



Ten new species of the *Stegana* (*Steganina*) *shirozui* species group (Diptera, Drosophilidae) from China

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Abstract

Ten new species of the *Stegana* (*Steganina*) *shirozui* species group are described from central to southwestern China: *S. (S.) danbaensis* **sp. nov.**, *S. (S.) dianensis* **sp. nov.**, *S. (S.) glabra* **sp. nov.**, *S. (S.) montana* **sp. nov.**, *S. (S.) oligochaeta* **sp. nov.**, *S. (S.) tentaculifera* **sp. nov.**, *S. (S.) parvispina* **sp. nov.**, *S. (S.) pianmaensis* **sp. nov.**, *S. (S.) protuberans* **sp. nov.**, *S. (S.) xishuangbanna* **sp. nov.** A key to all the species of the *shirozui* group is provided.

Key words: China, new species, *Stegana shirozui* group, Drosophilidae

Introduction

A total of seven species group have been established in the subgenus *Steganina* of the genus *Stegana*, including 75 species: the *biprotrusa* group (including six species, Wu et al., 2010), the *castanea* group (including eight species, Wang et al., 2011); the *coleoprata* group (including 22 species, Laštovka & Máca, 1982; Chen & Chen, 2008), the *nigrolimbata* group (including seven species, Cao & Chen, 2008), the *ornatipes* group (including 11 species, Cheng et al., 2009; Lu et al., 2011b), the *undulata* group (including nine species, Sidorenko, 2002; Lu et al., 2011a) and the *shirozui* species group (Chen et al., 2009). The *shirozui* group comprised 12 species occurring in East Asia from tropical to subfrigid zone: *S. ctenaria* Nishiharu, 1979, *S. masanoritodai* Okada & Sidorenko, 1992 and *S. saigusai* Chen Gao & Chen, 2009 from Japan; *S. shirozui* Okada, 1971 from Taiwan; *S. jianfenglingensis*, *S. jiajinshanensis*, *S. maoershanensis*, *S. multidentata*, *S. qinlingensis*, *S. shennongi*, *S. wuyishanensis* and *S. xanthsticta* were described by Chen, Gao and Chen in 2009 from mainland China. Two diagnostic characters were designated for this species group (Chen et al., 2009): (1) face black, with two yellow bands on median and lower margin; (2) surstylus with 1 row of prenisetae submedially and serrated, minute processes (Figs 2, 8, 15, 22, 29, 36, 42, 46, 52, 59). Some morphological traits are observed in common between the *shirozui* and the *undulata* groups: surstylus with preniseta(e) submedially, and hypandrium mostly elongated anteromedially. In the present study, ten new species from southern China are described as new members of the *shirozui* group.

All type specimens were collected on tree trunks along streams in forest and preserved in 75% ethanol, then dried and pinned after morphological examination and identification in the laboratory. The type specimens are deposited in the following institutions: Kunming Institute of Zoology, Chinese Academy of Sciences, Kunming, China (KIZ); Department of Entomology, South China Agricultural University, Guangzhou, China (SCAU). We followed McAlpine (1981) for morphological terminology and Zhang & Toda (1992), and Chen & Toda (2001) for the definitions of measurements, indices and abbreviations.

Descriptions of new species

For the diagnosis and group description see Chen et al., 2009. For the new species described, only characters that depart from the group diagnoses and descriptions are provided for brevity. The mesoscutum pattern is left out of

descriptions of new species because it's complex and diversified in this group, the other body parts as depicted in detail in Table 1.

Stegana (Steganina) danbaensis sp. nov.

(Figs 1–6)

Diagnosis. This species is related to *S. multidentata* from Shennongjia, Hubei, but clearly distinguishable from the latter by the epandrium and aedeagus (in *S. multidentata*: epandrium broadened on posterior margins, more wider than 3/5 high; aedeagus distinctly expanded submedially and with rhombic opening in ventral view).

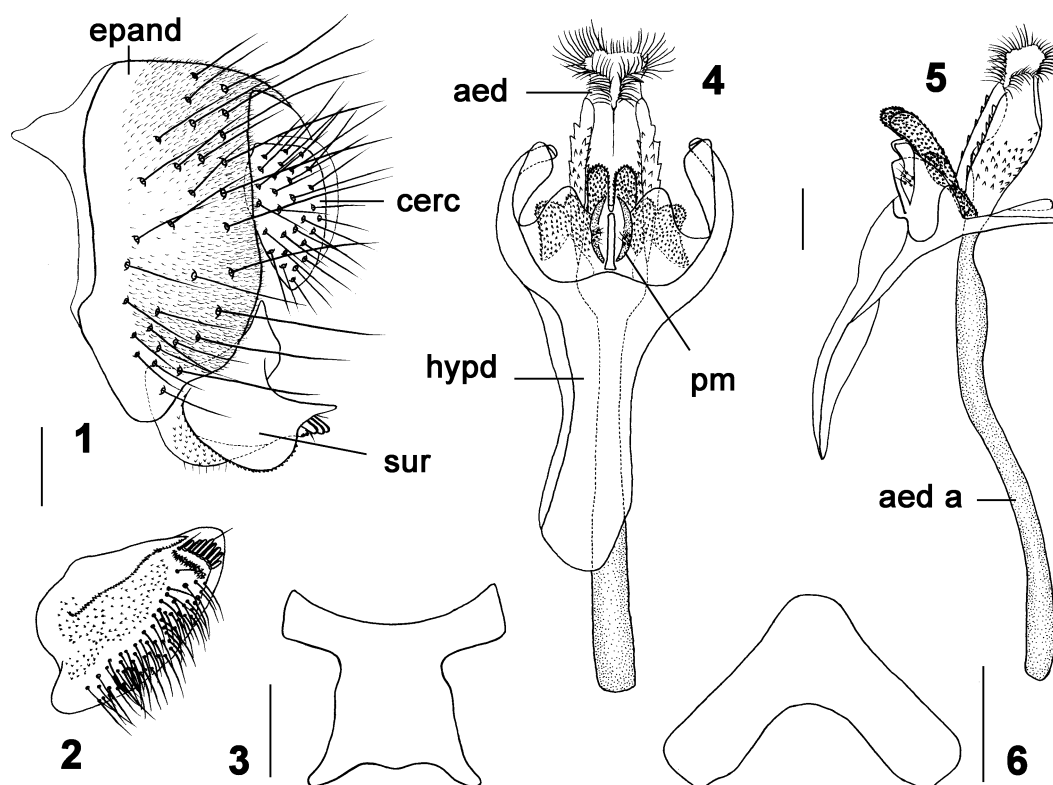
Description. Male terminalia: Epandrium roundly protruded ventrally, approximately twice as high as wide on posterior margins (Fig. 1). Cercus lacking pubescence (Fig. 2). Surstylus with 8 prenisetae submedially (Fig. 2). Tenth sternite strongly protruded apicolaterally (Fig. 3). Paramere with ca. 5–6 sensilla (Figs 4, 5). Aedeagus with globular projections bearing finely serrated processes basally (Figs 4, 5); nearly oval on opening in ventral view (Fig. 4). Gonopods round apically, not protruded dorsomedially (Fig. 6).

Measurements. BL = 2.78 mm in holotype; ThL = 1.68 mm; WL = 3.15 mm; WW = 1.51 mm, arb = 8/5, avd = 0.83, adf = 1.84, flw = 1.87, FW/HW = 0.45, ch/o = 0.16, prorb = 0.83, rcorb = 0.67, vb = 0.41, dcl = 0.46, sctl = 1.40, sterno = 0.90, orbito = 1.80, dcp = 0.25, sctlp = 2.20, C = 2.17, 4c = 1.02, 4v = 1.66, 5x = 1.57, ac = 10.50, M = 0.54, C3F = 0.68.

Type material. Holotype ♂ (SCAU, No. 120721), CHINA: Danba, Ganzi, Sichuan, 30°41' N, 101°45' E, 2670 m, 1.ix.2006, MF Xu.

Distribution. China (Sichuan).

Etymology. In reference to type locality, called “hill town” in the Tibetan language.



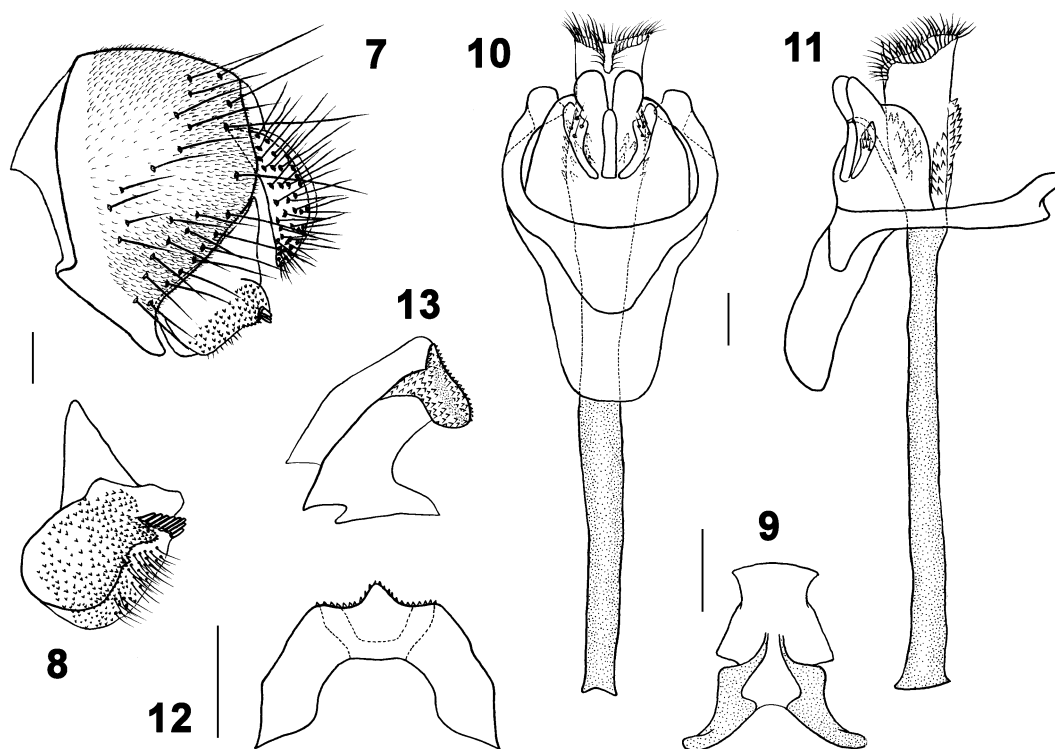
FIGURES 1–6. *Stegana (Steganina) danbaensis* sp. nov., male terminalia: 1. Epandrium (epan), cercus (cerc) and surstylus (sur) (lateral view); 2. surstylus (ventral view); 3. 10th sternite (ventral view); 4, 5. hypandrium (hypd), parameres (pm), aedeagus (aed) and aedeagal apodeme (aed a) (ventral and lateral view); 6. gonopods (ventral view). Scale bars: 0.1 mm.

Stegana (Steganina) dianensis sp. nov.

(Figs 7–13)

Diagnosis. This species is related to *S. montana* sp. nov., but clearly distinguishable from the latter by the scutellum and tenth sternite, in this species: scutellum yellow on distal half; tenth sternite not expanded distally (Fig. 9).

Description. Male terminalia: Epandrium broadened on posterior margins, wider than 3/5 high, pointedly protruded ventrally (Fig. 7). Cercus lacking pubescence (Fig. 7). Surstylus with 8 prenisetae submedially (Fig. 8). Tenth sternite sclerotized and furcated basally (Fig. 9). Paramere with ca. 4–6 sensilla (Figs 10, 11). Aedeagal opening narrow, aperture-like in ventral view (Figs 10, 11). Gonopods slightly roundly protruded, with oval, strong projection dorsomedially (Fig. 13).



FIGURES 7–13. *Stegana (Steganina) dianensis* sp. nov., male terminalia: 7. Epandrium, cercus and surstylus; 8. surstylus; 9. 10th sternite; 10, 11. hypandrium, aedeagus and aedeagal apodeme; 12, 13. gonopods. Scale bars: 0.1 mm.

Measurements. BL = 2.64 mm in holotype (range in 4♂ paratypes: 2.35–2.90 mm), ThL = 2.03 mm (1.76–1.98 mm), WL = 4.20 mm (3.90–4.30 mm), WW = 1.64 mm (1.54–1.68 mm), arb = 6/5 (6/5–7/5), avd = 0.64 (0.64–0.73), adf = 1.38 (1.22–2.38), flw = 1.63 (1.44–1.63), FW/HW = 0.42 (0.42–0.46), ch/o = 0.24 (0.21–0.24), pror = 0.96 (0.94–0.96), rcorb = 0.68 (0.65–0.67), vb = 0.41 (0.35), dcl = 0.54 (0.39–0.44), presctl = 0.46 (0.41–0.47), sctl = 1.25 (1.23–1.41), sterno = 0.92 (0.92–0.93), orbito = 1.67 (1.67–2.00), dcp = 0.26 (0.25–0.26), sctlp = 2.09 (2.08–2.10), C = 2.15 (2.11–2.21), 4c = 1.00 (0.93–1.00), 4v = 1.70 (1.49–1.83), 5x = 1.70 (1.55–1.77), ac = 9.40 (9.20–9.33), M = 0.47 (0.44–0.55), C3F = 0.63 (0.63–0.67).

Type material. Holotype ♂ (SCAU, No. 120722), CHINA: Mt. Ailao, Jingdong, Yunnan, 24°32' N, 101°01' E, 2450 m, 1–3.viii.2006, HZ Cao. Paratypes: CHINA: 4♂ (2♂ in KIZ; 2♂ in SCAU, Nos 120723, 24), same data as holotype; 1♂, Samage, Weixi, Yunnan, 27°22' N, 99°51' E, 1900 m, 27.vii.2004, HW Chen (SCAU, No. 120725).

Distribution. China (Yunnan).

Etymology. In reference to the shortened form of Yunnan province of the type locality.

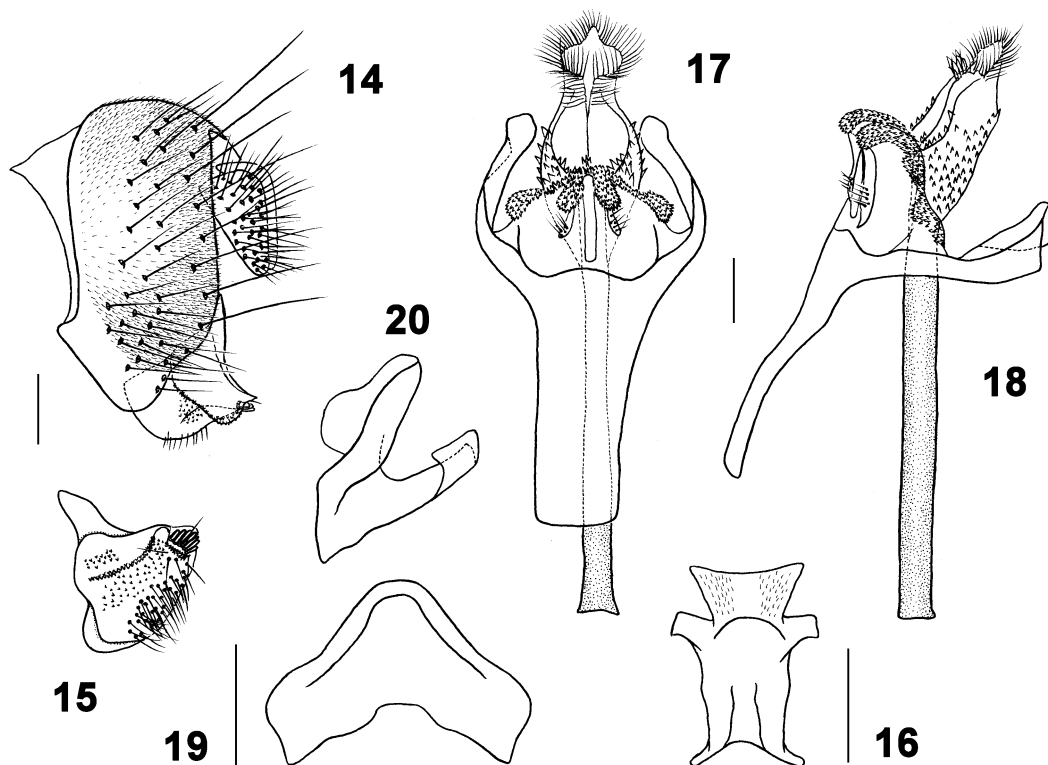
Stegana (Steganina) glabra sp. nov.

(Figs 14–20)

Diagnosis. This species is related to *S. ctenaria* from Japan, but clearly distinguishable from the latter by the tenth sternite squarely protruded and bearing pubescence apically (Fig. 16).

Description. Male terminalia: Epandrium roundly protruded ventrally (Fig. 14). Cercus lacking pubescence (Fig. 14). Surstylus with 7 prenisetae submedially (Fig. 15). Paramere with ca. 5 sensilla (Figs 17, 18). Aedeagus with globular projections bearing finely serrated processes basally, nearly oval on opening in ventral view, protruded apically (Figs 17, 18). Gonopods round apically, not protruded dorsomedially (Figs 19, 20).

Measurements. BL = 2.78 mm in holotype (range in 7♂ and 5♀ paratypes: 2.48–3.48 mm in ♂, 2.50–3.84 mm in ♀), ThL = 1.84 mm (1.60–2.06 mm in ♂, 1.68–2.34 mm in ♀), WL = 3.65 mm (3.32–4.05 mm in ♂,



FIGURES 14–20. *Stegana (Steganina) glabra* sp. nov., male terminalia: 14. Epandrium, cercus and surstylus; 15. surstylus; 16. 10th sternite; 17, 18. hypandrium, aedeagus and aedeagal apodeme; 19, 20. gonopods. Scale bars: 0.1 mm.

3.15–4.35 mm in ♀), WW = 1.58 mm (1.42–1.76 mm in ♂, 1.34–1.80 mm in ♀), arb = 9/6 (8–9/6), avd = 0.85 (0.67–0.83), adf = 1.63 (1.25–2.00), flw = 1.75 (1.63–2.00), FW/HW = 0.47 (0.39–0.50), ch/o = 0.24 (0.19–0.25), prorrb = 1.06 (1.05–1.25), rcorb = 0.63 (0.58–0.71), vb = 0.47 (0.36–0.47), dcl = 0.39 (0.38–0.55), presctl = 0.53 (0.43–0.63), sctl = 1.36 (1.21–1.53), sterno = 0.85 (0.81–0.92), orbito = 2.25 (1.75–2.00), dcp = 0.17 (0.17–0.23), sctlp = 1.62 (1.53–2.11), C = 2.12 (1.79–2.15), 4c = 1.11 (1.11–1.20), 4v = 1.86 (1.73–2.13), 5x = 1.27 (1.20–1.64), ac = 10.25 (9.25–12.00), M = 0.51 (0.44–0.56), C3F = 0.71 (0.68–0.75).

Type material. Holotype ♂ (SCAU, No. 120726), CHINA: Mt. Jizu, Binchuan, Yunnan, 26°00' N, 100°21' E, 1900 m, 20–23.vii.2006, T Li. Paratypes: CHINA: 5♂5♀ (2♂2♀ in KIZ; 3♂3♀ in SCAU, Nos 120727–32), same data as holotype except HL Cao, HZ Cao, T Li; 1♂ (SCAU, No. 120733), Qiongzhusi, Kunming, Yunnan, 25°02' N, 102°43' E, 1900 m, 19.vii.2006, HL Cao; 3♂1♀ (SCAU, Nos 120734–37), Mt. Wuliang, Nanjian, Yunnan, 24°32' N, 101°01' E, 2200 m, 25–27.vii.2006, HL Cao, HZ Cao, T Li; 2♀ (SCAU, Nos 120738, 39), Mt. Ailao, Jingdong, Yunnan, 2450 m, 31.vii.2006, T Li; 5♂3♀ (2♂1♀ in KIZ; 3♂2♀ in SCAU, Nos 120740–44), Mt. Wuliang, Jingdong, Yunnan, 1800 m, 4.viii.2006, HL Cao, HZ Cao, T Li; 1♂ (SCAU, No. 121226), Kuankuoshui, Guizhou, 28°14' N, 107°10' E, 1500 m, 11.viii.2011, YR Su.

Distribution. China (Guizhou, Yunnan).

Etymology. From the Latin word “glabrus” (= smooth), referring to the paramere lacking sensilla.

Stegana (Steganina) montana sp. nov.

(Figs 21–27)

Diagnosis. This species is related to *S. dianensis* sp. nov., but clearly distinguishable from the latter by the scutellum and tenth sternite, in this species: scutellum yellow medially, black laterally; tenth sternite expanded distally (Fig. 23).

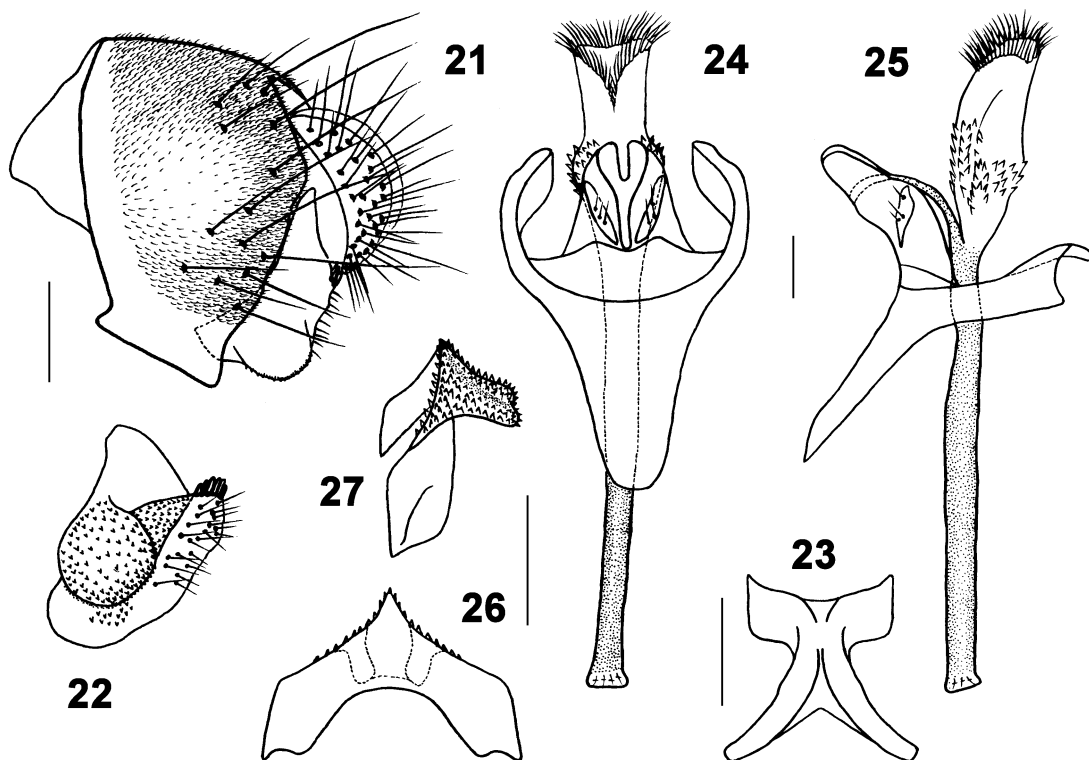


FIGURE 21–27. *Stegana (Steganina) montana* sp. nov., male terminalia: 21. Epandrium, cercus and surstylus; 22. surstylus; 23. 10th sternite; 24, 25. hypandrium, aedeagus and aedeagal apodeme; 26, 27. gonopods. Scale bars: 0.1 mm.

Description. Male terminalia: Epandrium broadened on posterior margins, wider than 3/5 high, pointedly protruded ventrally (Fig. 21). Cercus lacking pubescence (Fig. 21). Surstylus with 6 prensisetae submedially (Fig. 22). Tenth sternite furcated basally (Fig. 23). Paramere with ca. 3 sensilla (Figs 24, 25). Aedeagal opening slightly infundibular in ventral view (Figs 24, 25). Gonopods acute apically, with broadened, medially depressed projection dorsomedially (Fig. 27).

Measurements. BL = 3.04 mm in holotype (range in 4♂ and 5♀ paratypes: 2.80–3.20 mm in ♂, 2.90–3.25 mm in ♀), ThL = 1.85 mm (1.83–1.88 mm in ♂, 1.60–1.80 mm in ♀), WL = 3.35 mm (3.20–3.50 mm in ♂, 3.28–3.65 mm in ♀), WW = 1.50 mm (1.45–1.50 mm in ♂, 1.44–1.45 mm in ♀), arb = 9/5 (7–9/4–5), avd = 0.75 (0.68–0.83), adf = 1.78 (1.45–1.64), flw = 1.89 (1.71–1.83), FW/HW = 0.41 (0.40–0.43), ch/o = 0.16 (0.15–0.16), prorb = 1.25 (1.18–1.19), rcorb = 0.75 (0.75–0.88), vb = 0.47 (0.33–0.47), dcl = 0.46 (0.41–0.52), sctl = 1.35 (1.30–1.45), sterno = 0.83 (0.82–0.86), orbito = 1.60 (1.60–1.80), dcp = 0.23 (0.22–0.23), sctlp = 2.11 (1.78–2.00), C = 2.00 (1.77–2.09), 4c = 1.03 (1.06–1.10), 4v = 1.60 (1.50–1.67), 5x = 1.60 (1.45–1.67), ac = 12.00 (10.60–12.00), M = 0.46 (0.43–0.52), C3F = 0.70 (0.71–0.78).

Type material. Holotype ♂ (SCAU, No. 120745), CHINA: Mt. Wuliang, Nanjian, Yunnan, 2450 m,

25.vii.2006, HL Cao. Paratypes: CHINA: 12♂8♀ (3♂3♀ in KIZ; 9♂5♀ in SCAU, Nos 120746-59), same data as holotype except 25–28.vii.2006, HL Cao, HZ Cao, T Li; 6♂2♀ (SCAU, Nos 120760-67), Mt. Wuliang, Jingdong, Yunnan, 4.viii.2006, HL Cao, HZ Cao, T Li; 5♂2♀ (SCAU, No. 121081-87), Menghai, Xishuangbanna, Yunnan, 21°50' N, 100°08' E, 1940 m, 8.iv.2011, JM Lu, ZF Shao, YR Su, SJ Yan.

Distribution. China (Yunnan).

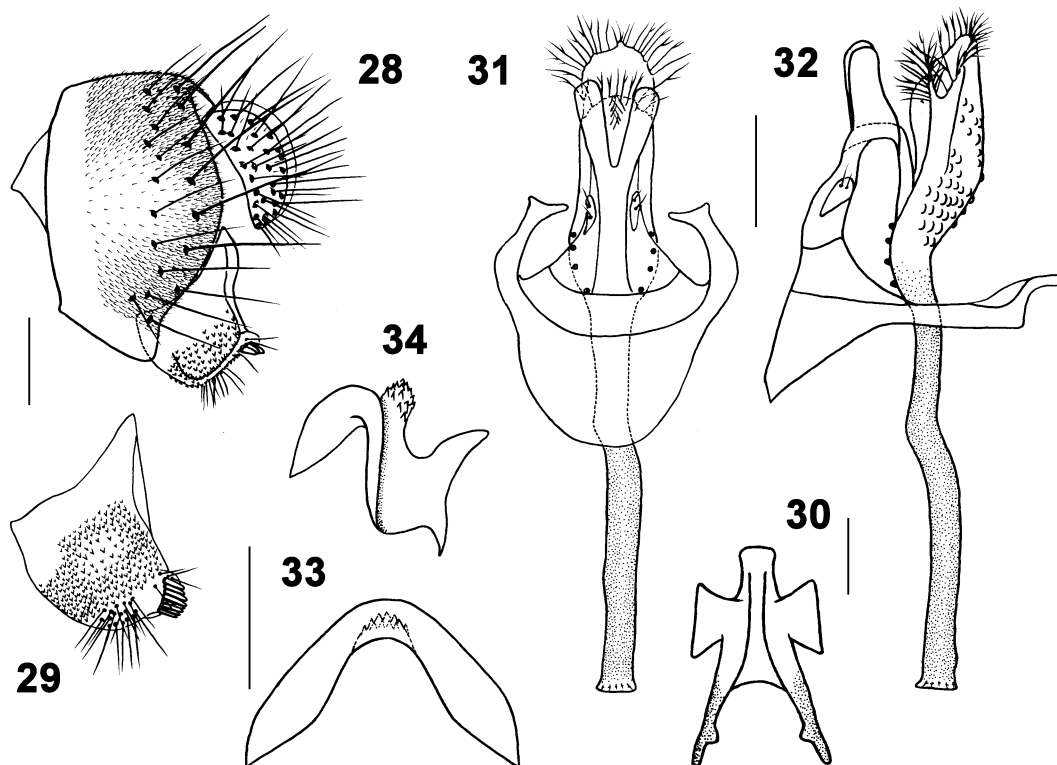
Etymology. From the Latin word “montanus” (= montaneous), referring to the specimens collected in mountains.

Stegana (Steganina) oligochaeta sp. nov.

(Figs 28–34)

Diagnosis. This species is related to *S. protuberans* sp. nov., but clearly distinguishable from the latter by the epandrium and aedeagus (in *S. protuberans*: epandrium not broadened on posterior margins, approximately twice as high as wide; aedeagus lacking sclerotized, round, minute processes basoventrally).

Description. Male terminalia: Epandrium broadened on posterior margins, approximately 3/5 as high as wide, protruded ventrally (Fig. 28). Cercus with sporadic pubescence (Fig. 28). Surstylus with 8 prensisetae submedially (Fig. 29). Tenth sternite sclerotized and deeply separated basally, protruded apically (Fig. 30). Paramere with ca. 2 sensilla (Figs 31, 32). Aedeagus with scalelike, minute processes dorsally and several sclerotized, round, minute processes basoventrally, slightly semilunar on opening in ventral view (Figs 31, 32). Dorsomedial projection of gonopods with serrated, minute processes distally (Fig. 34).



FIGURES 28–34. *Stegana (Steganina) oligochaeta* sp. nov., male terminalia: 28. Epandrium, cercus and surstylus; 29. surstylus; 30. 10th sternite; 31, 32. hypandrium, aedeagus and aedeagal apodeme; 33, 34. gonopods. Scale bars: 0.1 mm.

Measurements. BL = 2.78 mm in holotype (1♂ paratype 2.89 mm), ThL = 1.40 mm (1.36 mm), WL = 2.94 mm (3.09 mm), WW = 1.26 mm (1.38 mm), arb = 9/6 (9/5), avd = 0.80 (0.91), adf = 1.43 (1.38), flw = 1.86 (1.63), FW/HW = 0.48 (0.49), ch/o = 0.21 (0.24), prorb = damaged (damaged), rcorb = 0.85 (damaged), vb = 0.33 (0.40), dcl = 0.48 (0.48), presctl = 0.44 (0.45), sctl = damaged (damaged), sterno = 0.88 (0.86), orbito = 2.00 (2.25), dcp = 0.19 (0.17), sctlp = 1.78 (1.90), C = 1.97 (2.00), 4c = 1.17 (1.06), 4v = 1.90 (1.76), 5x = 1.45 (1.33), ac = 11.67 (12.00), M = 0.53 (0.47), C3F = 0.68 (0.66).

Type material. Holotype ♂ (SCAU, No. 120768), CHINA: Mt. Jizu, Binchuan, Yunnan, 1900 m, 23.vii.2006, HL Cao. Paratype: CHINA: 1♂ (SCAU, No. 120769), Mt. Wuliang, Nanjian, Yunnan, 25.vii.2006, HL Cao.

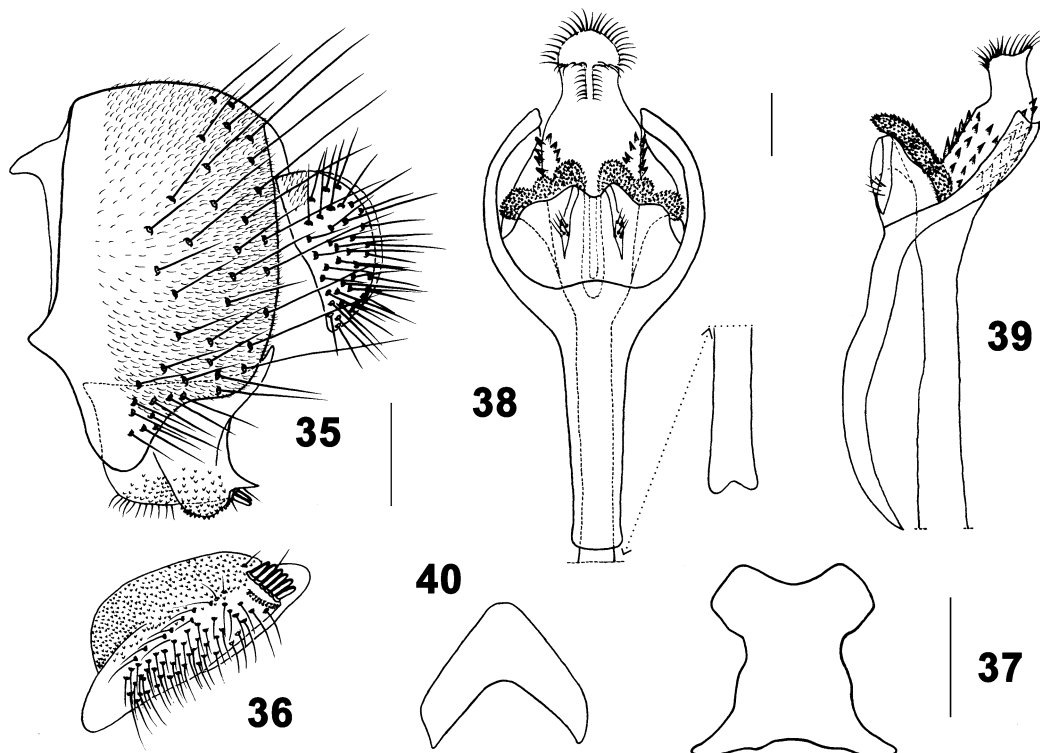
Distribution. China (Yunnan).

Etymology. A combination of the Greek words: oligos (= few) and chaite (= bristle, seta), referring to the cercus with sporadic pubescence.

Stegana (Steganina) tentaculifera sp. nov.

(Figs 35–40)

Diagnosis. Aedeagus with 2 rows of serrated, minute processes on ventral surface (Fig. 39), and sparse, serrated, minute processes on dorsal surface (Fig. 40).



FIGURES 35–40. *Stegana (Steganina) tentaculifera* sp. nov., male terminalia: 35. Epandrium, cercus and surstylus; 36. surstylus; 37. 10th sternite; 38, 39. hypandrium, aedeagus and aedeagal apodeme; 40. gonopods. Scale bars: 0.1 mm.

Description. Male terminalia: Epandrium holistically broadened, wider than 3/5 high, roundly protruded ventrally (Fig. 35). Cercus with dense pubescence dorsally (Fig. 35). Surstylus with 6 prenisetae submedially (Fig. 36). Tenth sternite slightly protruded basolaterally (Fig. 37). Paramere with ca. 5 sensilla (Figs 38, 39). Aedeagus with globular projections bearing finely serrated processes basally, slightly round on opening in ventral view (Figs 38, 39). Gonopods round apically, not protruded dorsomedially (Fig. 40).

Measurements. BL = 3.18 mm in holotype (range in 3♂ paratypes: 2.88–3.21 mm), ThL = 1.94 mm (1.90–2.10 mm), WL = 3.65 mm (3.32–3.77 mm), WW = 1.58 mm (1.52–1.66 mm), arb = 9/6 (8–9/6), avd = 0.75 (0.67–0.83), adf = 1.63 (1.65–1.86), flw = 1.75 (1.63–1.84), FW/HW = 0.40 (0.39–0.40), ch/o = 0.20 (0.19–0.20), prob = 1.16 (1.15–1.25), rcorb = 0.63 (0.58–0.67), vb = 0.40 (0.36–0.40), dcl = 0.36 (0.38–0.55), presctl = 0.47 (0.43–0.63), sctl = 1.25 (1.21–1.53), sterno = 0.86 (0.81–0.92), orbito = 2.05 (1.75–2.00), dcp = 0.17 (0.17–0.19), scltp = 1.62 (1.53–1.84), C = 2.12 (1.76–2.25), 4c = 1.11 (1.10–1.21), 4v = 1.86 (1.74–2.23), 5x = 1.27 (1.23–1.60), ac = 10.25 (9.15–12.00), M = 0.51 (0.42–0.58), C3F = 0.71 (0.63–0.74).

Type material. Holotype ♂ (SCAU, No. 120770), CHINA: Shennongjia, Hubei, 31°49'N, 109°41'E, 1900 m, 1–3.viii.2005, HW Chen. Paratypes: CHINA: 3♂ (SCAU, Nos 120771–73), same data as holotype.

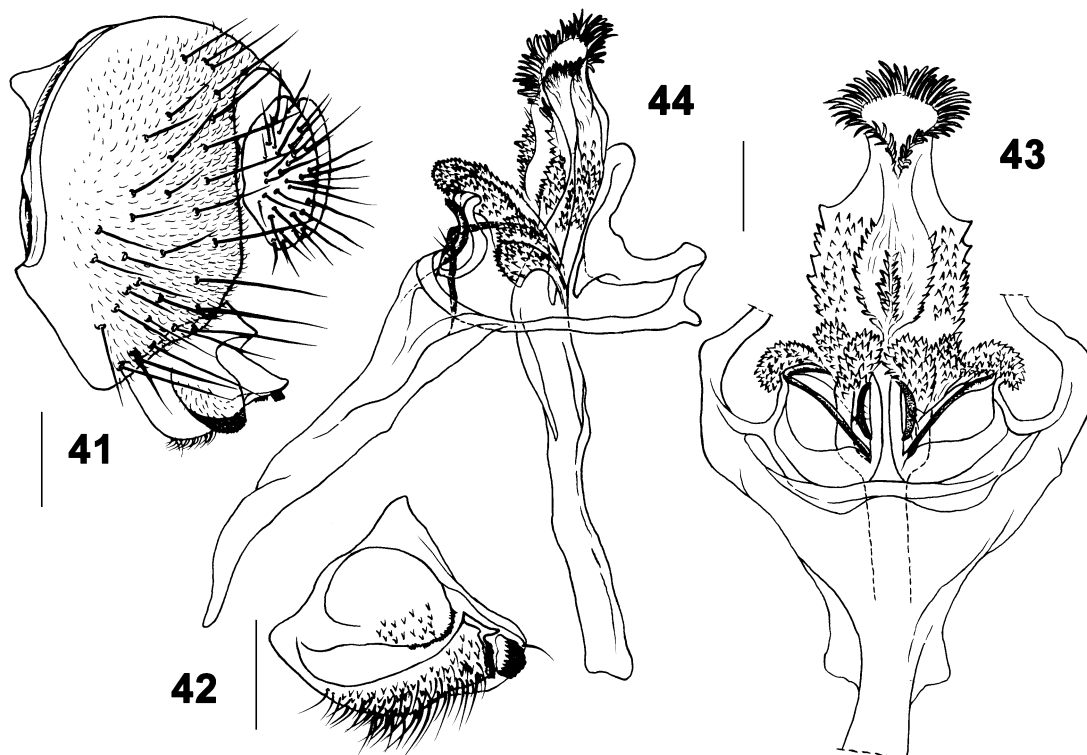
Distribution. China (Hubei).

Etymology. A combination of the Latin word *tentaculum* (= fine processus) and the Greek word *ferrein* (= to bear), referring to the aedeagus with tentacle-like setae apically.

Stegana (Steganina) parvispina sp. nov.

(Figs 41–44)

Diagnosis. This species is similar to *S. tentaculifera* sp. nov. in the male terminalia, showing distinct dissimilarity in aedeagus, in this species: aedeagus with denser serrated, minute processes on ventral and dorsal surfaces, expressly about 12 irregular rows on ventral surface (Figs 43, 44).



FIGURES 41–44. *Stegana (Steganina) parvispina* sp. nov., male terminalia: 41. Epandrium, cercus and surstylus; 42. surstylus; 43, 44. hypandrium, aedeagus and aedeagal apodeme. Scale bars: 0.1 mm.

Description. Male terminalia: Epandrium slightly protruded ventrally (Fig. 41). Surstylus with 8 prenisetae submedially (Fig. 41, 42). Tenth sternite slightly protruded basolaterally. Paramere with ca. 4, 5 sensilla (Figs 43, 44). Aedeagus with globular projections bearing finely serrated processes basally, slightly round on opening in ventral view (Figs 43, 44). Gonopods round apically, not protruded dorsomedially.

Measurements. BL = 3.45 mm in holotype (3.55 mm in 1 ♀ paratype), ThL = 1.93 mm (2.03 mm), WL = 4.10 mm (3.75 mm), WW = 1.70 mm (1.75 mm), arb = 8–9/6 (9/5–6), avd = 0.70 (0.80), adf = 1.47 (1.50), flw = 1.83 (1.83), FW/HW = 0.44 (0.47), ch/o = 0.15 (0.16), pror = 1.10 (1.15), rcorb = 0.83 (0.85), vb = 0.45 (0.47), dcl = 0.52 (0.54), sctl = 1.45 (1.57), sterno = 0.76 (0.81), orbito = 1.75 (1.80), dcp = 0.24 (0.24), sctlp = 1.78 (1.88), C = 1.92 (2.09), 4c = 1.12 (1.09), 4v = 1.81 (1.80), 5x = 1.25 (1.27), ac = 9.00 (10.67), M = 0.47 (0.51), C3F = 0.68 (0.69).

Type material. Holotype ♂ (SCAU, No. 120774), CHINA: Foping, Qinling, Shaanxi, 32°32' N, 107°41' E, 1000 m, 6.viii.2003, JJ Gao. Paratypes: CHINA: 1 ♀ (SCAU, No. 120775), same data as holotype.

Distribution. China (Shaanxi).

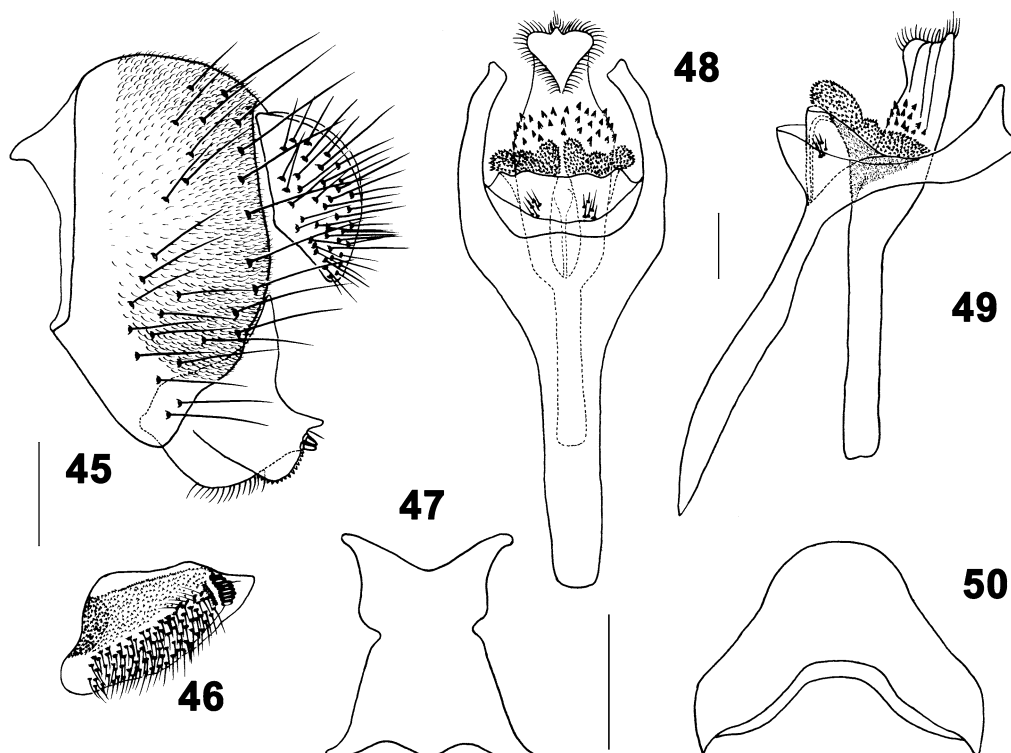
Etymology. A combination of the Latin words: *parvus* (= small) and *spina* (= thorn), referring to the aedeagus with serrated processes basally.

Stegana (Steganina) pianmaensis sp. nov.

(Figs 45–50)

Diagnosis. This species is related to *S. danbaensis* sp. nov. in the male terminalia, but in this species: 10th sternite slightly protruded apicolaterally (Fig. 47); aedeagus lacking serrated, minute processes on dorsal surfaces (Fig. 49).

Description. Male terminalia: Epandrium roundly protruded ventrally (Fig. 45). Cercus lacking pubescence (Fig. 45). Surstylus with 8 prenisetae submedially (Fig. 46). Tenth sternite broadened, slightly protruded apico- and basolaterally (Fig. 47). Paramere with ca. 5, 6 sensilla (Figs 48, 49). Aedeagus with globular projections bearing finely serrated processes basally (Figs 48, 49), nearly heart-shaped on opening in ventral view, protruded apically (Fig. 48). Gonopods broadly round apically, not protruded dorsomedially (Fig. 50).



FIGURES 45–50. *Stegana (Steganina) pianmaensis* sp. nov., male terminalia: 45. Epandrium, cercus and surstylus; 46. surstylus; 47. 10th sternite; 48, 49. hypandrium, aedeagus and aedeagal apodeme; 50. gonopods. Scale bars: 0.1 mm.

Measurements. BL = 2.89 mm in holotype (2.93 mm in 1 ♀ paratype), ThL = 1.76 mm (1.89 mm), WL = 3.48 mm (3.50 mm), WW = 1.48 mm (1.53 mm), arb = 8/6 (8/5–6), avd = 0.70 (0.83), adf = 1.43 (1.49), flw = 1.86 (1.86), FW/HW = 0.41 (0.43), ch/o = 0.16 (0.16), pror = 0.90 (0.84), rcorb = 0.67 (0.65), vb = 0.40 (0.43), dcl = 0.45 (0.46), presctl = 0.50 (0.50), sctl = 1.38 (1.39), sterno = 0.88 (0.88), orbito = 1.80 (1.80), dcp = 0.26 (0.25), scltp = 2.30 (2.20), C = 2.07 (2.17), 4c = 1.11 (1.02), 4v = 1.86 (1.66), 5x = 1.46 (1.57), ac = 10.25 (10.50), M = 0.51 (0.54), C3F = 0.79 (0.68).

Type material. Holotype ♂ (SCAU, No. 120776), CHINA: Pianma, Baoshan, Yunnan, 26°01'N, 98°37'E, 1700 m, 12.viii.2001, HW Chen. Paratype: CHINA: 1 ♀ (SCAU, No. 120777), same data as holotype.

Distribution. China (Yunnan).

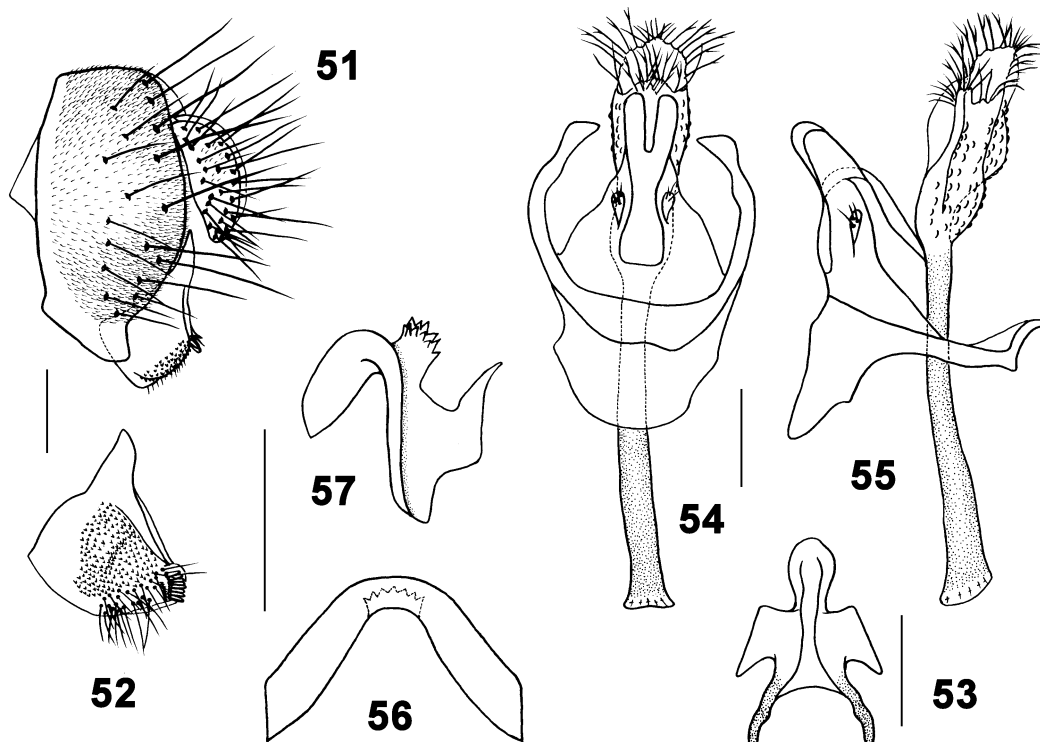
Etymology. In reference to the type locality.

Stegana (Steganina) protuberans sp. nov.

(Figs 51–57)

Diagnosis. This species and *S. oligochaeta* sp. nov. differ from the other species in having the clypeus nearly entirely black; dorsomedial projection of gonopods with serrated, minute processes distally; aedeagus with scalelike, minute processes.

Description. Male terminalia: Epandrium strongly protruded ventrally, not broadened on posterior margins, approximately twice as high as wide (Fig. 51). Cercus with sparse pubescence (Fig. 51). Surstylus with 8 prensisetae submedially (Fig. 52). Tenth sternite sclerotized and deeply separated basally, protruded apically (Fig. 53). Paramere with ca. 3 sensilla (Figs 54, 55). Aedeagus with scalelike, minute processes dorsally, slightly semilunar on opening in ventral view (Figs 54, 55). Dorsomedial projection of gonopods with serrated, minute processes distally (Fig. 57).



FIGURES 51–57. *Stegana (Steganina) protuberans* sp. nov., male terminalia: 51. Epandrium, cercus and surstylus; 52. surstylus; 53. 10th sternite; 54, 55. hypandrium, aedeagus and aedeagal apodeme; 56, 57. gonopods. Scale bars: 0.1 mm.

Measurements. BL = 2.75 mm in holotype (range in 3♀ paratypes: 2.22–2.80 mm), ThL = 1.40 mm (1.70–1.84 mm), WL = 2.84 mm (3.55–3.95 mm), WW = 1.24 mm (1.48–1.54 mm), arb = 7/5 (7/5–9/5), avd = 0.82 (0.75–0.87), adf = 1.57 (1.50–1.50), flw = 1.71 (1.63–1.75), FW/HW = 0.48 (0.46–0.48), ch/o = 0.27 (0.21–0.28), prorb = 1.25 (1.25–1.26), rcorb = 0.75 (0.67–0.73), vb = 0.36 (0.40–0.47), dcl = 0.47 (0.46–0.49), presctl = damaged (0.54–0.59), sctl = 1.39 (1.40), sterno = 0.80 (0.83–1.00), orbito = 2.00 (1.80–2.00), dcp = 0.21 (0.18–0.22), sctlp = 1.70 (1.69–2.00), C = 2.00 (1.98–2.23), 4c = 1.17 (1.00–1.07), 4v = 1.57 (1.70–1.80), 5x = 1.45 (1.20–1.38), ac = 11.67 (11.00–13.00), M = 0.53 (0.45–0.47), C3F = 0.57 (0.64–0.69).

Type material. Holotype ♂ (SCAU, No. 120778, CHINA: Mt. Wulian, Nanjian, Yunnan, 2200 m, 25–27.vii.2006, HL Cao. Paratypes: CHINA: 3♀ (SCAU, Nos 120779–81), same data as holotype.

Distribution. China (Yunnan).

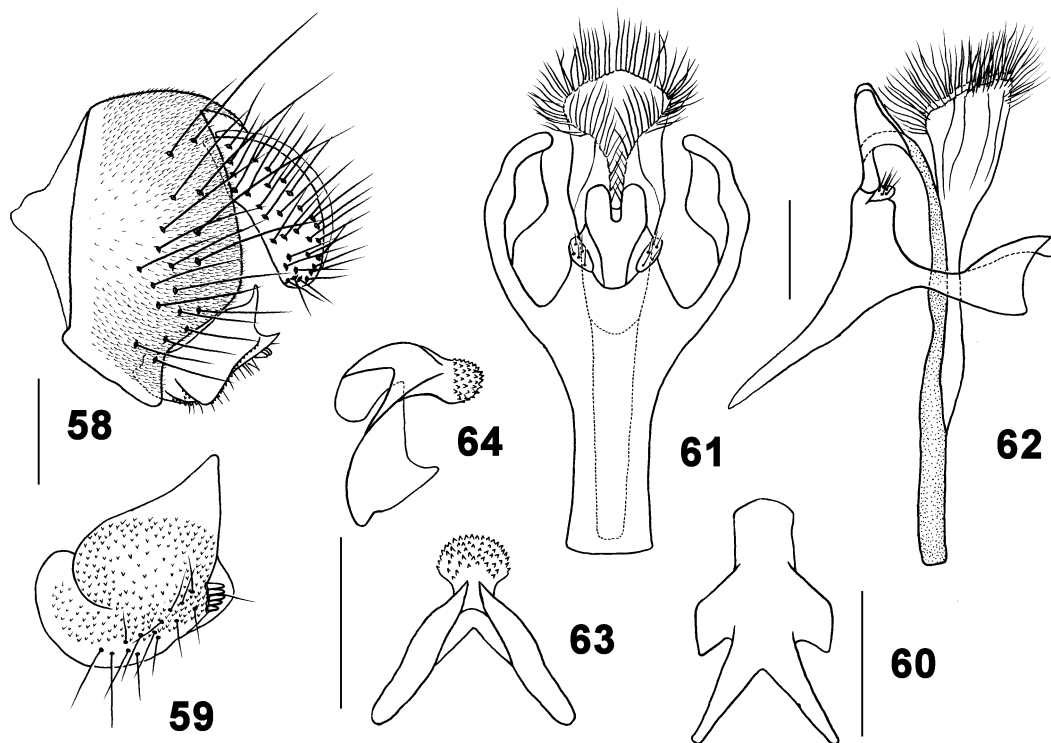
Etymology. From the Latin word: protuberans (= protruding), referring to the gonopods with 1 projection dorsomedially.

Stegana (Steganina) xishuangbanna sp. nov.

(Figs 58–64)

Diagnosis. This species is related to *S. saigusai* from Kumamoto, Japan, but clearly distinguishable from the latter by the aedeagus (in *S. saigusai*: aedeagal opening nearly triangular in ventral view, with longer and even tentacle-like setae).

Description. Male terminalia: Epandrium strongly protruded ventrally (Fig. 58). Cercus lacking pubescence (Fig. 58). Surstylus with 5 prensisetae submedially (Fig. 59). Tenth sternite furcated basally, protruded apically (Fig. 60). Paramere with ca. 5–6 sensilla (Figs 61, 62). Aedeagus lacking minute processes, slightly rhombic on opening in ventral view (Figs 61, 62). Dorsomedial projection of gonopods with serrated, minute processes distally (Figs 63, 64).



FIGURES 58–64. *Stegana (Steganina) xishuangbanna* sp. nov., male terminalia: 58. Epandrium, cercus and surstylus; 59. surstylus; 60. 10th sternite; 61, 62. hypandrium, aedeagus and aedeagal apodeme; 63, 64. gonopods. Scale bars: 0.1 mm.

Measurements. BL = 2.40 mm in holotype (range in 2♂ and 2♀ paratypes: 2.35–2.66 mm in ♂, 2.56–2.58 mm in ♀), ThL = 1.34 mm (1.28–1.70 mm in ♂, 1.84–1.90 mm in ♀), WL = 2.63 mm (2.59–3.28 mm in ♂, 2.65–2.89 mm in ♀), WW = 1.12 mm (1.08–1.40 mm in ♂, 1.42–1.52 mm in ♀), arb = 8/6 (7/5–9/6), avd = 0.83 (0.75–0.83), adf = 1.83 (1.50–1.86), flw = 2.00 (1.63–1.75), FW/HW = 0.43 (0.43–0.44), ch/o = 0.21 (0.20–0.26), prorb = 1.08 (1.07–1.08), rcorb = 0.83 (0.75–0.80), vb = 0.36 (0.38–0.42), dcl = 0.50 (0.46–0.52), presctl = 0.51 (0.54–0.62), sctl = 1.20 (1.15–1.36), sterno = 0.79 (0.83), orbito = 2.00 (2.00–2.25), dcp = 0.22 (0.18–0.21), sctlp = 1.70 (1.75–2.00), C = 2.24 (1.79–2.13), 4c = 0.97 (1.09–1.27), 4v = 1.63 (1.50–1.86), 5x = 1.50 (1.55–1.70), ac = 7.25 (7.00–8.25), M = 0.50 (0.47–0.65), C3F = 0.84 (0.82–0.88).

Type material. Holotype ♂ (SCAU, No. 120782), CHINA: Mengyang, Xishuangbanna, Yunnan, 22°20' N, 100°54' E, 600 m, 14.ix.2002, HW Chen. Paratypes: CHINA: 1♂2♀ (SCAU, Nos 120783–85), same data as holotype; 3♂ (SCAU, Nos 120786–88), Menglun, Xishuangbanna, Yunnan, 21°41' N, 101°25' E, 700 m, 17–19.iv.2007, HW Chen, JJ Gao; 3♂ (KIZ), Mengla, 21°28' N, 101°38' E, 600 m, Xishuangbanna, Yunnan, 21–24.iv.2007, HW Chen.

Distribution. China (Yunnan).

Etymology. The specific name means “dreamy and mystical eden” in the language of the Dai nationality in Xishuangbanna.

Key to the species of the *shirozui* species group (male)

1. Gonopods with 1 projection bearing serrated, minute processes dorsomedially (Figs 13, 27, 34, 57, 64) 2
- Gonopods without projection dorsomedially (Figs 6, 20, 40, 44, 50) 14
2. Hypandrium with numerous, serrated processes on flaps *qinlingensis*
- Hypandrium without serrated processes on flaps 3
3. Aedeagus without scalelike or serrated, minute processes (Figs 62, 62) 4
- Aedeagus with scalelike or serrated, minute processes (Figs 10, 11, 24, 25, 31, 32, 54, 55) 6
4. Surstylus with 7 prenisetae submedially; hypandrium with 2–3 setulae submedially and a few pubescence on flaps; aedeagus slightly thicker than aedeagal apodeme in ventral view *xanthosticta*
- Surstylus with 5 prenisetae submedially (Fig. 59); hypandrium neither setulae submedially nor pubescence on flaps; aedeagus distinctly thicker than duple thicker than aedeagal apodeme in ventral view (Figs 61, 62) 5
5. Aedeagal opening nearly triangular in ventral view, with shorter and even tentacle-like setae; dorsomedial projection of gonopods short and thick. *saigusai*
- Aedeagal opening oval in ventral view and with longer and irregular tentacle-like setae (Figs 61, 62); dorsomedial projection of gonopods globose (Figs 63, 64) *xishuangbanna sp. nov.*
6. Clypeus nearly entirely black; dorsomedial projection of gonopods apically with serrated, minute processes (Figs 34, 57); aedeagus with scalelike, minute processes (Figs 31, 32, 54, 55) 7
- Clypeus yellow or partly black; dorsomedial projection of gonopods nearly entirely covered with serrated, minute processes; aedeagus with serrated, minute processes (Figs 10, 11, 24, 25) 8
7. Epandrium broadened on posterior margins, approximately 3/5 as high as wide (Fig. 28); aedeagus bears several sclerotized, round, minute processes basoventrally (Figs 31, 32) *oligochaeta sp. nov.*
- Epandrium not broadened on posterior margins, approximately twice as high as wide (Fig. 51); aedeagus lacking sclerotized, round, minute processes basoventrally (Fig. 54, 55) *protuberans sp. nov.*
8. Scutellum unicolor; dorsomedial projection of gonopods pointed at tip 9
- Scutellum black, yellow at tip; dorsomedial projection of gonopods round at tip (Figs 13, 27) 10
9. Scutellum black; gonopods acute apically *shenmongi*
- Scutellum yellowish brown; gonopods round apically *shirozui*
10. First flagellomere nearly entirely yellow, with black pubescence along distal margin. 11
- First flagellomere yellow on basal 1/3, black on distal 2/3. 13
11. Scutellum only yellow at tip; dorsomedial projection of gonopods slightly protruded in lateral view. *maoershanensis*
- Scutellum yellow on distal half at least; dorsal projection of gonopods strongly protruded in lateral view (Figs 13, 27) 12
12. Scutellum yellow on distal half; tenth sternite not expanded distally (Fig. 9) *dianensis sp. nov.*
- Scutellum yellow medially, black laterally; tenth sternite expanded distally (Fig. 23) *montana sp. nov.*
13. Clypeus black medially, yellow laterally; aedeagal opening infundibular in ventral view. *wuyishanensis*
- Clypeus brown, dark medially; aedeagal opening nearly triangular in ventral view. *jiajinshanensis*
14. Gonopods with serrated, minute processes dorsomedially *masanoritodai*
- Gonopods glabrous, lacking serrated, minute processes. 15
15. Paramere undistinguishable; gonopods acute apically; aedeagus without globular projections bearing finely serrated processes basally *jianfenglingensis*
- Paramere present (Figs 4, 5, 17, 18, 38, 39, 43, 44, 48, 49); gonopods round apically; aedeagus with globular projections bearing finely serrated processes basally (Figs 6, 19, 20, 40, 44, 50) 16
16. Scutellum black, yellow at tip 17
- Scutellum nearly brown to black 18
17. Epandrium broadened on posterior margins, more wider than 3/5 high; aedeagus distinctly expanded submedially, rhombic on opening in ventral view *multidentata*
- Epandrium not broadened on posterior margins, approximately twice as high as wide (Fig. 1); aedeagus slightly expanded submedially, oval on opening in ventral view (Fig. 4) *danbaensis sp. nov.*
18. Aedeagal opening apicomedially protruded in ventral view (Figs 17, 48) 19
- Aedeagal opening apicomedially not protruded in ventral view (Figs 38, 43) 21
19. Aedeagus lacking minute, serrated processes on posterior surface (Fig. 49) *pianmaensis sp. nov.*
- Aedeagus with denser, minute, serrated processes on posterior surface (Fig. 18) 20
20. Tenth sternite with pubescence apically (Fig. 16) *glabra sp. nov.*
- Tenth sternite lacking pubescence apically *ctenaria*
21. Aedeagus with denser serrated, minute processes on ventral and dorsal surfaces, expressly ca. 12 irregular rows on ventral surface (Figs 43, 44) *parvispina sp. nov.*
- Aedeagus with 2 rows of serrated, minute processes on ventral surface in per site, and sparse, serrated, minute processes on dorsal surface (Figs 38, 39) *tentaculifera sp. nov.*

TABLE 1. Examination of variation of body coloration among new species of the *shirozui* species group.

Species	first flagellomere	clypeus	palpus	scutellum
<i>danbaensis</i>	yellow, black apically	yellow	yellow	black, slightly yellow at tip
<i>dianensis</i>	yellow	yellow	yellow	black, broadly yellow at tip
<i>glabra</i>	yellow, black on distal 1/3	yellow	yellow	dark brown to black
<i>montana</i>	yellow, with black pubescence on distal margin	yellow, slightly black above	yellow	black laterally, yellow medially
<i>oligochaeta</i>	yellow, black on distal 1/3	black	yellow, distally slightly brown	black, slightly yellow at tip
<i>tentaculifera</i>	yellow, black on distal 1/4	black medially, yellow laterally	yellow	black
<i>parvispina</i>	yellow, black on distal 1/4	yellow	yellow	black
<i>pianmaensis</i>	yellow, black on distal 1/4	yellow	yellow	black
<i>protuberans</i>	yellow, black on distal 1/3	black	yellow	black, slightly yellow at tip
<i>xishuangbanna</i>	yellow, black on distal 1/3	yellow	yellow	brown, slightly yellow at tip

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