

Two new species and a key to *Pachyprotasis* species (Hymenoptera: Tenthredinidae) from the Nanling Mountains, China

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Abstract: The species of *Pachyprotasis* Hartig are investigated in the Nanling Mountains of China. Two new species are described and illustrated: *Pachyprotasis hunanensis* Zhong, Li & Wei **sp. nov.** and *P. leucotrochantera* Zhong, Li & Wei **sp. nov.** A key to 16 known species and 1 subspecies of *Pachyprotasis* from the Nanling Mountains is also provided.

Key words: Tenthredininae; Macrophyini; sawflies; taxonomy

中国南岭方颜叶蜂属两新种及分种检索表（膜翅目：叶蜂科）

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摘要: 简要介绍了中国南岭山脉方颜叶蜂属种类调查概况, 并记述南岭方颜叶蜂属 2 新种: 湖南方颜叶蜂 *Pachyprotasis hunanensis* Zhong, Li & Wei **sp. nov.** 与白转方颜叶蜂 *P. leucotrochantera* Zhong, Li & Wei **sp. nov.**。编制了南岭方颜叶蜂属 16 种及 1 亚种分种检索表。

关键词: 叶蜂亚科; 钩瓣叶蜂族; 叶蜂; 分类

Introduction

Pachyprotasis Hartig, 1837, is mainly distributed in the north of the Oriental and the Palearctic Regions. Specimens of *Pachyprotasis* constitute the most frequently collected

Accepted 24 November 2021. Published online 27 January 2022. Published 25 March 2022.

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sawflies in China. In the world, 211 species and 14 subspecies of *Pachyprotasis* have been recognized. At least 149 species have been documented from China and the Myanmar-Yunnan frontier (Malaise 1945; Taeger *et al.* 2006, 2010; Zhong & Wei 2010a, b, 2012; Zhong *et al.* 2015, 2017, 2018, 2019, 2020, 2021).

The Nanling Mountains is the general name for the border mountains of Hunan, Jiangxi and Guangdong Provinces and the Guangxi Zhuang Autonomous Region. This area is located in 24°00'–26°30' N, 110°00'–116°00' E, and has a subtropical humid climate. Sixteen species and one subspecies of *Pachyprotasis* are found in the Nanling Mountains including these two newly described species (Malaise 1945; Nie & Wei 1999; Wei 2005, 2006; Wei & Nie 1998; Zhong, Li & Wei 2018, 2020, 2021; Zhong & Wei 2009). The species found in this area were mostly belong to *Pachyprotasis formosana*, *P. flavipes*, *P. opacifrons* and the *P. rapae* groups, which are species widely distributed in China. The species mostly distributed in a colder climate belong to the *P. pallidistigma* and *P. melanosoma* group and have not yet been collected in the Nanling Mountains.

In this study, two new species of the *P. opacifrons* group, namely *P. hunanensis* **sp. nov.** and *P. leucotrochantera* **sp. nov.**, were collected from Shaanxi, Hunan and Hubei Provinces in China and are described. A key for separating Nanling area *Pachyprotasis* species is also provided.

Material and methods

Specimens were examined with a Motic-DM-143 stereomicroscope. Images of adults were taken with a Keyence VHX-5000 digital camera. Images of genitalia were taken with a Nikon NI-SSR digital camera. All images were further processed with Adobe Photoshop CS 11.0.

Terminology of sawfly genitalia follows Ross (1945), Viitasaari (2002) and Zhong & Wei (2012). Wing venation follows Zhong & Wei (2012).

The holotype and all paratypes are deposited in the Asian Sawfly Collection, Nanchang, China (ASMN).

Taxonomy

Key to species of *Pachyprotasis* from Nanling Mountains, China

1. Antennae black, in the male, sometimes with a white stripe along the entire underside..... 2
- Antennae black, apex of flagellomere 6 and the last 3 flagellomeres white; hind legs reddish brown, apical 1/3 of metafemur and apical 1/4 of metatibia black. China (Chongqing, Fujian, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Zhejiang) *P. nanlingia* Wei
2. Hind legs more or less red, reddish brown, or reddish yellow (in the male, sometimes only traces of that color at the base of tibiae or apex of femora) 3
- Hind legs black or pale yellow, without red macula 7
3. Hind tarsi black, the apical joints sometimes with white or red macula 4
- Hind tarsi white, basal 2/3 of tarsomere 1 black; hind coxae, trochanters and basal 1/5 of femora white; all tergites black, without white spots; punctures on upper part of mesepisternum large, deep and coarse, while ones on lower part minute and dense. China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan,

- Hubei, Hunan, Shaanxi, Zhejiang); Burma-Yunnan frontier; India *P. subulicornis* Malaise
4. Thorax black or yellowish white, without red spots 5
- Posterior margin of pronotum, spots on lateral mesoscutal lobe, lateral part of mesoscutellum and mesopostnotum, lateral part of metanotum, mesepisternum, central spot on mesepimeron reddish brown; labrum and clypeus yellowish brown. China (Hunan) *P. nigratarsalia* Zhong, Li & Wei
5. Mesepisternum black, lower with broad horizontal white band which is not narrower than 1/4 of mesepisternum 6
- Mesepisternum black, without white spot; central part of each tergum with a large triangular white spot. China (Gansu, Guizhou, Henan, Hunan, Sichuan, Yunnan) *P. zuoae* Wei
6. Dorsal part of head polished, sculptures absent or indistinct, punctures sparse; apex of median mesoscutal lobe yellowish white. China (Fujian, Hunan, Shaanxi, Zhejiang) *P. wui* Wei & Nie
- Dorsal part of head opaque, sculptures distinct, punctures dense; lateral parts of median mesoscutal lobe yellowish white. China (Hunan, Jiangxi, Zhejiang) *P. parawui* Zhong, Li & Wei
7. General color of hind tarsi white or yellow, sometimes base of tarsomere 1, tarsomere 2 and apex of tarsomere 5 black 8
- Hind tarsi mostly black, at least each apex of tarsomere black 11
8. Mesepisternum black, anterior part sometimes with yellowish white spot, central part with broad yellowish white spot in male 9
- Mesepisternum yellowish white, upper corner black; body length 11 mm; central part of each tergum with a large triangular white spot. China (Fujian, Gansu, Guizhou, Guangdong, Hunan, Shaanxi, Sichuan, Zhejiang) *P. boyii* Wei & Zhong
9. Punctures on mesepisternum rough and irregular, surface between punctures opaque, space between punctures narrower than diameter of punctures; mesopleuron black, without distinct white spot in female (in male, central part of mesepisternum sometimes with broad white spot); hind coxae black 10
- Punctures on mesepisternum smooth and regular, surface between punctures polished, space between punctures much wider than diameter of punctures; mesopleuron black, anterior and central part of mesepisternum with large white spots in female; hind coxae yellowish white. China (Guangxi, Guizhou, Hunan) *P. xiaoi* Wei
10. Punctures on mesepisternum minute and shallow; all trochanters white, without black; labrum and clypeus white, apex of clypeus black; median fovea pit-like, not reaching median ocellus. China (Hubei, Hunan) *P. leucotrochantera* Zhong, Li & Wei **sp. nov.**
- Punctures on mesepisternum large and deep; all trochanters with blackish brown spots; labrum and clypeus white, central parts with blackish brown spots; median fovea ditch-like, reaching median ocellus. China (Hubei, Hunan, Shaanxi) *P. hunanensis* Zhong, Li & Wei **sp. nov.**
11. Mesepisternum yellowish white, lower part with broad black band which is broader than 1/4 of mesepisternum, or mesepisternum and mesepimeron black, anterior part sometimes with white spot, or mesepisternum lower with horizontal yellowish white band, but not narrower than 1/4 of mesepisternum 12
- Mesepisternum white, upper corner black, lower part sometimes with an narrow and short black band, but not broader than 1/8 of mesepisternum 16
12. Mesepisternum yellowish white, lower part with broad black band, or mesepisternum black, lower with broad yellowish white band, and not narrower than 1/4 of mesepisternum 13
- Mesepisternum black, anterior part sometimes with yellowish white spot, or lower part sometimes with a horizontal yellowish white band, but not broader than 1/8 of mesepisternum 15
13. Punctures on and around frontal area dense, distance between punctures much narrower than diameter of punctures 14

- Punctures on and around frontal area rather scattered, distance between punctures much wider than diameter of punctures. China (Guangxi, Hunan) *P. breviserrula* Wei & Zhong
- 14. Punctures on mesepisternum large; punctures on dorsal part of head extremely minute, interspaces polished, sculptures indistinct. China (Hunan, Guangdong, Zhejiang) *P. puncturalina* Zhong, Li & Wei
- Punctures on mesepisternum extremely minute; punctures on dorsal part of head minute, surface between punctures opaque, sculptures distinct. China (Guangdong, Guizhou, Hunan, Shaanxi, Zhejiang) *P. wulingensis* Wei
- 15. Flagellomere 1 longer than flagellomere 2; an arrow-shaped spot on apex of median mesoscutal lobe yellowish white; spot on temple small; middle serrulae with 8–10 posterior subbasal teeth. China (Guizhou, Hebei, Henan, Hubei, Hunan, Shaanxi, Zhejiang) *P. lineatella* Wei & Nie
- Flagellomere 1 shorter than flagellomere 2; V-shaped spot on lateral parts of median mesoscutal lobe yellowish white; spot on temple large; middle serrulae with 2–4 posterior subbasal teeth. China (Guangdong, Hubei, Hunan, Shaanxi) *P. obscuroidentella* Wei & Zhong
- 16. Mesoscutellum not elevated, flat above and with sharp lateral carina; postocellar area nearly 2 times wider than long; head smooth, almost impunctate; mesepisternum pale, lower part with black horizontal band. China (Guangxi, Hunan, Zhejiang); Yunnan-Burma frontier; India *P. gregalis* Malaise
- Mesoscutellum elevated, lateral carina rounded; postocellar area 1.5 times wider than long; face on and around the frontal area with isolated, shallow and rather fine punctures; mesepisternum quite pale, without black horizontal band. China (Anhui, Beijing, Gansu, Guangxi, Hebei, Henan, Hunan, Jiangxi, Jilin, Liaoning, Shaanxi, Sichuan, Shanxi, Zhejiang); Burma *P. sellata sagittata* Malaise

1. *Pachyprotasis hunanensis* Zhong, Li & Wei sp. nov. (Figs 1, 2)

Description. Holotype female (Figs 1A–D). Body length 10.0 mm. Body black, with white pattern as follows: labrum and clypeus except central spots, supraclypeal area, inner orbit continuous with lower of hind orbit, narrow oblique spot on temple, spot on ventral side of scape, inner margin of tegula, posterior margin of mesepisternum, laterotergite 2 entirely, small basal spots on laterotergites 3–5, posterior margins of laterotergites 7–8, posterior parts of all sterna; center of labrum and clypeus both with black spots. Legs black, white on stripes on front parts of fore legs from base of coxae to apex of tibiae, stripes on front part of middle legs from base of coxae to basal 2/5 of femora, fore and middle tarsus except anterodorsal parts of tarsomere 1 and apex of tarsomere 5, dorsal parts of hind trochanters, dorsal stripes on basal 1/7 of hind femora, hind tarsi forming apex of tarsomere 1 to basal half of tarsomere 5. Wings pale brown, veins C, R1 and 2r and stigma blackish brown, other veins black.

Punctures on labrum and clypeus sparse, indistinct; punctures on dorsal part of head dense and shallow, surface between punctures opaque, sculptures distinct; punctures on mesonotum minute and dense, surface between punctures opaque; punctures on upper part of mesepisternum large, dense and rough, while ones on lower part minute, dense and rough, space between punctures irregular, sculptures distinct, sub-shining; sculptures on mesepimeron distinct, luster indistinct; punctures and sculptures on metepisternum dense and minute, luster indistinct, while those on metepimeron shallow and sparse, space between punctures polished, shining; mesoscutellum with dense and rough punctures, luster indistinct, punctures on mesoscutellar appendage shallow and minute, sculptures dense, slightly shining; part of terga with a few minute and shallow punctures, surface between punctures with distinct sculptures and oily luster; punctures on outer side of hind coxae dense and shallow.

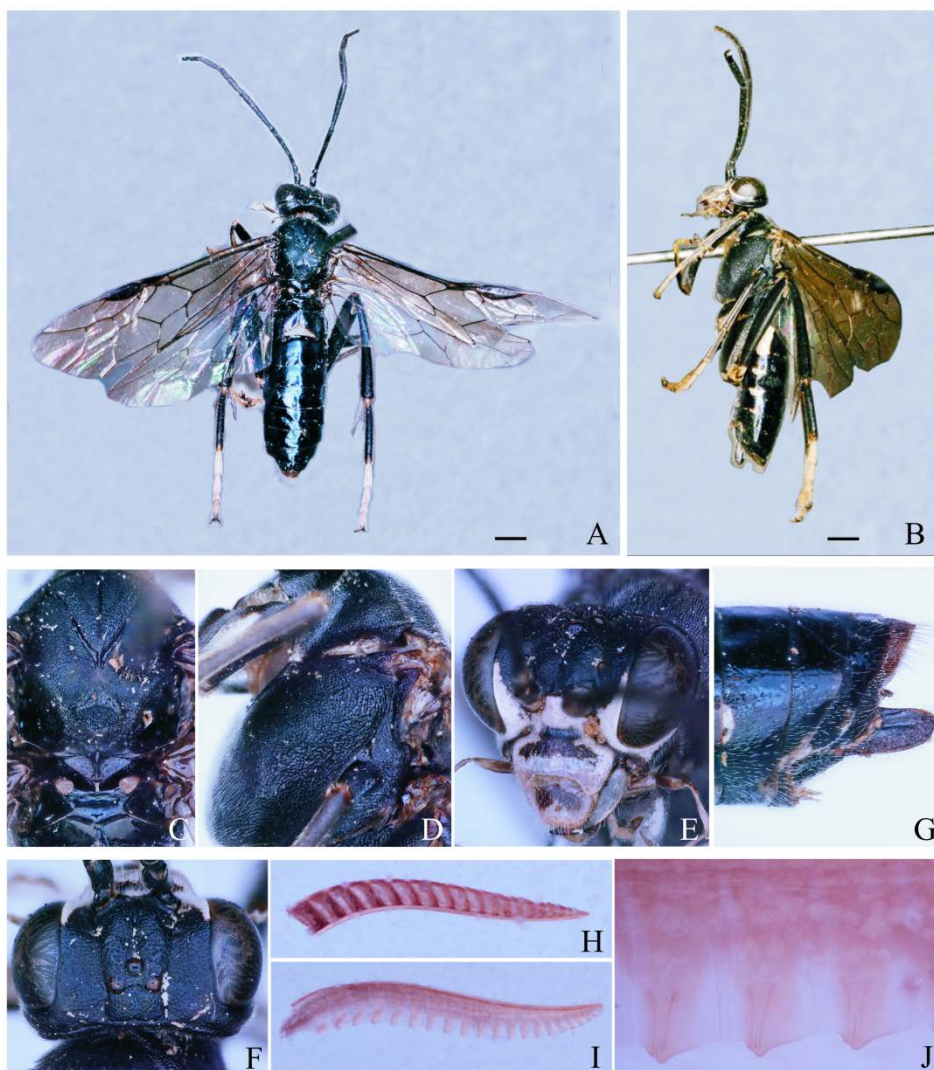


Figure 1. *Pachyprotasis hunanensis* Zhong, Li & Wei **sp. nov.**, ♀, holotype. A. Adult female, dorsal view; B. Adult female, lateral view; C. Mesonotum and metanotum, dorsal view; D. Mesopleuron and metapleuron, lateral view; E. Head, frontal view; F. Head, dorsal view; G. Ovipositor sheath, lateral view; H. Lance; I. Lancet; J. Middle serrulae of lancet. Scale bars = 1 mm (Figs A, B).

Labrum large, anterior margin truncate; clypeus truncately incised to $2/7$ of its middle length, lateral lobes blunt; malar space as wide as diameter of median ocellus; inner margins of eyes slightly convergent downwards (Fig. 1E); supra-antennal tubercles wanting, frontal area elevated, as high as level of eyes in lateral view, frontal ridge broad and blunt; median fovea ditch-like, reaching median ocellus, supra-antennal pit deep; interocellar and postocellar furrows wide and a little deep; postocellar area slightly elevated, broader than long by $2 : 1$, lateral furrows deep and straight backwards; head slightly narrowed behind eyes (Fig. 1F). Antenna as long as thorax and abdomen together, flagellomere 1 equal to flagellomere 2.

Mesoscutellum bluntly elevated, lateral carina blunt, mesoscutellar appendage with acute middle carina. Metatarsomere 1 longer than following 4 tarsomeres together, claw with inner tooth longer than outer tooth. Front wing with middle petiole of anal cell approximately 0.5 times length of basal anal cell, distinctly longer than vein R+M; petiole of anal cell on hind wing approximately 0.3 times length of vein cu-a.

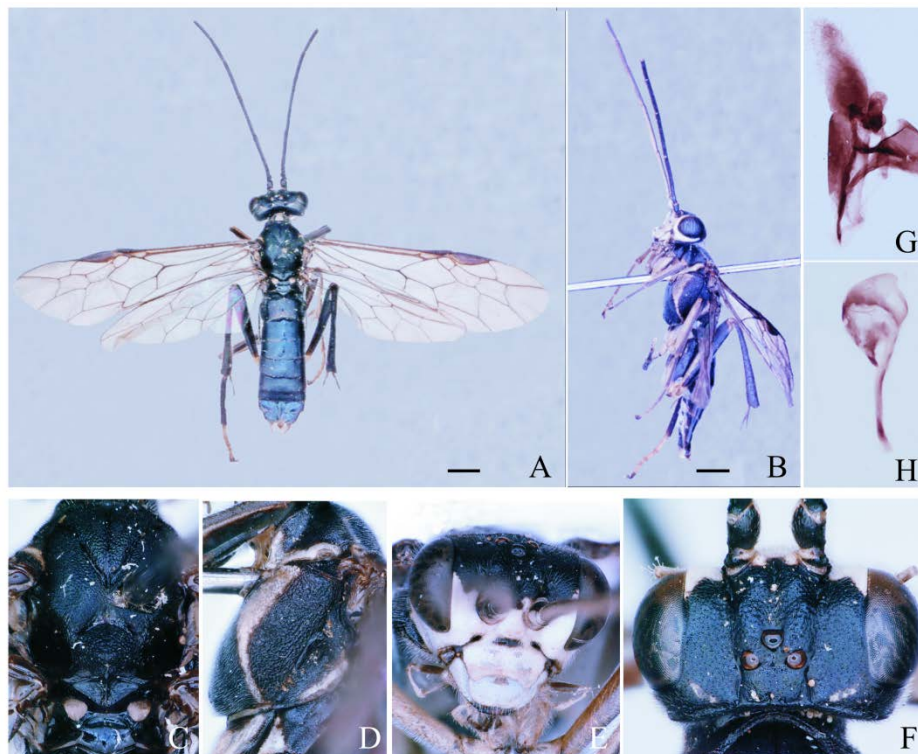


Figure 2. *Pachyprotasis hunanensis* Zhong, Li & Wei **sp. nov.**, ♂, paratype. A. Adult female, dorsal view; B. Adult female, lateral view; C. Mesonotum and metanotum, dorsal view; D. Mesopleuron and metapleuron, lateral view; E. Head, frontal view; F. Head, dorsal view; G. Harpe and parapenis; H. Penis valve. Scale bars = 1 mm (Figs A, B).

Ovipositor sheath slightly shorter than hind tarsomere 1, apex slightly acute; apical sheath distinctly longer than basal sheath (Fig. 1G). Lancet with 23 annuli, base of each serrula elevated, middle serrulae with 2 anterior and 9–10 posterior subbasal teeth (Figs 1H–J).

Male. Body length 8.5 mm. Color and structure similar to female, but white parts are different (Figs 2A–F): lower half of inner orbit continuing with lower 2/3 of hind orbit, ventral side of flagellum, posterior part of pronotum, basal half of tegula, large spot on anterior part of mesepisternum, posterior margin of mesepimeron, posterior part of metepisternum, front parts of fore and middle legs from base of coxae to apex of tarsomere 5, a dorsal band on basal 4/5 of hind femora are white. Gonoforceps and penis valve as in Figs 2G, 2H.

Holotype. ♀, **China**, Hunan, Sangzhi County, Mt. Badagong, 109°44'E, 29°40'N, 01-V-2000, leg. Tiejun DENG. **Paratypes.** 1♀, **China**, Hunan, Sangzhi County, Mt. Badagong, 109°44'E, 29°40'N, 01-V-2000, leg. Meicai WEI; 1♀, **China**, Hunan, Shimen

County, Mt. Huping, 110°48'E, 30°07'N, 30-IV-2000, leg. Mingli CHEN; 1♀3♂, **China**, Hunan, Suining County, Huangsang, 110°04'E, 26°26'N, alt. 600–900 m, 21–22-IV-2005, leg. Wei XIAO & Yang LIN; 1♀, **China**, Hunan, Yongzhou City, Mt. Shunhuang, 111°03'E, 26°24'N, alt. 800–1000 m, 27-IV-2004, leg. Meicai WEI; 1♀, **China**, Hunan, Xingshan County, Mt. Shennongjia, Banbiyan, 110°13'E, 31°28'N, alt. 2500 m, 29-VI-2002, leg. Yihai ZHONG; 1♀, **China**, Hunan, Xingshan County, Mt. Shennongjia, Jizhigou, 110°13'E, 31°28'N, alt. 1756 m, Hubei Province, 30-VI-2008, leg. Fu ZHAO; 1♀, **China**, Shaanxi, Xi'an City, Mt. Zhongnan, 108°58'E, 33°54'N, alt. 1292 m, 26-V-2006, leg. Xun ZHU.

Etymology. The specific epithet refers to the type locality of Hunan Province, China.

Remarks. This species is distinct from other similar species of the *P. opacifrons* group by the following characters: punctures on mesepisternum large, dense and rough, while ones on lower part minute, dense and rough, space between punctures irregular; all trochanters white, with blackish brown spots; labrum and clypeus white, central parts with blackish brown spots; median fovea ditch-like, reaching median ocellus.

2. *Pachyprotasis leucotrochantera* Zhong, Li & Wei sp. nov. (Fig. 3)

Description. Holotype female (Figs 3A–D). Body length 8.0 mm. Body black, with white pattern as follows: labrum, clypeus except posterior part, supraclypeal area, lower half of inner orbit continuous with lower 2/3 of hind orbit, narrow stripe on upper of inner orbit continuing with narrow oblique spot on temple, lateral margin of pronotum, base of tegula, posterior spots on lateral parts of median mesoscutal lobe, a small medial butterfly-shaped spot on lateral mesoscutal lobe, central part of mesoscutellum, mesoscutellar appendage entirely, metascutellum, spot on lower part of mesepisternum, posterior margins of mesepimeron and metepimeron, anterior spots and posterior margins of all laterotergites, posterior parts of all sterna; center of labrum and clypeus both with black spots. Legs black, white stripes on outer side of fore and middle coxae, fore and middle trochanters except small spots on outer side, basal margins and front sides on apex of fore femora, fronts sides of fore and middle tibiae and tarsi, hind trochanters, basal 1/3 of hind femora, hind tarsomeres 2–5. Wings subhyaline, veins and stigma blackish brown.

Punctures on labrum and clypeus sparse, minute and shallow; punctures on dorsal part of head minute and sparse, surface between punctures with dense sculptures, luster indistinct; punctures on mesonotum minute and dense, surface between punctures opaque, sculptures dense; punctures on upper part of mesepisternum large, dense and rough, while ones on lower part minute, dense and rough, sculptures dense and distinct, sub-shining; sculptures on anepimeron distinct, space between sculptures opaque, sculptures on katepimeron dense, space between sculptures polished, shining; punctures and sculptures on metepisternum dense and minute, luster indistinct, punctures on metepimeron shallow and sparse, space between punctures polished, shining; central part of mesoscutellum polished, punctures absent, lateral part with large and deep punctures, shining; punctures on mesoscutellar appendage sparse and shallow, sculptures dense, slightly shining; lateral part of terga with a few minute and shallow punctures, surface between punctures with sculptures and oily luster; punctures on outer side of hind coxae a little dense and distinct.

Labrum large, anterior margin truncate; clypeus truncately incised to 1/3 of its middle length, lateral lobes acute; malar space as wide as diameter of median ocellus; inner margins

of eyes slightly convergent downwards (Fig. 3E); supra-antennal tubercles wanting, frontal area elevated, below level of eyes in lateral view, frontal ridge broad and blunt; median fovea and supra-antennal pit deep, shallow; interocellar furrows wide and shallow, postocellar furrows absent; postocellar area slightly elevated, broader than long by 2.5 : 1, lateral furrows deep and divergent backwards; head slightly narrowed behind eyes (Fig. 3F). Antenna as long as thorax and abdomen together, flagellomere 1 equal to flagellomere 2. Mesoscutellum bluntly elevated, lateral carina blunt, mesoscutellar appendage with blunt middle carina. Metatarsomere equal to following 4 tarsomeres together, claw with inner tooth shorter than outer tooth. Front wing with middle petiole of anal cell approximately 0.5 times length of basal anal cell, distinctly longer than vein R+M; petiole of anal cell on hind wing 0.5 times length of vein cu-a.

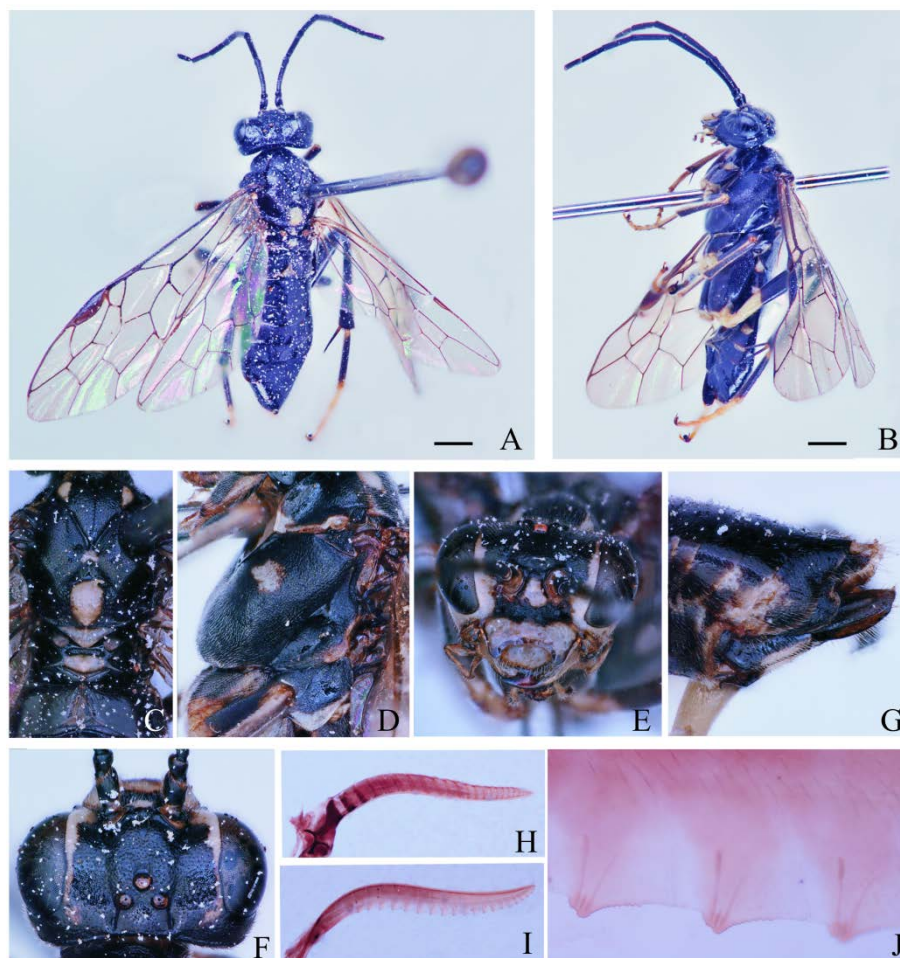


Figure 3. *Pachyprotasis leucotrochantera* Zhong, Li & Wei **sp. nov.**, ♀, holotype. A. Adult female, dorsal view; B. Adult female, lateral view; C. Mesonotum and metanotum, dorsal view; D. Mesopleuron and metapleuron, lateral view; E. Head, front view; F. Head, dorsal view; G. Ovipositor sheath, lateral view; H. Lance; I. Lance; J. Middle serrulae of lance. Scale bars = 1 mm (Figs A, B).

Ovipositor sheath slightly shorter than hind tarsomere 1 and round in lateral view; apical sheath distinctly equal to basal sheath (Fig. 3G). Lancet with 21 annuli, base of each serrula elevated, middle serrulae with 2 anterior and 10–11 posterior subbasal teeth (Figs 3H–J).

Male. Unknown.

Holotype. ♀, **China**, Hunan, Yongzhou City, Mt. Shunhuang, 111°03'E, 26°24'N, alt. 900–1200 m, 28-IV-2004, leg. Weixing LIU. **Paratypes.** 1♀, **China**, Hunan, Wugang City, Mt. Yunshan, Yunfengge, 110°37'E, 26°38'N, alt. 1170, 18-IV-2010, leg. Xiaohua WANG; 1♀, **China**, Hubei, Xingshan County, alt. 1300 m, 12-V-1994; 2♀, **China**, Hubei, Xingshan County, Mt. Shennongjia, Qianjiaping, 110°24'E, 31°24'N, alt. 1530 m, 22-V-2010, leg. Zejian LI.

Etymology. The specific epithet “*leucotrochantera*” refers to the hind trochanter having white maculae.

Remarks. This species is similar to *P. hunanensis* Zhong, Li & Wei **sp. nov.**, but can be distinguished from the latter by the following characters: punctures on mesepisternum minute and shallow; all trochanters white, without black macula, basal 1/3 of hind femur white; labrum and clypeus white, apex of clypeus black; median fovea pit-like, not reaching median ocellus.

Acknowledgements

This research was supported by the National Special Construction Agriculture Technology System of China (CARS-44-SYZ 13), the National Natural Science Foundation of China (31970447), the Natural Science Foundation of Hunan Province (2021JJ31153) and the special fund for scientific research of postdoctoral work station assessment in Zhejiang Province, China (2021).

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