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 Palaearctic species of the genus Periclistus.

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1. Introduction

Gall wasps (Hymenoptera, Cynipoidea: Cynipidae) are endophytaphagous 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, Pénzes 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 (Palaearctic 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* (Smilaceae) (Ashmead 1896, Schick et al. 2003). The genus *Xestophanes* is endemic to Europe in the Western Palaearctic 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 inquilinous members of Diastrophini, *Periclistus* and *Synophromorpha*, differ from other Palaearctic 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 (Penzès 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 Palaearctic, 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 (Primorski Krai), *P. natalis* Taketani & Yasumatsu, 1973 and *P. quinlani* Taketani & Yasumatsu, 1973 from Japan, and *P. qinghaiensis* Pujade-Villar, Wang, Guo & Chen, 2016 from Qinghai Province of China. The genus *Synophromorpha* has a Nearctic and Eastern Palaearctic distribution with six described species (Abe et al. 2007), including two species from the Eastern Palaearctic: *S. tobiasi* 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 inquilinous species in the tribe Diastrophini are known from the Eastern Palaearctic.

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 Palaearctic, 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 Palaearctic cynipid inquilines 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 Cer-roptrres 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 *Ceropistes 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 pili-ferous punctures. Malar space about 1/4 times as long as height of eye. Lower face with sparse sil-ver 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. Trans-facial 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 seg-ments: 6: 4: 8: 3: 2: 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 pubes-cent in lower portion; metapleural sulcus reaching mesopleuron in upper three-fourths of its height in lateral view. Propodeum alutaceous, shiny, pubescent; lateral propodeal carinae dis-tinct, 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
third metasomal tergites fused, with a patch of pubesence 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, Shenzhen (Fujian Province), 11.IV.1991, Tang Yu-qing leg., 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, fronts 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; para-psidal 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.
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
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 inquilines 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 Palaearctic 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 mesoscutal 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: 2.5: 2.5; POL: LOL: OOL is 4: 2.5: 4.5, 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 Palaearctic species of *Periclistus* Foerster, 1869

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

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**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.
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 inquilines, 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 mediadly long mediadly, 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**, **Xestophonan** and **Xestophonanopsis 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 inquilinous genera, being all associated with host plants in Rosaceae family, and it is uncertain as to whether **Xestophonanopsis 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 **Xestophonanopsis 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 Palaearctic species of **Periclistus** have a smooth mesoscutum with short and superficial notauli as in **Xestophonanopsis gen. n.**, but in these cases the scutum has strong piliferous fine punctures (absent in **Xestophonanopsis gen. n.**) and the irradiating carinae in the lower face are dense and delicate (not dense and strong as in **Xestophonanopsis gen. n.**).

Cynipids as herb gallers are mostly unknown in the Eastern Palaearctic (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 Kovaliev, 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: Palaeartic occurrence of the genus Synophromorpha (Hymenoptera: Cynipidae) confirmed on the basis of a new species from Japan. — Entomologica Scandinavica 29: 25–28. doi: https://doi.org/10.1163/18763129X00168

Abe, Y., Melika, G. & Stone, G. N. 2007: The diversity and phylogeography of cynipid gallwasp (Hymenoptera: Cynipidae) of the Oriental and Eastern Palaearctic Regions, and their associated communities. — Oriental Insects 41: 169–212. doi: https://doi.org/10.1080/001387997.1876312X45032116

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., Pénzes, 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/10.1163/1876312X45032116

Buffington, M. & Morita, S. I. 2009: Not all oak gallwasp 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 Saphoneurus (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/10.1603/AN12021

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.
