujade-Villar et al. 2016). *Periclistus setosus* share the same set of morphological features characteristic of the Eastern Palearctic species of the genus (see diagnosis above), suggesting that these species may share a common origin and diversified within the region, although formal phylogenetic analysis is needed before such a conclusion is even tentatively proposed.

3.2.2. *Periclistus capillatus* Kovalev, 1968

Type material. 1♀, with the following labels: “Kedrovaya pad’ [Nature Reserve] Primorie [= Primorskiy kray] O. Kovalev 17 V 60”. Deposited in ZIN.

Additional material. 1♀, with the *Saphonecus* label, Baiyun Mountain, Songxian (Henan Province), 19.VII.1996, Cai Ping leg., No. 972990 (deposited UB, JP-V coll.); 1♂, with the *Synergus chinensis* label, Luanchuan (Henan Province), 12.VII.1996, Cai Ping leg., No. 974554; 1♀, with the *Saphonecus* label Zhouzhi, Houzhenzi (Shaanxi Province), 2-3.VI.1998, Ma

Yun leg., No. 981572 (deposited in ZAFU).

Comments. This species was originally described based on a single female collected in the Far East of Russia. According to Pujade-Villar et al. (2016), the main diagnostic characters for this species include: black head and mesosoma, reddish brown metasoma, testaceous antennae and legs; 12-segmented antenna, F1 slightly shorter than F2 (Fig. 4b); frons and vertex smooth without piliferous fine punctures, mesoscutum alutaceous to smooth with piliferous fine punctures and sparse pubescence; notauli and median mesocutal sulcus present posteriorly, short, nearly absent in anterior 3/4 to 2/3 of scutum; mesopleuron smooth; radial cell open (Fig. 4a) but partially closed (R1 distinctly projected toward anterior margin of forewing), 3.0–3.3 times as long as broad; areolet visible; metasomal tergites fused (T2+T3) and smooth, with an anterolateral patch of white setae; subsequent segments glabrous with micropunctures. The male is similar to the female except for the following characters: antenna 14-segmented, F1 slightly shorter than F2, curved and expanded apically and basally (Fig. 4c); antennal formula is 4: 3: 5: 6: 5: 5: 4.5: 4: 4: 3.5: 3: 3: 2.5: 4.5; POL: LOL: OOL is 4: 2.5: 2, and lateral ocellus as wide as OOL; radial cell 3.2 times as long as broad.

First record from China.

3.2.3. Taxonomic key to Eastern Palearctic species of *Periclistus* Foerster, 1869

The known species of *Periclistus* in the Eastern Palearctic can be identified using the following taxonomic key.

1. Radial cell long, around 4.0 times as long as wide, opened; forewing with small clouded macula posterior to anterior margin near apex of radial cell 2
 - Radial cell short, around 3.0 times as long as wide, and partially closed or closed, but if closed, the marginal vein very inconspicuous; forewing hyaline 3
2. Notaular pits present anteriorly, weakly impressed; metasoma reddish-brown. [Distribution: Japan] *P. natalis*
 - Notaular pits absent; metasoma blackish brown. [Distribution: Japan] *P. quinlani*
3. Notauli completely absent. [Distribution: China] *P. qinghainensis*
 - Notauli present, complete or incomplete 4
4. Frons and vertex without punctures. F1 shorter than F2. Radial cell open, R1 present along wing margin along at least the proximal half of radial cell, sometimes inconspicuously closed. Scutum anteriorly weakly alutaceous and with fine piliferous punctures, especially between anterior parallel lines; notauli incomplete or very weakly impressed anteriorly. Metasoma reddish-brown. [Distribution: Far East and China] *P. capillatus*
 - Frons and vertex with fine piliferous punctures. F1 as long as F2. Radial cell partially open, R1 shortly projected along wing margin of radial cell. Scutum smooth between setiferous points, shiny; notauli complete. Metasoma blackish brown. [Distribution: China] *P. setosus*

4. Discussion

All the specimens examined in the present study were collected using Malaise traps, and therefore do not allow to elucidate the biology of the species they represent. Information on the hosts, both gall making host and plant host, is very important in the identification of cynipid inquiline, and consequently, identification of specimens collected by Malaise traps can sometimes be very difficult.

The species included in the present study fall well within the tribe Diastrophini according to Ronquist *et al.* (2015), displaying the characteristic features of the tribe, including that the clypeo-

pleurostomal lines are absent, the gular sulci are indistinct, the female antenna is 12-segmented, the longitudinal ridge on F1 of male antenna is present, the pronotum is medially long medially, the pronotal plate is distinct, its lateral margins are entirely marked, almost reaching the posterior margin of the pronotum, the mesoscutum and the mesopleuron are glabrous (*Diastrophus*, *Xestophanes* and *Xestophanopsis* **gen. n.**) or sculptured with piliferous punctures (*Periclistus* and *Synophromorpha*), the metatarsal claws are strongly bent apically and expanded to a lobe or tooth basally, the claws have long subapical seta, the abdominal terga 3–8 are either free in both sexes (*Diastrophus*) or 3+4 fused in females and free in males (*Xestophanes*, *Periclistus* and *Synophromorpha*) and, finally, the sternal part of the petiolar annulus (the ventral marginal flange of petiole) is present and distinctly projecting.

The Diastrophini tribe includes both gall-forming and inquiline genera, being all associated with host plants in Rosaceae family, and it is uncertain as to whether *Xestophanopsis distinctus* **comp. n.** is a gall-maker or an inquiline species. Nonetheless, the new genus shares more morphological similarities with the gall making genera of the tribe, especially *Xestophanes*, and does not seem to be closely related to the known inquiline genera. For example, *Synophromorpha* has a complete and very strongly impressed notauli while *Xestophanopsis* **gen. n.** has an incomplete and posteriorly very superficial notauli, although the both genera have the lower face with strong striae irradiating from the clypeus, reaching the eye and the ventral margin of the antennal sockets. Some Eastern Palearctic species of *Periclistus* have a smooth mesoscutum with short and superficial notauli as in *Xestophanopsis* **gen. n.**, but in these cases the scutum has strong piliferous fine punctures (absent in *Xestophanopsis* **gen. n.**) and the irradiating carinae in the lower face are dense and delicate (not dense and strong as in *Xestophanopsis* **gen. n.**).

Cynipids as herb gallers are mostly unknown in the Eastern Palearctic (Abe *et al.* 2007). Within the gall making genera in Diastrophini, Species of *Xestophanes* are exclusively associated with herbaceous species of *Potentilla* while those of *Diastrophus* form galls on *Rubus* spp., *Potentilla* spp., *Fragaria virginiana* Duchesne and *Smilax*

sp. (Schick *et al.* 2003). All the plant species used by species of *Diastrophus*, except one, belong to the rose family, of which nearly half are herbaceous. It is therefore highly likely that *Xestophanopsis* **gen. n.** is a gall-forming taxon associated with Rosaceae and perhaps also with its herbaceous species, given the fact that it is morphologically more similar to the herb-galling *Xestophanes*.

It is a long-held belief that thorough studies on the Eastern Palaearctic cynipids would yield probably some of the richest cynipid faunas. The discovery of *Xestophanopsis* **gen. n.**, in the tribe Diastrophini, and its possible host association certainly add new evidence to support this assertion. Similarly, several new genera in the tribe Phanacidini have been recently described from the Eastern Palaearctic (*Asiocynips* Kovalev, 1982, *Zerovia* Diakontschuk, 1988 and *Diakontschukia* Melika, 2006) to be associated with Asteraceae. Still further, many new taxa in the tribes Cynipini and Synergini have also been described from this area (Melika *et al.* 2005, 2010, 2013, Tang *et al.* 2011, Liu *et al.* 2012, Bozsó *et al.* 2015, Schwéger *et al.* 2015a, b, Zhu *et al.* 2015). The anticipated high richness of the cynipid fauna is most probably based on the species richness of Rosaceae (species of which Diastrophini species are associated with) in China, which is remarkable: 55 genera (two endemic) and 950 species (546 endemic), including 22 genera (one endemic) and 457 species (240 endemic) in the subfamily Rosoideae, to which *Rubus* and *Potentilla* belong (Lu *et al.* 2003). Similarly, the same level of species richness and endemism is matched by the Chinese Fagaceae (Huang *et al.* 2000), which are almost exclusively used by the species-rich tribes of Cynipini and Synergini.

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References

- Abe, Y. 1998: Palaearctic occurrence of the genus *Synophomorpha* (Hymenoptera: Cynipidae) confirmed on the basis of a new species from Japan. — *Entomologica Scandinavica* 29: 25–28. doi: <https://doi.org/10.1163/187631298X00168>
- Abe, Y., Melika, G. & Stone, G. N. 2007: The diversity and phylogeography of cynipid gallwasps (Hymenoptera: Cynipidae) of the Oriental and Eastern Palaearctic Regions, and their associated communities. — *Oriental Insects* 41: 169–212. doi: <https://doi.org/10.1080/00305316.2007.10417504>
- Ashmead, W. H. 1896: Descriptions of new parasitic Hymenoptera. — *Transactions of the American Entomological Society* 23: 179–234.
- Belizin, V. I. 1959: Gall wasps of the tribe Aylaxini (Hymenoptera, Cynipoidea) new for the fauna of the U. S. S. R. — *Entomologicheskoye Obozreniye* 38: 662–74. [In Russian.]
- Bozsó, M., Tang, C. T., Péntzes, Z., Yang, M. M., Bihari, P., Pujade-Villar, J., Schwéger, S. & Melika, G. 2015: A new genus of cynipid inquiline, *Lithosaphonecrus* Tang, Melika & Bozs (Hymenoptera: Cynipidae: Synergini), with description of four new species from Taiwan and China. — *Insect Systematics & Evolution* 46(1): 79–114. doi: <https://doi.org/10.1163/1876312X-45032116>
- Buffington, M. & Morita, S. I. 2009: Not all oak gallwasps gall oaks: the description of *Dryocosmus rileypokei*, a new, apostate species of Cynipini from California. — *Proceedings of the Entomological Society of Washington* 111(1): 244–253. doi: <https://doi.org/10.4289/0013-8797-111.1.244>
- Csóka, G., Stone, G. N. & Melika, G. 2005: Biology, Ecology and Evolution of gall-inducing Cynipidae. — In: Raman, A., Schaefer, C. W. & Withers, T. M. (eds.), *Biology, ecology and evolution of gall-inducing arthropods*: 569–636. Science Publishers, Inc. Enfield, New Hampshire, USA. 642 pp.
- Harris, R. 1979: A glossary of surface sculpturing. State of California, Department of Food and Agriculture. — *Occasional Papers in Entomology* 28: 1–31.
- Huang, C. J., Zhang, Y. T. & Bartholomew, B. 2000: Fagaceae. — In: Wu, Z. Y. & Raven, P. H. (eds.), *Flora of China: Cycadaceae through Fagaceae*: 314–400. Science Press, Missouri Botanical Garden, Beijing, St Louis, MO. 453 pp.
- Liljeblad, J. & Ronquist, F. 1998: A phylogenetic analysis of higher-level gall wasp relationships (Hymenoptera: Cynipidae). — *Systematic Entomology* 23: 229–252. doi: https://doi.org/10.1046/j.1365-3113.1998.*00053.x
- Liu, Z., Yang, X. H., Zhu, D. H. & He, Y. Y. 2012: A new species of *Saphonecrus* (Hymenoptera, Cynipoidea) associated with plant galls on *Castanopsis* (Fagaceae) in China. — *Annals of the Entomological Society of America* 105(4): 555–561. doi: <https://doi.org/10.1163/AN12021>

- Lu, L., Gu, C., Li, Ch., Crinan, A., Bruce, B., Brach, A. R., Boufford, D. E., Ikeda, H., Ohba, H., Robertson, K. R. & Spongberg, S. A. 2003: Rosaceae. — *Flora of China* 9: 46–434.
- Melika, G. 2006: Gall Wasps of Ukraine. Cynipidae. — *Vestnik zoologii* (supplement) 21(1): 1–300.
- Melika, G., Ros-Farré, P., Péntzes, Zs., Ács, Z. & Pujade-Villar, J. 2005: *Ufo abei* Melika et Pujade-Villar (Hymenoptera: Cynipidae: Synergini) new genus and new species from Japan. — *Acta Zoologica Academiae Scientiarum Hungaricae* 51(4): 313–27.
- Melika, G., Pujade-Villar, J., Abe, Y., Tang, C. T., Nicholls, J., Wachi, N., Ide, T., Yang, M. M., Péntzes, Zs., Csóka, Gy. & Stone, G. N. 2010: Palaearctic oak gallwasps galling oaks (*Quercus*) in the section *Cerris*: re-appraisal of generic limits, with descriptions of new genera and species (Hymenoptera: Cynipidae: Cynipini). — *Zootaxa* 2470: 1–79. doi: <https://doi.org/10.11646/zootaxa.2470.1.1>
- Melika, G., Tang, C. T., Sinclair, F., Yang, M. M., Lohse, K., Hearn, J., Nicholls, J. A. & Stone, G. N. 2013: A new genus of oak gallwasp, *Cyclocynips* Melika, Tang & Sinclair (Hymenoptera: Cynipidae: Cynipini), with descriptions of two new species from Taiwan. — *Zootaxa* 3630(3): 534–548. doi: <https://doi.org/10.11646/zootaxa.3630.3.8>
- Nieves-Aldrey, J. L. 1994: Revision of West-European genera of the tribe Aylacini Ashmead (Hymenoptera, Cynipidae). — *Journal of Hymenoptera Research* 3: 175–206.
- Nieves-Aldrey, J. L. 2001: Hymenoptera, Cynipidae. — In: Ramos, M. A., Alba Tercedor, J., Bellés, X., Gosálbez, J., Guerra, A., Macpherson, E., Martin-Piera, F., Serrano, J. & Templado, J. (eds.), *Fauna Ibica*, vol. 16: 1–636. Museo Nacional de Ciencias Naturales. CSIC. Madrid. 636 pp.
- Nieves-Aldrey, J. L., Rodriguez, P. A. & Medianero, E. 2013: Description of a new species of *Diastrophus* (Hymenoptera: Cynipidae: ylacini from Colombia: The first herb gall wasp native to the Neotropical Region. — *Annals of the Entomological Society of America* 106(6): 719–728. doi: <https://doi.org/10.1603/AN13033>
- Péntzes, Zs., Melika, G., Bozsoki, Z., Bihari, P., Mikó, I., Tavakoli, M., Pujade-Villar, J., Fehér, B., Fülöp, D., Szabó, K., Sipos, B., Somogyi, K. & Stone, G. N. 2009: Systematic re-appraisal of the gall-usurping wasp genus *Synophrus* Hartig, 1873 (Hymenoptera: Cynipidae: Synergini). — *Systematic Entomology* 34: 1–25. doi: <https://doi.org/10.1111/j.1365-3113.2009.00482.x>
- Péntzes, Zs., Tang, C. T., Bihari, P., Bozsó, M., Schwéger, S. & Melika, G. 2012: Oak associated inquiline (Hymenoptera, Cynipidae, Synergini). — *TISCIA monograph series*, 11. Szeged, Hungary. 76 pp.
- Pujade-Villar, J., Wang, Y. P., Guo, R. & Chen, X. X. 2016: Revision on Palaearctic species of *Perichlistus* Förster with description of a new species and its host plant gall (Hymenoptera: Cynipidae). — *ZooKeys* 596: 65–75. doi: <https://doi.org/10.3897/zookeys.596.5945>
- Ronquist, F. & Nordlander, G. 1989: Skeletal morphology of an archaic cynipoid, *Ibalia rufipes* (Hymenoptera: Ibaliidae). — *Entomologica Scandinavica* (supplement) 33: 1–60.
- Ronquist, F. & Liljebblad, J. 2001: Evolution of the gall wasp-host plant association. — *Evolution* 55: 2503–2522. doi: <https://doi.org/10.1111/j.0014-3820.2001.tb00765.x>
- Ronquist, F., Nieves-Aldrey, J. L., Buffington, M. L., Liu, Z., Liljebblad, J. & Nylander, J. A. A. 2015: Phylogeny, evolution and classification of gall wasps. The plot thickens. — *PLOS ONE* 10(5): e0123301. doi: <https://doi.org/10.1371/journal.pone.0123301>
- Schick, K., Z. Liu, Z. & Goldstein, P. Z. 2003: Phylogeny and evolution of host plant association of *Diastrophus* gall wasps (Hymenoptera, Cynipidae). — *Proceedings of the Entomological Society of Washington* 105: 715–732.
- Schwéger, Sz., Melika, G., Tang, C. T., Bihari, P., Bozsó, M., Stone, G. N., Nicholls, J. A. & Péntzes, Z. 2015a: New species of cynipid inquiline of the genus *Synergus* (Hymenoptera: Cynipidae: Synergini) from the Eastern Palaearctic. — *Zootaxa* 3999(4): 451–497. doi: <https://doi.org/10.11646/zootaxa.3999.4.1>
- Schwéger, S., Melika, G., Tang, C. T., Yang, M. M., Stone, G. N., Nicholls, J. A., Sinclair, F., Hearn, J., Bozsó, M. & Péntzes, Zs. 2015b: New species of cynipid inquilines of the genus *Saphonecrus* (Hymenoptera: Cynipidae: Synergini) from the Eastern Palaearctic, with a re-appraisal of known species world-wide. — *Zootaxa* 4054: 1–84. doi: <https://doi.org/10.11646/zootaxa.4054.1.1>
- Tang, C. T., Melika, G., Nicholls, J., Yang, M. M. & Stone, G. N. 2011: A new genus of oak gallwasps, *Cycloneuroterus* Melika & Tang, with the description of five new species from Taiwan (Hymenoptera: Cynipidae: Cynipini). — *Zootaxa* 3008: 33–62. doi: <https://doi.org/10.11646/zootaxa.3008.1.2>
- Wang, Y., Liu, Z., Chen, X. 2012: Eastern Palaearctic cynipid inquilines — the genus *Ceroptres* Hartig, 1840 with descriptions of two new species (Hymenoptera: Cynipidae: Cynipinae). — *Annals of the Entomological Society of America* 105(3): 377–385. doi: <https://doi.org/10.1603/AN11017>
- Weld, L. 1957: Cynipid galls of the Pacific slope. — Privately printed, Ann Arbor, MI, USA. 80 pp.
- Weld, L. 1959: Cynipid galls of the Eastern United States. — Privately printed, Ann Arbor, MI, USA. 155 pp.
- Weld, L. H. 1960: Cynipid galls of the Southwest (Hymenoptera, Cynipoidea): an aid to their identification. — Privately printed, Ann Arbor, MI, USA. 35 pp.
- Zhu, D. H., Liu, Z., Lu, P. F., Yang, X., Yang, X. H., Su, C. Y. & Liu, P. 2015: New gall wasp species attacking chestnut trees: *Dryocosmus zhuii* n. sp. (Hymenoptera: Cynipidae) on *Castanea henryi* from Southeastern China. — *Journal Insect Science* 15(1): 156. doi: <https://doi.org/10.1093/jisesa/iev118>