A study of the *Phaonia angelicae* group (Diptera: Muscidae), with descriptions of six new species from China

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Abstract

The *P. angelicae* group from China was studied, and six new species are described: *P. hanmiensis*, *n. sp.*, *P. nanlingensis*, *n. sp.*, *P. reduncicauda*, *n. sp.*, *P. spargocerca*, *n. sp.*, *P. subincana*, *n. sp.*, and *P. varimargina*, *n. sp.* A key to the identification of males of the 40 Chinese species is given.

摘要

本文描述了蝇科棘蝇属基棘蝇种团的六个新种，即汗密棘蝇 *P. hanmiensis*, *n. sp.*, 南岭棘蝇 *P. nanlingensis*, *n. sp.*, 翘尾棘蝇 *P. reduncicauda*, *n. sp.*, 膨叶棘蝇 *P. spargocerca*, *n. sp.*, 亚灰白棘蝇 *P. subincana*, *n. sp.* 和变带棘蝇 *P. varimargina*, *n. sp.*, 并给出了基棘蝇种团40个中国种类的分种检索表及其分布。

Abbreviations: *a*, anterior seta; *acr*, acrostichal setae; *ad*, anterodorsal setae; *av*, anteroventral setae; *collect.*, collector; *dc*, dorsocentral setae; *dm-cu*, medio-cubital cross-vein; *fr*, frontal setae; *ial*, intra-alar setae; *IESNU*, Institute of Entomology, Shenyang Normal University, China, *loc.*, locality; *M*, medial vein. *ors*, orbital setae; *p*, posterior setae; *pd*, posterodorsal setae; *post dc*, postsutural dorsocentral setae; *pra*, prealar setae; *prst acr*, presutural acrostichal setae; *prst dc*, presutural dorsocentral setae; *pv*, posteroventral setae; *R₄+₅*, branch of radius; *r-m*, radio-medial cross-vein; *v*, ventral setae

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Introduction

Robineau-Desvoidy (1830) established Phaonia (Diptera: Muscidae), with P. viarum as the type species. The genus and species from the Palaearctic Region were first divided into 16 groups (Ringdahl 1949), then 18 groups (Henning 1963), and later 21 groups and 3 subgroups (Zinovjev 1981). Following the work of these earlier researchers, Chinese scholars have concentrated on the study of Phaonia. Ma et al. (2002) divided the Phaonia species from China into 38 groups and 18 subgroups. The P. angelicae group was first presented by Ringdahl (1949) and divided into three subgroups by Zinovjev (1981). Now the P. angelicae group only includes the P. angelicae subgroup and the P. hybrida subgroup because Xue (2006) revised the P. consobrina subgroup because it has cerci that are deeply concave in the middle. In this paper, 40 Chinese species of the P. angelicae group are included, including six new species.

Materials and Methods

The type specimens of six new species are all deposited at the Institute of Entomology, Shenyang Normal University, China.

The morphological terminology follows that of McAlpine (1981). Absolute measurements are used for the body length in millimeters (mm). The following abbreviations are used for characters: ors, orbital setae; fr, frontal setae; prst acr, presutural acrostichal setae; acr, acrostichal setae; prst dc, presutural dorsocentral setae; dc, dorsocentral setae; post dc, postuteral dorsocentral setae; ist, intralaral setae; pra, prealar setae; av, anteroventral setae; a, anterior seta; ad, anterodorsal setae; pd, posterodorsal setae; p, posterior setae; pv, posteroventral setae; v, ventral setae; r-m, radio-medial cross-vein; dm-cu, medio-cubital cross-vein; R4-5, branch of radius; and M, medial vein. Other abbreviations used are: collect., collector; loc., locality; and IESNU, Institute of Entomology, Shenyang Normal University, China.

P. angelicae group

Diagnosis. -- Epistoma situated in front of the anterior margin of frons or at the same vertical line in profile; thorax without presutural acr; basisternum of prosternum bare; mid tibia with p and pv; abdomen black; distal part of cerci with inboard processus and outboard processus.

Distribution. -- The 40 Chinese species of P. angelicae group are mainly distributed in Sichuan Province, China.

Bionomics. -- Relevant records are lacking.

Key to species of P. angelicae group from China (♀♂)

1. Fore tibia dense with long, brush-like hairs on the ventral surface.................................2
   — Fore tibia without above mentioned hairs on the ventral surface..............................7
2. Prementum about 6.0 times as long as broad..............................................................3
   — Prementum about 4.0 times as long as broad...........................................................4
3. Basal part of wing and haltere blackish brown; hind femur without pv......................
   .......P. kunjirapensis Xue et Zhang, 1996
   — Basal part of wing light brown and haltere yellow; hind femur with short pv in basal half......P. paederocerca Feng et Ma, 2002
4. Mid tibia with 1–2 ad; hind femur without pv; outboard processus of cercus broad and big............P. biastostyla Xue, 1998
   — Mid tibia without ad...............................5
5. Scape yellow, pedicel black, postpedicel blackish brown .............................................. *P. subhybrida* Feng et Ma, 2002
   — Antenna black ................................................................................................. 6
6. Gena about 1/3 of eye in height; hind tibia with 1 sub-basal *pd* ........................................... *P. labidocerca* Feng et Ma, 2002
   — Gena about 1/2 of eye in height; hind tibia without additional *pd* ................................. *P. mengi* Feng, 2000
7. Scutum with 3 *post dc* ................................................................. *P. longirostris* Xue et Zhao, 1998
   — Scutum with 4 *post dc* ................................................................................... 8
8. Hind tibia without additional *pd* .................................................................................. 9
   — Hind tibia with 1–3 short and weak *pd* in sub-basal .................................................. 24
9. Tibiae yellow or reddish brown, sometimes basal parts black........................................... 10
   — Tibiae black, sometimes basal parts reddish brown..................................................... 12
10. Parafacial slightly wider than the postpedicel; the anterior margin of gena with 2 rows of upcurved subvibrissal setulae; mid tibia with 1 *pv*; each tergite with median black vitta ............................................................... *P. sunwuensis* Xue et Ma, 1998
    — Parafacial narrower than the postpedicel; the anterior margin of gena without above mentioned setulae; mid tibia with 2–3 *pv*; each tergite without median black vitta.................................................................................. 11
11. Frons with *fr* row, extending to both sides of anterior ocellus, lower 2/5 strong and long; tibiae yellow; hind tibia with 3 *av*, 2 *ad* .................................................................................................................. *P. subemarginata* Fang, Li et Deng, 1986
    — Frons only with 5 pairs of *fr* in lower half; tibiae black in basal, yellow in apical; hind tibia with 2 *av*, 1 *ad* .................................................................................................................. *P. daxiongi* Feng, 2001
12. Mid tibia with 1–2 *ad* ......................................................................................... 13
    — Mid tibia without *ad* ......................................................................................... 15
13. Katepimeron bare.......................................................................................... *P. incana* (Wiedemann, 1817)
    — Katepimeron with hairs................................................................................. 14
14. Frons broad, about 2.0 times as wide as the distance between outer margins of posterior ocelli; fore tibia with 1 median *p*; each tergite with median black vitta, covered with grayish yellow pruinosity........... *P. zhangyeensis* Ma et Wu, 1992
    — Frons narrow, subequal in width to anterior ocellus; fore tibia with 2 median *p*; each tergite with unconspicuous median black vitta, densely covered with gray pruinosity........ *P. subconsobrina* Ma, 1992
15. Epistoma snout-shaped, distinctly situated in front of the anterior margin of frons in profile........................................................................................................................................... 16
    — Epistoma not snout-shaped, slightly situated front of the anterior margin of frons, or at the same vertical line in profile........................................................................................................ 18
16. Frons broad, subequal to the distance between outer margins of posterior ocelli; fore tibia with 1 median *p*.............................................. *P. scrofigena* Ma et Xue, 1998
    — Frons narrow, about 1.5 times as wide as anterior ocellus; fore tibia with 2 median *p*.............................................................................................................. 17
17. Haustellum about 2.5 times as long as palpus; mid femur only with *pv* in basal half; mid tibia with 1 *pd*, 3 *pv*; hind femur completely with *pv* row; hind tibia with 5 *ad*.............................................................................................................. *P. latimargina* Fang et Fan, 1988
    — Haustellum about 1.5 times as long as palpus; mid femur with *pv* row, basal 2/3 strong and long; mid tibia with 3–4 *pd*, 1 *pv*; hind femur without *pv* in basal half; hind tibia with 3 *ad*...................................................................................... *P. varimargina* Xue et Zhang, n. sp.
18. Fore tibia without median *p*........................................................................ 19
    — Fore tibia with median 1–2 *p* ................................................................... 20
19. Hind tibia with 2 rows of hair-like ad, 2 rows of short and weak pv in the middle; thorax and abdomen aeneous in ground color, covered with grayish white pruinosity

— Hind tibia with 3 ad, without pv in the middle; thorax and abdomen black in ground color, sparsely covered with pruinosity

.............P. papillaria Fang et Fan, 1993

20. Basicosta brownish yellow; surfaces of upper ommatidia distinctly enlarged; gena about 1/3 of eye in height; hind femur with long and strong av in apical half; hind tibia with 2–4 ad, without p...

— Basicosta black..............................21

21. Gena about 1/2 of eye in height ................

.............P. megistogenysa Feng et Ma, 2002

— Gena about 1/5–1/4 of eye in height.....22

22. Parafacial about 2.0 times as wide as the postpedicel; the anterior margin of gena with 2 rows of upcurved subvibrissal setulae; pra subequal in length to posterior notopleural setae; apical parts of femora, and basal parts of tibiae reddish brown; hind tibia with a row of short p in the middle

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-----P. zhongongshana Ma et Feng, 2002

— Parafacial subequal in width to the postpedicel; the anterior margin of gena with a row of upcurved subvibrissal setulae at most; pra about 1.5 times as long as posterior notopleural seta at least; legs all black, hind tibia without p..........23

23. Facial carina projecting, nearly buninoid; katepimeron with hairs; hind tibia only with 2 ad; cersus with inconspicuous inboard processus

.............P. hanmiensis Xue et Zhang, n. sp.

— Facial carina not projecting; katepimeron bare; hind tibia with a row of ad; cersus with distinct inboard processus

.............P. nanlingensis Xue et Zhang, n. sp.

24. Tibiae reddish brown or yellow in apical half

— Legs all black or brownish black, sometimes apical parts of femora, and basal parts of tibiae yellow

25. Gena about 1/3 of eye in height; the anterior margin of gena with a row of upcurved subvibrissal setulae; hind femur with 3–4 pv in basal thirds

.....P. fuscitibia Shinonaga et Kano, 1971

— Gena about 1/2 of eye in height; the anterior margin of gena with 2 rows of upcurved subvibrissal setulae; hind femur without pv...P. nigeritegula Feng, 2002

26. Katepimeron bare....................................................27

— Katepimeron with hairs.............................................30

27. Apical parts of femora, and basal parts of tibiae yellow

....P. wulinga Xue, 1998

— Legs all black.........................................................28

28. Epistoma not projecting, at the same vertical line with the anterior margin of frons in profile

.............P. subincana Xue et Zhan, n. sp.

— Epistoma snout-shaped, distinctly situated front of the anterior margin of frons in profile

29. Each tergite without shining patches; dm-cu not clouded

...............P. mimoincana Ma et Feng, 1986

— Tergite 5 with a pair of shining lateral patches; dm-cu clouded

.............P. redundicauda Xue et Zhan, n. sp.

30. Mid tibia with ad............................................31

— Mid tibia without ad..............................................33

31. Fronto-orbital plate, parafacial and gena covered with golden pruinosity; mid tibia with 3–4 ad...........P. hamiloba Ma, 1992

— Fronto-orbital plate, parafacial and gena covered with gray pruinosity; mid tibia with 1 ad

32. Wing hyaline; hind femur with pv row in apical; abdomen long oviform, each
tergite with median black vitta, without shining patches............................

......P. hunyuanensis Ma et Wang, 1998
— Wing light brown; hind femur without pv; abdomen short cone-shaped, with shifting plates, without median vittae..............

......P. maowenensis Deng et Feng, 1998

33. Fore tibia without median p; abdomen without median vittae and shining patches......P. ningxiaensis Ma et Zhao, 1992
— Fore tibia with median p......................................34

34. Scape and pedicel all dark brown, or scape yellow........................................35
— Antenna black..................................................36

35. Scape and pedicel dark brown; gena about 1/3 of eye in height; the anterior margin of gena with 2 rows of upcurved subvibrissal setulae; tergite 3 and 4 with median black vitta............P. fusciantenna Feng et Ma, 2002
— Scape yellow; gena about 1/2 of eye in height; the anterior margin of gena with 3 rows of upcurved subvibrissal setulae; each tergite with median black vitta............P. megacerca Feng et Ma, 2002

36. Parafacial with a white patch in upper half; prementum about 7.0 times as long as broad; scutum with 3 black vittae............P. longipalpis Feng et Ma, 2002
— Parafacial without patches; prementum about 4.0 times as long as broad at most; scutum with 4 black vittae, or without vittae.................................................37

37. Scutum with 3 prst dc; gena reddish brown in upper half.................................

........P. jiagedaiqiensis Ma et Cui, 1992
— Scutum with 2 prst dc; gena black............38

38. pra slightly longer than or subequal to posterior notopleural seta; each tergite without median black vitta......................

......P. spargocerca Xue et Zhang, n. sp.
— pra long and strong, about 2.0 times as long as posterior notopleural seta; tergite 3 and 4 with median black vitta............39

39. Frons about 2.0 times as wide as anterior ocellus; gena about 1/2 of eye in height; the anterior margin of gena with 2 rows of upcurved subvibrissal setulae; apical parts of femora, and basal parts of tibiae reddish brown........................................

..........P. wanfodinga Feng et Ma, 2002
— Frons subequal in width to anterior ocellus; gena about 1/4 of the eye in height, the anterior margin of gena without upcurved subvibrissal setulae; legs all black.............P. paomashanica Feng, 2004

1. P. biastystyla Xue, 1998: 1222
Distribution. -- China: Tonghua City (type loc.), Jilin Province; Benxi City, Liaoning Province.

2. P. curvicercalis Wei, 1990: 497
Distribution. -- China: Pan County (type loc.), Guizhou Province.

3. P. daxiongi Feng, 2001: 30
Distribution. -- China: Mt. Erlang (type loc.), Yaan City, Sichuan Province.

4. P. fusciantenna Feng et Ma, 2002: 94
Distribution. -- China: Mt. Zhougong (type loc.), Yaan City, Sichuan Province.

5. P. fuscitibia Shinonaga et Kano, 1971: 177
Distribution. -- Japan: Sapporo (type loc.). China: Jiagedaqi, Heilongjiang Province; Mt. Changbai, Jilin Province. Mongolia. Russia.

6. P. hamiloba Ma, 1992: 443
Distribution. -- China: Yushu County (type loc.), Qinghai Province; Kangding County, Sichuan Province; Mt. Houding, Zhangjiakou City, Hebei Province.

7. P. hanmiensis Xue et Zhang, n. sp. (Figure 1 A–D)
Holotype male. -- Body length 6.0–6.2 mm.

Head. Eye covered with long ciliae; frons subequal in width to anterior ocellus, frontal vitta black, disappearing in the middle; 10 pairs of fr, extending to both sides of anterior ocellus, upper 4–5 short, which are subequal in length to eye ciliae, without ors; fronto-orbital plate, parafacial and gena covered with pale gray pruinosity, parafacial subequal in width to the postpedicel; antenna black, postpedicel about 2.5 times as long as broad; arista long plumose, the longest hair about 2.0 times as long as the width of the postpedicel; facial carina projecting, nearly buninoid; vibrissal angle situated in front of frontal angle in profile; gena about 1/5 of eye in height, the anterior margin of gena with a row of up-curved subvibrissal setulae, genal and postgenal hairs black; prementum about 2.5 times as long as broad, covered with gray pruinosity and hairs; palpus black, longer than prementum.

Thorax. Black in ground color, sparsely covered with gray pruinosity; scutum with 4 black vittae, scutellum black; 8–10 rows of hair-like prst acr, acr 0+1, dc 2+4, ial 0+2, pra long and strong, about 1.5 times as long as posterior notopleural seta; notopleuron and katepimeron with hairs, lateral and ventral surface of scutellum, basisternum of pro sternum, and meron all bare; spiracles dark brown; katepisternal setae 1+2.

Wing. Light brown, veins dark brown, basicosta black; costal spines absent, dorsal and ventral surface of radial node all bare; distal parts of R_{4+5} and M straight, r-m and dm-cu not clouded; calypters and haltere brown-yellow.

Legs. All black; fore tibia with 2 median p, without long hairs on the ventral surface; mid femur with a row of short and weak av, a row of pv (3 of them long and strong in the basal half); mid tibia with 2 p, 2 pv, without ad; hind femur with av in the apical half, without pv; hind tibia with 3–4 av, 2 ad, 1 pd in apical quarter, without additional sub-basal pd and apical pv; all tarsi longer than tibiae; claws and pulvilli short and small.

Abdomen. Black in ground color, nearly rounded in dorsal view, covered with gray pruinosity; tergites 4 and 5 slightly shiny, each tergite with median narrow black vitta, without shining patches; sternite 1 bare, the posterior part of every sternite 2–5 with a pair of long setae; cercus with many thin hairs on inner margin, with inconspicuous inboard processus.

Female. -- Unknown.

Type material. -- Holotype. China, Tibet, Motuo County, Hanmi, 2150-3200 m a.s.l., 9 August 2003, Mingfu Wang Collect., ♂ (IESNU). Paratype. Same data as holotype. ♂ (IESNU).

Remarks. -- This new species is similar to P. zhongshana Ma et Feng, 2002, but it differs from the latter in the male: parafacial subequal in width to the postpedicel; anterior margin of gena with a row of up-curved subvibrissal setulae; pra long and strong, about 1.5 times as long as posterior notopleural seta; katepimeron with hairs; legs all black; hind tibia with 2 ad; cercus with many thin hairs on inner margin, without distinct inboard processus.

Etymology. -- The species name is based on the place of collection, Hanmi.
Figure 1. *Phaonia hanmiensis*, n. sp. (A) male, abdomen in dorsal view; (B) male, sternite 5 in ventral view; (C) male, cerci in posterior view; (D) male, cercus and surstylus in profile. Scale bars: A, 1.0 mm; B, 0.5 mm; C and D, 0.2 mm. High quality figures are available online.

**Distribution.** -- China: Tibet.

8. *P. hunyuanensis* Ma et Wang, 1998: 1221

**Distribution.** -- China: Hunyuan County (type loc.), Shanxi Province.

9. *P. incana* (Wiedemann, 1817): 81

**Distribution.** -- Germany: Kiel (type loc.). China: Mt. Changbai, Jilin Province; Haiyan County, Maqin County, Qinghai Province. Mongolia. Russia.

10. *P. jiagedaqiensis* Ma et Cui, 1992: 924

**Distribution.** -- China: Jiagedaqi (type loc.), Heilongjiang Province.

11. *P. kunjirapensis* Xue et Zhang, 1996: 225

**Distribution.** -- China: Kunjirap (type loc.), Tashikertergantajike Autonomous County, Xinjiang Uygur Autonomous Region.

12. *P. labidocerca* Feng et Ma, 2002: 58

**Distribution.** -- China: Mt. Erlang (type loc.), Yaan City, Sichuan Province.

13. *P. latimarginata* Fang et Fan, 1988: 503

**Distribution.** -- China: Mt. Galongla (type loc.), Motuo County, Tibet.

14. *P. longipalpis* Feng et Ma, 2002: 96

**Distribution.** -- China: Mt. Erlang (type loc.), Yaan City, Sichuan Province.

15. *P. longirostris* Xue et Zhao, 1998: 1233

**Distribution.** -- China: Mt. Xiaowutai (type loc.), Hebei Province.

16. *P. maowenensis* Deng et Feng, 1998: 95

**Distribution.** -- China: Sanlong (type loc.), Maowen County, Sichuan Province.

17. *P. megacerca* Feng et Ma, 2002: 95

**Distribution.** -- China: Mt. Erlang (type loc.), Yaan City, Sichuan Province.

18. *P. megistogenysa* Feng et Ma, 2002: 86

**Distribution.** -- China: Mt. Erlang (type loc.), Yaan City, Sichuan Province.

19. *P. mengi* Feng, 2000: 203

**Distribution.** -- China: Mt. Jiaoding (type loc.), Hanyuan County, Sichuan Province.

20. *P. mimoincana* Ma et Feng, 1986: 89

**Distribution.** -- China: Mt. Erlang (type loc.), Yaan City, Sichuan Province.

21. *P. nanlingensis* Xue et Zhang, n. sp. (Figure 2 A–C)

**Holotype male.** -- Body length 7.0–7.2 mm.

**Head.** Eye sparsely covered with long ciliae, surfaces of inboard upper ommatidia not enlarged; frons subequal in width to anterior ocellus, frontal vitta black, disappearing in the middle; 12–14 pairs of fr, extending to both sides of anterior ocellus, upper half short and

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subequal in length to eye ciliae, without ors; fronto-orbital plate, parafacial and gena covered with pale gray pruinosity, parafacial subequal in width to the postpedicel; antenna black, postpedicel about 3.0 times as long as broad; arista long plumose, the longest hair about 1.5 times as long as the width of the postpedicel; vibrissal angle slightly situated in front of frontal angle in profile; gena about 1/4 of the eye in height, genal and postgenal hairs black; proboscis short, prementum about 3.0 times as long as broad, covered with gray pruinosity and hairs; palpus black, longer than prementum.

**Thorax.** Black in ground color, sparsely covered with caesious pruinosity; scutum with 4 black vittae, scutellum black; acr 0+1, dc 2+4, ial 0+2, pra long and strong, about 2.0 times as long as posterior notopleural seta; notopleuron with hairs; lateral and ventral surface of scutellum, basisternum of prosternum, katepimeron, and meron all bare; spiracles dark brown; katepisternal setae 1+2.

**Wing.** Light brown, veins dark brown, basicosta black, subcostal sclerite light brown; costal spines short and weak; dorsal and ventral surfaces of radial node all bare; distal parts of R4+5 and M straight; r-m and dm-cu not clouded; calypters light brown, haltere yellow.

**Legs.** All black; fore tibia with 1 median p, without long hairs on ventral surface; mid femur with 3–4 pv in basal half, without av row; mid tibia with 2–3 p, 2 pv, without ad; hind femur with av row, without pv; hind tibia with 4 av, a row of ad, 1 pd in apical fifth, without apical pv; all tarsi longer than tibiae; claws and pulvilli long, subequal in length to fourth tarsomere.

**Abdomen.** Black in ground color, nearly rounded in dorsal view, sparsely covered with caesious pruinosity; each tergite with median black vitta, without shining patches; sternite 1 bare; cersus with distinct inboard processus; surstylus slender, but distal part enlarged.

**Female.** -- Unknown.

**Type material.** -- **Holotype.** China, Guangdong Province, Shaoguan City, Nanling National Park, Mt. Xiaohuang, 850–1900 m a.s.l., 22 July 2004, Chuntian Zhang Collect., ♂ (IESNU). **Paratype.** Same data as holotype. 5 ♂♂ (IESNU).

**Remarks.** -- This new species is similar to *P. zhougongshana* Ma et Feng, 2002, but it differs from the latter in the male: eye sparsely covered with long ciliae; parafacial subequal in width to the postpedicel; legs all black; hind tibia with 4 av, without a, p; surstylus slender, but distal part enlarged.

**Etymology.** -- The species name is based on the place of collection, Nanling, where Mount Xiaohuangshan lies.

![Figure 2](https://academic.oup.com/jinsectscience/article-abstract/13/1/129/1753145)
Distribution. -- China: Guangdong Province.

22. *P. nigeritegula* Feng, 2002: 3
Distribution. -- China: Taiziping (type loc.), Mt. Emei, Sichuan Province.

23. *P. ningxiaensis* Ma et Zhao, 1992: 924
Distribution. -- China: Xixia (type loc.), Jingyuan County, Ningxia Hui Autonomous Region.

24. *P. paederocerca* Feng et Ma, 2002: 55
Distribution. -- China: Wanfoding (type loc.), Mt. Emei, Sichuan Province; Mt. Jiaoding, Hanyuan County, Sichuan Province.

25. *P. paomashanica* Feng, 2004: 8
Distribution. -- China: Mt. Paoma (type loc.), Kangding County, Sichuan Province.

26. *P. papillaria* Fang et Fan, 1993: 1241
Distribution. -- China: Qingtiange (type loc.), Weixi Lisu Autonomous County, Yunnan Province.

27. *P. planeta* Feng et Ma, 2002: 86
Distribution. -- China: Mt. Erlang (type loc.), Yaan City, Sichuan Province.

28. *P. reduncicauda* Xue et Zhang, n. sp. (Figure 3 A–H)

Holotype male. -- Body length 7.8 mm.

**Head.** Eye covered with long dark brown ciliae; frons subequal in width to the distance between outer margins of posterior ocelli, frontal vitta black, subequal in width to fronto-orbital plate; 11 pairs of *fr*, extending to both sides of anterior ocellus, upper 5 short, which are subequal in length to eye ciliae, without *ors*; fronto-orbital plate, parafacial and gena covered with gray pruinosity, parafacial with a silvery white patch in the upper half; antenna black, postpedicel about 2.5 times as long as broad; arista plumose, the longest hair slightly longer than or subequal to the width of the postpedicel; facial carina projecting, relatively narrower; epistoma snout-shaped, distinctly situated front of the anterior margin of frons in profile; gena about 2/5 of eye in height, the anterior margin of gena with 2–3 rows of upcurved subvibrissal setulae, genal and postgenal hairs all black; prementum about 2.5 times as long as broad, covered with gray pruinosity and hairs; palpus black, longer than prementum.

**Thorax.** Black in ground color, densely covered with gray pruinosity; scutum with 4 black vittae, scutellum black; 6 rows of hair-like *prst acr, acr 0+1, dc 2+4, ial 0+2, pra* long and strong, about 1.5 times as long as posteri-
or notopleural seta; notopleuron with hairs; lateral and ventral surface of scutellum, basisternum of prosternum, katepimeron, and meron all bare; spiracles dark brown; katepisternal setae 1+2.

**Wing.** Light brown, veins dark brown, basicosta black; costal spines short, about 1/2 of r-m in length; dorsal and ventral surface of radial node all bare; distal parts of R₄-₅ and M straight; dm-cu clouded; calypters and haltere brownish yellow.

**Legs.** All black; fore tibia with 2 median p, without long hairs on ventral surface; mid femur with pv row, which was stronger in the basal half, without av row; mid tibia with 3 p, 2 pv, without ad; hind femur with av in the apical half, without pv; hind tibia with 3–4 av, 4 ad, 1 pd in apical quarter, additional 1–2 pd in basal third, without apical pv; all tarsi longer than tibiae; claws and pulvilli short.

**Abdomen.** Black in ground color, oviform in dorsal view, densely covered with bluish gray pruinosity; each tergite with median black vitta, posterior margin of tergite 3 and 4 with stripes, tergite 5 with a pair of shining lateral patches, other tergites without shining patches; sternite 1 bare; distal part of inner processus of cersus enlarged, and curved backward; ejaculatory apodeme big globose.

**Female.** -- Body length 6.8–7.8 mm. Frons about 1/3 of head in width, frontal vitta about 4.0 times as wide as fronto-orbital plate 5 fr, 2 ors; frontal triangle reaching to the middle of frons; parafacial about 1.5 times as wide as the postpedicel; the longest aristal hair about 1.2 times as long as the width of the postpedicel; fore tibia with 1 median p; mid tibia with 1–2 pv; hind tibia with 2–3 ad; posterior margin of tergite 3 with relatively broader stripe; the other characters as male.

**Type material.** -- **Holotype.** China, Tibet, Motuo County, Mt. Duoxiongla, 3600–4200 m a.s.l., 8 August 2003, Mingfu Wang Collect., ♂ (IESNU). **Paratype.** Same data as holotype. 2 ♀♀ (IESNU).

**Remarks.** This new species is similar to *P. mimoincana* Ma et Feng, 1986, but it differs from the latter in the male: frons subequal in width to the distance between outer margins of posterior ocelli; parafacial with a silvery white patch in the upper half; arista plumose, the longest hair slightly longer than or subequal to the width of the postpedicel; gena about 2/5 of eye in height; costal spines short, about 1/2 of r-m in length; dm-cu clouded; mid femur with pv row, which was stronger in the basal half; posterior margin of tergite 3 and 4 with stripes; tergite 5 with a pair of shining lateral patches.

**Etymology.** -- The species name is derived from the Latin words “reduncus” meaning curved backward and “cauda” meaning tail, referring to the inner processus of the cersus being curved backward.

**Distribution.** -- China: Tibet.

**29. P. scrofigena Ma et Xue, 1998: 1266**

**Distribution.** -- China: Barkam County (type loc.), Sichuan Province.

**30. P. spargocerca Xue et Zhang, n. sp.** (Figure 4 A–F)

**Holotype male.** -- Body length 8.0 mm.
Head. Eye densely covered with light brown ciliae; frons narrow, subequal in width to anterior ocellus, fronto-orbital plates adjoining in the middle; 13 pairs of fr, extending to both sides of anterior ocellus, upper 7 short, which were subequal in length to the eye ciliae, without ors; fronto-orbital plate, parafacial and gena covered with dark gray pruinosity, parafacial about 1.75 times as wide as the postpedicel; antenna black, postpedicel about 3.0 times as long as broad; arista long plumose, the longest hair about 1.5 times as long as width of the postpedicel; vibrissa angle distinctly situated in front of the frontal angle in profile; gena about 2/5 of eye in height, the anterior margin of gena with a row of up-curved subvibrissal setulae, genal and postgenal hairs all black; the upper lateral area of occiput with hairs; proboscis short, with a pair of prestomal teeth; prementum about 2.5 times as long as broad, covered with pruinosity; palpus black and slender, slightly longer than prementum.

Thorax. Black in ground color, scutum with 4 inconspicuous black-brown vittae, scutellum black; acr 0+1, dc 2+4, ial 0+2, pra slightly longer than or subequal to posterior notopleural seta; both sides of scutellum with few hairs, ventral surface bare; notopleuron and katepimeron with hairs, basisternum of prosternum, proepisternum, anepimeron, and meron all bare; anterior spiracle light yellow to white, posterior spiracle light brown; katepisternal setae 1+2.

Wing. Light brown, veins dark brown, basicosta black; costal spines short and weak; dorsal and ventral surface of radial node all bare; distal parts of R_4+5 and M straight; r-m and dm-cu not clouded; calypters light brown, the lower calypter project; haltare brown yellow.

Legs. All black; fore tibia with 3 pv in the apical half, without long hairs on the ventral surface; mid femur with strong av row, 1 preapical a, 2 pd, 3–4 blunt-pointed pv in the basal half; mid tibia with 1 p, 2 pv, without ad; hind femur with a row of av, which become long and strong apically, without pv; hind tibia with 4 short and weak av in the middle, complete ad row, 1 long and strong pd in the apical quarter, 1 additional pd basal, without p and apical pv; all tarsi longer than tibiae; claws and pulvilli short.

Abdomen. Black in ground color, oviform in dorsal view, without vittae and shining patches; sternite 1 bare.

Female. -- Body length 9.0 mm. Frons about 3/8 of the head in width, fronto-orbital plate about 1/4 of the frontal vitta in width, frontal vitta black; frontal triangle covered with brownish yellow pruinosity, reaching to upper...
2/5 of frons; 8 pairs of fr, 2 pairs of ors; fronto-orbital plate and upper parafacial covered with gray pruinosity, lower parafacial and gena covered with brownish yellow pruinosity; parafacial about 2.0 times as wide as the postpedicel; arista long plumose, the longest hair about 1.2 times as long as the width of the postpedicel; gena about 1/2 of the eye in height; prementum sparsely covered with pruinosity; scutum distinct with black brown vittae; both sides of scutellum with few hairs; dm-cu clouded; fore tibia with median p; mid tibia with 2 ad, 3–4 p, 2 pv; hind tibia with 2–3 av; hind part of tergite 1, fore part of tergites 3 and 4 densely covered with gray pruinosity; tergites 3 and 4 with median vittae; the other characters as male.

**Type material.** -- **Holotype.** China, Yunnan Province, Shangri-La County, Bita Lake, 4000–4150 m, 2 July 2002, Wanqi Xue Collect., ♀ (IESNU). **Paratype.** Same data as holotype, ♂ (IESNU).

**Remarks.** -- This new species is similar to *P. wanfodinga* Feng et Ma, 2002, but it differs from the latter in the male: frons narrow, subequal in width to anterior ocellus; parafacial about 1.75 times as wide as the postpedicel; arista long plumose, the longest hair about 1.5 times as long as the width of the postpedicel; gena about 2/5 of the eye in height, the anterior margin of gena with a row of upcurved subvibrissal setulae; pra slightly longer than or subequal to posterior notopleural seta; anterior spiracle light yellow to white.

**Etymology.** -- The species name is derived from the Greek words “spargosis” meaning enlarged and “cercus” meaning cercus, referring to male cerci being broad in the apical part.

**Distribution.** -- China: Yunnan Province.

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31. *P. subconsobrina* Ma, 1992: 923
**Distribution.** -- China: Mt. Changbai (type loc.), Jilin Province.

32. *P. subemarginata* Fang, Li et Deng, 1986: 241
**Distribution.** -- China: Mt. Emei (type loc.), Sichuan Province.

33. *P. subhybrida* Feng et Ma, 2002: 58
**Distribution.** -- China: Mt. Erlang (type loc.), Yaan City, Sichuan Province.

34. *P. subincana* Xue et Zhang, n. sp. (Figure 5 A–D)

**Holotype male.** -- Body length 6.0–6.2 mm.

**Head.** Eye sparsely covered with short light brown ciliae; frons about 1.2 times as wide as the distance between outer margins of posterior ocelli; frontal vitta black, the narrowest part about 2.0 times as wide as the fronto-orbital plate; 11 pairs of fr, extending to both sides of anterior ocellus, without ors; fronto-orbital plate, parafacial and gena sparsely covered with gray pruinosity, parafacial about 1.5 times as wide as the postpedicel; antenna black, postpedicel about 2.5 times as long as broad; arista ciliated, the longest hair slightly shorter than the width of half the postpedicel; epistoma at the same vertical line with the anterior margin of frons in profile; gena about 1/2 of the eye in height, the anterior margin of gena with 3 rows of upcurved subvibrissal setulae, genal and postgenal hairs all black; prementum about 2.5 times as long as broad, covered with gray pruinosity; palpus black and slender, slightly longer than the prementum.

**Thorax.** Black in ground color, sparsely covered with brownish gray pruinosity; scutum
with 4 black vittae, scutellum black; 4 rows of hair-like prst acr, acr 0+1, dc 2+4, ial 0+2, pra about 2.0 times as long as posterior notopleural seta; notopleuron with hairs, lateral and ventral surface of scutellum, basisternum of prostemum, katepimeron, and meron all bare; spiracles dark brown; katepisternal setae 1+2.

**Wing.** Light brown, basal part of wing and veins dark brown, basicosta black; costal spines short and weak; dorsal and ventral surface of radial node all bare; subcosta bowlike, distal parts of R₄₋₅ and M straight; r-m and dm-cu not clouded; calypters pale brown, haltere light brown in basal, black in apical.

**Legs.** All black; fore tibia with 1 median p, without long hairs on the ventral surface; mid femur with a row of short av, a row of pv that become short apically; mid tibia with 1 short and weak ad, 2–3 p, 1–2 pv; hind femur with av row, which is long and strong in the apical 2/5, without pv; hind tibia with 2–3 av, 4–5 ad, 1 long and strong pd in the apical third, 1 short and weak pd in the middle, 2 short and weak pd in the sub-basal region; all tarsi longer than tibiae; claws and pulvilli short.

**Abdomen.** Black in ground color, long ovoid in dorsal view, covered with dark gray pruinosity and spindly setae; each tergite with median black vitta, but the median black vitta of tergites 4 and 5 narrower; posterior margins of tergites 3–5 with black stripes; sternite 1 bare; cerci nearly quadrate in posterior view, outboard processus broad, and longer than inboard processus.

**Female.** -- Unknown.

**Type material.** -- **Holotype.** China, Tibet, Motuo County, Mt. Duoxiongla, 3600–4200 m a.s.l., 8 August 2003, Mingfu Wang Collect., ♂ (IESNU). **Paratype.** Same data as holotype. 2 ♀♀ (IESNU).

**Remarks.** -- This new species is similar to *P. mimoincana* Ma et Feng, 1986, but it differs from the latter in the male: eye sparsely covered with short light brown ciliae; arista ciliated, the longest hair slightly shorter than the width of half of the postpedicel; gena about 1/2 of the eye in height; mid tibia with 1 short and weak ad; hind femur without pv; hind tibia with 1 short and weak pd in the middle; cerci nearly quadrate in the posterior view, outboard processus broad, and longer than the inboard processus.

**Etymology.** -- The species name is based on the new species being similar to *P. mimoincana* Ma et Feng, 1986.

**Distribution.** -- China: Tibet.

**35. P. sunwuensis Xue et Ma, 1998: 1281**

**Distribution.** -- China: Heilongjiang Province.
36. *P. varimargina* Xue et Zhang, n. sp. (Figure 6 A–D)

**Holotype male.** -- Body length 6.0–6.2 mm.

**Head.** Eye covered with long ciliae, surfaces of upper ommatidia not enlarged; frons about 1.5 times as wide as the anterior ocellus, frontal vitta black, disappearing in the middle; 11 pairs of *fr*, extending to both sides of the anterior ocellus, upper 5 short and slightly longer than the eye ciliae, without *ors*; fronto-orbital plate, parafacial and gena covered with gray pruinosity, parafacial about 1.5 times as wide as the postpedicel; antenna black, postpedicel about 2.5 times as long as broad; arista long plumose, the longest hair about 1.3 times as long as the width of the postpedicel; facial carina projecting, nearly buninoid; episoma snout-shaped, distinctly situated in front of the anterior margin of frons in profile; gena about 2/5 of the eye in height, the anterior margin of gena with a row of upcurved subvibrissal setulae, genal and postgenal hairs all black; prementum without pruinosity; palpus black and slender; haustellum relatively shorter, about 1.5 times as long as the palpus.

**Thorax.** Black in ground color, sparsely covered with gray pruinosity; scutum with 4 black vittae, scutellum black; 8 rows of hair-like *prst acr*, *acr* 0+1, *dc* 2+4, *ial* 0+2, *pra* long and strong, about 2.0 times as long as the anterior notopleural seta, posterior notopleural seta short and weak, about 1/2 of the anterior notopleural seta in length; notopleuron with hairs; lateral and ventral surface of scutellum, basisternum of prosternum, katepimeron, and meron all bare; spiracles dark brown; katepisternal setae 1+2.

**Wing.** Light brown, veins dark brown, basicosta black; costal spines short and weak, shorter than *r-m* in length; dorsal and ventral surface of radial node all bare; distal parts of *R*₄₊₅ and *M* straight; *r-m* and *dm-cu* not clouded; calypters and haltiere brown-yellow.

**Legs.** All black; fore tibia with 2 median *p*, without long hairs on the ventral surface; mid femur with a row of short and weak *av*, a row of *pv* that are long and strong in the basal two-thirds; mid tibia with 3–4 *p*, 1 *pv*, without *ad*; hind femur with *av*, short and weak *pv* in the apical half; hind tibia with 3 *av*, 3 *ad*, 1 *pd* in apical quarter, without sub-basal *pd*, apical *pv*; all tarsi longer than tibiae; claws and pulvilli short.

**Abdomen.** Black in ground color, nearly rounded in dorsal view, covered with gray pruinosity; each tergite with median black vitta, the posterior margins of tergites 3–5 with broad shifting stripes; sternite 1 bare.

**Female.** -- Unknown.

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**Figure 6.** *Phaonia varimargina*, n. sp. (A) male, abdomen in dorsal view; (B) male, sternite 5 in ventral view; (C) male, cerci in posterior view; (D) male, cersus and surstylus in profile. Scale bars: A, 1.0 mm; B, 0.5 mm; C and D, 0.2 mm. High quality figures are available online.
Type material. -- **Holotype.** China, Tibet, Motuo County, Mt. Duoxiongla, 3600–4200 m a.s.l., 8 August 2003, Mingfu Wang Collect., ♂ (IESNU). **Paratype.** Same data as holotype. 2 ♀♀ (IESNU).

Remarks. -- This new species is similar to *P. latimargina* Fang et Fan, 1988, but it differs from the latter in the male: surfaces of upper ommatidia not enlarged; parafacial about 1.5 times as wide as the postpedicel; arista long plumose, the longest hair about 1.3 times as long as the width of the postpedicel; haustellum relatively shorter, about 1.5 times as long as the palpus at most; mid femur with a row of *pv* that are long and strong in the basal two-thirds; mid tibia with 3–4 *p*, 1 *pv*; hind femur without *pv* in the basal half; hind tibia with 3 *ad*; abdomen nearly rounded in dorsal view.

Etymology. -- The species name is derived from the Latin words “*variatus*,” meaning shifting and “*marginis*,” meaning margin, referring to the posterior margins of tergites 3–5 having broad shifting stripes.

Distribution. -- China: Tibet.

37. *P. wanfodinga* Feng et Ma, 2002: 98
**Distribution.** -- China: Wanfoding (type loc.), Mt. Emei, Sichuan Province; Mt. Erlang, Yaan City, Sichuan Province.

38. *P. wulinga* Xue, 1998: 1290
**Distribution.** -- China: Mt. Leigong (type loc.), Leishan County, Guizhou Province.

39. *P. zhangyeensis* Ma et Wu, 1992: 924
**Distribution.** -- China: Zhangye City (type loc.), Gansu Province.

40. *P. zhougongshana* Ma et Feng, 2002: 85
**Distribution.** -- China: Mt. Zhougong (type loc.), Yaan City, Sichuan Province.

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