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ORIGINAL ARTICLE

Review of the genus *Latuspina* (Hymenoptera: Cynipidae), with descriptions of two new species and their host galls

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Abstract The East Palaearctic genus *Latuspina* Monzen is reviewed. Four species are recognized: *L. acutissima* Wang, Pujade-Villar & Guo, **sp. nov.**, *L. shaanxinensis* Wang, Pujade-Villar & Guo, **sp. nov.**, *L. stirps* (Monzen) and *L. manmiaoyangae* Melika & Tang. An illustrated key to *Latuspina* species and host information are provided.

Key words Hymenoptera, Cynipini, *Latuspina*, new species, China.

1 Introduction

To date only 50 valid Cynipini species are recognised from the Eastern Palaearctic Region (Abe *et al.*, 2007; Melika *et al.*, 2010, 2011; Tang *et al.*, 2011a, b, 2012; Pujade-Villar & Wang, 2012). The genus *Latuspina* was originally described by Monzen as a subgenus of *Neuroterus* Hartig (Monzen, 1954). Later, the subgenus was elevated to generic status by Melika *et al.* (2010). So far, two species of *Latuspina* are known all over the world: *L. stirps* (Monzen, 1954) from Japan and *L. manmiaoyangae* (Tang, Sinclari & Nicholls, 2012) from Taiwan. The genus can be readily separated from other Cynipini genera by having the presence of two subapical lateral projections on the ventral spine of the hypopigium. Hereby, we describe two new species *L. acutissima* Wang, Pujade-Villar & Guo, **sp. nov.** and *L. shaanxinensis* Wang, Pujade-Villar & Guo, **sp. nov.** from China, provide information about their host relationships and an identification key to *Latuspina* species.

2 Materials and methods

Morphological terminology including abbreviations follows Liljebald & Ronquist (1998), Melika (2006), Ronquist & Nordlander (1989) and Harris (1979).

Additional abbreviations used here include: F1–F12—1st and subsequent flagellomeres; POL (post-ocellar distance)—the shortest distance between the posterior ocelli; OOL (ocellar–ocular distance)—the shortest distance between the posterior ocellus to the inner margin of the compound eye.

Observations and measurements were made using a Leica MZ 12.5 stereomicroscope (Wetzlar, Germany). Photos were taken by a digital camera (Q-Imaging, Micropublisher 3.3 RTV) attached to a Leica MZ APO stereomicroscope (Wetzlar, Germany) and subsequently processed with Synoptics Auto- Montage version 5.0 software.

Specimens of the present study are deposited in the Hymenoptera Collection of Zhejiang Agricultural and Forest

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3 Systematics

***Latuspina* Monzen, 1954**

Neuroterus (*Latuspina*) Monzen, 1954: 35. Type species: *Neuroterus stirps* Monzen, 1954: 35.
Latuspina Monzen, 1954: Melika, 2010: 18.

Description. Body length usually less than 3.0 mm; body color black to brown; female antenna with 12 or 13 segments; male antenna with 13-segments; pedicel as long as scape; pedicel and scape flattened, more than two times as wide as flagellomeres; F1 strongly incised and swollen anteriorly; malar sulcus absent; mesosoma glabrous; notaulus absent or if present not reaching anterior margin of mesoscutum; transscutal articulation absent medially; mesoscutum emarginate and elevated posterolaterally above dorsoaxillar area, fused with mesoscutellum; mesoscutellum without foveae, with anterior scutellar depression; mesopleuron coriaceous, with irregular wrinkles; propodeum without or with weak, fragmented, indistinct lateral propodeal carinae or curved outwards; metasoma strongly compressed laterally; ventral spine of hypopygium with two subapical lateral projections; lateral subapical projections of ventral spine of hypopygium with 5-11 setae extending far beyond apex.

Diagnosis. Ventral spine of hypopygium with two subapical lateral projections; lateral subapical projections of ventral spine of hypopygium with 5–11 setae extending far beyond apex.

Key to the sexual forms of *Latuspina* species.

1. Females 2
   Males 5
2. Antenna with 13 flagellomeres (Fig. 16); F1 1.5 times as long as F2 (Fig. 16); postero-median 1/3 of internotaular area sculptured (Fig. 15); medial mesoscutal line present (Fig. 15) ..... ***L. shaanxinensis* Wang, Pujade-Villar & Guo, sp.nov.**
   Antenna with 12 flagellomeres; F1 1.1–1.2 times as long as F3; mesoscutum smooth; medial mesoscutal line absent 3
3. Notauli absent (Fig. 3); lateral subapical projections of ventral spine of hypopygium with 7–11 setae (Fig. 7) ..... ***L. acutissima* Wang, Pujade-Villar & Guo, sp. nov.**
   Notauli present; lateral subapical projections of ventral spine of hypopygium with 5–8 setae 4
4. POL 1.1 times as long as OOL; ocelli ovate; notauli extend to posterior margin of mesoscutum; anterior transverse depression on mesoscutellum coriaceous ..... ***L. stirps* (Monzen, 1954)**
   POL 1.6 times as long as OOL; ocelli rounded; notauli absent in posterior 1/3 of mesoscutum; anterior transverse depression on mesoscutellum with parallel carina; interstices between carinae smooth ..... ***L. manmiaoyangae* Melika & Tang, 2012**
5. POL 2.6 times as long as OOL; OOL equal to diameter of lateral ocellus ..... ***L. manmiaoyangae* Melika & Tang, 2012**
   POL 3.6 times as long as OOL; OOL two times as long as diameter of lateral ocellus ..... ***L. stirps* (Monzen, 1954)**

***Latuspina acutissimae* Wang, Pujade-Villar & Guo, sp. nov.** (Figs 1–11)

Material examined. Holotype. ♀, China, Zhejiang, Tianmu Mountain (119°27′E, 30°19′N), 2011-IV-25, Rui Guo. Paratypes. 12♀, same data as the holotype.

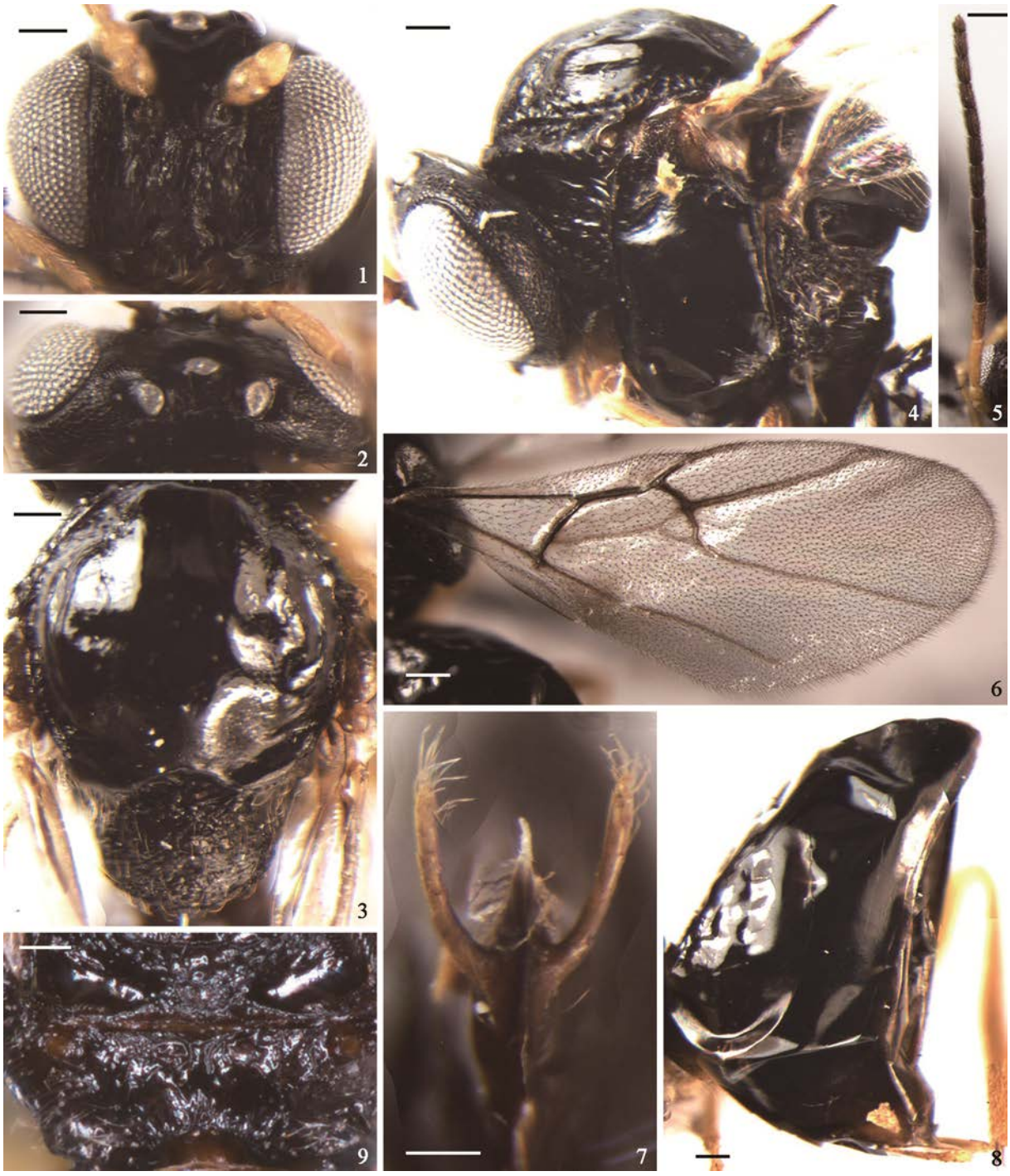
Etymology. The species is named after its host plant, *Quercus acutissima* Carruth.

Diagnosis. The new species is similar to *L. manmiaoyangae*, but can be separated from the latter by characters as follows: longer on ventral spines (Fig. 7) (two lateral ventral spines and meddle ventral spine uniformly shorter on *L. manmiaoyangae*), notauli absent (Fig. 3) (notauli indicated by narrow stripes of foveae in *L. manmiaoyangae*) and in propodeal lateral carinae complete (Fig. 9) (present the posterior 2/3 in *L. manmiaoyangae*). Additionally, host galls plants are present on *Q. cacutissima* in *L. acutissima* Wang, Pujade-Villar & Guo, **sp. nov.** and on *Q. variabilis* in *L. manmiaoyangae*.

Description. Female. Body length 2.4 mm; Fore wing 2.9 mm; head, mesosoma except legs, and metasoma black; mandibles brown, palpi light brown to yellowish; legs yellow, except darker basis of coxae; scape, pedicel, F1 and F2 yellow, subsequent flagellomeres darker; hypopygium light brown.

Head (Figs 1–2). Head alutaceous, with rare white setae; setae denser on lower face than upper face; head 2.5 times as broad as long from dorsal view; head 1.7 times as broad as high from anterior view; head broader than mesosoma from dorsal view; gena alutaceous; gena less than half of compound eye diameter, not visible from anterior view; malar space alutaceous, 0.3 times as long as compound eye height; malar striae absent; malar sulcus absent; POL 1.6 times as long as

OOL; OOL 1.7 times as long as diameter of lateral ocellus; OOL 2.0 times as long as LOL; ocelli ovate; transfacial distance 1.1 times as long as compound eye height; transfacial distance 1.5 times as long as lower face height (distance between antennal rim and ventral margin of clypeus); antennal socket diameter slightly longer than distance between antennal sockets; antennal socket diameter nearly equal to shortest distance between compound eye and antennal socket. Lower face alutaceous, with narrow elevated median area and rare setae. Clypeus small, shortest distance between clypeus and compound eye 1.7 times as long as clypeus width; central convex region of clypeus coriaceous, anterior tentorial pits present; epistomal sulcus absent; clypeo-pleurostomal line absent; ventrally emarginate and not incised medially; frons flat, punctate, with rounded impressed area ventral to median ocellus; vertex and occiput very delicately punctate; interocellar



Figures 1–9. *Latuspina acutissima* Wang, Pujade-Villar & Guo, **sp. nov.** 1. Head, anterior view. 2. Head, dorsal view. 3. Mesosoma, dorsal view. 4. Mesosoma, lateral view. 5. Antenna. 6. Forewing. 7. Ventral spine of hypopygium, lateral view. 8. Metasoma, lateral view. 9. Propodeum, dorsal view. Scale bars: 1–4, 7–9 = 0.1 mm; 5–6 = 0.2 mm.

area elevated relative to vertex in anterior view; sculpture on intericellar area more enhanced than sculpture on vertex; Postocciput coriaceous, around occipital foramen impressed.

Antenna (Fig. 5). Antenna with 12 flagellomeres; antenna as long as body; scape as long as broad; pedicel as long as broad; F1 2.5 times as long as pedicel; F1 1.3 times as long as F2, F2 longer than F3, F1 and F2 narrower than all subsequent flagellomeres; ratio of length of scape, pedicel and F1–F12 as follows: 6: 9: 22: 18: 18: 18: 17: 17: 13: 13: 12: 12: 11: 9; placoid sensilia present on F3–F12.

Mesosoma (Figs 3–4, 9). Mesosoma longer than high in lateral view, with rare setae; pronotum coriaceous; pronotum posterolaterally with some irregular wrinkles; pronotum emarginated along lateral edge; mesoscutum smooth; as long as broad (width measured across basis of tegulae); notauli, parapsidal lines, anterior admedian lines and median mesoscutal line absent; mesoscutum elevated postero-laterally, above dorsoaxillar areas; transscutal articulation absent; dorsoaxillar area smooth, with few short setae; mesoscutellum longer than broad; mesoscutellum sides parallel; mesoscutellum 0.6 times length of mesoscutum, rugose, overlapping metanotum in lateral view; mesoscutellum with distinct rim laterally and posteriorly. Scutellar foveae absent; replaced by deep and narrow transverse area, with coriaceous bottom. Mesopleuron coriaceous, with transverse, parallel carinae; specullum smooth; mesopleural triangle rugose, with strong irregular wrinkles. Metapleural sulcus reaching mesopleuron at dorsal 1/3 height of mesopleuron; preaxilla coriaceous; lateral axillar area with parallel wrinkles; lateral axillar area without setae; axillar carina with longitudinal striae; axillula ovate, rugose, with rare setae; subaxillular bar smooth; posterior margin of subaxillar bar in same level as metanotal trough in lateral view; metascutellum coriaceous; metanotal trough smooth, metascutellum glabrous; propodeum coriaceous; propodeum with rare setae; lateral propodeal carinae complete, strongly curved externally in posterior half; tarsal claws without basal lobe.

Wing (Fig. 6). Fore wing longer than body, margin with long, dense ciliae; radial cell 3.5 times as long as broad; R1 and Rs reaching fore wing margin; areolet big, triangular, well-delimited; Rs+M well traceable, nearly reach basal vein, slightly below lower half.

Metasoma (Fig. 7–8). Metasoma shorter than head+mesosoma, higher than long in lateral view, smooth, without setae laterally; second metasomal tergite extending dorsally to more than half length of metasoma; lateral subapical projections of ventral spine of hypopygium with 7–11 short setae; setae on lateral subapical projections of ventral spine of hypopygium extending posterior to apex of lateral subapical projections of ventral spine of hypopygium.

Male. Unknown.

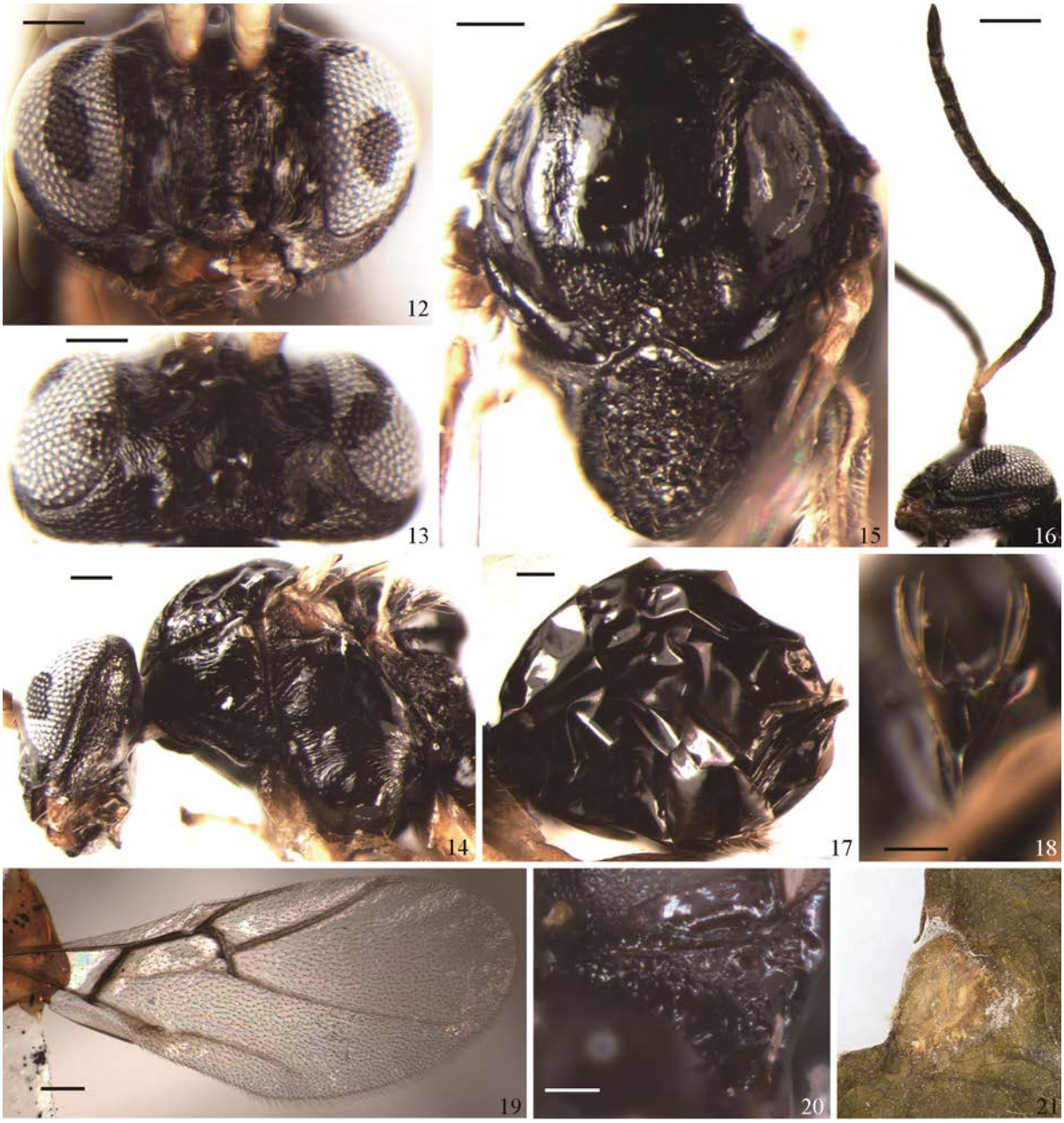
Gall (Figs 10–11). Young gall. Spherical, compressed if closely clustered; green with back spots; juicy; covered with small tubercles. Mature gall. Brown, reaches 1.2 mm in diameter; wall hard; single larval chamber present.

Biology. Only the sexual generation is known, inducing leaf vein galls on *Quercus acutissima* leaves. Galls are appearing on the tree from early May, maturing through the summer and in late October. Under the laboratory conditions, adults emerged from late September.

Figures 10–11. *Latuspina acutissima* Wang, Pujade-Villar & Guo, **sp. nov.**, galls.

***Latuspina shaanxinensis* Wang, Pujade-Villar & Guo, sp. nov.** (Figs 12–21)

Material examined. Holotype. ♀, China, Shaanxi, Houzhenzi (107°47′E, 33°50′N), 2011-VI-18, Rui Guo.



Figures 12–21. *Latuspina shaanxinensis* Wang, Pujade-Villar & Guo, **sp. nov.** 12. Head, anterior view. 13. Head, dorsal view. 14. Mesosoma, lateral view. 15. Mesosoma, dorsal view. 16. Antenna. 17. Metasoma, lateral view. 18. Ventral spine of hypopygium, lateral view. 19. Forewing. 20. Propodeum, posterodorsal view. 21. Gall. Scale bars: 12–15, 17–18, 20 = 0.1 mm, 16, 19 = 0.2 mm.

Etymology. The new species is named after type specimens collecting location.

Diagnosis. This new species, *Latuspina shaanxinensis* Wang, Pujade-Villar & Guo, **sp. nov.**, is only known by females morphologically. It is similar to *L. strips*, but it can be separated from the latter by characters as follows: shorter on ventral spines (Fig. 18) (two lateral ventral spines and meddle ventral spine uniformly slightly longer on *L. strips*), antenna with 14 segments (Fig. 16) (13 segments in the rest of species), mesoscutum basal smooth (alutaceous in *L. strips*), median mesoscutal line indicated by narrow stripes of alutaceous sculpture in *L. shaanxinensis* Wang, Pujade-Villar & Guo, **sp. nov.** (Fig. 15) (absent in *L. strips*) and lateral propodeal carinae curved outwards in posterior 1/2 (Fig. 20) (without propodeal carinae and uniformly dull coriaceous in *L. strips*).

Description. Female. Length. Female body length 2.1 mm, fore wing 2.4 mm; male known.

Color. Head, mesosoma, and metasoma uniformly and entirely black; mandibles brown, palpi light brown to yellowish; legs yellow, except darker basis of coxae; scape brown, pedicel, F1 and F2 light brown to yellowish, subsequent flagellomeres darker; hypopygium light brown.

Head (Figs 12–13). Head transverse in anterior view, delicately alutaceous, with a very few white setae, which denser on lower face; 2.2 times as broad as long from above; 1.6 times as broad as high in anterior view and broader than mesosoma. Gena alutaceous, not broadened behind eye, more than twice narrower than cross diameter of eye, invisible in anterior view. Malar space alutaceous, with striae irradiating from clypeus extending to eye margin, 0.1 times as long as height of eye, without malar sulcus. POL 1.3 times as long as OOL; OOL 4.0 times as long as diameter of lateral ocellus, 2.0 times as long as LOL; ocelli ovate. Transfacial distance 1.3 times as long as height of eye and 1.4 times as long as height of lower face (distance between antennal rim and ventral margin of clypeus); diameter of antennal socket slightly larger than distance between sockets, and nearly equal to distance between eye margin and socket. Lower face delicately uniformly alutaceous, with narrow elevated median area and very few setae; striae irradiating from clypeus but not extending to torulus. Clypeus small, shiny, distance between clypeus and margin of eye nearly 1.5 times as long as width of clypeus, with slightly elevated central coriaceous part, with very indistinct anterior tentorial pits, indistinct epistomal sulcus and clypeo-pleurostomal line; ventrally emarginate and not incised medially. Frons flat, micropunctate, with rounded impressed area below median ocellus; vertex and occiput very delicately micropunctate, shiny; interocellar area elevated, with stronger sculpture than vertex. Postocciput delicately coriaceous, shiny, around occipital foramen impressed, with few delicate striae extending to level of gula.

Antenna (Fig. 16). Antenna with 13 flagellomeres, as long as body; scape and pedicel strongly broadened, respectively both as long as broad, F1 2.6 times as long as pedicel, 1.5 times as long as F2, F2 slightly longer than F3, F1 and F2 slightly narrower than all subsequent flagellomeres; ratio of scapus, pedicel and F1–F13 as follows: 9: 8: 21: 14: 13: 13: 13: 12: 8: 9: 8: 8: 8: 8: 7. Placodeal sensilia on F7–F13.

Mesosoma (Figs 14–15, 20). Mesosoma slightly longer than high in lateral view, with very few setae. Pronotum shiny, delicately coriaceous; with some irregular wrinkles postero-laterally, emarginated along lateral edge. Anterior half of mesoscutum smooth, shiny; posterior half of mesoscutum delicately rugose, as long as broad (width measured across basis of tegulae); notauli absent but indicated by narrow stripes of alutaceous sculpture, absent in posterior 1/3; median mesoscutal line absent but indicated by narrow stripes of alutaceous sculpture, absent in anterior 1/2; parapsidal lines and anterior parallel lines absent. Transscutal articulation absent. Dorsoaxillar area smooth, shiny, with few short setae. Mesoscutellum longer than broad, with parallel sides, 0.6 times shorter than length of mesoscutum, uniformly rugose, overhanging metanotum, with distinct rim laterally and posteriorly. Scutellar foveae absent, replaced by deep and narrow transverse area, with coriaceous bottom. Mesopleuron coriaceous, with dense transverse parallel delicate ridges; speculum smooth, shiny; mesopleural triangle rugose, with strong irregular wrinkles, shiny. Metapleural sulcus reaching mesopleuron at upper 1/3 height; preaxilla delicately coriaceous, shiny; lateral axillar area with parallel wrinkles, without setae; axillar carina broad, with longitudinal striae; axillula slightly ovate, uniformly rugose, with few setae; subaxillular bar shiny, smooth, in most posterior end as high as height of metanotal trough. Metascutellum uniformly coriaceous, higher than height of smooth, shiny ventral impressed area; metanotal trough smooth, shiny, without setae. Propodeum uniformly dull coriaceous, with few setae; lateral propodeal carinae distinct, curved outwards in posterior 1/2; mid-carinae distinct, divided into lateral propodeal areas; lateral propodeal area uniformly dull coriaceous, without setae. Tarsal claws simple, without basal lobe.

Wing (Fig. 19). Forewing longer than body, margin with long dense cilia; radial cell of forewing 3.6 times as long as broad, veins R1 and Rs reaching wing margin; areolet small, triangular, well-delimited; vein Rs+M well traceable, nearly reach basalis, slightly below lower half.

Metasoma (Figs 17–18). Metasoma shorter than head+mesosoma, higher than long in lateral view, smooth, shiny, without setae laterally; 2nd metasomal tergite extending dorsally to 1/3 length of metasoma; prominent part of ventral spine of hypopygium with two short subapical lateral lumps, spine tri-forked but central part very short, each lump with 5–8 long setae extending far beyond apex.

Gall (Fig. 21). Almost discoid, an integral swelling leaf gall locate at beside of leaf midrib with irregularly shaped and a single larval chamber. Mature gall brown, reaches 1.5 mm in diameter.

Biology. Only the sexual generation is known, inducing leaf vein galls on *Quercus* leaves. Galls are appearing on the tree from early May, developing and maturing through the summer and in late October. Under the laboratory conditions, adults emerged from late September.

Distribution. China (Shaanxi).

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