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Revision of the Chinese species of *Dialineura* Rondani, 1856 (Diptera, Therevidae, Therevinae)

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Abstract

The genus *Dialineura* Rondani is reviewed from China. One species, *D. elongata* **sp. n.** is described as new to science. Two species, *D. nigrofemorata* Kröber and *D. gorodkovi* Zaitzev, are recorded from China for the first time. The female information of *D. henanensis* Yang is also included here. A key to all the male species in the world and a biogeography map of China are presented.

Keywords

Therevidae, *Dialineura*, new species, key to the world, distribution, China

Introduction

The genus *Dialineura* Rondani, 1856 belongs to the subfamily Therevinae (Diptera: Therevidae). Until now, this genus had twelve known species in the world, which are distributed in Palaearctic region, Oriental region (i.e. China) and Nearctic region (i.e. Canada and USA). Four species have been known to occur in China: *D. kikowensis* Ôuchi, 1943 from Zhejiang; *D. affinis* Lyneborg, 1968 from Sichuan; *D. aurata* Zaitzev, 1971 from Northeast China; *D. henanensis* Yang, 1999 from Henan.

Both Irwin and Lyneborg (1981a) and Webb and Irwin (1991) gave the detailed descriptions for body and male terminalia. Irwin and Lyneborg (1981a) emphasized

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mid coxa with long pile on posterior surface, and Webb and Irwin (1991) presented the description and figures for female terminalia. The genus *Dialineura* can be characterized by the following features: male eyes nearly contiguous medially; male and female frons pruinose; parafacial usually bare; scape of antenna more or less swollen, wider than first flagellomere; style one-segmented, terminal spine minute; prosternal furrow pilose; scutal chaetotaxy (pairs): *np* 3–6, sa 2, pa 1–2, dc 1–3, sc 1–2; cell m_3 open; middle coxa with long pile on posterior surface; hind femur with 6–10 anteroventral setae; in male genitalia, hypandrium absent; some species with substylus on gonocoxite; in female genitalia, spermathecal sac duct very short (Irwin and Lyneborg 1981a; Nagatomi and Lyneborg 1988; Webb and Irwin 1991).

Material and methods

The specimens were studied and illustrated with an OPTEC SMZ-B_2 stereomicroscope. Male genitalic preparations were made by removing and heating the apical portion of the abdomen in lactic acid at 180°C temperature for 15 min, and rinsing in water and 75% ethanol. Female genitalic preparations were made by removing and rinsing the abdomen in a saturated NaOH solution at room temperature for one day, staining with a saturated Chlorazol Black solution in 75% ethanol, and rinsing in 75% ethanol. After examination, preparations were transferred to fresh glycerin and stored in a microvial pinned below the specimen. The habitus photographs of adults were taken with a digital camera (Canon EOS 450D). Type specimens were deposited in the Entomology Museum of China Agricultural University (CAU), Beijing.

Morphological terminology follows Winterton et al. (1999). The term antennal ratio is defined as length ratio of scape : pedicel : first flagellomere : style. The term substylus is according to Zaitzev (1971), Nagatomi and Lyneborg (1988) and Webb and Irwin (1991), describing a medial spinous process of gonocoxite.

The following abbreviations are used:

Scutal chaetotaxy	**Setae on legs**
dc dorsocentral	***a*** anterior
np notopleural	***ad*** anterodorsal
pa post-alar	***av*** anteroventral
sa supra-alar	***d*** dorsal
sc scutellar	***pd*** posterodorsal
	pv posteroventral
Genitalic term	
A1 A1 setae (= acanthophorites)	
A2 A2 setae	
bea base of ejaculatory apodeme	
ce cercus	
d distiphallus	
da dorsal apodeme of parameral sheath	

ea ejaculatory apodeme
f furca
ga gonocoxal apodeme
gc gonocoxite
gs gonostylus
igp inner gonocoxal process
lep lateral ejaculatory process
ogp outer gonocoxal process
ses subepandrial sclertie
sp spermtheca
spd spermathecal duct
sps spermathecal sac
s8 sternite 8
t8 tergite 8
va ventral apodeme of parameral sheath
vl ventral lobe

Taxonomy

Following is a key to the world male species of the genus *Dialineura*. The males of *Dialinuera kikowensis* Ôuchi, 1943 and *Dialineura aurata* Zaitzev, 1971 are unknown, but we can identify females of these two species according to their distinct characters. The female *D. kikowensis* has two wide yellow vittae on mesonotum (Fig. 71), apical margin of cell m_3 narrower than cross-vein m-cu (see fig. 1, Ôuchi 1943), each tergites 2–7 with a median black spot (Fig. 71); female *D. aurata* has the body completely covered with dense bright yellow pubescence (Fig. 72).

Some figures cited in the key for the previously described species are from Zaitzev (1971, 1977), Nagatomi and Lyneborg (1988) and Webb and Irwin (1991).

1 Substylus on gonocoxite absent **2**
– Substylus on gonocoxite present (Figs 52, 66) **6**
2 Frons entirely with white pile ..... ***Dialineura albata* (Coquillett, 1898)**
– Frons with some black setae **3**
3 Distiphallus basally stout and ventrally curved (see Figs 2, 3, Zaitzev 1971.... **4**
– Distiphallus basally slender and recurved (Figs 14, 34 ..... **5**
4 Dorsal apodeme of aedeagus distinctly raised in lateral view, distiphallus wide in dorsal view (see fig. 2, Zaitzev 1971) ..... ***Dialienura anilis* (Linné, 1761)**
– Dorsal apodeme of aedeagus relatively smooth in lateral view, distiphallus tapering in dorsal view (see fig.3, Zaitzev 1971) ..... ***Dialienura mongolica* Zaitzev, 1971**
5 Femora black with yellow tips (Fig. 26), pterostigma of wing pale yellow (Fig. 25); apical epandrium narrow with a triangular medial invagination (Fig. 30), dorsal apodeme of aedeagus 1/2 as long as ventral apodeme (Fig. 34) ..... ***Dialineura henanensis* Yang, 1999**

– Mid and hind femora mostly yellow (Figs 5, 6), pterostigma of wing brown (Fig. 3); apical epandrium wide with a trapezoidal medial invagination (Fig. 10), dorsal apodeme of aedeagus nearly as long as ventral apodeme (Fig. 14) ..... ***Dialineura elongata* sp. n.**

6 Distiphallus serrated at lateral edges (Fig. 67, 68 and see fig. 19, Lyneborg 1968 ..... ***Dialineura affinis* Lyneborg, 1968**

– Distiphallus relatively smooth at lateral edges **7**

7 Scape of antenna very large, at least 1.5 times longer than first flagellomere (see fig. 7, Zaitzev 1977; and fig. 15, Nagatomi and Lyneborg 1988)..... **8**

– Scape of antenna at most 1.3 times longer than first flagellomere..... **9**

8 Tergites 2–4 with a black basal spot; subepandrial sclerite triangular (see fig. 5, Zaitzev 1977), dorsal apodeme of aedeagus shorter than 2/3 length of ejaculatory apodeme (see fig. 4, Zaitzev 1977) ..... ***Dialineura lehri* Zaitzev, 1977**

– Tergites 2–6 with a black basal band which produced medially; subepandrial sclerite trapezoidal (see fig. 28, Nagatomi and Lyneborg 1988), dorsal apodeme of aedeagus nearly as long as ejaculatory apodeme (see fig. 24, Nagatomi and Lyneborg 1988)***Dialineura shozii* Nagatomi & Lyneborg, 1988**

9 Subepandiral sclerite triangular, at most 2 times longer than cercus (see fig. 5, Webb and Irwin 1991) ..... ***Dialineura gorodkovi* Zaitzev, 1971**

– Subepandrial sclerite constricted medially, at least 3 times longer than cercus (Fig. 51 and see figs 7, 8 and 10, Zaitzev 1971) **10**

10 Only white pile present on fore femur (Fig. 45); epandrium 2 times longer than subepandrial sclerite (Fig. 51 and see fig. 6, Zaitzev 1971) .... ***Dialineura nigrofemorata* Kröber, 1937**

– Black pile distinctly present on fore femur; epandrium 1.5 times longer than subepandrial sclerite (see fig. 9, Zaitzev 1971)..... ..... ***Dialineura lyneborgi* Zaitzev, 1971**

***Dialineura elongata* sp. n.**
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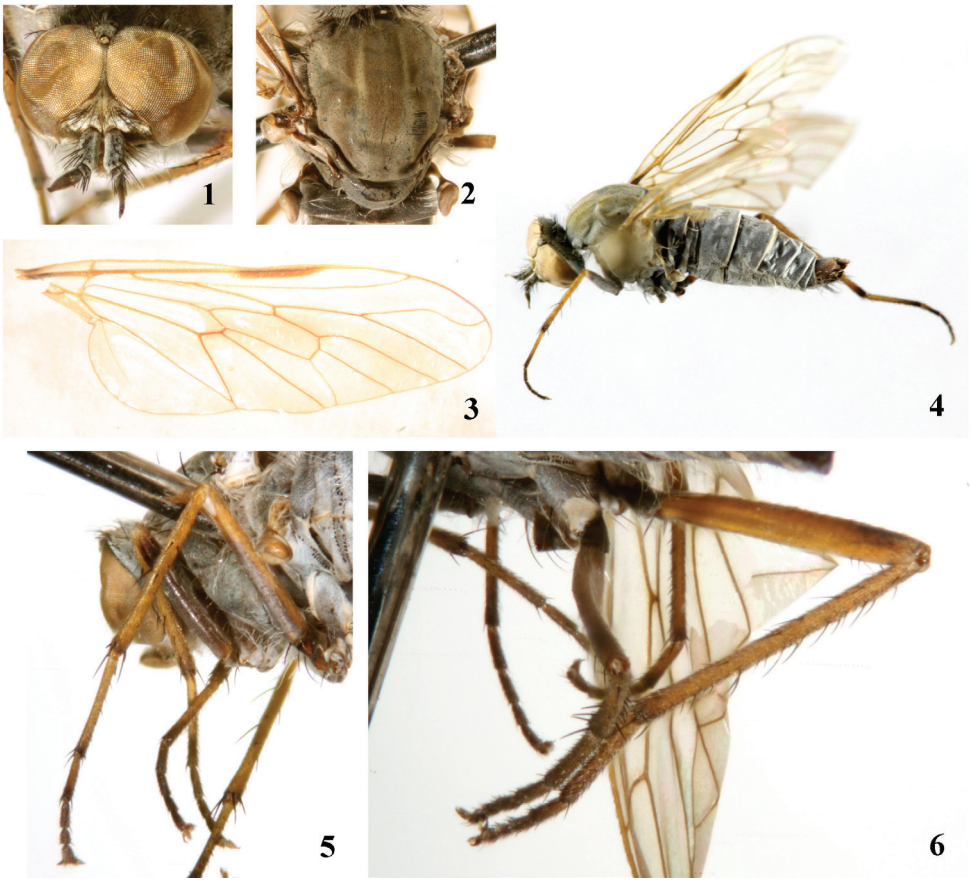
http://species-id.net/wiki/Dialineura_elongata
Figs 1–22, 73

Diagnosis. Male mesonotum with 3 wide brown vittae, separated by 2 narrow pale yellow stripes, the central vitta with a narrow grey stripe in the middle; female mesonotum with 3 wide brown vittae, separated by 2 narrow pale brown stripes, the central vitta with a narrow pale brown to dark brown stripe in the middle. Mid and hind femora mostly yellow. Pterostigma of wing brown. Male apical epandrium relatively wide with a trapezoid medial invagination; gonocoxite relatively wide apically; dorsal apodeme of aedeagus nearly as long as ventral apodeme; distiphallus recurved and S-shaped.

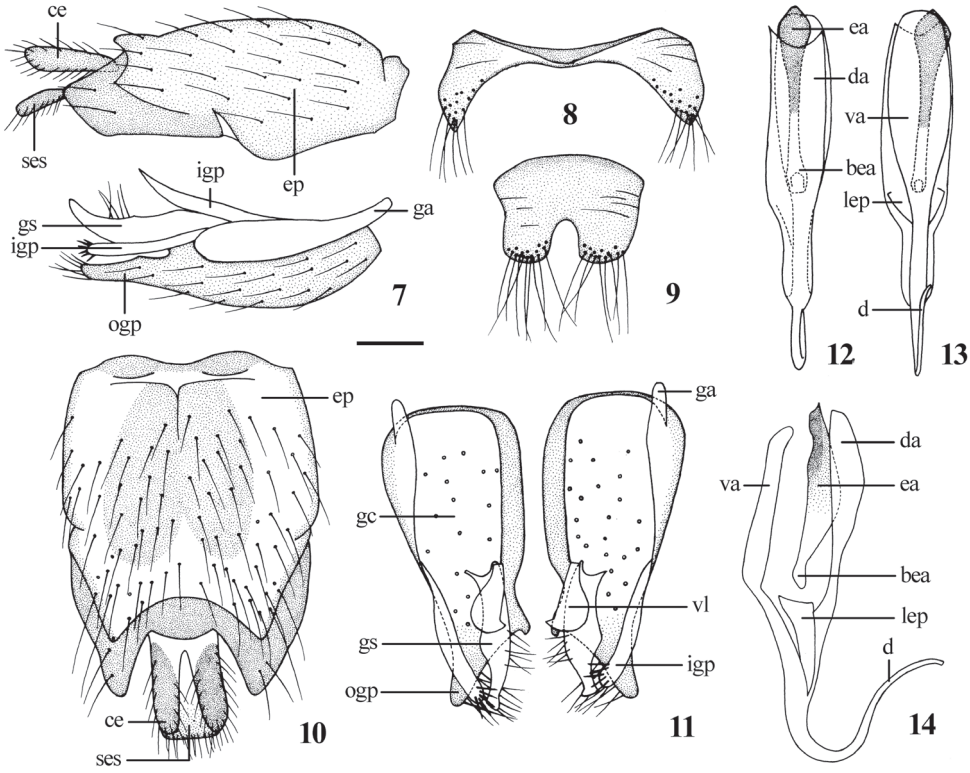
Description. Male. Body length 7.1–8.5 mm, wing length 6.0–7.0 mm.



Figures 1–6. *Dialineura elongata* **sp. n.** Male. **1** head, frontal view **2** mesonotum **3** wing **4** habitus of male, lateral view **5** mid leg **6** hind leg.

Head (Fig. 1) with dense pale pubescence over black ground color, central area of frons brown. White pile from gena to occiput, black setae on ocellar tubercle and frons, parafacial bare, upper occiput also with some black postocular setae. Eyes reddish brown and nearly contiguous on upper frons. Antenna with dense pale pubescence over black ground color, except first flagellomere and style brown; black setae on scape long and thick, but those on pedicel short and thin; first flagellomere nearly bare; central part of first flagellomere widest; style resting apically on first flagellomere with a tiny distal spine; antennal ratio: 5.0 : 1.0 : 4.1 : 0.7. Proboscis pale yellow with some black parts marginally, covered with short brown pile; palpus pale yellow with white pile.

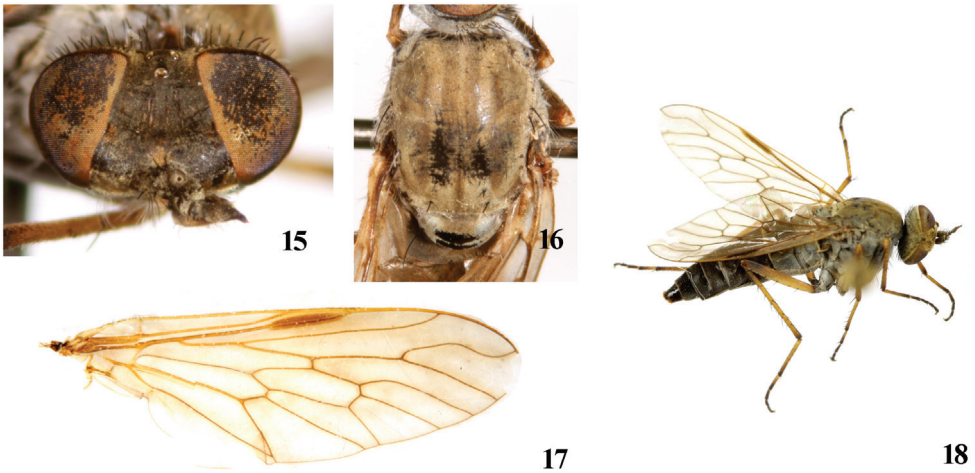
Thorax with dense pale pubescence over black ground color; mesonotum (Fig. 2) with 3 wide brown vittae, separated by 2 narrow pale yellow stripes, the central vitta with a narrow grey stripe in the middle. Notum with sparse short white pile mixed with short black pile marginally, prosternum and pleuron with white pile; macrosetae on thorax black. Scutal chaetotaxy (pairs): *np* 3, *sa* 2, *pa* 1, *dc* 2, *sc* 2. Coxae and trochanters pale pollinose over black ground color, fore femur with pale pubescence over black ground



Figures 7–14. *Dialineura elongata* **sp. n.** Male. **7** terminalia, lateral view **8** tergite 8 **9** sternite 8 **10** epandrium, cercus and subepandrial sclerite, dorsal view **11** gonocoxite and gonostylus, dorsal view **12** aedeagus, dorsal view **13** aedeagus, ventral view **14** aedeagus, lateral view. Scale: 0.2 mm.

color except apex yellow, both mid and hind femora (Figs 5, 6) yellow, except ventral surface of mid femur and apical dorsal part of hind femur dark brown, tibiae brownish yellow with dark brown apices, all tarsomeres 1–2 brownish yellow with dark brown apices, basal part of hind tarsomere 3 brownish yellow but apical part dark brown, other tarsomeres dark brown. White pile present on coxae and femora, setae on legs black. Fore coxa with *a* 1–2, *av* 1; mid coxa with *a* 3; hind coxa with *a* 2–3, *d* 1. Fore and mid femora without any prominent setae; hind femur with *av* 6, *pv* 3. Fore tibia with *ad* 2–4, *pd* 2–5, *pv* 4, apically with 7 setae; mid tibia with *ad* 3–4, *pd* 3, *av* 2–3, *pv* 2–5, apically with 6 setae; hind tibia with *ad* 5–8, *pd* 5–8, *av* 5–8, *pv* 4–7, apically with 6 setae. Wing (Fig. 3) hyaline tinged yellow; pterostigma very narrow, brown, at end of R_1; veins brown. Halter stalk pale yellow but dark brown basally and apically; knob brown.

Abdomen with dense pale pubescence over black ground color, posterior margin of each segment pale yellow. White pile on abdomen, some black setae on terminalia. **Male genitalia:** Epandrium (Fig. 10) elongated, 1.4 times longer than wide, apically with a trapezoidal medial invagination. Subepandrial sclerite rectangular, as long as cercus. Gonocoxite (Fig. 11) relatively wide apically. Dorsal apodeme of aedeagus (Figs 12–14) nearly as long as ventral apodeme; distiphallus recurved and S-shaped.



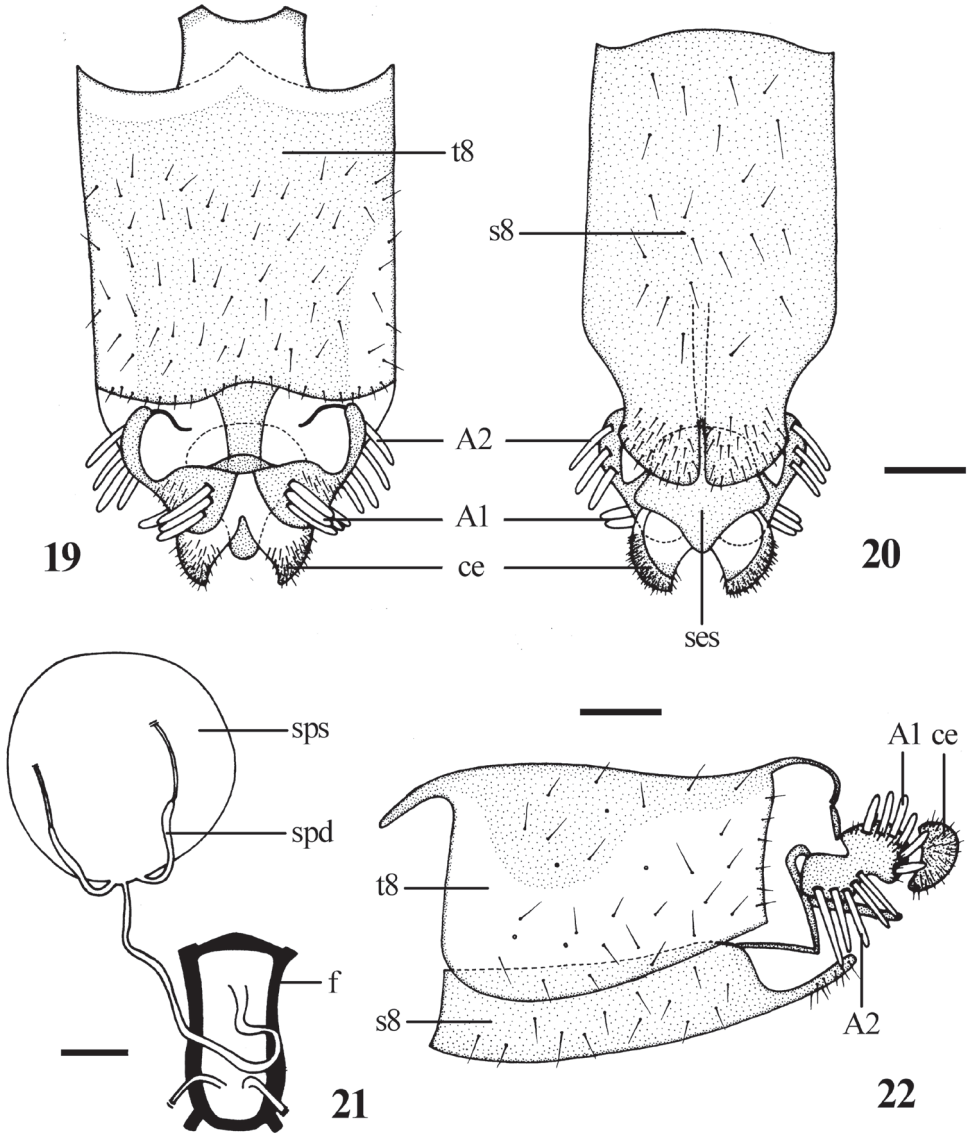
Figures 15–18. *Dialineura elongata* **sp. n.** Female. **15** head, frontal view **16** mesonotum **17** wing **18** habitus of female, lateral view.

Female. Body length 8.9–10.5 mm, wing length 6.5–7.9 mm.

Most characters of female are similar to the male, with following exceptions: Frons (Fig. 15) with dense dark brown pubescence over black ground color. Frons wide with 2 rows black setae, the narrowest point of frons 5 times wider than anterior ocellus. Antenna ratio: 4.2 : 1.0 : 3.9 : 0.7. Proboscis black but pale yellow marginally. Mesonotum (Fig. 16) with 3 wide brown vittae, separated by 2 narrow pale brown stripes, the central vitta with a narrow pale brown to dark brown stripe in the middle. Fore coxa with *a* 1, *av* 1; mid coxa with *a* 3; hind coxa with *a* 3, *d* 1. Fore and mid femora without any prominent setae; hind femur with *av* 6, *pv* 2. Fore tibia with *ad* 4, *pd* 4, *pv* 4, apically with 5 setae; mid tibia with *ad* 3–4, *av* 5, *pd* 4–5, *pv* 5, apically with 5 setae; hind tibia with *ad* 8, *pd* 9–10, *av* 8, *pv* 9, apically with 3 setae. Pale pubescence on abdomen thinner than the male. **Female genitalia:** Tergite 8 (Fig. 19) slightly longer than wide in dorsal view; sternite 8 (Fig. 20) rectangular in ventral view with an incision apically. Cercus (Fig. 22) semicircular. Subepandrial sclerite (Fig. 20) bell-shaped. Furca (Fig. 21) 1.7 times longer than wide. Accessory glands with separated ducts. Spermathecal sac rather large and spherical; two spermathecae.

Type material. Holotype male, **CHINA:** Shaanxi, Zhouzhi, Houzhenzi (33°53'N, 108°02'E), 1. V. 2009, Mao-Ling Sheng. Paratypes: 3 male, same data as holotype; 1 male, 2 female, **CHINA:** Yunnan, Xishuangbanna, Jinghong (21°58'N, 100°48'E, 300m), 27. IV. 2002, Wen-Quan Zhen; 1 male, **CHINA:** Shaanxi, Zhouzhi, Houzhenzi (33°53'N, 108°02'E), 8. V. 2009, Mao-Ling Sheng; 1 male, 1 female, **CHINA:** Beijing, Botanical Garden (39°59'N, 116°12'E), 24. IV. 2006, Hui Dong.

Distribution. Palaearctic region: China (Shaanxi, Beijing); Oriental region: China (Yunnan) (Fig. 73). This is biogeographically part of North China Region and South China Region (Zhang 1999).



Figures 19–22. *Dialineura elongata* **sp. n.** Female. **19** terminalia, dorsal view **20** terminalia, ventral view **21** internal reproductive organs **22** terminalia, lateral view. Scale: 0.2 mm.

Remarks. This new species is similar to *D. henanensis* Yang from China, especially in the recurved and S-shaped distiphallus and the relatively wide apical gonocoxite. But it can be separated from the following features: most areas of the mid and hind femora of both male and female are yellow; the pterostigma of the wing is brown; the halter knob is brown; the epandrium is wide apically with a trapezoidal medial invagination; the subepandrial sclerite is rectangular, as long as the cercus; the dorsal apodeme of aedeagus is nearly as long as the ventral apodeme. In *D. henanensis*, most

areas of the mid and hind femora are black; the pterostigma of the wing is pale yellow; the halter knob is pale yellow; the epandrium is narrow apically with a triangular medial invagination; the subepandrial sclerite is triangular, nearly 2 times longer than the cercus; the dorsal apodeme of aedeagus is 1/2 as long as the ventral apodeme.

Etymology. The specific name refers to the elongated distiphallus, from the Latin adjective "elongatus" meaning prolonged.

Dialineura henanensis Yang, 1999

http://species-id.net/wiki/Dialineura_henanensis
Figs 23–42, 73

Dialineura henanensis Yang, 1999: 186. Type locality: Henan, China (Holotype deposited in Entomology Museum of China Agricultural University, Beijing).

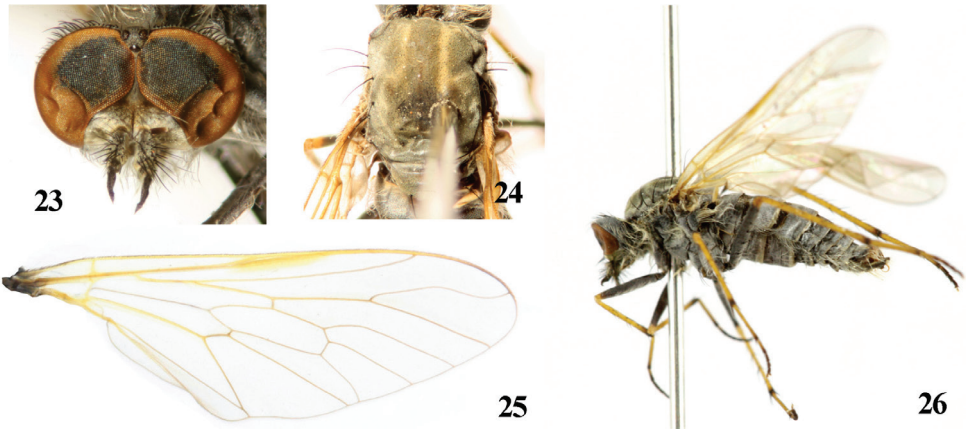
Diagnosis. Male mesonotum with 3 wide grey vittae, separated by 2 narrow pale yellow stripes, the central vitta with a narrow brown stripe in the middle; female mesonotum with 3 wide black vittae, separated by 2 narrow grey stripes, the central vitta with a narrow grey stripe in the middle. Pterostigma of wing pale yellow. Halter knob pale yellow. Male epandrium wide basally then suddenly narrow after middle line and with a triangular medial invagination apically; gonocoxite relatively wide apically; dorsal apodeme of aedeagus 1/2 as long as ventral apodeme; distiphallus recurved and S-shaped.

Redescription. Male. Body length 7.3–8.5 mm, wing length 6.6–7.1 mm.

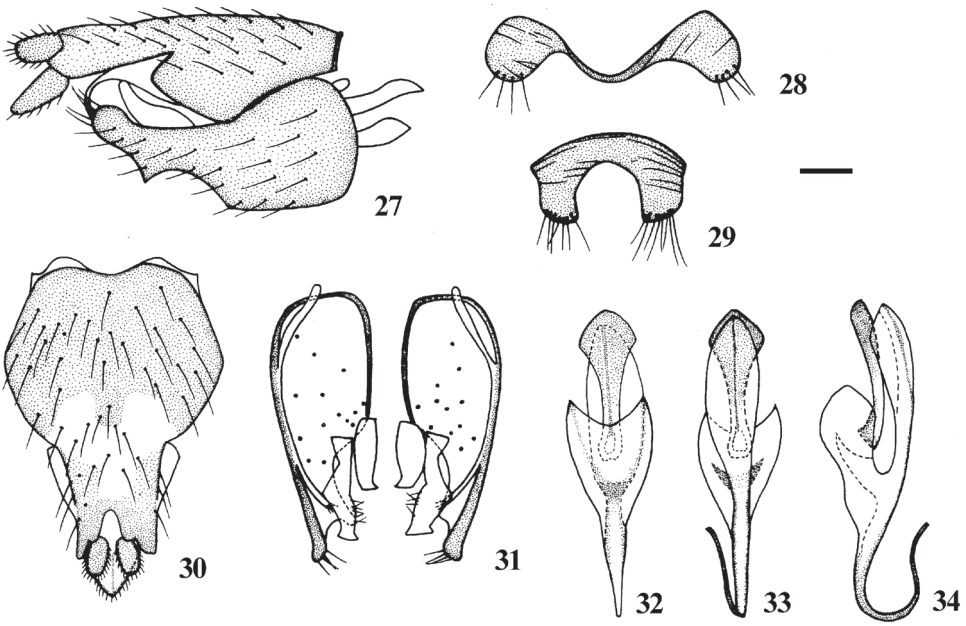
Other characters as described for *D. elongata* sp. n., with following exceptions: Antennal ratio: 5.5 : 1.0 : 4.5 : 0.5. Proboscis black with short white pile; palpus black with white pile. Mesonotum (Fig. 24) with 3 wide grey vittae, separated by 2 narrow pale yellow stripes, the central vitta with a narrow brown stripe in the middle. Notum with sparse short white pile mixed with black pile. All femora (Fig. 26) black with yellow tips. Fore coxa with *a* 1, *av* 1; mid coxa with *a* 3; hind coxa with *a* 2–3, *d* 1. Fore and mid femora without any prominent setae; hind femur with *av* 6, *pv* 2–3. Fore tibia with *ad* 3–4, *pd* 3, *pv* 3, apically with 4 setae; mid tibia with *ad* 3, *pd* 3, *av* 3, *pv* 4, apically with 6 setae; hind tibia with *ad* 9, *pd* 6–8, *av* 8, *pv* 4–5, apically with 8 setae. Pterostigma of wing (Fig. 25) pale yellow; veins yellow. Halter stalk brownish yellow basally and dark brown apically; knob pale yellow. Anterior margins of tergites 2–3 of abdomen with very thin pubescence so that ground color is visible. Terminalia with only white pile. **Male genitalia:** Epandrium (Fig. 30) much elongated, 1.3 times longer than wide, apically narrowed with a triangular medial invagination. Subepandrial sclerite triangular, nearly 2 times longer than cercus. Dorsal apodeme of aedeagus (Figs 32–34) 1/2 as long as ventral apodeme.

Female. Body length 9.3–10.1 mm, wing length 7.0–7.9 mm.

Most characters of female are similar to the male, with following exceptions: Frons and antenna with dense brownish yellow pubescence over black ground color. Frons (Fig. 35) wide with 2 rows black setae, the narrowest point of frons 3–5 times

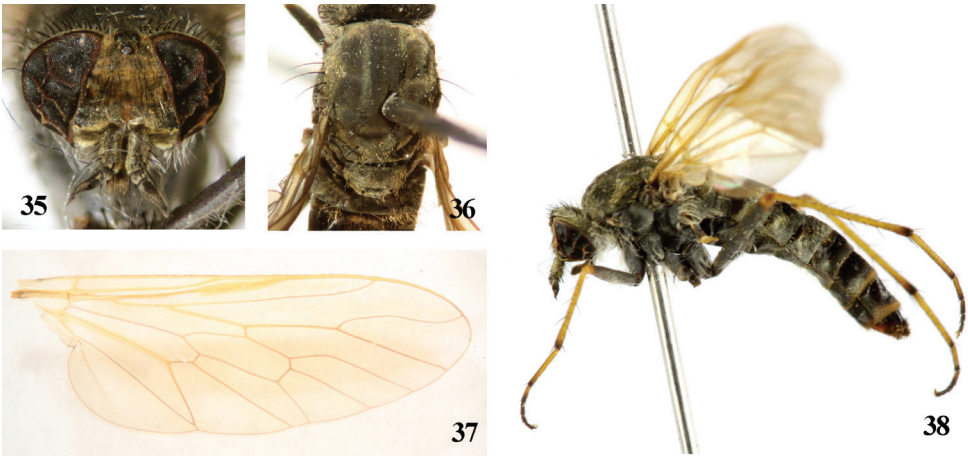


Figures 23–26. *Dialineura henanensis* Yang. Male. **23** head, frontal view **24** mesonotum **25** wing **26** habitus of male, lateral view.



Figures 27–34. *Dialineura henanensis* Yang. Male. **27** terminalia, lateral view **28** tergite 8 **29** sternite 8 **30** epandrium, cercus and subepandrial sclerite, dorsal view **31** gonocoxite and gonostylus, dorsal view **32** aedeagus, dorsal view **33** aedeagus, ventral view **34** aedeagus, lateral view. Scale: 0.2 mm.

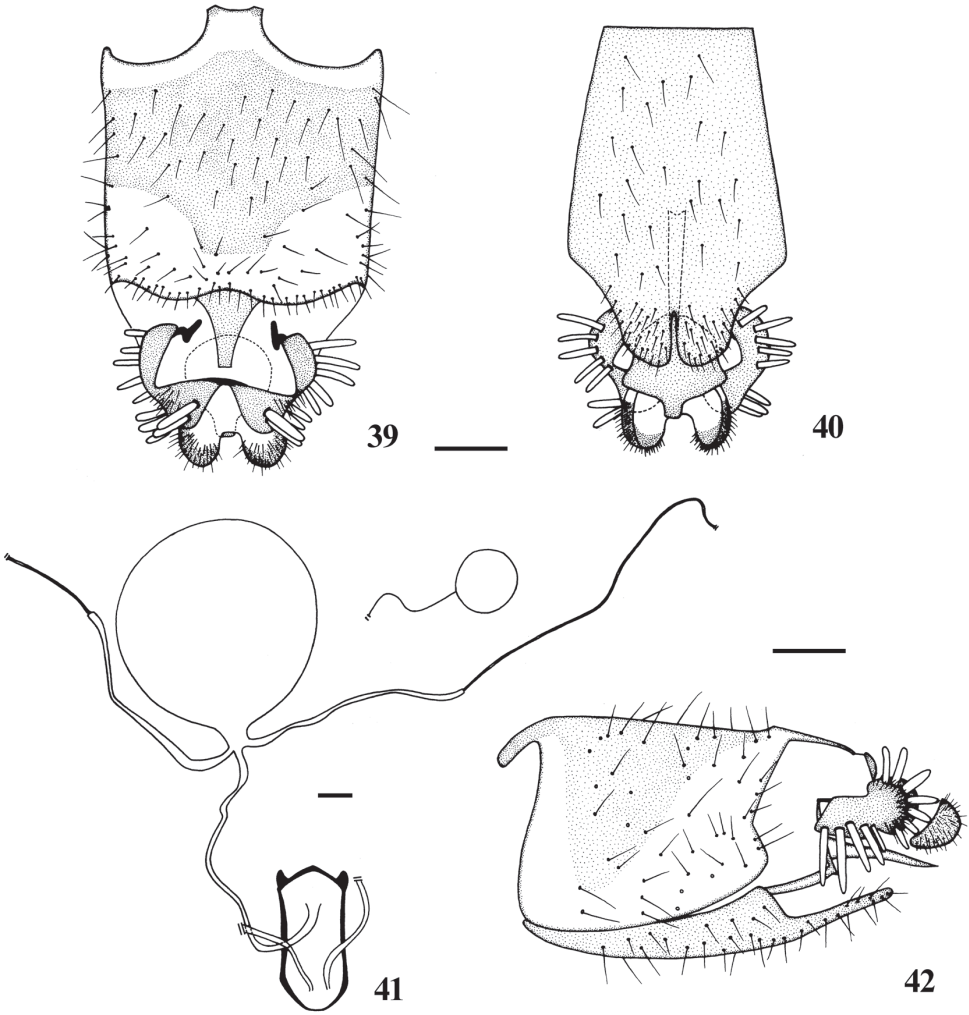
wider than anterior ocellus. Antennal setae shorter than male; antennal ratio: 4.5 : 1.0 : 4.1 : 0.6. Proboscis with short brown pile. Mesonotum (Fig. 36) with 3 wide black vittae, separated by 2 narrow grey stripes, the central vitta with a narrow grey stripe in the middle. Notum with more pile than male. Fore coxa with *a* 1, *av* 1; mid coxa with *a* 3; hind coxa with *a* 3, *d* 1. Fore and mid femora without any prominent setae;



Figures 35–38. *Dialineura henanensis* Yang. Female. **35** head, frontal view **36** mesonotum **37** wing **38** habitus of female, lateral view.

hind femur with *av* 5–7, *pv* 4–5. Fore tibia with *ad* 3, *pd* 3, *pv* 2–4, apically with 6 setae; mid tibia with *ad* 3, *pd* 3, *av* 2, *pv* 4, apically with 6–8 setae; hind tibia with *ad* 7–9, *pd* 10, *av* 8, *pv* 5–7, apically with 6 setae. Most anterior margins of tergites of abdomen with very thin pubescence so that ground color is visible. White short setae mixed with brown short setae on abdomen, except tergite 1 with some white pile. **Female genitalia:** Tergite 8 (Fig. 39) quadrate in dorsal view; sternite 8 (Fig. 40) long trapezoidal in ventral view with an incision apically. Cercus (Fig. 42) semicircular. Subepandrial sclerite (Fig. 40) bell-shaped. Furca (Fig. 41) 2.2 times longer than wide. Accessory glands with separated ducts. Spermathecal sac rather large and spherical; two spermathecae, spherical.

Materials. 1 male, **CHINA:** Beijing, Shangfang Mountain (39°39'N, 115°49'E), 22. V. 1976, Chi-Kun Yang; 4 male, 14 female, **CHINA:** Yunnan, Xishuangbanna, Jinghong (21°58'N, 100°48'E, 300m), 27. IV. 2002, Wen-Quan Zhen; 2 male, **CHINA:** Henan, Neixiang, Baotianman (33°31'N, 111°52'E), 20. V. 2006, Wei-Hai Li; 3 male, 3 female, **CHINA:** Beijing, Mentougou (39°56'N, 116°06'E), 30. V. 2008, Tao Wang; 1 male, **CHINA:** Shaanxi, Zhouzhi, Houzhenzi (33°53'N, 108°02'E), 5. V. 2009, Mao-Ling Sheng; 1 male, 1 female, **CHINA:** Yanqing, Song Mountain (40°29'N, 115°49'E; 780 m), 23. V. 2009, Wei-Na Cui & Jin-Jing Wang; 10 male, 22 female, **CHINA:** Beijing, Xiaolongmen Woodland (39°57'N, 115°26'E), 24. V. 2009, Li Shi, Hui Yu & Liang Liang; 52 male, 76 female, **CHINA:** Beijing, Xiaolongmen Woodland (39°57'N, 115°26'E; 1 177–1 430 m), 25. V. 2009, Li Shi, Hui Yu & Liang Liang; 16 male, 17 female, **CHINA:** Beijing, Ling Mountain, Ancient Road (39°59'N, 115°29'E; 1 022–1 144 m); Li Shi & Liang Liang; 1 female, **CHINA:** Beijing, Xiaolongmen (39°57'N, 115°26'E), 21. V. 2010, Tao Li; 1 male, **CHINA:** Inner Mongolia, Helan Mountain, Gulaben, Luanchaigou (39°00'N, 105°50'E), 10. VIII. 2010, Li-Hua Wang.



Figures 39–42. *Dialineura henanensis* Yang. Female. **39** terminalia, dorsal view **40** terminalia, ventral view **41** internal reproductive organs **42** terminalia, lateral view. Scale: 0.2 mm.

Distribution. Palaearctic region: China (Henan, Beijing, Shaanxi, Inner Mongolia); Oriental region: China (Henan, Yunnan) (Fig. 73). This is biogeographically part of North China Region, Mongolia-Xinjiang Region and South China Region (Zhang 1999).

Remarks. Yang (1999) first described *Dialineura henanensis* from Henan, China and gave the figures of male genitalia, but the female was unknown. We found large amount of *D. henanensis* specimens from other provinces (i.e. Shaanxi, Inner Mongolia, Yunnan) and city (i.e. Beijing) of China, therefore we infer that this species is widespread in China. We redescribe this species and give figures of both male and female genitalia.

***Dialineura nigrofemorata* Kröber, 1937**
http://species-id.net/wiki/Dialineura_nigrofemorata
Figs 43–55, 73

Dialineura nigrofemorata Kröber, 1937: 272, 290. Type locality: Transbaibalia, Russia (Holotype deposited in Naturhistorisches Museum Wien, Vienna); Zaitzev 1971: 192.
Dialineura intermedia Lyneborg, 1968: 159. Type locality: District SE, Baikal Lake, Russia.

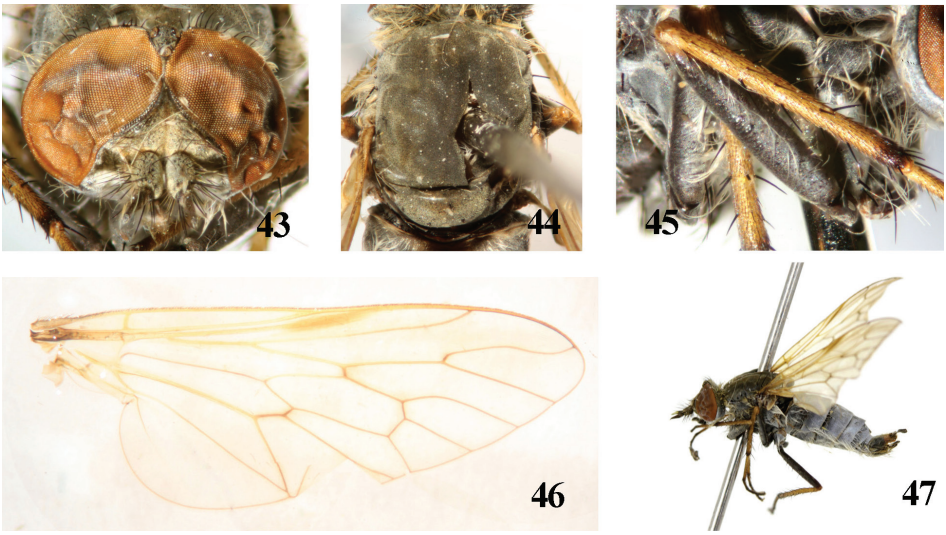
Diagnosis. Male mesonotum with 3 wide black vittae separated by 2 narrow pale grey stripes. Pterostigma of wing yellow. Fore femur only with white pile. Male subepandrial sclerite very long; gonocoxite narrow apically and with substylus in interior margin.

Redescription. Male. Body length 8.2 mm, wing length 7.0 mm.

Head (Fig. 43) with dense pale pubescence over black ground color, central upper area of frons brown. White to pale yellow pile from gena to occiput, black setae on ocellar tubercle and frons, setae on frons divided into 2 tufts, parafacial bare, upper occiput also with some black postocular setae. Eyes reddish brown and nearly contiguous on upper frons. Antenna with dense pale pubescence over black ground color, except first flagellomere and style brown; black setae on scape long and thick, but those on pedicel short and thin, first flagellomere nearly bare; central part of first flagellomere widest; style resting apically on first flagellomere with a tiny distal spine; antennal ratio: 3.6 : 1.0 : 3.5 : 0.9. Proboscis black with short brown pile; palpus brown with white pile.

Thorax with dense pubescence over black ground color; mesonotum (Fig. 44) with 3 wide black vittae separated by 2 narrow pale grey stripes. Notum with sparse white pile, prosternum and pleuron with white to pale yellow pile; macrosetae on thorax black. Scutal chaetotaxy (pairs): *np* 3, *sa* 2, *pa* 1, *dc* 1, *sc* 2. Coxae and trochanters pale pollinose over black ground color, femora with pale pubescence over black ground color except apices brownish yellow, tibiae brownish yellow with dark brown apices, all tarsomeres 1 brownish yellow with dark brown apices, other tarsomeres dark brown. White pile present on coxae and femora, setae on legs black. Fore coxa with *a* 1, *av* 1; mid coxa with *a* 3; hind coxa with *a* 3, *d* 1. Fore and mid femora without any prominent setae; hind femur with *av* 7, *pv* 8. Fore tibia with *ad* 4, *pd* 5–6, *pv* 4–6, apically with 6 setae; mid tibia with *ad* 5, *pd* 5, *av* 4, *pv* 4, apically with 7 setae; hind tibia with *ad* 9, *pd* 10–11, *av* 9–10, *pv* 7, apically with 6 setae. Wing (Fig. 46) hyaline tinged yellow; pterostigma very narrow, yellow, at end of R_1; veins brown except basal surface of wing pale yellow. Halter stalk brownish yellow basally and black apically; knob brown.

Abdomen with dense pubescence over ground color, except tergite 1 and anterior margins of tergites 2–3 with very thin pubescence so that ground color is visible, posterior margin of each segment pale yellow. White pile on abdomen and terminalia. **Male genitalia:** Epandrium (Fig. 51) elongated, 1.3 times longer than wide, apically narrowed with a triangular medial invagination. Subepandrial sclerite slightly constricted in the central area, nearly 3 times longer than cercus. Gonocoxite (Fig. 52) narrow



Figures 43–47. *Dialineura nigrofemorata* Kröber. Male. **43** head, frontal view **44** mesonotum **45** fore femur **46** wing **47** habitus of male, lateral view.

apically and with substylus in interior margin. Distiphallus (Figs 53–55) short and curved, basal part of distiphallus relatively stout.

Female. Unknown.

Material. 1 male, **CHINA:** Liaoning, Xinbin (41°43'N, 125°02'E), 7. VII. 2005, Juan Li.

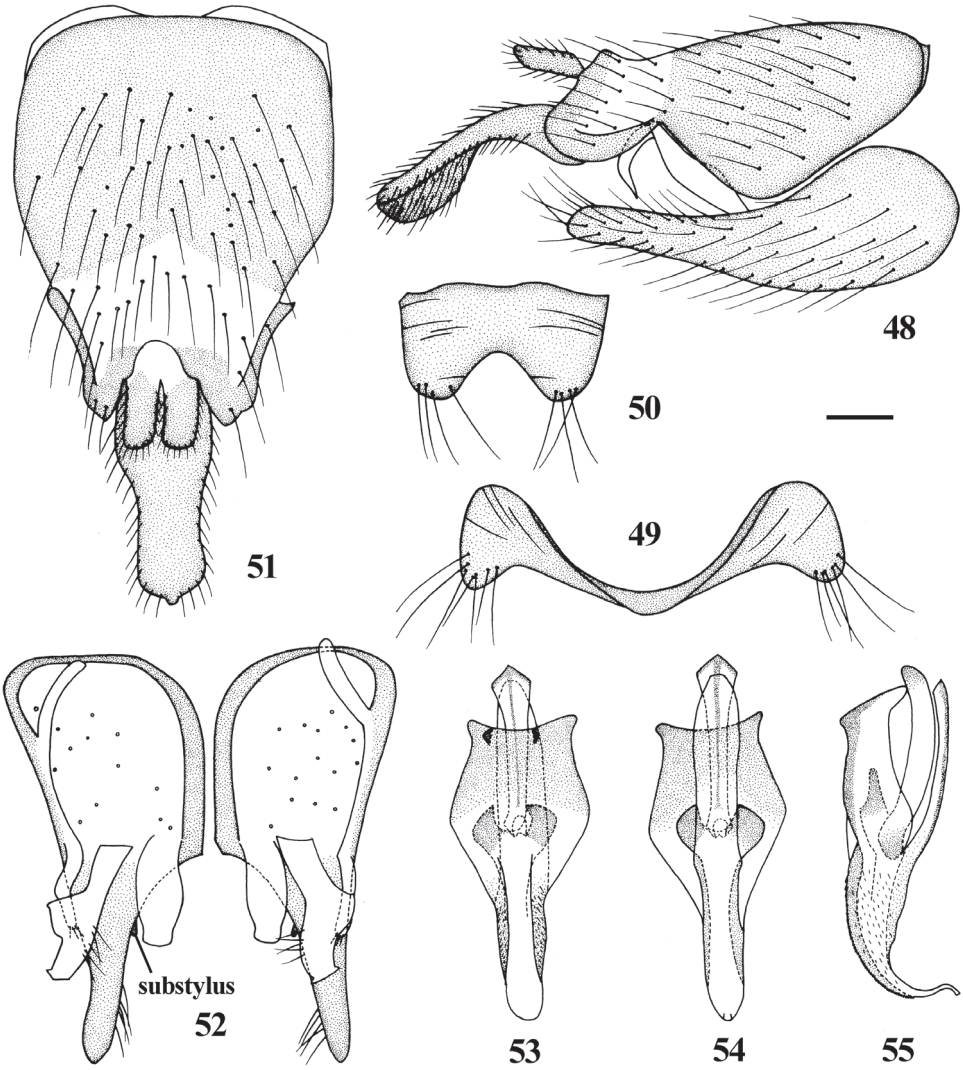
Distribution. Palaearctic region: China (Liaoning) (Fig. 73), Russia. In China, this is biogeographically part of Northeast Region (Zhang 1999).

Remarks. Kröber (1937) first described a female specimen of *Dialineura nigrofemorata* from Transbaibalia, Russia. Lyneborg (1968) described this species as *D. intermedia* and gave the figures of male genitalia. Zaitzev (1971) redescribed *D. nigrofemorata*, gave the figures of male genitalia and revised *D. intermedia* Lyneborg, 1968 as a synonymy, and he pointed out that the *D. nigrofemorata* described by Lyneborg (1968) in fact was *D. lyneborgi*. We newly record *D. nigrofemorata* from China. This species is similar to *D. lyneborgi* Zaitzev from Russia in the long subepandrial sclerite. But it can be separated from the following features: only white pile present on the fore femur (Fig. 45); the epandrium is nearly 2 times longer than the subepandrial sclerite. In *D. lyneborgi*, black pile distinctly present on fore femur; the epandrium is 1.5 times longer than the subepandrial sclerite (Zaitzev 1971).

***Dialineura gorodkovi* Zaitzev, 1971**

http://species-id.net/wiki/Dialineura_gorodkovi
Figs 56, 57, 73

Dialineura gorodkovi Zaitzev, 1971: 191. Type locality: Chukchi, Russia (Holotype deposited in Zoological Institute, Academy of Science of Russia, St. Petersburg); Lyneborg 1975: 577; Webb and Irwin 1991: 873.



Figures 48–55. *Dialineura nigrofemorata* Kröber. Male. **48** terminalia, lateral view **49** tergite 8 **50** sternite 8 **51** epandrium, cercus and subepandrial sclerite, dorsal view **52** gonocoxite and gonostylus, dorsal view **53** aedeagus, dorsal view **54** aedeagus, ventral view **55** aedeagus, lateral view. Scale: 0.2 mm.

Diagnosis. Black setae on frons (Fig. 56) very long and dense, even expand to parafacicals. Male mesonotum (Fig. 57) with 3 wide dark brown vittae, separated by 2 narrow brownish grey stripes, the central vitta with a narrow brownish grey stripe in the middle. Pterostigma of wing dark brown. Male subepandrial sclertie (Zaitzev 1971, p191, fig. 5; Webb and Irwin 1991, p872, fig. 5) triangular and 1.5–2 times longer than cercus; gonocoxite (Zaitzev 1971, p191, fig. 5; Webb and Irwin 1991, p872, fig. 7, 8) narrow apically and with substylus in interior margin.

Materials. 2 male, **CHINA:** Beijing, Xiaolongmen (39°57'N, 115°26'E), 21. V. 2010, Tao Li.

Figures 56, 57. *Dialineura gorodkovi* Zaitzev. Male. **56** head, frontal view **57** mesonotum.

Distribution. Palaearctic region: China (Beijing) (Fig. 73), Russia; Nearctic region: Canada and USA. In China, this is biogeographically part of North China Region (Zhang 1999).

Remarks. Zaitzev (1971) firstly described *Dialineura gorodkovi* from Chukchi, Russia and gave the figures of the male genitalia. Lyneborg (1975) first recorded D. gorodkovi in north America. Webb and Irwin (1991) redescribed *D. gorodkovi* and gave figures of both male and female genitalia. We newly record *D. gorodkovi* from China.

Dialineura affinis Lyneborg, 1968

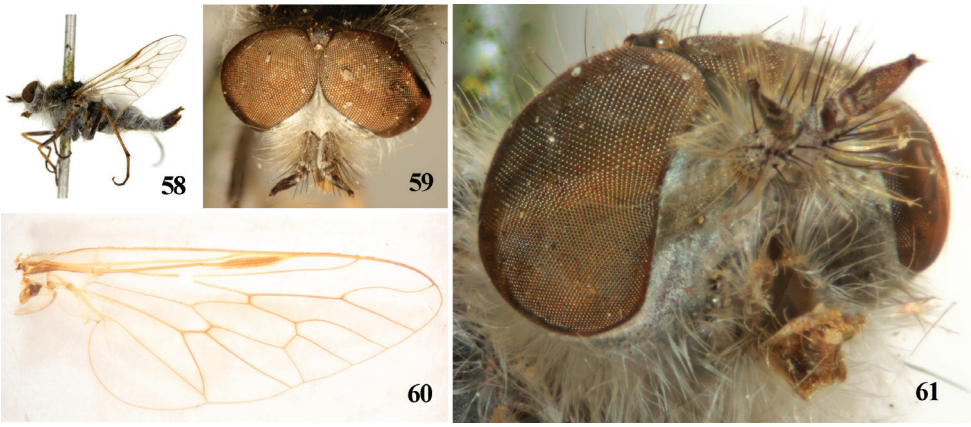
http://species-id.net/wiki/Dialineura_affinis
Figs 58–69, 73

Dialineura affinis Lyneborg, 1968: 157. Type locality: Sichuan, China (Holotype deposited in U. S. National Museum, Washington D. C.); Zaitzev 1971: 187; Yang 1999: 186.

Diagnosis. Frons with white pile. Pterostigma of wing brownish yellow. Male gonocoxite narrow apically and with substylus in interior margin; distiphallus serrated at lateral edges.

Redescription. Male. Body length 8.1–8.5 mm, wing length 6.0–7.2 mm.

Head (Fig. 59) with dense pale pubescence over black ground color. White pile on frons and from gena to occiput, brown pile on ocellar tubercle, parafacial bare, upper occiput also with some black postocular setae. Eyes reddish brown and nearly contiguous on upper frons. Antenna with dense pale pubescence over black ground color; black setae on scape long and thick, but those on pedicel short and thin, scape also covered with long white pile, first flagellomere nearly bare; central part of first flagellomere widest; style resting apically on first flagellomere with a tiny distal spine;



Figures 58–61. *Dialineura affinis* Lyneborg. Male. **58** habitus of male, lateral view **59** head, frontal view **60** wing **61** parafacial.

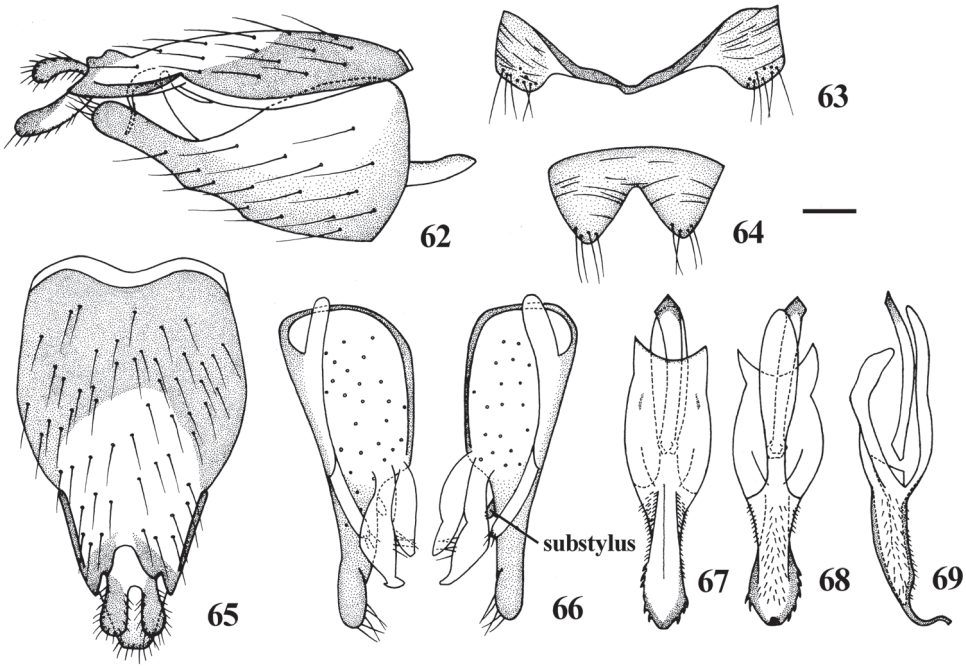
antennal ratio: 5.3 : 1.0 : 4.3 : 0.8. Proboscis brownish yellow with short brown pile; palpus pale brownish yellow with white pile.

Thorax with dense pale pubescence over black ground color (as the pubescence on the mesonotum of specimens are totally scraped off, the pattern on the mesonotum is unknown). Notum with dense white pile, prosternum and pleuron with dense white pile; macrosetae on thorax black. Scutal chaetotaxy (pairs): *np* 3, *sa* 2, *pa* 1–2, *dc* 2, *sc* 2. Coxae and trochanters pale pollinose over black ground color, femora with pale pubescence over black ground color except apices brownish yellow, tibiae brownish yellow with dark brown apices, all tarsomeres 1 brownish yellow with dark brown apices, other tarsomeres dark brown. White pile present on coxae and femora, setae on legs black. Fore coxa with *a* 1, *av* 1; mid coxa with *a* 3; hind coxa with *a* 2, *d* 1. Fore and mid femora without any prominent setae; hind femur with *av* 6, *pv* 3. Fore tibia with *ad* 3–4, *pd* 3, *pv* 4, apically with 4–5 setae; mid tibia with *ad* 3–4, *pd* 4, *av* 5, *pv* 4, apically with 6 setae; hind tibia with *ad* 7–9, *pd* 8, *av* 7–8, *pv* 6–7, apically with 5 setae. Wing (Fig. 60) hyaline tinged yellow; pterostigma very narrow, brownish yellow, at end of R_1; veins brown except upper basal surface of wing yellow. Halter stalk yellow but dark brown apically; knob brown.

Abdomen with dense pale pubescence over black ground color, except tergite 1 and terminalia with very thin pubescence so that ground color is visible, posterior margin of each segment pale yellow. White pile on abdomen and terminalia. **Male genitalia:** Epandrium (Fig. 65) elongated, 1.5 times longer than wide, apically narrowed with a triangular medial invagination. Subepandrial sclerite trapezoid, little longer than cercus. Gonocoxite (Fig. 66) with substylus, relatively narrow apically. Distiphallus (Figs 67–69) short and curved, serrated at lateral edges.

Female. Unknown.

Materials. 3 male, **CHINA:** Tianjin, Qingguang Farm (39°13'N, 117°00'E), 9. IV. 1965; 1 male, **CHINA:** Tianjin, Qingguang Farm (39°13'N, 117°00'E), 10. IV. 1965. The collectors are totally unknown.



Figures 62–69. *Dialineura affinis* Lyneborg. Male. **62** terminalia, lateral view **63** tergite 8 **64** sternite 8 **65** epandrium, cercus and subepandrial sclerite, dorsal view **66** gonocoxite and gonostylus, dorsal view **67** aedeagus, dorsal view **68** aedeagus, ventral view **69** aedeagus, lateral view. Scale: 0.2 mm.

Distribution. Oriental region: China (Sichuan); Palaearctic region: China (Tianjin) (Fig. 73). This is biogeographically part of Southwest Region and North China Region (Zhang 1999).

Remarks. Lyneborg (1968) first described *Dialineura affinis* from Sichuan, China as a very special species because of "The face bears long blackish hairs similar to those on the frons", and he gave the figures of male genitalia. Irwin and Lyneborg (1981a) pointed it out again - "Lateral portion of face usually bare, only pilose in *affinis* Lyneborg from China" – as an exception of the general characters of *Dialineura*. Zaitzev (1971) recorded it in the revision of Palaearctic species of the genus *Dialineura*. Yang (1999) included it into the key to species of *Dialineura* from China. We find the structures of male genitalia of our materials are almost same as *D. affinis*, especially in the distiphallus with the serrated lateral edges; therefore we identify our materials as *D. affinis*. However, the parafacial (Fig. 61) of our specimens are totally bare without any pile or setae, if the "face" (Lyneborg 1968) and the "lateral portion of face" (Irwin and Lyneborg 1981a) refer to the same structure of parafacial. Moreover, the frons (Fig. 56) of our specimens are covered with only white pile instead of blackish setae.

***Dialineura kikowensis* Ôuchi, 1943**
http://species-id.net/wiki/Dialineura_kikowensis
Figs 70–71, 73

Dialineura kikowensis Ôuchi, 1943: 481. Type locality: Zhejiang, China (Holotype deposited in Shanghai Entomological Museum, Shanghai); Yang 1999: 186.

Diagnosis. Female mesonotum with two wide yellow vittae. Apical margin of cell m_3 narrower than cross-vein m-cu (Ôuchi 1943, p481, fig. 1). All femora (Fig. 67) entirely yellow. Each tergite of abdomen with a large black central spot.

Material. Holotype female, **CHINA:** Zhejiang, Xikou (29°41'N, 121°16'E), 11. V. 1936. The collector is unknown.

Distribution. Oriental region: China (Zhejiang) (Fig. 73). This is biogeographically part of Central China Region (Zhang 1999).

Remarks. Ôuchi (1943) described only one female specimen of *Dialineura kikowensis* from Zhejiang, China and gave the figures of middle part of wing and abdomen in dorsal view. Yang (1999) included it into the key to species of *Dialineura* from China. We examine photos of the type specimen.

Figures 70–71. *Dialineura kikowensis* Ôuchi. Female. **70** habitus of female, lateral view **71** habitus of female, dorsal view.

***Dialineura aurata* Zaitzev, 1971**
http://species-id.net/wiki/Dialineura_aurata
Figs 72, 73

Dialineura aurata Zaitzev, 1971: 198. Type locality: Southern seaside of Russia (Holotype deposited in Zoological Institute, Academy of Science of Russia, St. Petersburg); Zaitzev 1977: 128; Yang 1999: 186.

Diagnosis. Head and entire body covered with dense bright yellow pubescence. Legs pale yellow. Segment 8 of abdomen shinny black. (Zaitzev 1971)

Distribution. Palaearctic region: China (Northeast region) (Fig. 73) (Zhang 1999), Russia.

Remarks. Zaitzev (1971) described four female specimens of *Dialineura aurata* from Palaearctic region including one from Northeast China. Zaitzev (1977) newly recorded three female specimens of *Dialineura aurata* from the Far East region of Russia. Yang (1999) included it into the key to species of *Dialineura* from China.

Figure 72. Habitus of female *Dialineura aurata* Zaitzev, 1971, lateral view.

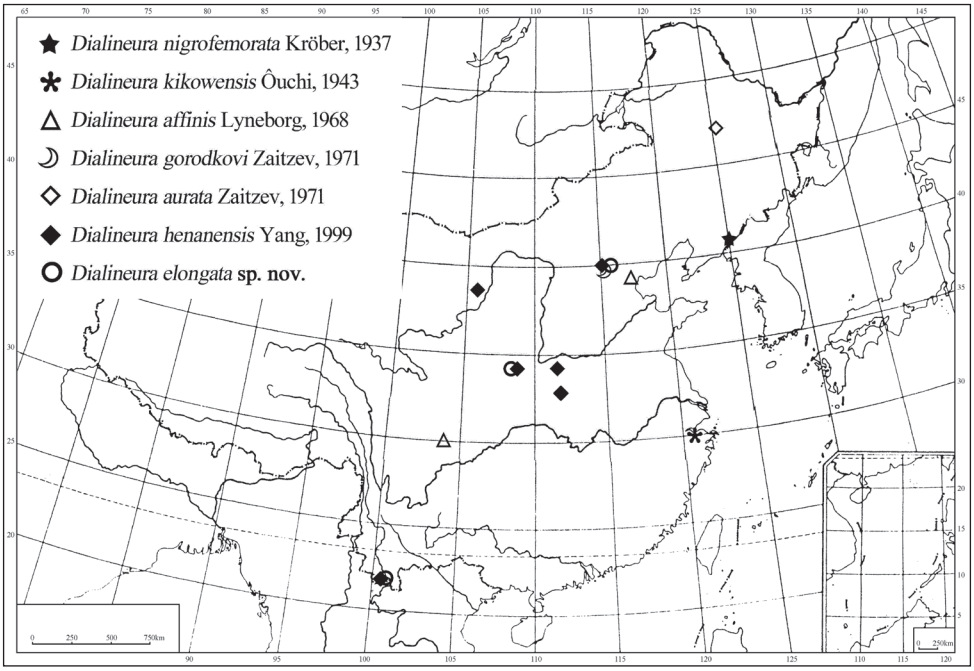


Figure 73. Distribution of *Dialineura* in China.

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RESEARCH ARTICLE

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Revision of the *Lispe longicollis*-group (Diptera, Muscidae)

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Abstract

The *Lispe longicollis* species-group is revised. *Lispe ethiopica* **sp. n.** is described. The following 3 new synonyms are established: *Lispe assimilis* Wiedemann, 1824 (syn: *cyrtoneurina* Stein, 1900 and *modesta* Stein, 1913); *Lispe manicata* Wiedemann, 1830 (syn: *forficata* Kurahashi & Shinonaga, 2009). Female of *Lispe microptera* Seguy, 1937 is described for the first time. Identification key for known Eurasian and African species is given.

Keywords

Lispe longicollis species-group, Muscidae, Diptera, key, new species, new synonym

Introduction

The *Lispe longicollis* species-group was proposed by Hennig (1960) based on the characteristic shape of a vein M which is distinctly curved forward at apex. The species of this group also share these additional characters: *t3* with submedian *av*, *ad* and *pd* setae; abdomen with large, more or less fused trapezoid spots; frontal triangle narrow; *dc* 2+4, usually only 2 posterior pairs are strong (in *L. glabra* Wiedemann and *L. manicata* Wiedemann *dc* setae should be described as 0+2, but careful examination shows that 4 anterior pairs of minute *dc* setulae are normally present but broken in most specimens). Hennig divided the group into two subgroups.

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Subgroup 1 included the species with ventral seta on *t2* and consisted of *L. longicollis* Meigen, 1826 (S Palaearctic) and *L. cilitarsis* Loew, 1856 (North Africa and Near East). In this paper another three species are added to subgroup 1: *L. microptera* Seguy, 1937 known from Pakistan and India and two Afrotropical species, *L. barbipes* Stein, 1908 and the here described *L. ethiopica* sp. n. The main subgroup character is the presence of fine hairs on the meron above the hind coxa; other characters: *t2* with ventral seta (except for *L. microptera*); male hind basitarsus curved and bears long ventral hairs (except for *L. longicollis*); halves of cercal plate of a subquadrate shape and strongly conjoined with each other (less so in *L. longicollis*); the flies inhabit banks of salted to fresh water.

Hennig's subgroup 2 included widespread *L. assimilis* Wiedemann, 1824 and African *L. nuba* Wiedemann, 1830 which lack the ventral seta on *t2*. In this paper another three Oriental species are added to the subgroup 2: *L. glabra* Wiedemann, 1824, *L. manicata* Wiedemann, 1830 and *L. pacifica* Shinonaga & Pont, 1992. Subgroup 2 is characterized as follows: meron bare; *t2* without ventral seta; male hind basitarsus unmodified; halves of cercal plate of subtriangular shape and less conjoined with each other; the flies inhabit banks of fresh water only.

This revision considers Palaearctic, Afrotropical and Oriental species of the *Lispe longicollis* group. The group is absent in the Nearctic region, there are two Australian species not seen by the author, namely *Lispe weschei* Malloch, 1922 and *Lispe xenochaeta* Malloch, 1923, which also belong to the same group.

Material and methods

The majority of the specimens studied are deposited in the Zoological Museum of Lomonosov Moscow State University, Moscow, Russia, in this case not indicated in text. Other collections are abbreviated as follows:

BMNH Natural History Museum, London, UK;
TAUI Tel-Aviv University, Israel;
ZIN Zoological Institute of the Russian Academy of Sciences, St Petersburg, Russia;
ZMHU Museum für Naturkunde, Humboldt-Universität zu Berlin, Berlin, Germany.

The names of the collectors are abbreviated as follows: KT – Konstantin Tomkovich, NV – Nikita Vikhrev.

The following abbreviations for morphological structures are used: *f1*, *t1*, *f2*, *t2*, *f3*, *t3* = fore-, mid-, hind- femur or tibia; *ac* = acrostichal setae; *dc* = dorsocentral setae; *a*, *p*, *d*, *v* = anterior, posterior, dorsal, ventral seta(e); *prst* – presutural, *post* - postsutural.

The abbreviation for the tarsi as *tar* followed by a pair of digits separated by a hyphen was proposed by Vikhrev (2011): the first digit (1 to 3) gives the leg number and the second digit (1 to 5) the number of the tarsal segment. For example, *tar1-4* = 4th segment of fore tarsus; *tar3-1* = hind basitarsus.

Geographical coordinates are given in the Decimal Degrees format.

Synonymies are listed only for the species to which the new synonymies are considered, for full lists of synonymies see the regional Diptera Catalogues: Pont 1977, 1980 and 1986.

Identification key to Eurasian and African species of *Lispe longicollis*-group

1 Meron bare; *t2* with only 1 *pd* seta, without ventral seta. ♂: hind basitarsus not modified as below. Subgroup 2 ..... **2**

– Meron setulose above hind coxa. *t2* with ventral seta (exception *L. microptera*). ♂: hind basi-tarsus modified: curved and with long ventral hairs (exception *L. longicollis*). Subgroup 1 ..... **6**

2 Disc of scutum densely brownish-grey dusted; *dc* 2+4, two last prescutellar pairs strong, others at least clearly distinct; presutural intraalar seta present; medium size species, body length 6–7.5mm **3**

– Disc of scutum mostly subshining, with a pair of thinly dusted submedian vittae only; *dc* 0+2, only last pair strong; presutural intraalar setae absent; large species, body length 8–9.5mm **5**

3 ♂: *f2* with setae on *av* to *pv* surfaces long and dense, the longest setae about twice as long as femur width. ♀: either *f2* in basal part with erect, rather dense setulae on *av* to *pv* surfaces, these setae at base almost equal to femoral width (*L. pacifica*) or *f1* ventrally with 2–3 rows of fine setulae (*L. nuba*) **4**

– ♂: *f2* without *av*-setae and with only short *pv*-setulae which even in basal part about half as long as femur width. ♀: *f2* with only short and sparse setulae; *f1* bare on ventral surface apart from usual row of *av* setae. Africa, Palearctic and Oriental regions, Australia ..... ***assimilis* Wiedemann**

4 ♂: *f1* ventrally with a dense brush of setulae placed in about 5 rows in basal half of femur and in 1–2 rows in apical half, the usual *av* row of setae on *f1* reduced to 1(2) setae at apex. *f2* with ventral setae long in basal 1/3 (2 times as long as femur width), ventral setae in median 1/3 much shorter, only as long as femur width. ♀: *f1* ventrally with 2-3 rows of fine setulae. Africa..... ..... ***nuba* Wiedemann**

– ♂: *f1* ventrally without setulae; a complete *av* row on *f1* present, though consists of fine setae. *f2* with ventral setae of equal length in basal 2/3 of femur, about 1.5–2 times as long as femur width. ♀: *f1* bare on ventral surface apart from usual row of *av* setae. East Asia..... ***pacifica* Shinonaga & Pont**

5 Palpi darkened at apex. Parafacials with usual sparse fine hairs. *f3* with submedian *av* seta long (equal to femur width) and placed beyond middle Abdominal dusted median vitta complete, although vague on anterior parts of tergites. Hind basitarsus without *v* seta at base. ♂: mid legs and wing venation modified as in Figs 15 and 16; cercal plate as shown in Fig. 11. Oriental region ..... ***glabra* Wiedemann**

– Palpi entirely yellow. Parafacials entirely bare. *f3* with submedian *av* seta short (half as long as femur width) and placed before middle. Abdomen with dusted median stripes conspicuous only on posterior half of tergites. Hind basitarsus with a strong "Anthomyiidae-like" *v* seta at base. ♂: mid tarsi modified as in Fig. 14; wing venation similar to females (Fig. 13); cercal plate as in Fig. 12. South of the Oriental region ..... ***manicata* Wiedemann**

6 *t2* without *av* seta (*L. microptera* – 1 *pd*; ♂ *L. barbipes* – 1 *v-pv*; ♀ *L. barbipes* – 1 *pd*, 1 *v-pv*) **7**

– *t2* with 1 *p*(*pd*) and 1 *av* setae **8**

7 *t2* with 1 *p*(*pd*) seta. ♂ (Fig. 3): *f3* with 4–5 fine long *pv* in basal half and 1(2) *av* in basal 1/3; *tar3-1* slightly laterally compressed and outward curved, with waved ventral setulae more dense at base and at apex; *tar3-2* with waved *v* setulae; cercal plate as in Fig. 8. ♀: *f3* on *av* surface usually with a short *av* seta before middle (in some specimens this seta absent). Pakistan, India .... ***microptera* Seguy**

– *t2* with 1 *v*(*pvv*) seta. ♂ (Fig. 1): *f2* with 2-3 strong, straight and long ventral spines; *f3* in basal 1/3 with 1-2 *av* and 1 long fine *pv*; *t3* at apical 1/3 with long waved setae on *ad* to *av* surface; *tar3-1* elongated, downward curved; with waved *v* setulae. ♀: *f3* without *av* seta; *t2* with 1 *v-pv* and 1 *pd* approximated setae. Africa ..... ***barbipes* Stein**

8 *f3* with a strong submedian *av* seta. Meron with 6-8 setulae above hind coxa and 2-4 below posterior spiracle and usually with 1 setula present on katepimeron. ♂: hind tarsus simple; cercal plate as in Fig. 3. South Palaearctic from Central Europe to Transbaikalia ..... ***longicollis* Meigen**

– *f3* without submedian *av*. Meron only with 4-5 setulae above hind coxa. ♂: hind tarsus modified **9**

9 Palpi black. ♂ (Fig. 4): mid tarsus simple; *tar3-1* dorso-ventraly flattened, distinctly wider than width of *t3*; cercal plate - Fig. 5, sternite 5 – Fig. 6. Ethiopia ..... ***ethiopica* sp. n.**

– Palpi yellow. ♂ (Fig. 2): mid tarsus with a row of curled setulae on *p* surface; *tar3-1* not widened, less wide than width of *t3*; cercal plate as in Fig. 7. Near East, N Africa ..... ***cilitarsis* Loew**

Taxonomy

***Lispe assimilis* Wiedemann, 1824**
http://species-id.net/wiki/Lispe_assimilis
Figs 10, 19

Lispe quadrilineata Macquart, 1835.
Lispe incerta Malloch, 1925.
Lispe inexpectata Canzoneri & Meneghini, 1966.

Lispe cyrtoneurina Stein, 1900: 393 syn. nov. Type locality: Papua New Guinea, Dilo.
Lispe modesta Stein, 1913: 557 syn. nov. Type locality: Abyssinia, Dambelsee [= Ethiopia, Ziway Lake].

Material examined. Syntype *Lispe modesta* Stein, 1913 ♂, (ZMHU). [**Ethiopia**] Abyssinia, Lac. Dembel [Ziway Lake], I.1912, Kovacs.

Australia,: ***Qld***., Townsville, 19.29°S, 146.80°E, 17.IV.2012, G.Cocks, 1♀.

Ethiopia: ***Amhara***, Tana Lake env., 1800m asl, 11.54°N, 37.39°E, 2–4.VIII.2012, NV, 3♂♂, 1♀; ***Oromia***, Ziway Lake, 7.91°N, 38.73°E, 12.III.2012, NV, 1♂, 1♀.

India: ***Goa*** state, 15.0°N 74.1°E, 3–16.II.2008, KT, 29♂♂♀♀; ***Rajasthan*** state, Jaipur, 26.96°N, 75.85°E, 22.II.2011, NV, 7♂♂, 11♀♀; ***Uttarakhand*** state, 30.1°N, 78.2°E, 4.IX.2011, NV, 1♀.

Israel, Kinneret Lake env., 27.X.2011, NV, 7♂♂, 2♀♀.

[**Italy**], ***Sicilia***, Partinico L., 12.VIII.1978, S.Canzoneri, 1♀, (labeled *L. inexpectata*) (ZMHU).

Myanmar, ***Shan*** state, Inle Lake, 30.XI.2009, NV, 6♂♂, 2♀♀.

Morocco: ***Essaouira*** prov., Essaouira env., 27.III.2009, NV, 1♂, 3♀♀, 1–5.V.2012, NV, 1♂, 2♀♀; ***Marrakech*** prov., Marrakech, 21.III.2009, NV, 1♂, ***Tat-Tan*** prov, Draa R., 11.V.2012, NV, 1♀.

Nigeria, Zungeru (9.81°N 6.16°E), 25.II.1911, J.Macfei, 1♀ (BMNH).

Sudan, 08.III.1929, 1♂ with Emden's identification label *L. modesta* (BMNH).

Thailand: ***Chiang Mai*** prov., Sop Poeng env., 17.XI.2009, NV, 1♂; ***Mae Hong Son*** prov., Pai env., 19.4°N, 98.4°E, 15–25.XI.2010, NV, 14♂♂.

Turkey: ***Adana*** prov., Yumurtalik env., IV.2010, NV, 1♂, 1♀; ***Antalya*** prov., Manavgat env., IX.2006–9, NV, 16♂♂, 10♀♀; ***Hatay*** prov., Samandag env., IV.2010, NV, 3♂♂, 1♀; ***Mersin*** prov., Silifke env., IV.2010, NV, 1♂, 1♀; ***Sakarya*** prov., Karasu env., V.2009, NV, 1♂; ***Zonguldak*** prov., Alapli env., V.2009, NV, 1♂.

Distribution. S Palaearctic, Afrotropical and Oriental regions, Australia, Oceania.

Synonymies. The taxonomy of *L. assimilis* was considered by Shinonaga and Pont (1992). In that paper the synonymy of *L. quadrilineata*, *L. incerta* and *L. inexpectata* with *L. assimilis* was established and the related Oriental species with long ventral hairs on mid femur was described as *Lispe pacifica* Shinonaga & Pont, 1992, it was shown that *L. assimilis* in the sense of old authors is *L. pacifica*, while later authors followed this misinterpretation.

Lispe cyrtoneurina Stein, 1900 – syn. nov. of *L. assimilis*. Stein's (1900) original description completely fits *L. assimilis*, the only difference found is 3 (instead of 4) *post dc*. The male lectotype of *L. cyrtoneurina* (stored in Genoa, Museo Civico di Storia Naturale di Genova) was reexamined by Adrian Pont. The lectotype is in poor condition, damped and mostly squashed; 4 *post dc*; everything else fit *L. assimilis* (Pont, pers. com. and unpublished notes).

Lispe modesta Stein, 1913 – syn. nov. of *L. assimilis*. The very short Stein's (1913) description fits *L. assimilis*. Examined by me specimens from Asia and Africa were found similar, the specimens from Ziway Lake in Ethiopia are especially interesting

as it is the type locality of *L. modesta*. In a later paper (Stein, 1918: 175) Stein himself listed *L. assimilis* from Rangoon (Yangoon, Myanmar) as "*Lispe assimilis* Wied. var. *modesta* Stein" and wrote that the male of *L. assimilis* var. *modesta* (=*L. assimilis* in the present interpretation) differs from *L. assimilis* (=*L. pacifica* in the present interpretation) only by the absence of long ventral hairs on *f2*.

Lispe pacifica Shinonaga & Pont, 1992. According to the remark cited above Stein in 1918 started to regard *L. assimilis* and *L. pacifica* as variations of the same species. In fact, the separation of these species in female sex is sometimes doubtful and males have similar genitalia. Note also that in both species the pollinosity is very variable: dusting on face, parafacialia and parafrontalia from pure white to deep yellow, dusting on parafrontalia and frontal triangle from weak to strong, dusting of scutum from grey to brown, the colour of the tibiae from almost entirely yellow to almost entirely dark. I would like to report that my observations made around Pai (Thailand, Mae Hong Son province) somewhat support the valid taxonomic status of *Lispe pacifica* Shinonaga & Pont, 1992. Pai town is so far the only locality I know where both species *L. assimilis* and *L. pacifica* were found together at the same time and usually at the same pools. A series of 17 males of *L. pacifica* and 14 males of *L. assimilis* were collected. All examined males have distinct characters either of one or other species, with no intermediate specimens recorded. Thus in a sympatric condition no trace of crossbreeding between the two species has been found.

So, *Lispe assimilis* Wiedemann, 1824 = *Lispe cyrtoneurina* Stein, 1900 syn. nov. = *Lispe modesta* Stein, 1913, syn. nov.

Lispe barbipes **Stein, 1908**

http://species-id.net/wiki/Lispe_barbipes
Fig. 1

Material examined. Syntypes 1♂, 1♀ (ZMHU). S. W. Afrika, Luderitzbucht [**Namibia**, Luderitz, 26.65°S, 15.16°E], S. Schultze 1♂; S. W. Afrika, Kalahari, Moocane, Wasserspiegel [**Botswana**, Mookane, 23.7°S 26.6°E, water level], X.1904, S. Schultze 1♀.

As it was reported by Pont and Werner (2006): "there must be some doubt as to whether this is actually a syntype, since the locality [of ♂ syntype] was not mentioned by Stein (1908) and is on the coast of Namibia rather than at the eastern edge of the Kalahari desert in Botswana."

Ethiopia, ***Afar***, Mille env., 530m asl, 11.381°N, 40.731°E, 9.VIII.2012, NV, 1♀.

South Africa, [***Northern Cape*** prov.], Olifantshoek [≈27.94°S, 22.74°E], 26.II.1988, D.Simon, 2 ♂♂ (TAUI).

[**Namibia**], South Africa, Van Zylserus [***Kunene*** reg., Van Zyls pass, 17.64°S, 12.71°E, 1000m asl], 12.I.1988, D.Simon, 3 ♂♂ (TAUI and ZMUM).

Distribution. Afrotropical: Botswana, Ethiopia, Namibia, South Africa.

Redescription. Male. Body size – 7-8 mm. Head with frontal triangle narrow. Parafacial covered with hairs. Antenna black. Arista in basal half with hairs slightly

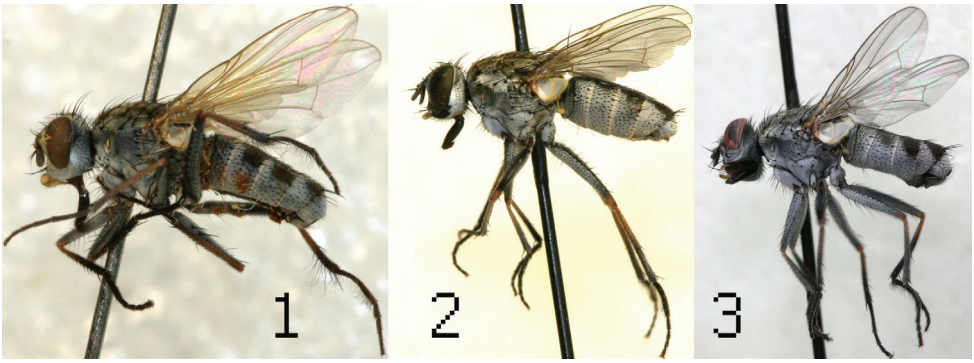

Figure 1–3. ♂♂ *L. barbipes* Stein (**1**) *L. cilitarsis* Loew (**2**) *L. microptera* Séguy (**3**).

shorter than antenna width, in apical half bare. Palpus yellow. Scutum and scutellum brownish dusted with indistinct vittae, pleura brownish-grey dusted. *dc* 2+4 (strong-strong+medium-medium-strong-strong); intraalars 1+2; supraalars 1+2, the posterior one weak. Meron with setulae above hind coxa. Wing with vein R4+5 distinctly curved forward. Legs dark, but femora at apex and tibiae in basal half yellow. *f1* with a row of 6-7 strong *av* setae in apical 3/5. *t1* with a row of 7-8 short but strong *d* setae and with submedian *p* seta. *f2* with 2(3) strong, straight and long (2 times as long as femur width) ventral spines; other setae: 1(2) median *a* seta(e), 2 *p* at apex. *t2* with 1 submedian *v* seta (which is slightly shifted from true *v* position onto posterior surface and may be named "*pvv* seta"). *f3* curved; with 1-2 *av* setae and 1 long but fine *pv* in basal 1/3, *pv* preapical present, *av* preapical absent. *t3* with submedian 1 *av*, 1 *ad* and 1 *pd* setae; below middle with a row of 3-4 straight *ad*; at apical 1/3 with long waved setae on *ad* to *av* surface. Hind tarsus modified: *tar3-1* elongated, downward curved; with waved ventral setulae, these in apical 1/3 especially long; *tar3-2* thickened. Abdomen grey dusted with large lateral black spots, these on tergites 3 and 4 separated by grey vitta, on tergite 5 fused.

Females differs from male as follows: spines on *f2* absent; *t2* with 2 approximated submedian setae, shorter *p-pd* and longer *v-pv*, *f3* without *av* and *pv* setae (these characters did not mention in Stein's (1908) original description), *t3* without long setae at apex; hind tarsus unmodified.

Lispe cilitarsis Loew, 1856

http://species-id.net/wiki/Lispe_cilitarsis
Figs 2, 7

Material examined. Syntype ♂, ZMHU, also seen by Hennig (1960: 426), [**Egypt**] Assyud [Asyut], Frauenfeld, 1♂.

Egypt: Sinai, 21.V.1981, A.Freidberg, 1♂ (TAUI); Cairo, 2♂♂, 1♀ (ZIN); Cairo, Port Said, Suez, Luxor, Aswan, 12♂♂, 6♀♀ (ZMHU).

Ethiopia: ***Amhara***, Tana Lake env., 1800m asl, 11.54°N, 37.39°E, 2-4.VIII.2012, NV, 2♂♂; ***Oromia***, Ziway L., 1640m asl, 7.91°N, 38.73°E, 11–13.III.2012, NV, 1♂.

Israel: Ma'agan Michael, 28.VII.1964, A.Valdenberg, 19♂♂, 20♀♀ (TAUI); Eilat env., 24.X.2011, NV, 10♂♂, 9♀♀.

Morocco: ***Tan-Tan*** prov., Draa R., 28.528°N, 10.947°W, 11.V.2012, NV, 1♂, 1♀.

Distribution. Egypt, Ethiopia, Israel, Morocco. Also reliably known from Saudi Arabia and Oman (Pont 1991). In Ethiopia *L. cilitarsis* seems uncommon and restricted to northern regions in comparison with resembling *L. ethiopica* sp. nov., so specimens from Africa should be re-examined and so far I regard other Afrotropical records as doubtful.

Lispe ethiopica **Vikhrev, sp. n.**
urn:lsid:zoobank.org:act:8412D7E2-3B7E-4527-A0F2-6B3DACBEB089
http://species-id.net/wiki/Lispe_ethiopica
Figs 4, 5, 6

Holotype: male, Ethiopia, Oromia, Langano Lake, 1590m asl, 7.646°N, 38.706°E, 13-15.III.2012, NV (ZMUM).

Paratypes 23♂♂, 24♀♀. **Ethiopia:** Dire Dawa, Afrika, Diredaua [= Ethiopia, Dire Dawa, 9.60°N, 41.85°E], 28.X.[1945–55], O.Theodor, 1♂(TAUI); ***Oromia*:** Mojo bridge, 8.597°N, 39.111°E, 21.IX.2003, A.Freidberg, 1♂ (TAUI); Langano Lake, 1590m asl, 7.646°N, 38.706°E, 13–15.III.2012, NV, 9♂♂, 12♀♀; Ziway Lake, 1640m asl, 7.91°N, 38.73°E, 11–13.III.2012, NV, 11♂♂, 12♀♀; Abijata Lake, 1580m asl, 7.61°N, 38.65°E, 14.III.2012, NV, 1♂.

Description. Male, body length 6.5–7.5 mm.

Head. Frontal triangle remarkably narrow, brownish in posterior half, yellowish-grey dusted in anterior half. Interfrontalia blackish-brown. Fronto-orbital plate blakish-brown in posterior third, yellowish-grey dusted anteriorly; with 3-5 inclinate and 2 proclinate setae and dense hairs in outer row. Parafacial and cheek whitish dusted, occiput grey, parafacial with a row of hairs. Antenna black, postpedicel short, only 2 times longer than pedicel. Arista with hairs half as long as antenna width. Vibrissae medium strong. Palpi blackish.

Thorax. Pleura densely grey dusted, scutellum and disc of scutum brown, thinly dusted, with a pair of densely dusted prescutellar ochrous spots; vittae indistinct. Presutural *ac* in 4 irregular rows; *dc* 2+4, four anterior pair medium strong, two posterior pairs strong; intraalars 1+2; supraalars 1+2; katepisternals 1+2; anepimeron with 11-13 setulae; meron with 3-5 setulae above hind coxa. Wings hyaline, slightly brownish, vein M distinctly curved forward at apex, calypters white, halter yellow.

Legs black with grey dusting, but knees and base of tibiae yellowish. *f1* with a row of *pd* setae and a row of *pv* setulae; *t1* with submedian *p* seta. *f2* with *a* seta at middle and 2 *pd* preapicals; *t2* with *p* seta at middle and *av* seta in apical third; mid tarsus simple. *f3* with 1-2 fine *v* setulae at base, at apex with 1 short *av* and 1 short *pv*; *t3*

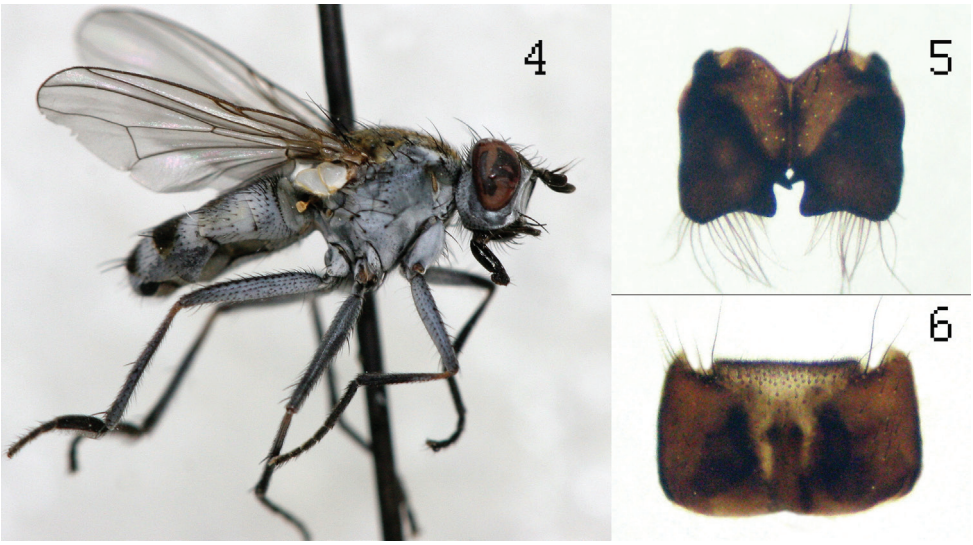

Figure 4–6. *L. ethiopica* sp.n.: male Holotype (**4**) cercal plate (**5**) sternite 5 (**6**).

with submedian *ad* and *pd* setae and with long fine *av* at apical third, setulae in the *ad* row elongated. Hind tarsus modified: *tar3-1* dorso-ventrally flattened, distinctly wider than width of *t3*, on *av* surface with a dense row of fine curled setulae.

Abdomen with dense whitish dusting; tergites 3 to 5 with a pair of large black fused spots each. Cercal plate and sternite 5 as in Figs 5 and 6.

Female differs from male as follows: body length 7-8 mm; *t3* with *av* seta strong; hind tarsus simple.

Diagnosis. *Lispe ethiopica* sp.n. is related to *L. cilitarsis* Loew, 1856 and probably was overlooked due to that resemblance. These two species may be reliably distinguished in both sexes as recommended in the identification key above.

Etymology. Named after the locality of the type series.

***Lispe glabra* Wiedemann, 1824**
http://species-id.net/wiki/Lispe_glabra
Figs 11, 15, 16

Material examined. India, ***Goa*** state, 15.0°N, 74.1°E, 3–16.II.2008, KT, 3♂, 7♀♀.

Myanmar, ***Shan*** state, Inle L., 30.XI.2009, NV, 3♀♀.

Thailand: ***Chanthaburi*** prov., Khao Khitchakut env., 12.82°N, 102.13°E, XI.2009, NV, 3♀♀; ***Chonburi*** prov., Pattaya env., XII.2008–9, NV, 40 ♂♂, ♀♀; ***Mae Hong Son*** prov., Pai env., 11.XI.2009, NV, 5♀♀; ***Phuket*** prov., Nai Thon beach, 20.II.2009. NV 3♂♂, 4♀♀, NV; ***Phang Nga*** prov., Thai Mueang env., 18.II.2009, NV, 1♂, 6♀♀; ***Rayong*** prov., Ban Phe env., 12.64°N, 101.46°E, NV, 3♀♀.

Distribution. Oriental region.

Figure 7–9. Cercal plates: *L. cilitarsis* Loew (**7**) *L. microptera* Séguy (**8**) and *L. longicollis* Meigen (**9**).

Descriptive notes. Body length 8.5–9.5 mm. Wings slightly brownish infuscated. Vein *M* gradually curved forward from level of crossvein *dm-cu*, cell *r*4+5 is almost closed and distance between veins M and R4+5 at wing margin is shorter than crossvein *rm*. Vein CuA2 not reaching wing margin, extending only to crossvein *dm-cu*; crossvein *dm-cu* skewed, it reaches vein *M* at acute angle of about 45˚. There is a downcurved fold surrounded by long microtrichia along posterior margin of wing between veins M and A2, microtrichia directed outward to the fold. Mid legs: *f*2 with remarkable row of very dense curled Velcro fastener-like setae in *pv* position in basal 2/3; *t*2 in apical 1/4 with a row of long ventral hairs; *tar2-1* with a complete row of long curved *pv* setulae. Male is unmistakable due to modified wings and mid legs. Female differs from female of *L. manicata* as given in the key.

***Lispe longicollis* Meigen 1826**
http://species-id.net/wiki/Lispe_longicollis
Fig. 9

Material examined. [**Iran**], Sistan [***Sistan and Baluchestan*** prov., ≈27°N, 61°E], 19–21.V.1898, Zarudniy, 2♂♂ (ZMHU).

Hungary, Kalocsa, [46.5°N 19.0°E] , Thalhammer, 2♀♀ (ZMHU).

Kazakhstan: ***Atyrau*** reg., Atyrau env., 47.0N, 51.8E, 21.V.2011, KT, 21♂♂, 17♀♀; ***Kyzylorda*** prov., Syr Darya R., KT, 26 ♂♂, ♀♀, ***W. Kazakhstan*** reg., Uralsk env., 51.07°N, 51.05°E, 26.VIII.2012, KT, 6♂♂, 7♀♀.

Russia: ***Astrakhan*** reg., Baskunchak L., 48.19°N, 46.82°E, 2–4.V.2010, KT, 7♂♂, 2♀♀; ***Gorno-Altay*** reg., Ust-Koksa env., 50.26°N, 85.61°E, 25.VI.2007, O.Kosterin, 1♀; ***Kalmykia*** reg., 47.875°N, 44.601°E, 08.VI.2012, NV, 3♂♂, 1♀; ***Khakassia*** reg., Shira env. 54.422°N, 90.147°E, 26.VI.2011, KT, 2♀♀; ***Krasnodar*** reg., Pshada R., 44.39°N, 38.34°E, 6.IX.2009, KT, 6♂♂, 3♀♀; ***Omsk*** reg., Omsk, 54.97°N, 73.36°E, 15.VI.2011, O.Kosterin, 1♀; ***Orenburg*** reg., Sol-Iletsk env., 51.342°N, 55.013°E, 28.VIII. KT, 7♂♂, 7♀♀; ***Saratov*** reg., Saratov env., 51.60°N, 46.35°E, 24.VIII.2012, KT, 1♂, 4♀♀; ***Stavropol*** reg.,saltish pond, 45.245°N, 42.665°E, 09.VI.2012, NV, 4♂♂, 2♀♀; ***Volgograd*** reg., 50.418°N,

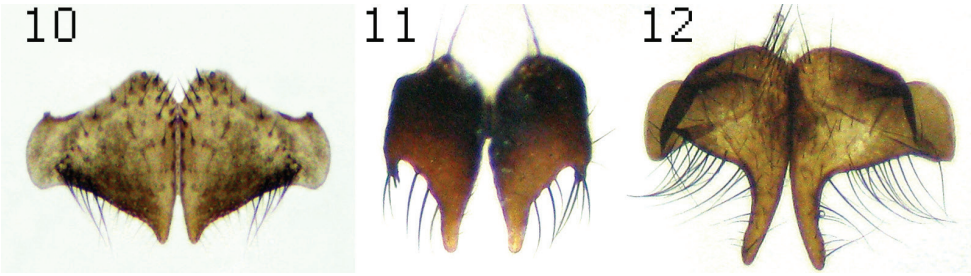

Figure 10–12. Cercal plates: *L. assimilis* (**10**) *L. glabra* Wiedemann (**11**) and *L. manicata* Wiedemann (**12**).

42.760°E, 7.VI.2012, NV, 1♂, Sarpa L., 48.35°N, 44.61°E, 7.VI.2012, NV, 3♂♂, 2♀♀; ***Zabaykalsky*** reg., Zun-Torey soda Lake, 50.01°N, 115.72°E, 30.VII.2011, A.Medvedev, 1♂.

[**Slovenia**], Illyria, Gorz [Gorica, ≈ 45.9°N 13.7°E], IX.67, Mik, 1♂ (ZMHU).

Tajikistan, ***Khatlon*** prov.; Jilikul env. (37.5°N, 68.5°E), 16.V.1987, M.Krivosheina, 2♂♂, 2♀♀; **Turkey:** ***Antalya*** prov., Manavgat env., 36.76°N, 31.45°E, X.2006–7, NV, 1♂, 2♀♀; ***Hatay*** prov., Samandag env., 36.07°N, 35.96°E, 16.IV.2010, NV, 1♂; ***Kayseri*** prov., Subashi env., 38.51°N, 35.19°E , 19.IV.2010, NV, 1♀; ***Konya*** prov., Beyshehir Lake, 37.79°N, 31.64°E, 11.IX.2009, NV, 18 ♂♂, ♀♀; ***Mersin*** prov., Silifke env., 36.31°N, 34.02°E, 22.IV.2010, NV, 2♂♂, 8♀♀.

Turkmenistan: ***Balkan*** prov., Atrek R., (37.7°N, 54.8°E), 28.VII.1932, Ushinsky, 1♀; ***Mary*** prov.; Badhyz NR (35.7°N, 61.8°E), V-VI.1991, A.Ozerov, 1♂, 6♀♀.

Ukraine, ***Donetsk*** reg., Volnovakha distr, 47.51°N, 37.68°E, 25.VIII.2008, KT, 1♂, 2♀♀;

Uzbekistan, ***Karakalpakstan*** reg., Muynak env. (43.76°N, 59.03°E), VI.1957, V.Sychevskaya, 3♂♂, 9♀♀.

Distribution. Southern Palaearctic, from 13°E to 116°E; from 55°N to 35°N.

Lispe manicata **Wiedemann, 1830**
http://species-id.net/wiki/Lispe_manicata
Figs 12, 13, 14

Xenolispa chiragrica Séguy, 1948.
Lispe forficata Kurahashi & Shinonaga, 2009: 303 syn. nov. Type locality: Malaysia, Borneo, Sarawak, Bario [3.75°N, 115.45°E].

Material examined. [**Indonesia**], [***Java***], Batavia, VI.1908, Jacobson, 1♀ (ZMHU).

Cambodia, ***Sianoukville*** prov., Ream Nat. Park, 10. 516°N, 103.617°E, 20.IV.2010, O.Kosterin, 1♂.

Thailand, ***Phuket*** prov., 08.043°N, 98.277°E, 21–26.II.2009, NV, 3♂♂, 2♀♀.

Distribution. South-East Asia: Cambodia, Malaysia (Borneo), Indonesia (Java), Singapore (Séguy 1948), S Thailand, S Vietnam (Séguy 1948).

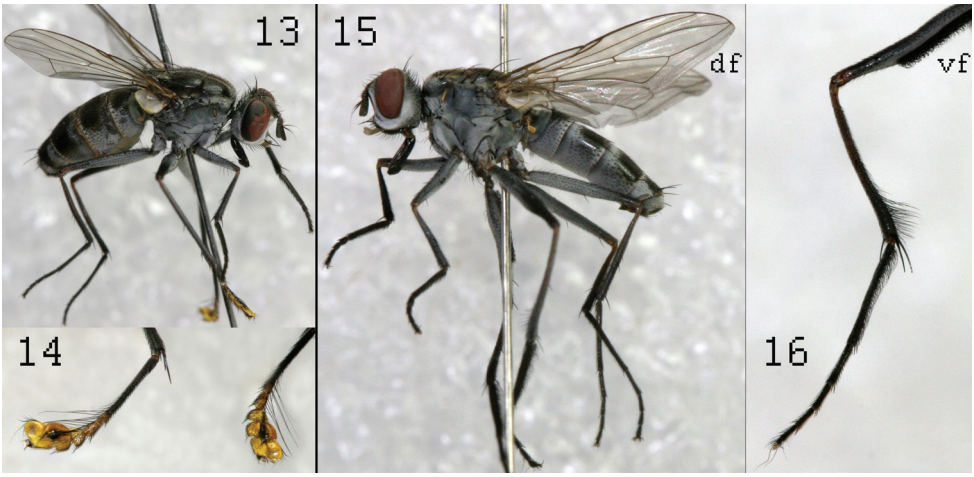

Figure 13–16. *Lispe manicata* Wiedemann: male (**13**) male mid tarsi (**14**) *L. glabra* Wiedemann: male (**15**) male mid tarsus (**16**), **df** – downcurved fold; **vf** – "velcro fastener- like setae.

Synonymy. The illustrations of wonderfully modified male mid tarsi and characteristic genitalia given by Kurahashi and Shinonaga (2009: fig. 1 c–d, 3 a–d) for *L. forficata* suggest it's conspecifity with *L. manicata*. So, *Lispe manicata* Wiedemann, 1830 = *Lispe forficata* Kurahashi & Shinonaga, 2009, syn. n.

The characters of female of *L. forficata* were shortly mentioned by Kurahashi and Shinonaga (2009), but these authors did not compare *L. forficata* with the most related species *L. glabra* and, in my opinion, the diagnostically important characters were either not mentioned or given erroneously. Therefore I find it necessary to provide the description of the female below.

Description of female. Body length 8.5–9.5 mm.

Head. Interfrontalia matt black; frontal triangle brownish-black, subshining, narrow, reaching to lunula. Upper half of fronto-orbital plates brownish-black, subshining, lower part dirty-golden dusted, 3-4 inclinate, 2 reclinate setae and a dense outer row of setulae. Parafacials densely whitish dusted, entirely bare. Gena whitish dusted, about 1.5 times as wide as postpedicel; occiput grey dusted, but less dusted in upper 1/3. Vibrissae strong. Antennae black, long; arista haired on basal half or slightly more, longest aristal hairs half as long as width of antenna. Palpi entirely yellow.

Thorax. Pleura and dorsolateral area, including postpronotal lobe and notopleuron, densely grey dusted. Disc of scutum mostly subshining brownish-black, with a pair of thinly dusted vittae situated mesad to *dc* rows, disc of scutellum subshiny brownish-black. *ac* hairs in 5-6 irregular rows; *dc* 0+2, only posterior pair strong (hair-like and indistinct posterior *prst dc* and 1-2 pairs anterior *post dc* may be found in some specimens); intraalars 0+1, presutural one absent; supraalars 1+2, the posterior one weak. Katepisternal setae 1+2; anepimeron with 9 (8-10) fine hairs, meron and katepimerom bare. Scutellum bare below at apex. Mesothoracic spiracle yellowish. Wings hyaline, slightly brownish infuscated, vein M distinctly curved forward at apex, calypters whitish, halteres yellow.

Legs. Legs long, densely grey dusted; black including coxae, but knees and basal half of *t2* and *t3* brownish-yellow; *f1* with a full row of 6 (5-7) *pd* setae and with a row of fine *pv* setulae, but in apical half 2-4 setae in *pv* row are strong (longer than tibial diameter, stronger than setae in *pd* row); *t1* with *p* seta, preapical *d* and apical *pd* and *pv*; *f2* thickened in basal half, *f2* with row of 3-5 *a*-setae in basal 1/3 and 2 *pd* at apex; *t2* with submedian *pd*; *f3* with short *av* before middle and shorter than setae of *ad* row, with a full row of *ad* subequal to femur depth, preapicals: *av* and *pv*; *t3* with submedian *av*, *ad* and *pd* setae; hind basitarsus with *av* seta at base.

Abdomen: black with grey pollen. Tergites 1+2 to 5 each with a large blackish spots on dorsal and lateral sides, these spots on tergites 3 and 4 divided at midline by grey dusted interrupted vitta.

Male. Similar to female, but mid tarsi modified: apex of mid basitarsus and 4 apical tarsal segments bright yellow; *tar2-2* and *tar2-3* enlarged, *tar2-4* and *tar2-5* strongly enlarged; apex of *tar2-1* and *tar2-2* with long *pd-p* setae. Cercal plate as shown on Fig. 12.

***Lispe microptera* Séguy, 1937**
http://species-id.net/wiki/Lispe_microptera
Figs 3, 8

Material examined. India: ***Rajasthan*** state: Jaipur, 26.96°N, 75.85°E, 21–22.II.2011, NV, 10♂♂, 7♀♀; Sambhar salt-lake, 26.916°N, 75.190°E, 23.II.2011, NV, 8♂♂.

Distribution. India, Rajasthan and Pakistan, Karachi (type locality).

Description of female. Body length 7–7.5 mm, wing length 6mm.

Frontal triangle narrow, yellowish dusted; interfrontalia brownish-black. Fronto-orbital plate blackish grey dusted, with 4 inclinate and 2 proclinate setae and dense hairs in outer row. Parafacial covered with hairs. Antenna black, postpedicel short. Arista with hairs two times shorter than antenna width, in apical third bare. Palpus narrow, dirty-yellow.

Thorax. Scutum and scutellum brownish dusted with a pair of indistinct vittae, pleura grey dusted.

dc 2+4 (medium - medium + medium/weak-medium/weak-strong-strong). Meron with 3-4 setulae above hind coxa, anepimerom with about 15 setulae. Wing with vein R4+5 distinctly curved forward.

Legs. Femora dark with yellow apex, tibiae yellow in basal half and dark in apical half, tarsi black.

f1 with a complete row of 10-12 *pv* setae. *t1* with submedian *p* seta. *f2* with a row of short *a* setae in basal half and with 2 *pd* at apex. *t2* with 1 submedian *p* seta. *f3* slightly curved; with a short *av* seta at basal 1/3 (absent in some specimens) and short *pv* at apex, *av* preapical absent. *t3* with 1 *ad* and 1 *pd* setae at middle. Hind tarsus unmodified.

Abdomen grey dusted with large dorsal black spots separated by anteriorly interrupted grey vitta.

Male differs from female as follows: body length 6.5-7 mm, wing length 5-5.5 mm; *f2* with a complete row of fine *v* setae about as long as femur width; *f3* in basal half with 4–5 fine long (2–2.5 femur width) *pv* setae and 1(2) *av* in basal 1/3; hind tarsus modified: *tar3-1* slightly laterally compressed and outward curved, with waved ventral setulae more dense at base and at apex; *tar3-2* with waved ventral setulae; male cercal plate as in Fig. 8.

***Lispe nuba* Wiedemann, 1830**
http://species-id.net/wiki/Lispe_nuba

Material examined: Ethiopia: ***Amhara*:** Tana Lake env., 1800m asl, 11.54°N, 37.39°E, 2–4.VIII.2012, NV, 6♂♂, 7♀♀; Hayk L., 1920m asl, 11.325°N, 39.688°E, 06.VIII.2012, NV, 3♂♂, 2♀♀; Karakore env., 1500m asl, 10.375°N, 39.933°E, 08.VIII.2012, NV, 4♂♂, 1♀; ***Oromia*:** Dedre Zeit, Hora L., 1900m asl, 8.757°N, 38.993°E, 10.VII.2012, NV, 3♂♂, 3♀♀.

Egypt: Cairo, 5♂♂, 1♀, with Becker, Kowarz and Hennig determination labels (ZIN).

Israel: Yeruham (30.99°N 34.90°E), 22.VII.1962, J.Kugler, 1♂, 1♀ (TAUI).

Distribution. Africa and Near East.

Remarks. Emden (1941) in the key to African *Lispe* wrote that in *L. nuba* "front tibiae without a *pv*". It is not correct, all examined specimens have *t1* with *pv* seta in both sexes, though short in males.

***Lispe pacifica* Shinonaga & Pont, 1992**
http://species-id.net/wiki/Lispe_pacifica
Figs 17, 18

Material examined. Cambodia, ***Koh Kong*** prov., 11.605°N, 103.046°E, XII.2010, NV, 2♀♀.

[**Taiwan**] Formosa: Takao, [22.6N 120.3E], 7.VII.1907, H.Sauter, 6♂♂, 6♀♀, Anping, [23.0N, 120.2E], IX.1908, H.Sauter, 7♂♂, 5♀♀ (ZMHU).

Thailand: ***Chanthaburi*** prov., Khao Khitchakut env., XI.2009, NV, 1♀; ***Chiang Mai*** prov., Sop Poeng env., XI.2009, NV, 1♂; ***Chonburi*** prov., Pattaya env., XI.2007–XII.2009, NV, 28 ♂♂, ♀♀; ***Mae Hong Son*** prov., Pai env., 19.4°N, 98.4°E, 15–25.XI.2010, NV, 19♂♂; ***Nakhon Ratchasima*** prov., Khao Yai NP; II.2009; NV, 1♂, 1♀; ***Phang Nga*** prov., Khao Lak env., XII.2010, NV, 3♂♂, 1♀; ***Phuket*** prov., Nai Thon beach, II.2009; NV, 4♂♂, 1♀; ***Rayong*** prov., Ban Phe env., XI.2009, NV, 2♂♂, 2♀♀; ***Sa Kaew*** prov., Mueang Sa Kaeo, II.2009; NV, 1♂.

Distribution. Widespread in South-East Asia.

Ecology

As it was mentioned above, the species of the subgroup 1 of the *Lispe longicollis* group may be found both on the freshwater and salted basins. *L. ethiopica* sp.n. was equally common on the freshwater Ziway Lake, on the brackish (2g/l) Langano Lake and on the salt (26g/l) Abijata Lake. *L. microptera* was collected at brackish lakes and ponds around Jaipur and on the hypersaline (70-300g/l depending on the season) Sambhar Lake. *L. longicollis* was collected in spring time on the hypersaline Baskunchak Lake, on the seashore salted marshes in Mersin province of Turkey and on the freshwater Titreyen Lake in Antalya province. *L. cilitarsis* in Israel near Eilat was also found at freshwater of cattle drinking bowl and on a hypersaline lake shore, although in the latter case *L. cilitarsis* avoided the sites covered with dry salt where only *Lispe halophora* Becker, 1903 was still present.

In contrast to this salt-tolerance, the species of the subgroup 2 of the *Lispe longicollis* group were observed on freshwater basins only: river banks, rice fields or freshwater lakes/ponds. All species but one prefer open sites, *L. manicata* seems to be the species of the forest rivers and streams where it was collected in Thailand and Cambodia, the same natural habitat was reported by Kurahashi and Shinonaga (2009) (for *L. forficata*) in Malaysian Borneo.

The species of the *Lispe longicollis* group mostly feed on slow moving living prey like Nematocera larvae (Fig. 17), but also were observed feeding on dead arthropods (Fig. 18) or even successfully hunting on a small Diptera imago like *Paracoenia*, Ephydridae (Fig. 19) or *Syntormon*, Dolichopodidae.

Figure 17–19. Feeding. Thailand, Phuket: male *L. pacifica*: with Chironomidae larva (**17**) and with dead spider (**18**) Turkey, Antalya, female *L. assimilis* with prey - *Paracoenia fumosa* (Ephydridae) (**19**).

Correction

I have to apologize for an unfortunate mistake in my previous paper on *Lispe* taxonomy (Vikhrev 2011, fig. 2): sternite 5 of *Lispe draperi* Séguy, 1933 was attributed to *L. tentaculata* (De Geer, 1776) and vice versa.

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I thank Adrian Pont (Oxford) for his various help and for the BMNH material, Oleg Kosterin (Novosibirsk) and Dmitry Gavryushin (Moscow) for their corrections of the text, Amnon Freidberg (Tel-Aviv), Joachim Ziegler (Berlin) and Emilia Narchuk (St Petersburg) for the very interesting material from TAUI, ZMHU and ZIN respectively.

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RESEARCH ARTICLE

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Tabanidae (Diptera) of Maranhão state, Brazil. V. Description of *Protosilvius gurupi* sp. n. (Pangoniinae, Pangoniini) and key to *Protosilvius* species

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Abstract

Protosilvius gurupi **sp. n.** (Tabanidae, Pangoniinae) is described and illustrated based on seven female and 53 male specimens collected in the Amazonian region at Reserva Biológica Gurupi, Centro Novo do Maranhão municipality, northwest Maranhão, Brazil. This is the first record of *Protosilvius* in northern Brazil and in the Amazon Basin. An illustrated key to all *Protosilvius* species is also presented.

Keywords

Amazon Basin, horseflies, neotropics, taxonomy

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Introduction

Currently, *Protosilvius* Enderlein, 1922 has been recorded only in Brazil. The genus was originally described to include *P. termitiformis* Enderlein, 1922. Fairchild's (1962) revision synonymized *Histriosilvius* Kröber, 1930 under *Protosilvius*, transferring *Histriosilvius longipalpis* Macquart, 1848 and describing three species, totaling five species, namely: *P. termitiformis* (type-species), *P. longipalpis*, *P. phoeniculus* Fairchild, 1962, *P. priscus* Fairchild, 1962 and *P. mackerrasi* Fairchild, 1962. Fairchild (1962) considered *Protosilvius* as part of the more basal tribe Pangoniini and to be closely related to the Australian genus *Ectenopsis* Macquart, 1838 and the Nearctic genera *Apatolestes* Williston, 1885 and *Asaphomyia* Stone, 1953. *Protosilvius* never was included in a phylogenetical analysis and this concept was not corroborated yet.

Enderlein's (1925) type specimen description is very short and insufficient to identify any specimen to species level. Fairchild (1962) re-described *P. termitiformis* and made a key to all known species at the time. Fairchild and Burger's (1994) catalog reports the following Brazilian records (in parenthesis) for *Protosilvius* species: *P. longipalpis* (unknown state), *P. mackerrasi* (São Paulo: Bananal), *P. phoeniculus* (Rio de Janeiro: Itatiaia), *P. priscus* (Goiás: Leopoldo Bulhões and Anápolis) and *P. termitiformis* (Minas Gerais: São João del Rei). Turcatel et al. (2007) extended the geographical record of *P. termitiformis* to Paraná, Fóz do Iguaçu, south of Brazil. The specimens recorded to Paraná were checked by FLO (junior author) at Universidade Federal do Paraná and they belong to a different genus, so this record was based on misidentified specimens. This study records *P. gurupi*. sp. n. in Maranhão, the first record in the Amazon Basin.

Material and methods

This study is based on the examination of 60 specimens collected at Reserva Biológica do Gurupi (Rebio Gurupi) (03°14'05"S, 46°41'83"W) of the Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio), in northwestern Maranhão state, Brazil. Rebio Gurupi is in an Amazonian region composed mainly of primary *terra firme* rainforest. Specimens were collected using a "mobile" light-trap, which consisted of a white sheet (1.2 × 1.2 m) hung vertically and lit by two mercury vapour lamp (160 watts) set in the storage trunk of a pick-up truck (Fig. 28). The truck was moved slowly and continuously (4 km/h) along an unpaved road surrounded by forest, stopping each 200 meters for 30 minutes. Collecting took place from 08:00 pm to 04:00 am by two persons on each side of the light trap (Fig. 28). Specimens that landed on the sheet were collected using a vial with ethyl acetate and brought to the laboratory for sorting, mounting and species identification.

The morphological terminology and figure abbreviations are based on Cumming and Wood (2009). The description was made using a Leica M125 stereoscopic microscope with an incident white light source.

The material collected was deposited in the following institutions: Coleção Zoológica do Maranhão (CZMA), Universidade Estadual do Maranhão, Caxias, Maranhão, Brazil; Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Amazonas, Brazil; Museu Paraense Emílio Goeldi (MPEG), Belém, Pará, Brazil; and Museu de Zoologia da Universidade de São Paulo (MZSP), São Paulo, São Paulo, Brazil.

The new species description was based solely on the holotype specimen. The opposite sex, based on paratype specimens, and the variations between individuals are discussed separately. The specimen length was based on the straight distance measured from the frons at antenna level (antenna excluded) to the apex of the abdomen. Wing length is the straight distance measured from the base of the costal vein to the wing apex. Label data are cited in full, including original spelling, enclosed in quotation marks (“”), with punctuation and date transcribed from the top downward. Square brackets ([ ]) are used to indicate information that is not included in the original label. The terminology used follows Cumming and Wood (2009). The new species description was based on same characters used for *P. termitiformis* re-description (Fairchild 1962) so both descriptions would be comparable considering the updated terminology, e.g. basal plate = postpedicel.

The apex of the abdomen was removed and then macerated in heated 85% lactic acid (Cumming 1992) so the terminalia could be dissected and then examined in an excavated slide with glycerin. Terminalia were then placed in a microvial with glycerin and pinned with their associated specimen. Structures were photographed using a Leica DFC500 digital camera fitted on a Leica MZ205 stereomicroscope and connected to a personal computer with the Leica Application Suite software, which includes an Auto-Montage module (Syncroscopy software) (http://www.syncroscopy.com/syncroscopy/) which produces a composite image of different focal point taken from the specimen. The keys and illustrated figures presented are modified from Fairchild (1962). It should be noted that Fairchild did not insert scale bars, since all species are about the same size, and all figures were reduced in the same proportion.

Results

Protosilvius gurupi **Rafael, Marques & Limeira-de-Oliveira, sp. n.**
urn:lsid:zoobank.org:act:3A1AA834-5114-4918-BC20-514836F16539
http://species-id.net/wiki/Protosilvius_gurupi
Figs 1–11

Material. HOLOTYPE female. “Brasil, MA[ranhão] [Centro Novo do Maranhão] REBIO – Res[erva] Biol[ógica do] Gurupi 03°14'05"S, 46°41'83"W “Arm[adilha] Luminosa móvel 07–15.I[Jan.].2011, F. Limeira-de-Oliveira & M. M. Abreu, cols.” (CZMA). Paratypes: same data as holotype (5 females, 22 males, CZMA; 2 females, 20 males, INPA; 5 males, MPEG; 5 males, MZSP).

Diagnosis. Mostly light yellow, slender, and soft-bodied specimens. Thorax and abdomen with yellow bristles. Antenna with three flagellomeres after postpedicel. Wing unusually long; usually with cup cell open, without petiole if cell is closed. Abdomen unicolorous. Female tergite 9 distinctly narrower medially; tergite 10 sub-rectangular**.**

Description. Holotype female. Body length: 8.9 mm. Specimen mostly light yellow. Head (Fig. 1) with eyes black (green in life,) more or less suboval in profile, rounded laterally in frontal view, with very short yellowish bristles which are barely visible under higher magnification. Frons (Fig. 2) narrow, somewhat parallel sided, slightly divergent dorsally and ventrally, frontal index about 2.7, smoothly tomentose, with a median inconspicuous groove, and short, inconspicuous brown bristles. Ocellar tubercle (Fig. 2) somewhat prominent, as high as ocellus. Subcallus (Fig. 2) very small, tomentose, separation from frons indistinct. Parafacial narrow, tomentose, with long black bristles. Face convex laterally, deeply sunken medially, tomentose, without bristles, separate from parafacial by deep groove. Antenna (Fig. 3) with scape and pedicel short, plump, yellow to brown, and with robust black bristles; flagellum light yellow with robust black bristles, apparently with six flagellomeres; postpedicel swollen when observed in lateral view, with three distal flagellomeres, the first flagellomere almost totally fused to postpedicel based on a distinct incomplete suture on medial side (see Fig. 3 from a clarified antenna of a different paratype specimen); second flagellomere as long as first and with an indistinct suture; third flagellomere, the distalmost, longer than two preceding flagellomeres. Palpus (Fig. 4) with first segment somewhat swollen, second slightly narrower and slightly curved, distinctly bristled. Proboscis short, as long as palpi, membranous, with long, narrow, soft and bristled labellum.

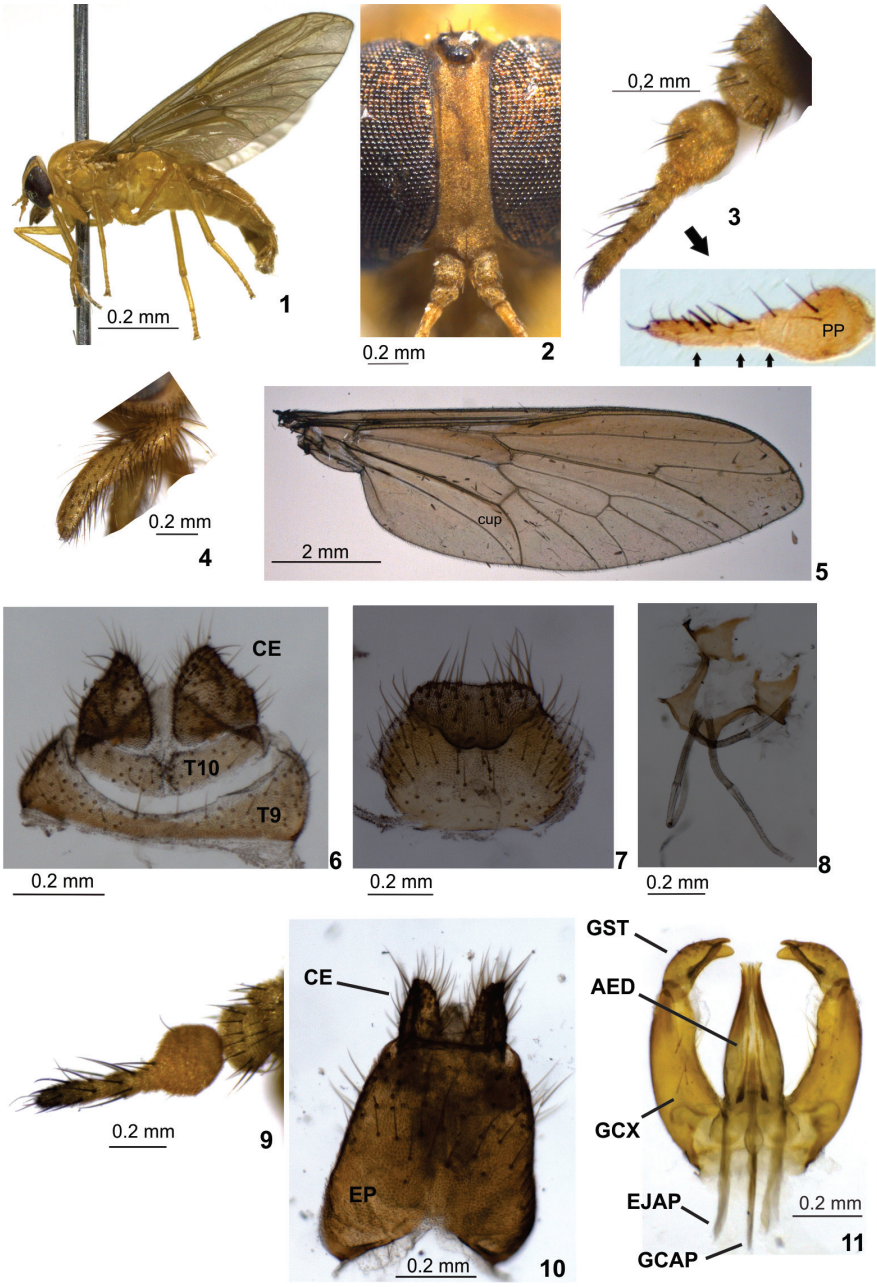
Thorax with scutum and scutellum light brown to dark yellow, sparsely yellow bristled, with yellow pruinescence. Pleuron slightly clearer than scutum, yellow with light grey to yellow pruinescence.

Legs (Fig. 1) entirely yellow except distal half of tarsomeres 5 brown; most legs with yellow bristles, except fore tibia black bristled. All tarsomeres 1 of equal length. Hind tibial spurs slightly shorter than mid ones.

Wing (Fig. 5) 9.1 mm long, 2.9 mm wide, narrower than usual for tabanids, diffusely brownish, with costal margin slightly darker; pterostigma ill defined. Vein Sc bare dorsally and ventrally; vein R_4 with short appendix; vein CuA_1 with even row of small setulae; cell cup open. Halteres with stem yellow and capitulum brown and white.

Abdomen (Fig. 1) long, narrow, entirely yellow, with short golden bristles dorsally and ventrally. Terminalia: Tergite 9 (Fig. 6) narrow medially, expanded laterally; tergite 10 subrectangular in dorsal view, divided medially; cercus subtriangular. Sternite 8 (Fig. 7) wider than long, with somewhat distinct gonapophysis. Genital fork as in figure 8.

Male. Body length: 9.0 mm; wing length: 9.1 mm. Habitus similar to female specimens except head holoptic, antenna (Fig. 9) slightly weaker, cell cup narrowly open (sometimes narrowly closed, without petiole), abdomen slender and of a lighter tone, first 3–4 abdominal segments light yellow, somewhat translucent, remaining brown. Terminalia (Fig. 10): epandrium with concavity basally; cercus subquadrate in lateral



Figures 1–11. *Protosilvius gurupi*, sp. n., paratype female. **1** habitus **2** frons **3** antenna; below detail of clarified antenna of a different paratype showing sutures between distal flagellomeres (distal flagellomeres indicated by smaller seta) **4** palpus **5** wing **6** tergite 9, tergite 10 and cercus **7** sternite 8 and gonapophysis **8** genital fork and spermathecal ducts **9–11** paratype male **9** antenna **10** epandrium and cercus **11** gonostylus and aedeagus. Figs **1, 3, 4, 9** in lateral view; **2** in frontal view; **5, 6, 8 10** in dorsal view; **7, 11** in ventral view. Abbreviations: **AED** = aedeagus, **CE** = cercus, **EJAP** = ejaculatory apodeme, **EP** = epandrium, **GCAP** = gonocoxal apodeme, **GCX** = gonocoxite, **GST** = gonostylus, **PP** = postpedicel, **T** = tergite.

view; gonocoxite slightly arched; gonostylus bifid (Fig. 11); ejaculatory apodeme and gonocoxal apodeme similar in length.

Etymology. The specific epithet is a noun in apposition and refers to Reserva Biológica do Gurupi, where the specimens were collected.

Distribution. Brazil, Maranhão.

Holotype condition. Pinned, not dissected, in good condition except for a damaged left wing. We chose the best preserved specimen, among the few females collected, as holotype because in most tabanids species the primary types are females.

Variation. One female specimen without short appendix on vein R_4. Female size varying from 8.6–9.6, mean 9.0 mm (n = 3). Male size varying from 8.0–10 mm, mean 9.1 cm (n = 10).

Discussion. *Protosilvius gurupi* sp. n. is smaller than other *Protosilvius* species, as the biggest specimens (9.8 mm) are slightly shorter than the smallest species, *P. priscus* (10 mm); these differ by three flagellomeres after the postpedicel in the former and four flagellomeres in the latter. Female specimens would key out to *P. termitiformis* in couplet 3 of Fairchild´s (1962) key by the following characters: short and sparse bristled specimens and abdomen unicolorous. *Protosilvius gurupi* has an open cup cell and narrow female tergite 9 (Fig. 6), whereas *P. termitiformis* has a closed cup cell and wide female tergite 9 (Fig. 20). According to Chainey and Hall (1996), female specimens of *Protosilvius* differ from *Boliviamyia* Chainey & Hall by a frons without callus, a slender palpus without a dorsal groove and apparently absent mandibles and both sexes have the antennal flagellum with a very short and/or irregular postpedicel and very long and slender apical flagellomeres.

Bionomics. Light traps are a common method for collecting many male and some female tabanids. All specimens of both sexes of *P. gurupi* sp. n. were collected in light traps, not one in the Malaise traps mounted nearby. The specimens were constantly collected in the light trap, either while the car was slowly moving or not. We believe the specimens are not nocturnal but they were attracted to trap when the light reached the specimens bedding in the vegetation. The collection was made in the Amazonian Region, in the state of Maranhão, in the rainy season, far from any drier area for at least 300 kilometers.

Key to female specimens of *Protosilvius*

1 Frons distinctly widening dorsally and ventrally (Fig. 12), over 4× as high as narrowest width. Flagellum with rather elongate postpedicel and distal portion 4-segmented, distal flagellomere longer than three preceding ones (Fig. 13). Abdominal tergites banded with silvery-white bristles on posterior margin ..... ***longipalpis***

– Frons narrow, nearly parallel sided, divergent ventrally or slightly wider dorsally and ventrally. Flagellum not as above. Abdominal tergites with only black bristles or banded with yellowish bristles on posterior margin..... **2**

2 Frons divergent ventrally (Figs 21, 24) **3**

– Frons parallel sided (Fig. 14) or slightly divergent dorsally and ventrally (Figs 2, 18) **4**

3 Frons around 3× as high as narrowest width just below ocelli (Fig. 21). Distal flagellomere longer than three preceding flagellomeres (Fig. 22) ..... ***priscus***

– Frons over 4× as high as narrowest width just below ocelli (Fig. 24). Distal flagellomere of similar length to preceding flagellomeres (Fig. 25) ..... ***mackerrasi***

4 Frons parallel sided (Fig. 14), less than 3× as high as dorsal width, just below ocelli. Postpedicel divided into 3 flagellomeres with another partial division, so that the flagellum may seem incompletely 8–segmented (Fig. 15). Scutum and scutellum black bristled. Abdominal tergites with band on posterior margin formed by yellow bristles ..... ***phoeniculus***

– Frons somewhat parallel sided to slightly divergent dorsally and ventrally (Figs 2, 18), more than 3× as high as dorsal width, just below ocelli. Postpedicel with flagellomeres somewhat fused (Figs 3, 19). Scutum and scutellum yellow bristled. Abdominal tergites without band on posterior margin, bristles unicolorous **5**

5 Cell cup closed, with short petiole. Tergite 9 uniformly wide medially and laterally, and tergite 10 wider medially in dorsal view (Fig. 20) ..... ***termitiformis***

– Cell cup open (Fig. 5), if closed then without petiole. Tergite 9 distinctly narrower medially and tergite 10 somewhat rectangular (Fig. 6) in dorsal view.. ..... ***gurupi* sp. n.**

Key to male specimens of *Protosilvius* (*Protosilvius termitiformis* and *P. longipalpis* are not included in this key because males are unknown)

1 Distal flagellomere widened (Fig. 16). Abdominal tergites with band on posterior margin formed by yellow bristles. Gonostylus with swollen base and bifid appendages ventrally directed (Fig. 17) ..... ***phoeniculus***

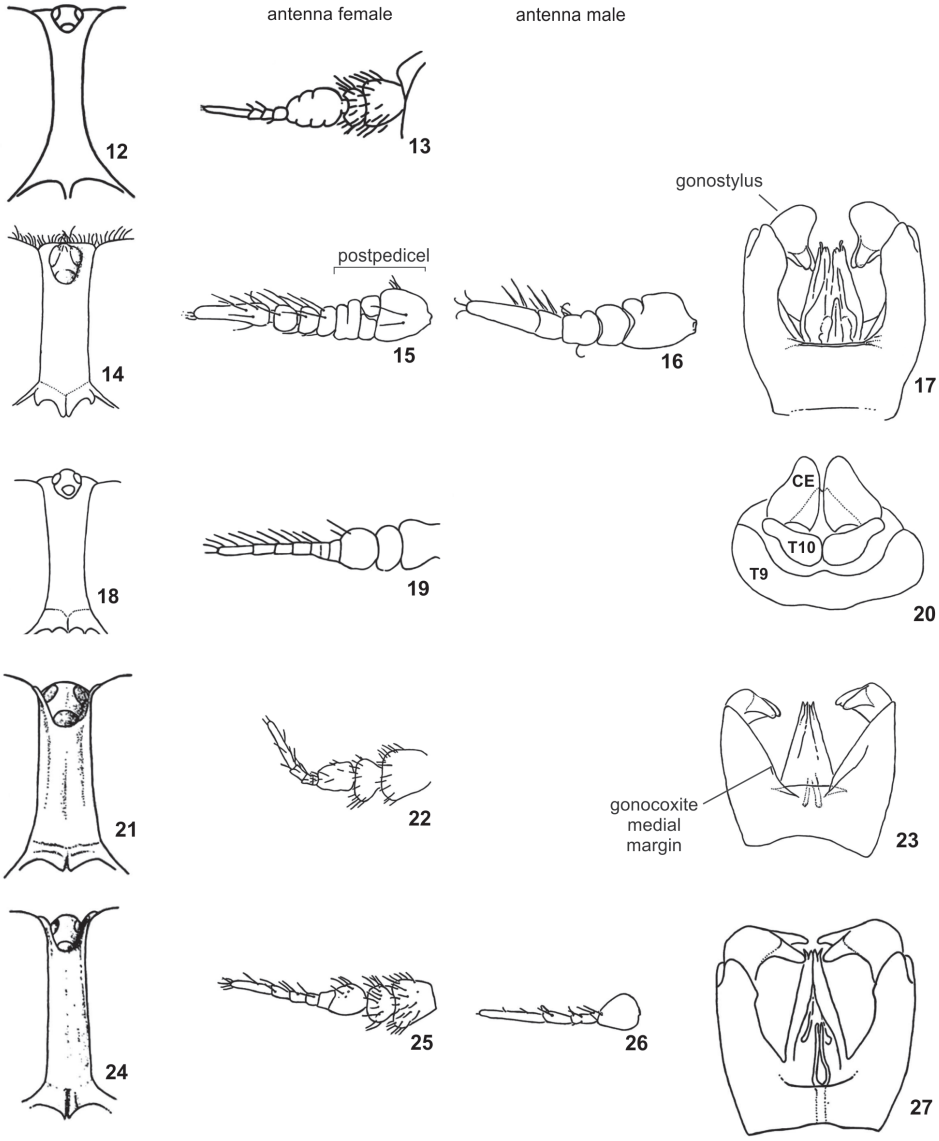
– Distal flagellomere not widened (Figs 9, 26). Abdominal tergites without band on posterior margin, bristles unicolorous. Gonostylus base not swollen and bifid appendages medially directed (Figs 11, 23, 27) **2**

2 Upper eye facets enlarged. Medial margin of gonocoxite nearly straight and phallus ends at level of gonocoxite apex (Fig. 23) ..... ***priscus***

– Upper eye facets not enlarged. Medial margin of gonocoxite slightly curved and phallus apex ends after gonocoxite apex (Figs 11, 27) **3**

3 Blackish specimens with blackish wings ..... ***mackerrasi***

– Yellowish specimens with diffusely brownish wings (as in figure 5) .... ***gurupi* sp. n.**



Figures 12–27. *Protosilvius* figures from Fairchild (1962). **12–13** *P. longipalpis*; **12** frons **13** antenna, female **14–17** *P. phoeniculus* **14** frons **15** antenna, female **16** antenna, male **17** genitalia, male **18–20** *P. termitiformis* **18** frons **19** antenna, female **20** tergite 9, tergite 10 and cercus **21–23** *P. priscus* **21** frons **22** antenna, female **23** genitalia, male **24–27** *P. mackerrasi* **24** frons **25** antenna, female **26** antenna, male **27** genitalia, male. Figs **12, 14, 18, 21, 24** in frontal view; **13, 15, 16, 19, 22, 25, 26** in lateral view, all arranged in the same orientation, **17, 20, 23, 27** in dorsal view; **7, 11** in ventral view. Abbreviations: **CE** = cercus, **T** = tergite.

28

Figure 28. "mobile"light trap placed on a pick-up truck.

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RESEARCH ARTICLE

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Two new species of *Phrynopus* (Anura, Strabomantidae) from high elevations in the Yanachaga-Chemillén National park in Peru (Departamento de Pasco)

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Abstract

We describe two new species of *Phrynopus* from a cloud forest of the Cordillera Yanachaga, Yanachaga-Chemillén National Park in Peru and describe and document the first clutch and case of parental care for a species of *Phrynopus*. One of the new species of *Phrynopus* is described based on two females (SVL 19.1–21.0 mm) which were found in leaf litter and moss layer in a cloud forest at 2900 m elevation. This new species is most similar to *Phrynopus bracki*. The second new species of *Phrynopus* was found in the transitional formation between cloud forest and wet puna at 3000 m elevation. Its description is based on a single female (SVL 20.7 mm) that was observed guarding nine eggs under moss. This new species is most similar to *Phrynopus nicoleae.* The eggs had a diameter of 5.7–5.8 mm (n = 3) and froglets when hatched a SVL of 6.2–6.5 mm (n = 3). Sympatric anurans include *Gastrotheca* sp., *Pristimantis aniptopalmatus, P. bromeliaceus*, *Pristimantis* sp., and *Rhinella yanachaga*.

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Resumen

Se describen dos nuevas especies de *Phrynopus* procedentes de un bosque nublado de la Cordillera Yanachaga, Parque Nacional Yanachaga-Chemillén, Perú, y se describe y documenta el primer caso de nidada y cuidado parental para una especie de *Phrynopus*. Una de las nuevas especies de *Phrynopus* es descrita basándose en dos hembras (Longitud Hocico-Cloaca 19.1–21.0 mm). Los especímenes fueron encontrados en la hojarasca y capa de musgo en un bosque nublado a 2900 m de altitud. Esta especie es muy similar a *Phrynopus bracki*. La segunda nueva especie de *Phrynopus* fue encontrada en una formación transicional entre el bosque nublado y la puna humeda a 3000 m de altitud. Su descripción se basa en una sola hembra (Longitud Hocico-Cloaca 20.7 mm) que fue observada protegiendo nueve huevos bajo musgo. Esta especie es muy similar a *Phrynopus nicoleae.* Los huevos tenían un diámetro de 5.7–5.8 mm (n = 3) y las ranitas cuando eclosionaron tenían una longitud hocico-cloaca de 6.2–6.5 mm (n = 3). Los anuros simpátricos incluyen *Gastrotheca* sp., *Pristimantis aniptopalmatus, P. bromeliaceus, Pristimantis* sp. y *Rhinella yanachaga*.

Keywords

Andes, Anura, new species, parental care, Peru, *Phrynopus,* Strabomantidae

Palabras claves

Andes, Anura, cuidado parental, especie nueva, Perú, *Phrynopus,* Strabomantidae

Introduction

The Yanachaga-Chemillén National Park (YCNP in the following) is located in the eastern Andes of the poorly explored Pasco department (Figs 1, 2). It was established in 1986 with the aim to protect a unique biodiversity area of the Andean montane cloud forest. Owing a difficult access to the area, the flora and fauna of the YCNP remained mostly unexplored until recently (Yallico and Rose 1998). Knowledge regarding the floristic composition of YCNP is steadily increasing especially due to the efforts of the botanical inventory and educational programs conducted by the Missouri Botanical Garden (e.g., Jasmín and Churchill 2008; La-Torre et al. 2003). More than 2000 plants have been identified within the territory of the YCNP (Brack et al. 2010). Among the vertebrate fauna, 527 species of birds and 49 species of mammals have been recorded inside the YCNP (Brack et al. 2010), but exploration of the herpetofauna has mostly been neglected. The Instituto Nacional de Recursos Naturales (1995) reported 16 species of reptiles and 2 species of frogs from the YCNP, but did not list these species. The few herpetological surveys that were conducted inside the YCNP in the 1980s by Hedges, early 1990s by Icochea, or in 2008 by Chaparro and by Boano and colleagues had a focus on amphibians, and lasted between a few days to a few weeks. A total of six new species of frogs (*Phrynopus*, *Pristimantis,* Strabomantidae) from the montane forest of YCNP were described by Hedges (1990) and Duellman and Hedges (2005, 2007, 2008). The fieldwork by Chaparro et al. (2008) led to the description of two new species of *Phrynopus* from the puna of the YCNP (Fig. 3). Duellman and Chaparro

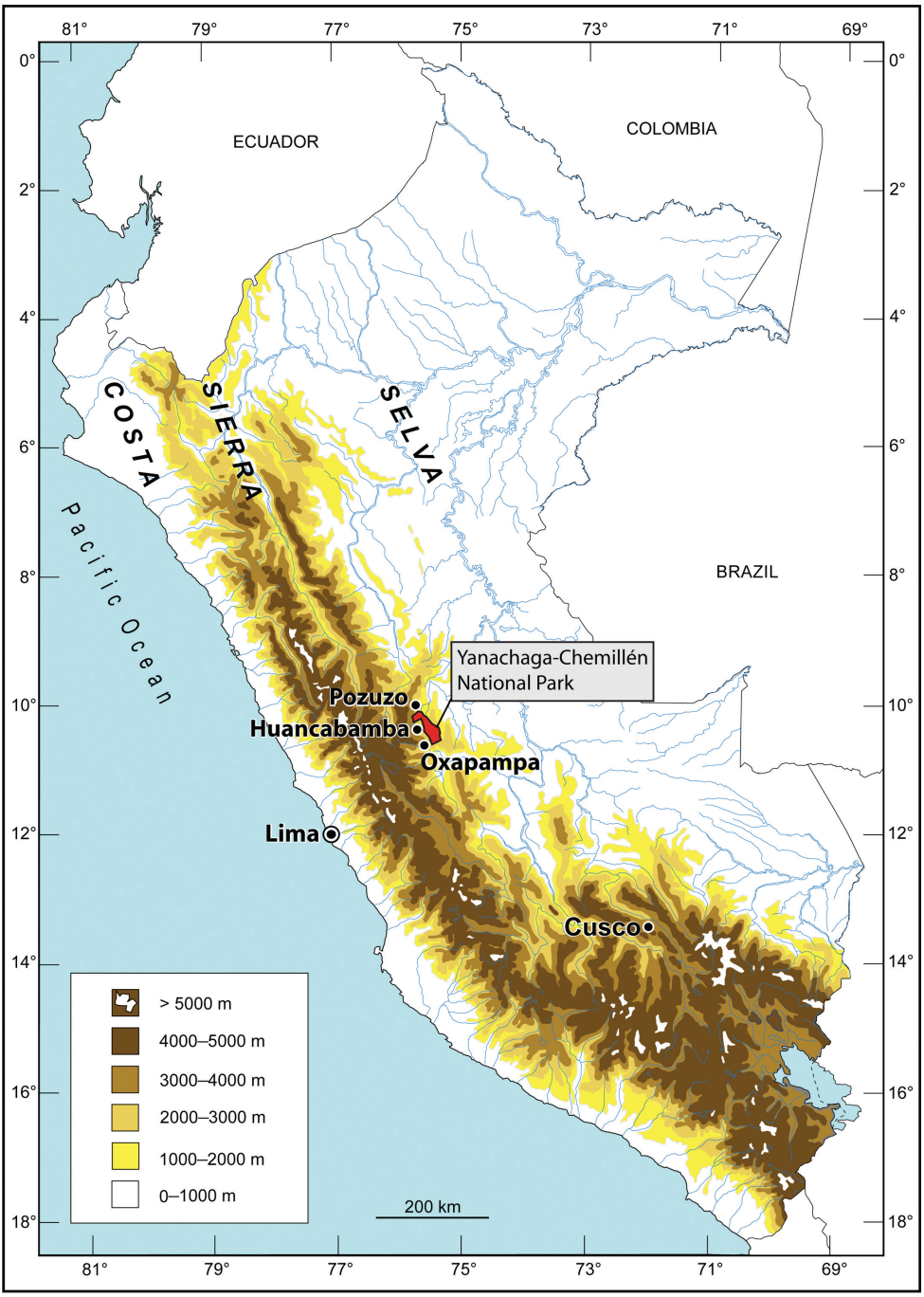

Figure 1. Map of Peru with the Yanachaga-Chemillén National Park in red. Map by E. Lehr.

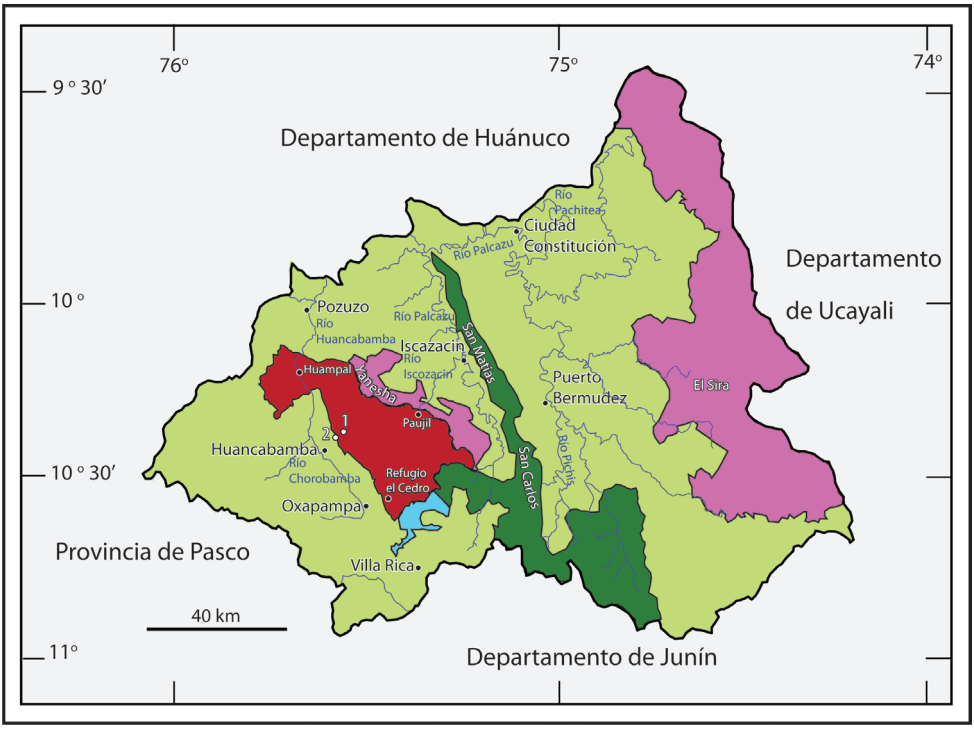

Figure 2. The Yanachaga-Chemillén National Park (in red) with three field stations: Refugio el Cedro at 2400 m, Huampal at 1000 m, and Paujil at 460 m. Other protected areas in the Central Selva region: in pink, Communal Reserves (Yanesha, El Sira); in dark, green Protected Forest (San Matías-San Carlos); and in blue, Municipal Conservation Area (Bosque de Sho'llet). Unprotected Provincial Area is shown in pale green. Collecting sites: 1, Quebrada Yanachaga (2900–3000 m); 2, Huancabamba park entrance (2290–2350 m). Designed by E. Lehr using a template from The Nature Conservancy (2007).

(2008) described two new species of *Pristimantis* from the puna and cloud forest of the YCNP, and Boano et al. (2008) described a new species of *Pristimantis* from the field station Refugio El Cedro. Lehr reviewed the amphibian specimens collected by Icochea deposited at the Natural History Museum in Lima (MUSM). This revision led to the description of three new species of anurans (*Gastrotheca carinaceps* Duellman, Trueb and Lehr, 2006; *Melanophryne barbatula* Lehr and Trueb, 2007; and *Rhinella yanachaga* Lehr, Pramuk, Hedges and Córdova, 2007). In summary, 16 new species of amphibians from the YCNP have been described since 1990 (see table 1). However, according to Brack et al. (2010) 71 species of amphibians and 44 species of reptiles were registered in the YCNP during an inventory in 2008. Nevertheless, no species lists of amphibians and reptiles are available nor any information regarding the deposition of voucher specimens. In an attempt to increase the knowledge of the local herpetofauna further, we explored areas within the YCNP that had not been surveyed previously, such as the Quebrada Yanachaga (Figs 2, 3). This led to the discovery of new species of anurans, among them two new species of *Phrynopus* that are described herein.

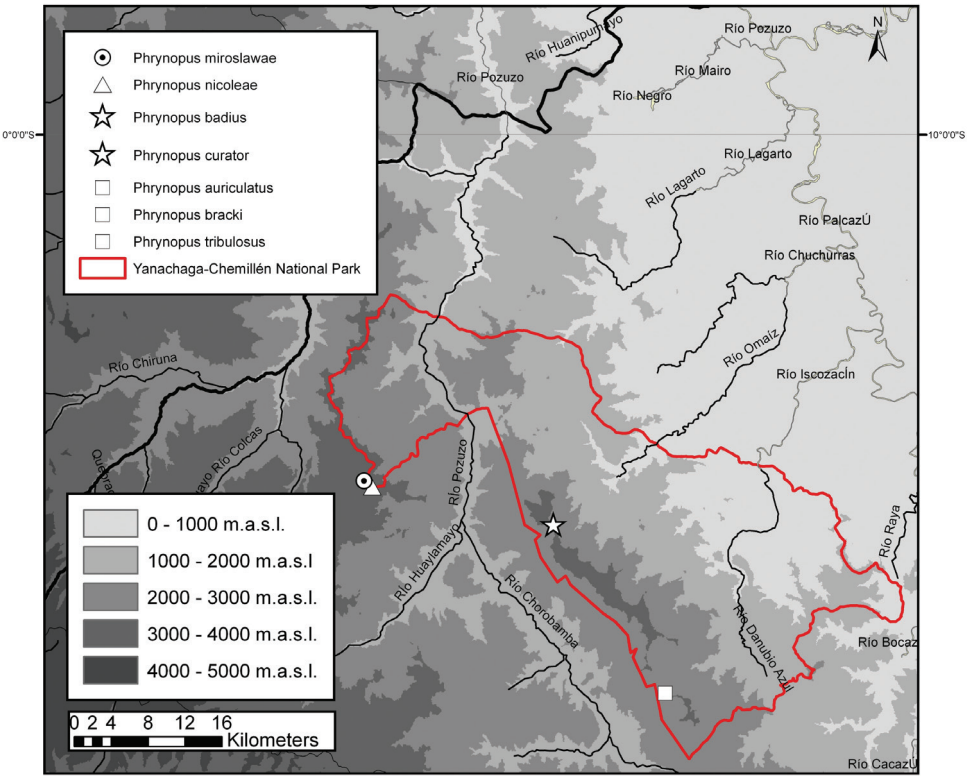

Figure 3. Distribution (based on type localities) of the seven species of *Phrynopus* known from the Yanachaga-Chemillén National Park. Map by J. C. Cusi.

Table 1. Amphibian species described from the YCNP since 1990.

Family	Species	Publication	Ecoregion
Bufonidae	*Rhinella yanachaga*	Lehr et al. (2007)	Montane forest (2600 m)
Hemiphractidae	*Gastrotheca carinaceps*	Duellman et al. (2006)	unknown
Microhylidae	*Melanophryne barbatula*	Lehr and Trueb (2007)	Montane forest (2500 m)
Strabomantidae	*Phrynopus auriculatus*	Duellman and Hedges (2008)	Montane forest (2600 m)
Strabomantidae	*P. badius*	This paper	Montane forest (2900 m)
Strabomantidae	*P. bracki*	Hedges (1990)	Montane forest (2600 m)
Strabomantidae	*P. curator*	This paper	Montane forest (3000 m)
Strabomantidae	*P. miroslawae*	Chaparro et al. (2008)	Puna (3363 m)
Strabomantidae	*P. nicoleae*	Chaparro et al. (2008)	Puna (3589 m)
Strabomantidae	*P. tribulosus*	Duellman and Hedges (2008)	Montane forest (2600)
Strabomantidae	*Pristimantis albertus*	Duellman and Hedges (2007)	Montane forest (1970 m)
Strabomantidae	*P. aniptopalmatus*	Duellman and Hedges (2005)	Montane forest (2300–2600 m)
Strabomantidae	*P. bipunctatus*	Duellman and Hedges (2005)	Montane forest (2060–2120 m)
Strabomantidae	*P. leucorrhinus*	Boano et al. (2008)	Montane forest (2500 m)

Family	Species	Publication	Ecoregion
Strabomantidae	*P. lucasi*	Duellman and Chaparro (2008)	Montane forest (2790 m)
Strabomantidae	*P. rhabdocnemus*	Duellman and Hedges (2005)	Montane forest (2600 m)
Strabomantidae	*P. stictogaster*	Duellman and Hedges (2005)	Montane forest (2600 m)
Strabomantidae	*P. spectabilis*	Duellman and Chaparro (2008)	Puna (3300 m)

Methods

Study Area

The YCNP (Figs 1–3) covers 1220 km² between 460 and 3643 m elevation and is located at 10°33'37"–17'37"S and 75°30'21"–20'39"W in eastern central Peru (Yallico and Rose 1998). It is contiguous with three other protected areas, the San Matías-San Carlos Protected Forest (1458 km²), the Yanesha Communal Reserve (347 km²), and the Municipal Conservation "Area Bosque de Sho'llet" (14 km²) covering together 3039 km² (The Nature Conservancy 2007, Brack et al. 2010). Located geographically inside the national park is the Cordillera Yanachaga, a mountain range east of, and isolated from, the eastern chain of the Andes. Environmental gradients within the YCNP span the ecoregions of puna (3000–3643 m), montane forests (600–3000 m), often separated by Inter Andean valleys, and humid tropical forests (below 600 m).

The Quebrada Yanachaga lies at the southwestern edge of the YCNP (ca. 10–15 km NE from Huancabamba, Fig. 2) at an approximate elevation between 2000 and 3000 m. It is covered by a dense primary montane cloud forest, which changes into more open formation called "pajonal" at the elevation of ca. 2900 m. Quebrada Yanachaga can be reached from Huancabamba taking the road to Prosoya (former Hacienda, see Lehr and von May 2004) and then walking towards the entrance of the park following a narrow trail. The field survey was conducted during January 16–23, 2012.

Morphological characters

The format for the description follows Lynch and Duellman (1997), and diagnostic characters of Duellman and Lehr (2009). Specimens were preserved in 96% ethanol and stored in 70% ethanol. Specimens were dissected to determine sex and maturity. The senior author measured the following variables to the nearest 0.1 mm with digital calipers under a microscope: snout–vent length (SVL), tibia length (TL), foot length (FL, distance from proximal margin of inner metatarsal tubercle to tip of Toe IV), head length (HL, from angle of jaw to tip of snout), head width (HW, at level of angle of jaw), eye diameter (ED), interorbital distance (IOD), upper eyelid width (EW), internarial distance (IND), and eye–nostril distance (E-N, straight line distance between anterior corner of orbit and posterior margin of external nares). Fingers and toes are numbered preaxially to postaxially from I–IV and I–V respectively. We determined

comparative lengths of Toes III and V by adpressing both toes against Toe IV; lengths of Fingers I and II were determined by adpressing the fingers against each other. To reduce reflections, preserved holotypes were photographed submersed in ethanol including ventral surfaces of hands and feet. Photographs taken in the field by E. Lehr and J. Moravec were used for descriptions of color in life.

Specimens were deposited in the herpetological collections of the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos (MUSM) in Lima, Peru, and the Field Museum (FMNH) in Chicago. For specimens examined, see Appendix I.

Results

***Phrynopus badius* sp. n.**
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http://species-id.net/wiki/Phrynopus_badius

Holotype. (Figs 4–7) MUSM 31099, an adult gravid female from Quebrada Yanachaga (ca. 10°22.772'S, 75°27.717'W), 2900 m elevation, Yanachaga-Chemillén National Park (Sector San Daniel), Distrito de Huancabamba, Provincia de Oxapampa, Departamento de Pasco, Peru, collected on 19 January 2012 by Edgar Lehr, Jiri Moravec, and Juan Carlos Cusi.

Paratype. FMNH 282818, an adult, gravid female, collected along with the holotype.

Diagnosis. A species of *Phrynopus* having the following combination of characters: (1) Skin on dorsum shagreen with small scattered tubercles, flanks tuberculate, skin on venter weakly areolate; discoidal fold absent, thoracic fold present; short postocular fold present, elongate tubercles forming discontinous dorsolateral ridges; (2) tympanic membrane and tympanic annulus absent; (3) snout rounded in dorsal and lateral views; (4) upper eyelid without enlarged tubercles; width of upper eyelid narrower than IOD; cranial crests absent; (5) dentigerous processes of vomers absent; (6) condition of vocal slits and nuptial pads unknown (no males found); (7) Finger I shorter than Finger II; tips of digits rounded; (8) fingers without lateral fringes; (9) ulnar and tarsal tubercles absent; (10) heel with minute tubercles; inner tarsal fold absent; (11) inner metatarsal tubercle ovoid, about twice as large as rounded outer metatarsal tubercle; supernumerary plantar tubercles absent; (12) toes without lateral fringes; basal webbing absent; Toe V shorter than Toe III; toe tips rounded (except for slightly pointed Toe IV), about as large as those on fingers; (13) in life, dorsum reddish brown or dark grayish brown, venter dark brown with scattered minute white dots, groin dark brown with bright orange flecks on its lower half and a dark brown inguinal bar on its upper half; (14) SVL in females 19.1–21.0 mm (n = 2).

The assignment of the new species to *Phrynopus* is based on the structure of the digital discs that lack circumferential groves as well as the overall morphological similarity with the other members of the genus. *Phrynopus badius* is readily distinguished from its congeners by its small size, by having discontinuous dorsolateral ridges, and

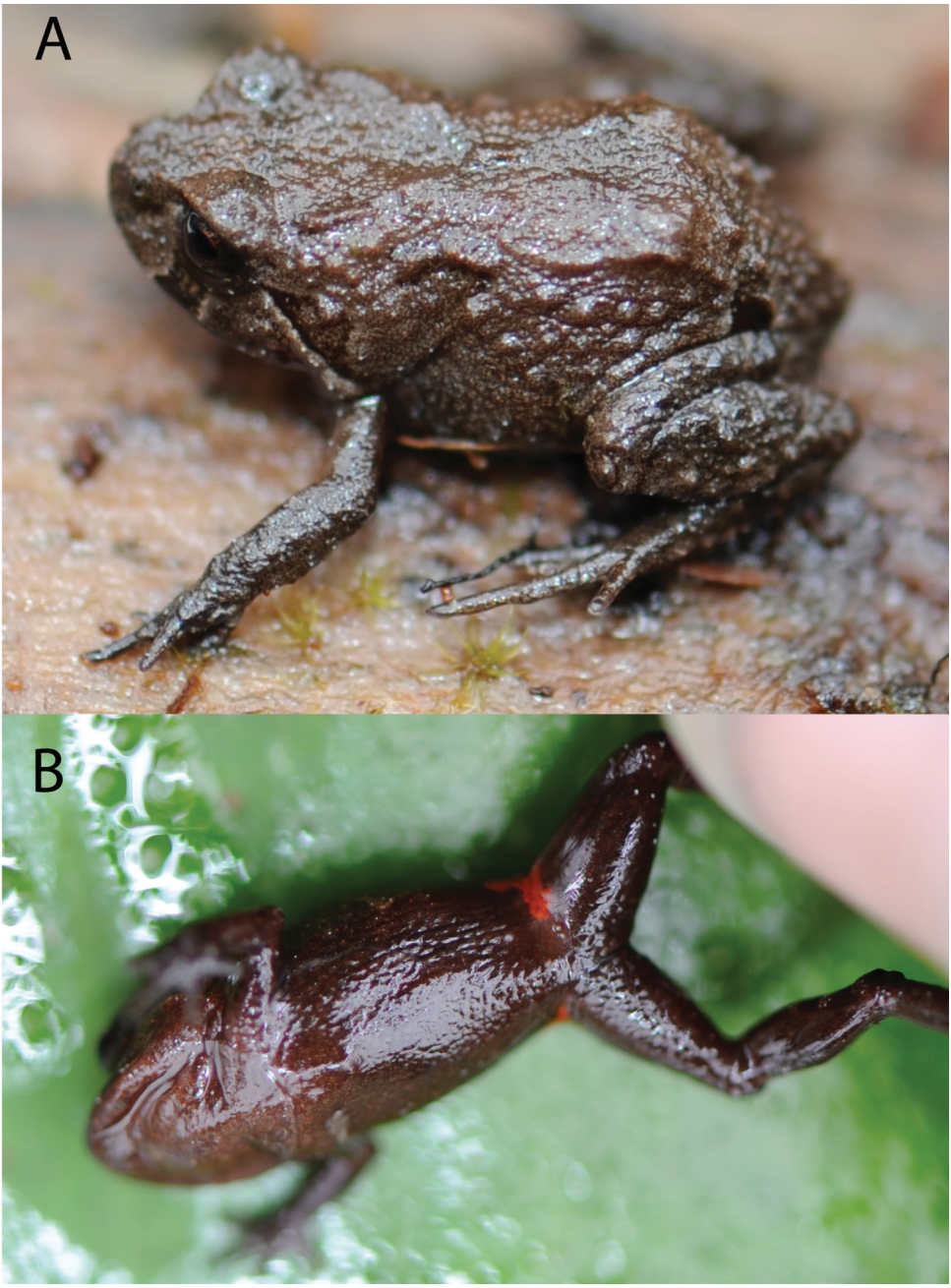

Figure 4. Holotype of *Phrynopus badius* in life (MUSM 31099, female, SVL 19.1 mm) in lateral (**A**), and ventral views (**B**). Photos by E. Lehr.

by having the dorsum reddish brown or dark grayish brown and the venter dark brown with scattered minute white dots, groin dark brown with bright orange flecks on its lower half and a dark brown inguinal bar on its upper half.

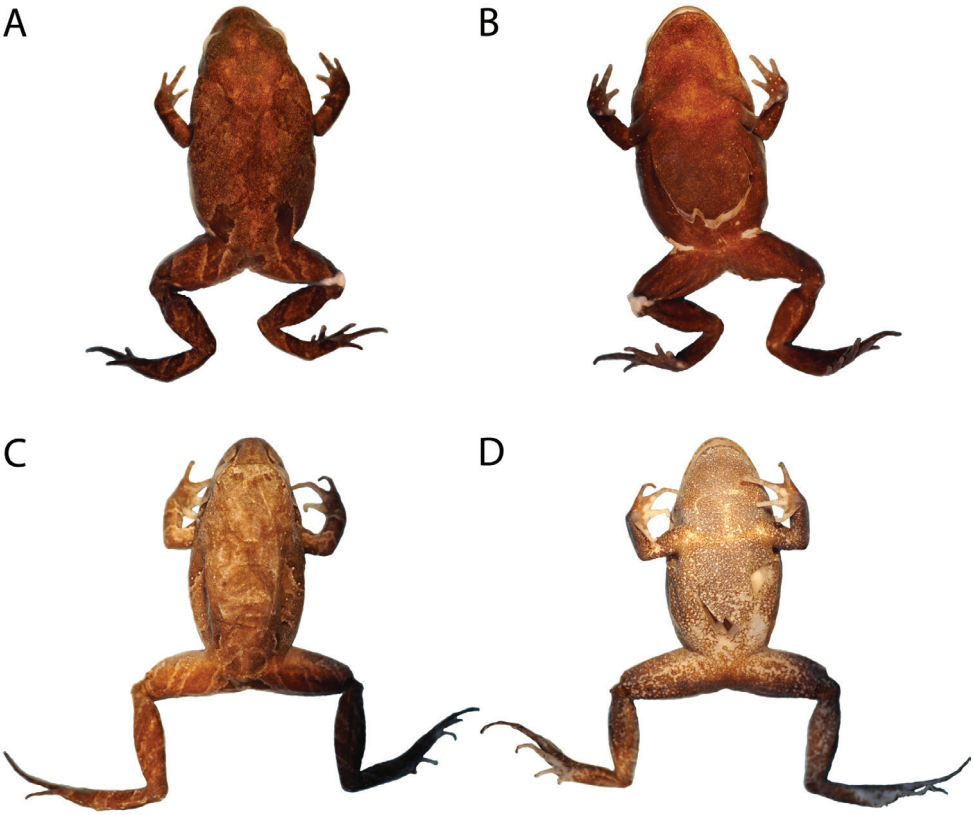

Figure 5. Holotype of *Phrynopus badius* in preservative in dorsal (**A**), and ventral (**B**) views, and holotype of *P. curator* in dorsal (**C**), and ventral (**D**) views. Photos by E. Lehr.

Furthermore *Phrynopus badius* differs from those species of *Phrynopus* (*auriculatus, montium, peruanus*) that have a tympanum (absent in *P. badius*), and from those species (*dagmarae, horstpauli, kotosh, miroslawae, nicoleae, vestigiatus*) that have dentigerous processes of vomers (absent in *P. badius*). *Phrynopus badius* shares with eight other species of *Phrynopus* (*bracki, dagmarae, heimorum, interstinctus, nicoleae, paucari, peruanus, vestigiatus*) an aposematic coloration consisting of red, orange, salmon or flesh coloured blotches in the groin. However, none of these species has the venter dark brown with scattered minute white dots, groin dark brown with bright orange flecks on its lower half, and a dark brown inguinal bar on its upper half.

Six other species of *Phrynopus* have been recorded from the YCNP. Those are *P. auriculatus* (Duellman and Hedges, 2008, at 2600 m), *P. bracki* (Hedges 1990, at 2600 m), *P. curator* sp. n. (this paper, 3000 m), *P. miroslawae* (Chaparro et al. 2008, at 3363 m), *P. nicoleae* (Chaparro et al. 2008, at 3589 m), and *P. tribulosus* (Duellman and Hedges, 2008, at 2600 m). *Phrynopus miroslawae* and *P. nicoleae* are from the puna of Santa Bárbara (Chaparro et al. 2008) which is located west of the Río Pozuzo, whereas all others are recorded east of the Río Huancabamba (see Fig. 3). *Phrynopus*

Figure 6. Paratype of *Phrynopus badius* in life (FMNH 282818, female, SVL 21.0 mm) in lateral (**A**), dorsal (**B**), and ventral (**C**) views. Photos by E. Lehr.

badius lacks a tympanum (present in *P. auriculatus*), does not have Toe I vestigial (vestigial in *P. bracki*), has groin dark brown with orange flecks on its lower half and a dark inguinal bar on its upper half (groin grayish brown in *P. curator*), lacks X-shaped dorsal ride and dentigerous processes of vomers (both present in *P. nicoleae*), lacks dorsolateral folds (prominent in *P. miroslawae*), and has the dorsum reddish brown or dark grayish brown (green in *P. tribulosus*). *Phrynopus badius* and *P. bracki* are similar in being small (SVL 21.0 mm in *P. badius* vs. 19.8 mm in *P. bracki,* Duellman and Lehr, 2009) and in having a predominately dark brown coloration. However, both can be distinguished as follows: *Phrynopus badius* lacks a discoidal fold and dentigerous processes of vomers (both present in *P. bracki*), fingers without lateral fringes (present in *P. bracki*), ulnar tubercles not coalesced into a ridge (ridge present in *P. bracki*), Toe V shorter than Toe III (Toe V longer than Toe III in *P. bracki*), Toe I longer than wide (Toe I as long as wide, vestigial in *P. bracki*), iris predominately black with fine bronze reticulations and red ringlet around pupil (iris bronze in *P. bracki*).

Description of holotype. Head narrower than body, slightly wider than long, HW 101.2% of HL; HW 34.0% of SVL; HL 33.5% of SVL; snout short, rounded in dorsal and lateral views (Figs 4, 5), ED larger than E-N distance; nostrils protuberant, directed dorsolaterally; canthus rostralis short, slightly concave in dorsal view, rounded in profile; loreal region slightly concave; lips rounded; upper eyelid without enlarged tubercles; EW narrower than IOD (EW 60.9% of IOD); supratympanic fold short and low, extending from posterior corner of eye to level of jaw articulation, barely distinguishable in preservation; tympanic membrane and tympanic annulus absent; postrictal tubercles indistinguishable from surrounding tuberculation. Choanae small, ovoid, not concealed by palatal shelf of maxilla; dentigerous processes of vomers absent; tongue narrow and long, much longer than wide, not notched posteriorly, posterior half free.

Skin on dorsum shagreen with small scattered tubercles, short postocular fold present, elongate tubercles forming discontinuous dorsolateral ridges; skin on flanks tuberculate; skin on throat smooth, that on chest and belly weakly areolate; discoidal fold absent, thoracic fold present; cloacal sheath short; large tubercles absent in cloacal region. Outer surface of forearm without minute tubercles; outer and inner palmar tubercles low, ovoid, outer about twice the size of inner palmar tubercle; supernumerary tubercles indistinct in preservative; subarticular tubercles low, barely discernible except for prominent, ovoid subarticular tubercles on base of fingers; fingers without lateral fringes; Finger I shorter than Finger II; tips of digits rounded, lacking marginal grooves (Fig. 7A).

Hind limbs short and robust, TL 37.2% of SVL; FL 41.4.9% of SVL; upper surface of hind limbs tuberculate; posterior and ventral surfaces of thighs areolate; heel with minute tubercles; outer surface of tarsus with small tubercles; inner metatarsal tubercle ovoid, about twice as large as rounded outer metatarsal tubercle; supernumerary plantar tubercles absent; subarticular tubercles low, ovoid in dorsal view; toes without lateral fringes; basal webbing absent; toe tips rounded (except for pointed tip of Toe IV), lacking marginal grooves, about as large as those on fingers; relative lengths of toes: 1 < 2 < 3 > 5 < 4; Toe V shorter than Toe III, Toe I less than half the size of Toe II (Fig. 7B).

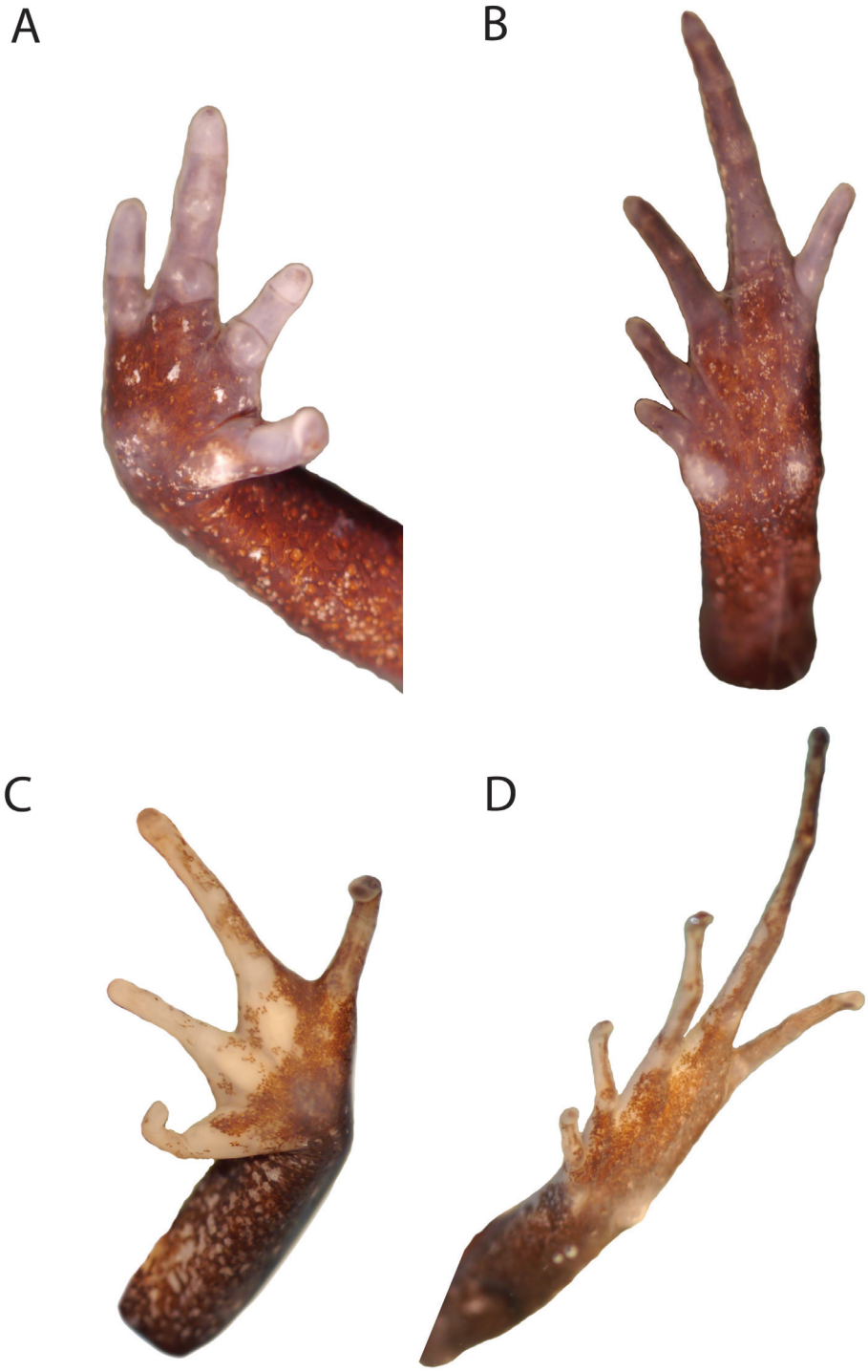

Figure 7. Photos of ventral surfaces of hand (**A**) and foot (**B**) of *P. badius* (MUSM 31099), and ventral surfaces of hand (**C**) and foot (**D**) of *P. curator* (MUSM 31106). Photos by E. Lehr.

Measurements (in mm) of holotype: SVL 19.1; TL 7.1; FL 7.9; HL 6.4; HW 6.5; ED 2.1; IOD 2.3; EW 1.4; IND 1.9; E-N 1.5.

Coloration of holotype in life. (Fig. 4): Dorsum dark grayish brown with white dots and reddish brown mottling; narrow, dark brown interorbital bar and a dark brown blotch on each side in the scapular region; dorsal surface of forearms with a dark brown bar; hind legs each with three dark brown diagonal stripes; ill-defined dark brown canthal stripe, supratympanic stripe broad, dark brown and outlined by tan; broad, dark brown bar on upper lip below eye bordered by narrow, tan stripe on each side; flanks coloured as dorsum with broad diagonal stripe at the anterior half; axilla dark brown with a small orange fleck; groin dark brown with orange flecks on its lower half and a dark inguinal bar on its upper half extending onto dorsal surface of thigh; posterior surfaces of thighs and concealed surfaces of shanks dark brown with few white dots; throat reddish brown with white dots; chest, belly, and extremities dark brown with white dots; fingers and toes gray, palmar and plantar surfaces gray with white mottling; iris predominately black with fine bronze reticulations and red ringlet around pupil.

Coloration of holotype in preservative. (Figs 5A, B): As described above but slightly paler and orange coloration being white; iris gray.

Variation. The female paratype (Fig. 6) is larger than the holotype, less tuberculate, and has elongate tubercles forming ill-defined dorsolateral ridges restricted to the anterior half of its body. The overall coloration pattern is similar to the holotype, however the dorsal coloration is reddish brown, the venter has more white dots and the groin has more orange flecks.

Measurements (in mm) of female (FMNH 282818): SVL 21.0; TL 7.5; FL 8.5; HL 7.0; HW 7.6; ED 2.3; IOD 2.4; EW 1.4; IND 1.9; E-N 1.7.

Etymology. The specific name *badius* is the Latin adjective meaning chestnut-brown or reddish-brown and refers to the coloration of the new species.

Distribution, ecology, and threat status. The species is only known from the type locality where it was found at 1.00 pm in the leaf litter and under moss in a primary cloud forest at 2900 m elevation. The axilla region of the left arm of the paratype bears two ectoparasites (mites). Syntopic anurans include *Rhinella yanachaga* (MUSM 31100, FMNH 282819) which is recorded herein for the first time outside its type locality of San Alberto (Lehr et al. 2007). We classify *Phrynopus badius* as "Data Deficient" according to the IUCN red list criteria and categories based on the limited information on its geographic range.

***Phrynopus curator* sp. n.**
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http://species-id.net/wiki/Phrynopus_curator

Holotype. (Figs 5, 7, 8, 10) MUSM 31106, an adult, gravid female, from Quebrada Yanachaga (10°22.772'S, 75°27.717'W), 3000 m elevation, Yanachaga-Chemillén National Park (Sector San Daniel), Distrito de Huancabamba, Provincia de

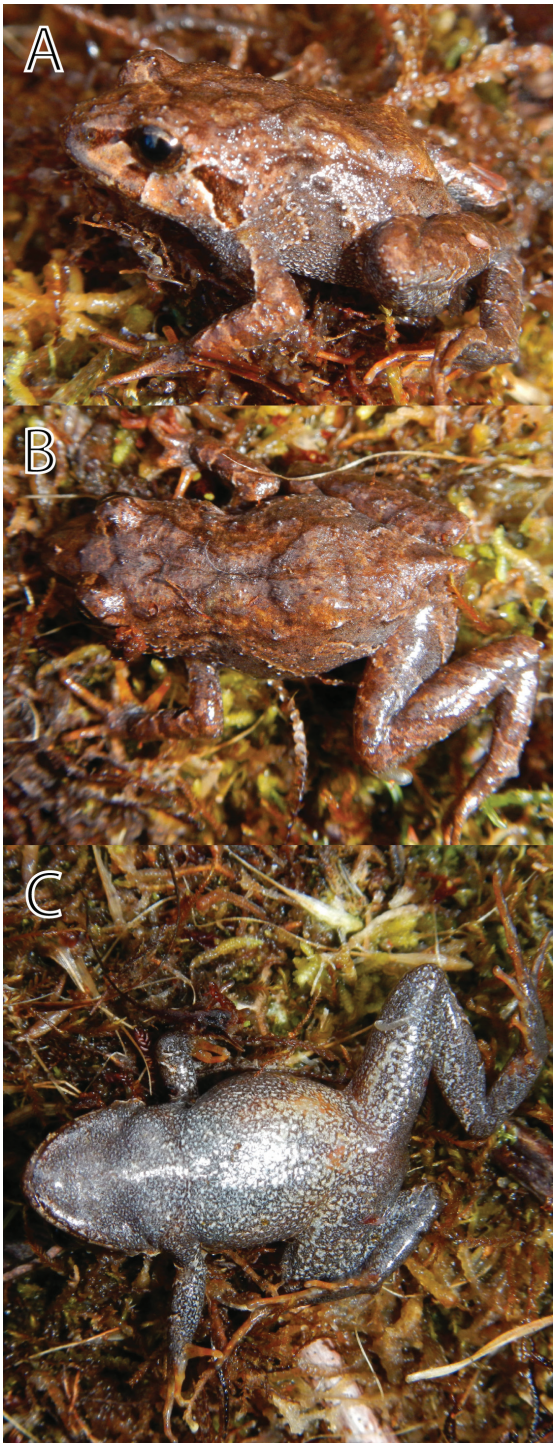

Figure 8. Holotype of *Phrynopus curator* in life (MUSM 31106, female, SVL 20.7 mm) in lateral (**A**), dorsal (**B**), and ventral views (**C**). Photos by E. Lehr.

Oxapampa, Departamento de Pasco, Peru, collected on 20 January 2012 by Edgar Lehr, Jiri Moravec, and Juan Carlos Cusi.

Referred specimens. (Fig. 10C) FMNH 282820–22, three hatchlings, collected as eggs with the holotype.

Diagnosis. A species of *Phrynopus* having the following combination of characters: (1) Skin on dorsum shagreen with small scattered tubercles, prominent ridges, and two prominent middorsal Y-shaped ridges, flanks shagreen with small scattered tubercles, skin on venter weakly areolate; discoidal fold absent, weak thoracic fold present; ridges forming discontinuous dorsolateral fold; (2) tympanic membrane and tympanic annulus absent; (3) snout rounded in dorsal and lateral views; (4) upper eyelid with three enlarged tubercles; width of upper eyelid narrower than IOD; cranial crests absent; (5) dentigerous processes of vomers absent; (6) condition of vocal slits and nuptial pads unknown (no males found); (7) Finger I shorter than Finger II; tips of digits rounded; (8) fingers without lateral fringes; (9) ulnar and tarsal tubercles absent; (10) heel with a distinct conical tubercle; inner tarsal fold absent; (11) outer metatarsal tubercle rounded, about twice as large as ovoid inner metatarsal tubercle; supernumerary plantar tubercles absent; (12) toes without lateral fringes; basal webbing absent; Toe V slightly shorter than Toe III; toe tips rounded, about as large as those on fingers; (13) in life, dorsum reddish brown with dark gray and yellowish-brown mottling, venter gray with pale gray mottling and brownish-cream flecks around posterior half of belly, groin brown and gray mottled; (14) SVL in single female 20.7 mm.

The assignment of the new species to *Phrynopus* is based on the structure of the digital discs that lack circumferential groves as well as the overall morphological similarity with the other members of the genus. *Phrynopus curator* is readily distinguished from its congeners by having the dorsum with prominent middorsal Y-shaped ridges, a conical heel tubercle, absence of dentigerous processes of vomers, and a gray venter with pale gray mottling.

Furthermore *Phrynopus curator* differs from those species of *Phrynopus* (*auriculatus, montium,* and *peruanus*) that have a tympanum (absent in *P. curator*), and from those species (*dagmarae, horstpauli, kotosh, miroslawae, nicoleae,* and *vestigiatus*) that have dentigerous processes of vomers (absent in *P. curator*). *Phrynopus curator* lacks an aposematic coloration consisting of red, orange, salmon or flesh colored blotches in the groin (present in *badius, bracki, dagmarae, heimorum, interstinctus, nicoleae, paucari, peruanus,* and *vestigiatus*).

Six other species of *Phrynopus* have been recorded from the YCNP. Those are *P. auriculatus* (Duellman and Hedges, 2008, at 2600 m), *P. badius* (this paper, 2900 m), *P. bracki* (Hedges 1990, at 2600 m), *P. miroslawae* (Chaparro et al. 2008, at 3363 m), *P. nicoleae* (Chaparro et al. 2008, at 3589 m), and *P. tribulosus* (Duellman and Hedges, 2008, at 2600 m). *Phrynopus miroslawae* and *P. nicoleae* are from the puna of Santa Bárbara (Chaparro et al. 2008) which is located west of the Río Huancabamba, whereas all others are recorded east of the Río Huancabamba (see Fig. 3). *Phrynopus curator* lacks a tympanum (present in *P. auriculatus*), has the groin brown and gray mottled (groin dark brown with orange flecks on its lower half and a dark inguinal bar on its up-

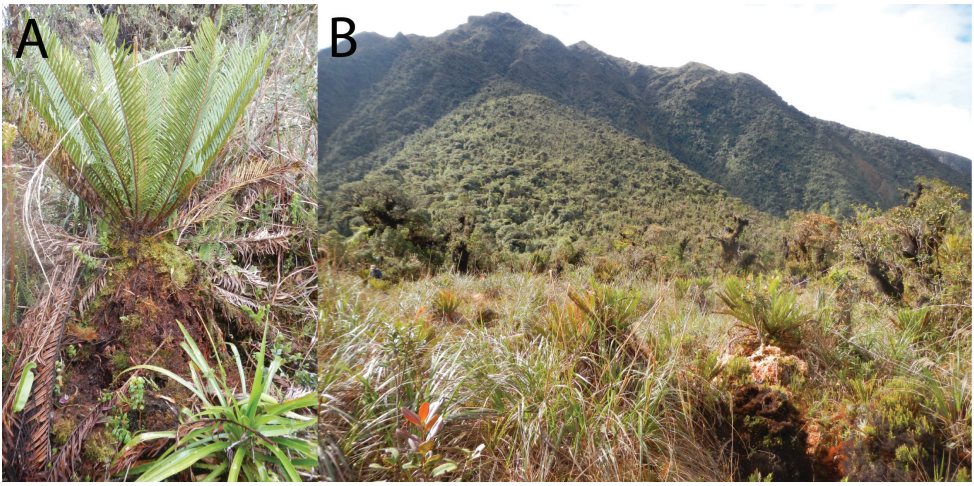

Figure 9. Habitat of *Phrynopus curator.* Fern where *P. curator* and clutch were found (**A**) on pampa of Quebrada Yanachaga at 3000 m elevation (**B**). Photos by E. Lehr.

per half in *P. badius*), does not have Toe I vestigial (vestigial in *P. bracki*), and its Finger I is shorter than Finger II (Finger I and Finger II of equal length in *P. nicoleae*). Furthermore *P. curator* lacks dentigerous processes of vomers (present in *P. nicoleae*), it has three enlarged tubercles on the upper eyelid (upper eyelid without enlarged tubercles in *P. nicoleae*), its flanks are reddish brown with dark gray and yellowish-brown mottling and with a broad gray diagonal stripe at the anterior half, bordered on both sides with a narrow tan stripe (flanks tan with abundant bluish-white spots in *P. nicoleae*), and its groin is brown and gray mottled (tan with abundant bluish-white spots and an orange spot in *P. nicoleae*). *Phrynopus curator* is smaller than *P. miroslawae* (SVL 20.7 mm vs. 29.2 mm in *P. miroslawae,* Chaparro et al. 2008), has dorsum with ridges (dorsum warty in *P. miroslawae*), and dorsolateral folds discontinuous (continuous), and has the dorsum reddish brown with dark gray and pale brown mottling (green in *P. tribulosus*).

Description of holotype. Head narrower than body, slightly longer than wide, HW 98.6% of HL; HW 33.8% of SVL; HL 33.3% of SVL; snout moderately long, rounded in dorsal and lateral views (Figs 5, 8), ED larger than E-N distance; nostrils not protuberant, directed dorsolaterally; canthus rostralis short, straight in dorsal view, rounded in profile; loreal region slightly concave; lips rounded; upper eyelid without enlarged tubercles; EW narrower than IOD (EW 82.6% of IOD); supratympanic fold short and low, extending from posterior corner of eye to level of jaw articulation, barely distinguishable in preservation; tympanic membrane and tympanic annulus absent; minute postrictal tubercles. Choanae small, ovoid, not concealed by palatal shelf of maxilla; dentigerous processes of vomers absent; tongue broad, longer than wide, not notched posteriorly, posterior one third free.

Skin on dorsum shagreen with small scattered tubercles, prominent ridges, and two prominent middorsal Y-shaped ridges connected at their bases; postocular folds short, ridges forming discontinuous dorsolateral fold; skin on flanks shagreen with

small scattered tubercles, skin on throat smooth, skin on chest and belly weakly areolate; discoidal fold absent, weak thoracic fold present; cloacal sheath short; large tubercles absent in cloacal region. Outer surface of forearm without minute tubercles; outer palmar tubercle bifid, low, ovoid, about twice the size of ovoid inner palmar tubercle; supernumerary tubercles indistinct in preservative; subarticular tubercles low, ovoid, most prominent on base of fingers; fingers without lateral fringes; Finger I shorter than Finger II; tips of digits rounded, lacking marginal grooves (Fig. 7C).

Hind limbs long and slim, TL 49.3% of SVL; FL 49.8% of SVL; upper surface of hind limbs tuberculate with narrow diagonal ridges (Fig. 10A); posterior and ventral surfaces of thighs areolate; heel with a distinct conical tubercle; outer surface of tarsus with small tubercles; outer metatarsal tubercle round, about twice as large as ovoid inner metatarsal tubercle; supernumerary plantar tubercles indistinct in preservative; subarticular tubercles low, ovoid in dorsal view, most distinct on base of toes; toes without lateral fringes; basal webbing absent; toe tips rounded, lacking marginal grooves, about as large as those on fingers; relative lengths of toes: 1 < 2 < 3 > 5 < 4; Toe V shorter than Toe III (Fig. 7D).

Measurements (in mm) of holotype: SVL 20.7; TL 10.2; FL 10.3; HL 6.9; HW 7.0; ED 2.4; IOD 2.3; EW 1.9; IND 2.1; E-N 1.8.

Coloration of holotype in life. (Fig. 8): Dorsum reddish brown with dark gray and yellowish-brown mottling, and few white tubercles; dark brown interorbital bar bordered anteriorly with a narrow yellowish-brown stripe; dorsal surface of forearms and hind legs with diagonal dark brown bars outlined with pale grayish-brown stripes; dark brown canthal stripe; broad, dark brown supratympanic stripe outlined by tan; broad, dark brown bar on upper lip below eye, bordered by narrow, tan stripe on each side; flanks colored as dorsum with a broad gray diagonal stripe at the anterior half, bordered on both sides with a narrow tan stripe; axilla and groin brown and gray mottled; gray inguinal bar bordered on both sides with a narrow tan stripe extending onto dorsal surface of thigh; posterior surfaces of thighs and concealed surfaces of shanks brown and gray mottled; throat gray with pale gray mottling; chest, belly, and extremities gray with pale gray dots and flecks; outer fingers and outer toes yellowish brown, palmar and plantar surfaces dark gray; iris predominately reddish brown with fine black reticulations and golden ringlet around pupil.

Coloration of holotype in preservative. (Figs 5C, D): As described above but slightly paler with gray coloration being brown and yellowish brown being white; iris gray.

Variation. Freshly hatched froglets (FMNH 282820–22) had a SVL of 6.2–6.5 mm (n = 3). Froglets were pale green with brown blotches on dorsum, brown canthal and supratympanic stripes, brown bars on upper lip, and distinct diagonal brown stripe on flanks and on extremities (Fig. 10C), all brown bars and stripes bordered with white stripes.

Etymology. The specific name *curator* is the Latin noun meaning caretaker and refers to the observed behaviour of the female guarding nine terrestrial eggs.

Distribution, natural history, and threat status. The species is only known from the type locality (a summit of a mountain ridge of Cordillera Yanachaga, 3000 m). The

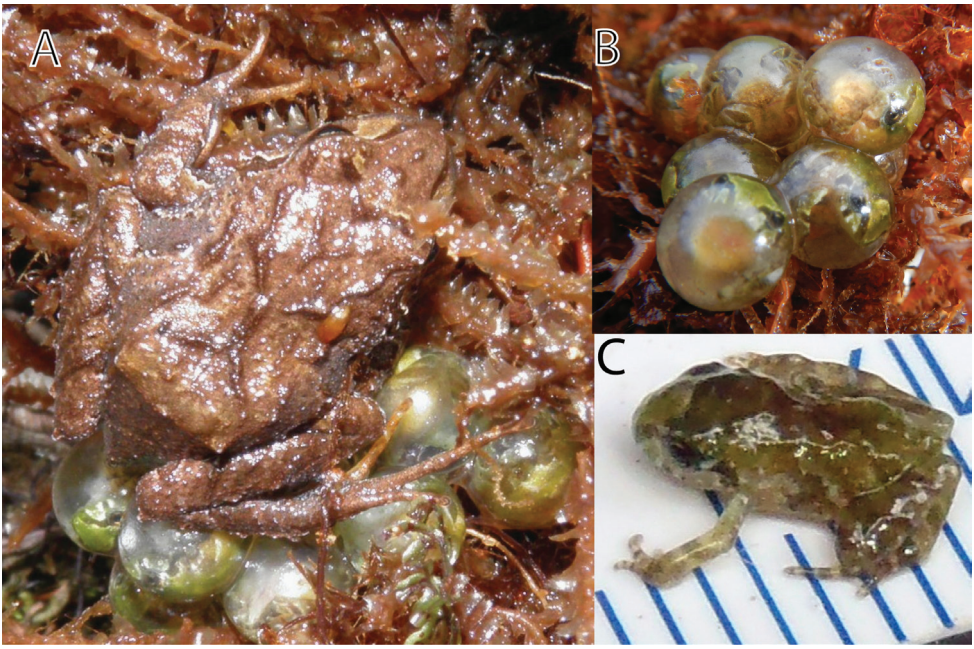

Figure 10. *Phrynopus curator* (MUSM 31106) guarding eggs (**A**), eggs (**B**) and hatchling (FMNH 282820-22) with scale in mm (**C**). Photos by J. Moravec (**A, C**) and E. Lehr (**B**).

habitat consisted of transitional formation between cloud forest and wet puna. The type locality is a slightly swampy plain covered by scattered bushes, small isolated trees, ferns, moss, and lichens (Fig. 9). The single specimen was found at 3.30 pm under a moss layer at approx. 10–15 cm depth covering the stem of a fern. The female was gravid (small unpigmented eggs) and guarding a clutch consisting of nine terrestrial eggs and was partially sitting on them (Fig. 10A). Young frogs (Fig. 10B) were clearly visible based on their pale green coloration and moved inside the eggs when being disturbed. The eggs had a diameter of 5.7–5.8 mm (n = 3). Two days after collection of three eggs three froglets hatched. *Phrynopus curator* called from under moss during the day. Sympatric anurans include *Gastrotheca* sp. (heard call), *Pristimantis aniptopalmatus*, *Pristimantis bromeliaceus* and *Pristimantis* sp. We classify *Phrynopus curator* as "Data Deficient" according to the IUCN red list criteria and categories based on the limited information on its geographic range.

Discussion

Despite the limited number of specimens of *Phrynopus badius* and *P. curator* both species are morphologically clearly differentiated from all other known species of *Phrynopus* which justifies their description. Calling males of both species were heard by day in leaf litter and moss layer. However, despite our efforts males were not located in the

dense vegetation. Both species of *Phrynopus* occupy different habitats. Whereas *P. badius* was found on the steep mountain slopes under closed canopy of cloud forest, *P.* curator inhabited moss layers in open transitional area between cloud forest and wet puna. Both species seem to display a dissimilar adaptation to different habitat conditions. *Phrynopus badius* has shorter legs (holotype TL 37.2% of SVL, paratype TL 35.7% of SVL) and moves by walking or short jumps. On the contrary, *P. curator* has longer legs (TL 49.3% of SVL), fingers and toes, is more agile and jumps readily if disturbed.

With *Phrynopus curator* we describe and document the first clutch and case of parental care for a species of *Phrynopus*. A previous report of parental care was provided by Catenazzi (2006) for a former member of the genus *Phrynopus (P. cophites,* now placed in the genus *Bryophryne)*. Clutches of strabomantid frogs and strabomantid frogs performing parental care are rarely found. In some species parental care is conducted by females only, while in others it is restricted to males and in a few both sexes show parental care (see Duellman and Lehr 2009). In the case of *P. curator* we found that females take care for eggs until they complete development. The observed female was sitting on the clutch motionless, with its belly and toes having direct contact with egg surfaces. The fact that the female was gravid (small ovarian eggs) indicates a fast reproductive cycle of this species. Because the stomach of the female was completely filled with unidentified parts of arthropods, food must have been consumed during the guarding period. However, it remains unknown whether the female leaves the clutch for this purpose or feeds on nearby arthropods.

New species of *Phrynopus* are frequently discovered when field work is conducted in cloud forests and puna regions in central Peru (e.g. Lehr and Oróz 2012). Therefore, the species diversity in this genus is highly underestimated. The currently known 25 species of *Phrynopus* are allocated to the departments of La Libertad (1 species), Huánuco (10), Pasco (11), and Junín (4) (Lehr and Oroz 2012, this paper). With seven known species (Fig. 3), the YCNP has the highest regional species diversity of *Phrynopus*, and we expect further new species if herpetological surveys are continued in the YCNP.

Acknowledgements

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Appendix I

Specimens examined

Phrynopus bracki: PERU: Pasco: Pasco: Parque de la Nación Yanachaga-Chemillén, 2600 m: MUSM 4400 (paratype); Parque de la Nación Yanachaga-Chemillén: San Alberto: MUSM 19906–08.

Phrynopus dagmarae: PERU: Huánuco: Palma Pampa, 3020 m: MUSM 20451 (holotype).

Phrynopus horstpauli: PERU: Huánuco: Ichocan, Jatunloma-forest, 3100 m: MTD 44333–39.

Phrynopus interstinctus: PERU: Húánuco: Cordillera de Carpish, San Marcos, 3100 m: MUSM 29543 (holotype), 3160 m: MUSM 29544–29545 (paratypes).

Phrynopus peruanus: PERU: Junín: Puna of Maraynioc (11°21'35.2"S, 75°28'52.6"W), 3825 m: MUSM 19977–78.

Phrynopus vestigiatus: PERU: Húánuco: Cordillera de Carpish, San Pedro de Carpish, 3100 m: MUSM 29542 (holotype).

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Rare and new cumaceans (Crustacea, Peracarida) from the southern margin of the Cap Ferret Canyon (Bay of Biscay)

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Abstract

A new cumacean genus and species, *Ithyleucon sorbei* **gen. et sp. n.**, was described from material collected in the southern margin of the Cap Ferret Canyon (Bay of Biscay, NE Atlantic). Although the new genus resembles *Pseudoleucon* Zimmer, 1903, in terms of the general aspect of the carapace and the pseudorostrum position, it shows important differences in the uropod structure and in the size of the antenna 1 accessory flagellum. In addition, some comments regarding the morphology of certain rare species (*Mesolamprops denticulatus* Ledoyer, 1983, *Hemilamprops normani* Bonnier, 1896 and *Schizocuma spinoculatum* (Jones, 1984)) are also provided.

Keywords

Cumacea, new species, deep sea, suprabenthos, Atlantic Ocean

Introduction

Cumaceans display a wide diversity in deep waters (Jones and Sanders 1972) especially in low and mid latitudes (Gage et al. 2004). Within the Atlantic Ocean, the Bay of Biscay is probably the area best known for deep-sea cumacean fauna thanks to the works of Bonnier (1896), Fage (1929), Jones (1974, 1984, 1985), Reyss (1974a, 1978)

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and Bishop (1981a and b). However, despite the high sampling effort conducted in this geographical area, Elizalde et al. (1993) pointed out the presence of some rare and undescribed species during a study of suprabenthic communities of the southern margin of the Cap Ferret Canyon. Based in part on that material, Corbera et al. (in press) recently re-described *Campylaspis laevigata* Jones, 1974.

Following the study of suprabenthic communities of the Cap Ferret Canyon, this work deals with some rare and undescribed cumacean species that have since been discovered there.

Material and methods

The present material was collected within the framework of a study on the suprabenthic community structure of the continental margin in the Bay of Biscay (Dauvin et al. 1985), During the ESSAIS I, ESSAIS II and ECOFER I surveys carried out between April and July 1989, 13 stations ranging from depths of 346 to 1099 m were sampled with a modified Macer-GIROQ suprabenthic sledge (full description in Dauvin et al. 1985). The collected material was fixed on board with a solution of 10% neutral formalin in seawater until subsequent sorting into major taxonomical groups at the laboratory. All groups (including cumaceans) were then transferred to 70% ethanol and so conserved until species identification. For morphological observations, the cumacean specimens were dissected in lactic acid and stained with chlorazol black. The dissected parts were mounted in Fauré medium and conserved in permanent glass slides sealed with nail varnish. Drawings were prepared using a camera lucida on an Olympus microscope.

The type material was deposited in the Biological Reference Collection (CBR) of the *Institut de Ciències del Mar*, CSIC, Barcelona.

Taxonomy

Family Lampropidae Sars, 1878

Mesolamprops denticulatus Ledoyer, 1983

http://species-id.net/wiki/Mesolamprops_denticulatus
Fig. 1C

Mesolamprops denticulata – Ledoyer 1983, pp. 73–74, fig. 4; Ledoyer 1987, p. 68, fig. 5
Mesolamprops sp. A – Elizalde et al. 1993, p. 250.
Mesolamprops denticulatus – Cartes et al. 2003, p. 749; Shalla and Bishop 2007, p. 1196.

Material examined. Cap Ferret Canyon, Bay of Biscay, ESSAIS I: stn TS01, 44°33.30'N, 2°08.30'W, 346–347 m, 21/04/89, 2 pread. female. ESSAIS II: stn TS04, 44°34.380'N, 2°10.18'W, 484–485 m, 18/05/89, 1 pread. female. ECOFER

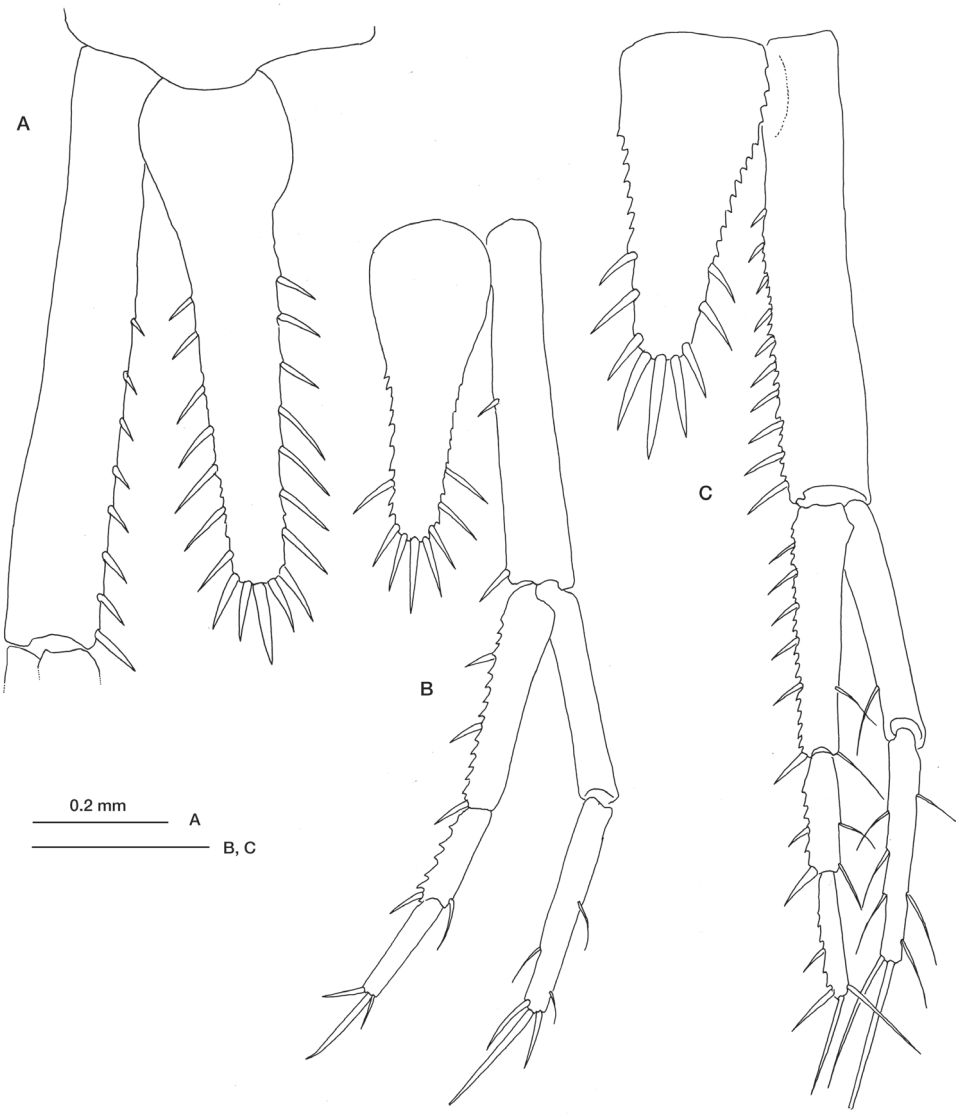

Figure 1. *Hemilamprops normani* Bonnier, 1896: **A** preadult female, telson and left uropod peduncle **B** manca, telson and right uropod. *Mesolamprops denticulatus* Ledoyer, 1983 **C** preadult female, telson and right uropod. Scale bar: 0.2 mm.

I: stn TS05, 44°35.57'N, 2°11.21'W, 522–523 m, 1/07/89, 2 pread. female, 1 pread. male, 1 adult male. J.-C. Sorbe leg.

Remarks. *Mesolamprops denticulatus* was described from the Mediterranean Sea by Ledoyer (1983), who identified the main diagnostic characteristics of the adult male (the flagellum of antenna 2 extending only to the end of thorax and two pairs of pleopods). Ledoyer also noted the difficulty of distinguishing the females of this species from those of two nearby species, *Hemilamprops normani* Bonnier, 1896 and *H. crista-*

tus (Sars, 1870). Nevertheless, a detailed comparative study of the telson and uropod structures has allowed us to establish the main differences. In *M. denticulatus* the telson has only 3–4 pairs of lateral setae (Fig. 1A); it is shorter than in *Hemilamprops*, and the terminal setae scarcely reach the distal end of the uropod peduncle; the central terminal seta is longer than the remaining two. Moreover, during the same developmental stage, *M. denticulatus* remains smaller than *H. normani*, based on measurements taken in preadult females (carapace length: 1.13 vs 1.93 mm).

Distribution. *Mesolamprops denticulatus* was for a long time considered an endemic Mediterranean species until Shalla and Bishop (2007) reported the presence of this species in the Faeroe-Shetland Channel. In addition, Elizalde et al. (1993) recorded an undetermined *Mesolamprops* species from the Bay of Biscay, and recently a study of this same material confirmed that this specimens belongs to *M. denticulatus* (Corbera and Sorbe in prep.). In the Mediterranean Sea, *M. denticulatus* is distributed between depths of 170 and 570 m (Ledoyer 1983, 1987; Cartes et al. 2003), which is a bathymetric distribution pattern similar to that the observed in the Faeroe-Shetland Channel (259–753 m), as well as in the Bay of Biscay (346–708 m).

Hemilamprops normani **Bonnier, 1896**

http://species-id.net/wiki/Hemilamprops_normani
Fig. 1A, B

Hemilamprops normani – Bonnier 1896, pp. 546–549, pl. 29 fig. 3
Hemilamprops cristata – Calman 1905, p. 41, 49 [nec *H. cristata* (Sars, 1870)].

Material examined. Cap Ferret Canyon, Bay of Biscay, ESSAIS II: stn TS10, 44°33.10'N, 2°13.13'W, 791–790 m, 18/05/89, 3 mancas, 2 pread. female, 1 ad. male; stn TS11, 44°32.89'N, 2°14.24'W, 923–924 m, 18/05/89, 6 mancas, 2 pread. males; stn TS13, 44°34.19'N, 2°16.18'W, 1097–1099 m, 17/05/89, 4 mancas, 2 imm. males. J.-C. Sorbe leg.

Remarks. Although Calman (1905) suggested the synonymy between *Hemilamprops cristatus* and *H. normani*, other authors (Sars 1900; Hansen 1920; Fage 1929, 1940) consider them as valid species, which is the criterion followed here. It is possible that the presence of *Mesolamprops denticulatus* in the Bay of Biscay, together with the two species of *Hemilamprops*, led to the confusion between these three species. *Hemilamprops normani* can be distinguished from the other two species by its higher number of lateral setae on the telson (6–8). Moreover, the three terminal setae of the telson of *H. cristatus* are of the same length, while in *H. normani* the central one is the longest.

Distribution. *Hemilamprops normani* is known to inhabit the waters of the Bay of Biscay (Bonnier 1896; Jones 1985), the west of Ireland (Calman 1905), the Azores Islands (Fage 1929) and the Mediterranean Sea (Fage 1940; Reyss 1974b). According to Jones (1985), in the Bay of Biscay this species inhabits bottoms between 280 and 3000 m. This wide bathymetric range, however, should not be assumed with complete

certainty, since it is possible that *H. normani* has been confused with *M. denticulatus*, at least in its most shallow distribution. During this study *H. normani* was always collected in waters deeper than 700 m.

Family Leuconidae Sars, 1878

Ithyleucon gen. n.

urn:lsid:zoobank.org:act:D9D1A1D7-C6EA-4E26-9C19-7AE5DE138F31
http://species-id.net/wiki/Ithyleucon

Diagnosis. Pseudorostrum extending anterodorsally and upturned; antenna 1 geniculate between peduncle article 1 and 2; accessory flagellum longer than main flagellum article 1; female with exopods on maxilliped 3 and pereopods 1–3; male with exopods on maxilliped 3 and pereopods 1–4; pereopod 2 ischium very short; uropod endopod 2-articulate; male with two pairs of pleopods.

Remarks. The shape of the carapace and the position of the pseudorostrum of *Ithyleucon* gen. n. resemble those of *Pseudoleucon* Zimmer, 1903. However, *Ithyleucon* differs from the latter by 1) the size of the uropod endopod, which is longer than the peduncle and of similar length as the exopod (i.e., as long as the peduncle and certainly shorter than the exopod in *Pseudoleucon*) and by 2) the antenna 1 accessory flagellum, which is longer than the main flagellum article 1 (shorter in *Pseudoleucon*). Although these two features, as well as the geniculated antenna 1, are in agreement with the diagnosis of *Bytholeucon* Watling, 1991, the anterolateral corner is strongly angular in this genus and the known males observed up until now have had only one pair of pleopods.

In addition to these morphological differences, the only two known *Pseudoleucon* species also show divergence in terms of their ecology and biogeography. They inhabit shallow bottoms of the northeastern Pacific and a phylogenetic relationship with the genus described herein seems to be highly unlikely.

Etymology. From the Greek *ithys,* meaning upright, referring to the position of the pseudorostrum, and *Leucon,* the stem genus. Gender masculine.

Type species. *Ithyleucon sorbei* sp. n.

Ithyleucon sorbei sp. n.

urn:lsid:zoobank.org:act:B29AE99A-81B2-431D-B9DB-221C28671864
http://species-id.net/wiki/Ithyleucon_sorbei
Figs 2–4

Pseudoleucon sp. A – Elizalde et al. 1993, p. 253.

Material examined. Holotype: Cap Ferret Canyon, Bay of Biscay, ESSAIS II, stn TS13, 44°34.19'N, 2°16.18'W, 1097–1099 m, 17/05/89, preadult female (ICMU12101901), Jean-Claude Sorbe leg.

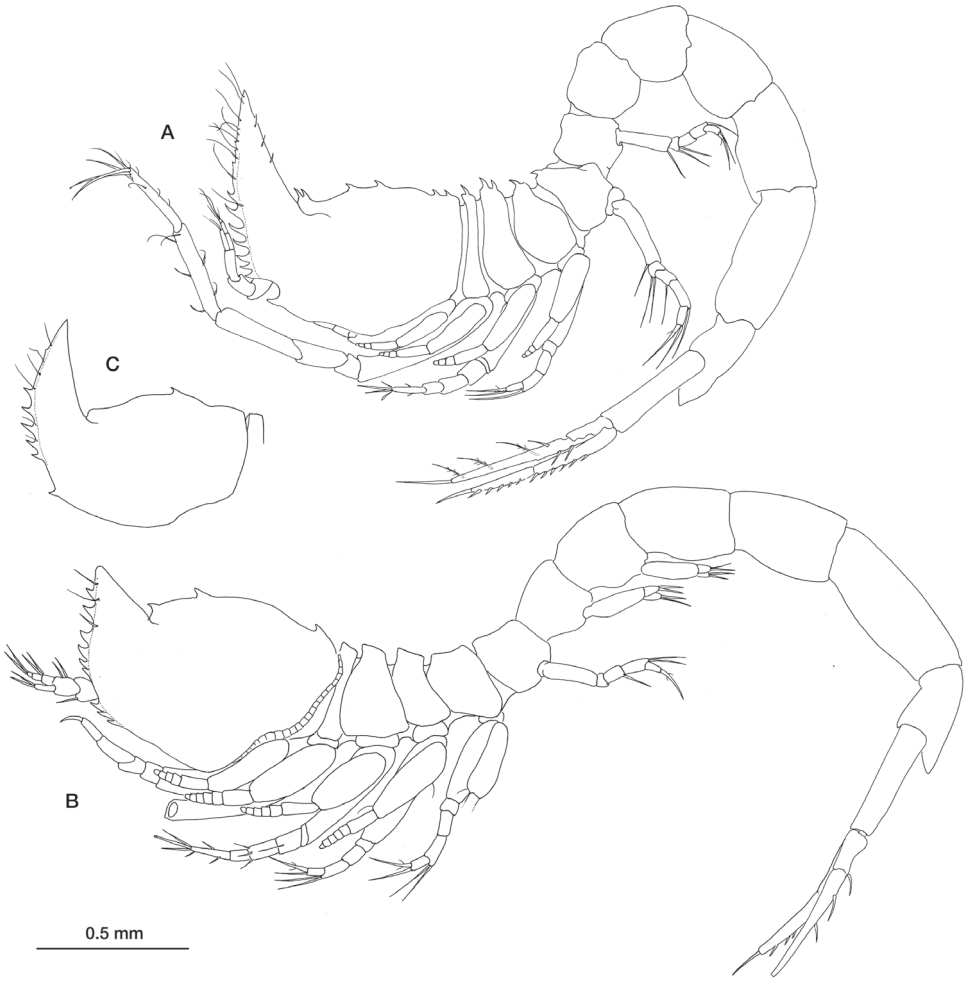

Figure 2. *Ithyleucon sorbei* gen. et sp. n. **A** preadult female holotype (ICMU12101901), whole animal in lateral view **B** preadult male paratype (ICMU12101904) **C** carapace of immature male paratype (ICMU12101906).

Paratypes: Same data as the holotype, 1 preadult female (ICMU12101903), 1 preadult female dissected in two slides (ICMU12101902), 2 preadult males (ICMU12101904 and ICMU12101905); ESSAIS I, stn TS12, 44°32.30'N, 2°15.10'W, 1024–1043 m, 22/04/89 1 immature male (ICMU12101906), Jean-Claude Sorbe leg.

Diagnosis. Carapace without ridges, frontal lobe with two teeth and others located posteriorly. Pseudorostral lobes extending anterodorsally, upturned, anterior margin serrate. Antenna 1 geniculate between peduncle articles 1 and 2, accessory flagellum extending beyond the mid-length of main flagellum. Female with exopods on pereopods 1–3; male with exopods on pereopods 1–4. Uropod peduncle shorter than rami; endopod bi-articulate, slightly shorter than exopod. Male with 2 pairs of pleopods.

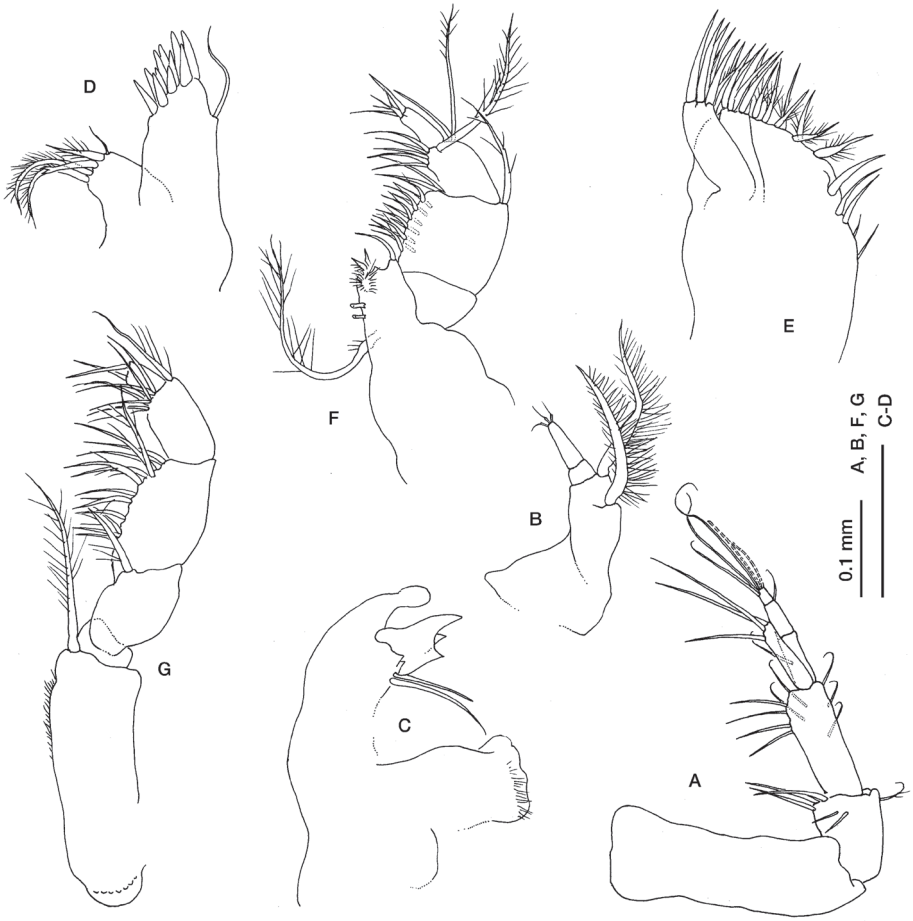

Figure 3. *Ithyleucon sorbei* gen. et sp. n. preadult female paratype (ICMU12101902): **A** antenna 1 **B** antenna 2 **C** left mandible **D** maxilla 1 **E** maxilla 2 **F** maxilliped 1 **G** maxilliped 2.

Description. Preadult female 3.125 mm total length. Carapace (Fig. 2) slightly longer than a fourth of the total length; frontal lobe with two teeth and others (3–4) positioned posteriorly on the middorsal line. Pseudorostral lobes extending anterodorsally, upturned by an angle of about 90°, anterior margin serrate; antennal notch small, anterolateral angle acute with 0–3 serrations on the lower margin

Antennula (Fig. 3A), peduncle 3-articulate, geniculate between articles 1 and 2; article 1 longer than the combined lengths of articles 2 and 3; article 2 shorter than article 3; main flagellum 3-articulate, shorter than the last peduncle article, with two aesthetascs and three long simple setae terminally; accessory flagellum longer than the main flagellum of article 1, with three long simple setae positioned terminally.

Antenna 2 (Fig. 3B) 3-articulate, with two pappose setae on article 1.

Mandible (Fig. 3C) base truncate, lacina mobilis with three teeth, two simple setae between lacina mobilis and pars molaris.

Maxillula (Fig. 3D) inner endite with five setae, one simple, three pappose and one bifid; outer endite with cuspidate setae.

Maxilla (Fig. 3E) with 3 endites; broad endite with 5 simple and several pappose setae terminally; narrow endites not extending beyond the distal margin of broad endite; inner narrow endite with 5 simple setae terminally; outer narrow endite with 4 simple setae terminally.

Maxilliped 1 (Fig. 3F) reduced with only three articles, dactylus minute.

Maxilliped 2 (Fig. 3G) basis shorter than rest of appendage, with a pappose seta on distal inner corner; merus with a long seta; carpus longer than merus with several simple setae on inner margin; propodus shorter than carpus, with a pappose seta on distal outer corner and several setae on inner margin; dactylus with two simple setae terminally.

Maxilliped 3 (Fig. 4A) with well developed exopod, basis longer than rest of appendage, produced distally, with three long pappose setae on distal outer corner and three pappose setae on inner margin; merus with small pappose sete on inner margin and a long pappose seta on distal outer corner; carpus as long as merus, with pappose seta on inner margin and two simple setae on distal outer corner; propodus shorter than carpus with a pappose seta on inner margin; dactylus shorter than propodus.

Pereopod 1 (Fig. 4B) with well developed exopod, basis shorter than the following three articles combined, with three pappose setae on its inner margin and a longer one on distal corner; ischium with a small simple seta on inner margin; merus half the length of carpus, with small pappose setae; carpus as long as propodus, with short simple setae on both margins and four long simple setae distally; propodus with simple setae on both margins; dactylus shorter than propodus, with five long simple setae terminally and some smaller ones along the margins.

Pereopod 2 (Fig. 4C) with well-developed exopod, basis as long as rest of appendage, with three pappose setae on inner margin and a long one on distal outer corner; ischium very short; as long as carpus; carpus with simple setae on distal margin; propodus half length of dactylus; dactylus with a simple setae on each margin and four terminally (the longest longer than the article).

Pereopod 3 (Fig. 4D) with well-developed exopod, basis longer than the rest of appendage, with a simple seta on distal anterior corner; ischium with three simple and a pappose setae on distal corner; merus twice as long as ischium, with a simple seta on distal corner; carpus twice as long as merus, with two long simple setae (distally annulated) on distal corner; propodus longer than half length of carpus with a long simple seta (distally annulated) on distal corner.

Pereopod 4 (Fig. 4E) basis as long as the rest of appendage, with simple and pappose setae on both margins; ischium with two long simple setae; merus with a simple seta on distal corner; carpus 1.5 times as long as merus, with two simple seta on the margin and two (distally annulated) on distal corner; propodus as long as merus, with a long simple seta (distally annulated) on distal corner.

Figure 4. *Ithyleucon sorbei* gen. et sp. n. preadult female paratype (ICMU12101902): **A** maxilliped 3 **B** pereopod 1 **C** pereopod 2 **D** pereopod 3 **E** pereopod 4 **F** pereopod 5 **G** uropod.

Pereopod 5 (Fig. 4F), basis as long as the three following article combined length; carpus twice as long as merus, with two simple setae (distally annulated) on distal corner; propodus as long as merus, with a long simple seta (distally annulated) on distal corner.

Uropod peduncle (Fig. 4G) slightly longer than the last pleonite and 0.66 times as long as exopod, with five small cuspidate setae on inner margin. Endopod 2-articulate; article 1, 1.6 times as long as article 2, with 10 cuspidate setae on inner margin; article

2 with six cuspidate setae on inner margin and one terminally. Exopod 2-articulate, slightly longer than endopod; article 2 with simple setae on the outer margin and upper face, five pappose setae on inner margin, and two long simple setae terminally.

Preadult male 3.63 mm total length (Fig. 2B). Similar in most characteristics—apart from the sexual ones—to the female but with a shorter pseudorostrum, a lower number of teeth on the middorsal line and without antennal notch. However, the pseudorostrum of the immature male (pleopods reduced to a single bud with few terminal simple setae) is long as it is in females (Fig. 2C).

Etymology. The new species is named in honour of Jean-Claude Sorbe (Arcachon, France) in recognition of his extensive work studying suprabenthic communities.

Distribution. Bay of Biscay, N Atlantic between 1024 and 1099 m depth.

Family Nannastacidae Bate, 1866

Schizocuma spinoculatum (Jones, 1984)

http://species-id.net/wiki/Schizocuma_spinoculatum
Fig. 5

Cumella spinoculata – Jones 1984, pp. 219–220, fig. 10.
Schizocuma spinoculatum – Watling 1991, p. 755.

Material examined. *Schizocuma spinoculatum*: ESSAIS II, stn TS13, 44°34.19'N, 2°16.18'W, 1097–1099 m, 17/05/89, 7 pread. females, 2 imm. males, 1 ad. male.

Schizocuma molosa (Zimmer, 1907): BENTART 06; stn 30, 69°58'24"S, 87°26'54"W, 1798–1799 m, 27/01/2006, 1 ad. male, 1 imm; stn 31, 69°57'46"S, 87°22'08"W, 1395 m, 29/01/2006, 2 imm. females, 1 ad. male; stn 38, 69°15'11"S, 80°12'11"W, 1339–1343 m, 5/02/2006, 1 imm. female.

Remarks. When Jones (1984) described *S. spinoculatum*, he had already noted its strong resemblance to *S. molosa*, but then the latter species was only known by a single partially broken specimen (Zimmer 1907, 1913). Comparison of the material collected in the Bay of Biscay with those obtained during the BENTART 06 cruise in the Bellingshausen Sea (Corbera et al. 2009) enabled us to identify differences between the two species. On the tip of pseudorostrum of *S. molosa* there are a couple of spines (Fig. 5C), one on the upper angle and another just bellow the siphon; the first one is absent in *S. spinoculatum* (Fig. 5A). The hinder dorsal third of the carapace of *S. molosa* also has a pair of forward curving spines and long simple setae while *S. spinoculatum* has only a pair of simple setae. Moreover, the carapace is more elongated in *S. molosa* than in *S. spinoculata* (length-height ratio: 1.8 vs 1.5), which is also true of the uropod peduncle (peduncle-endopod length ratio: 1.8–1.9 vs 1.5) (Fig. 5B, D). All of these differences can be observed both in males and in females, which gives support to the validity of both species.

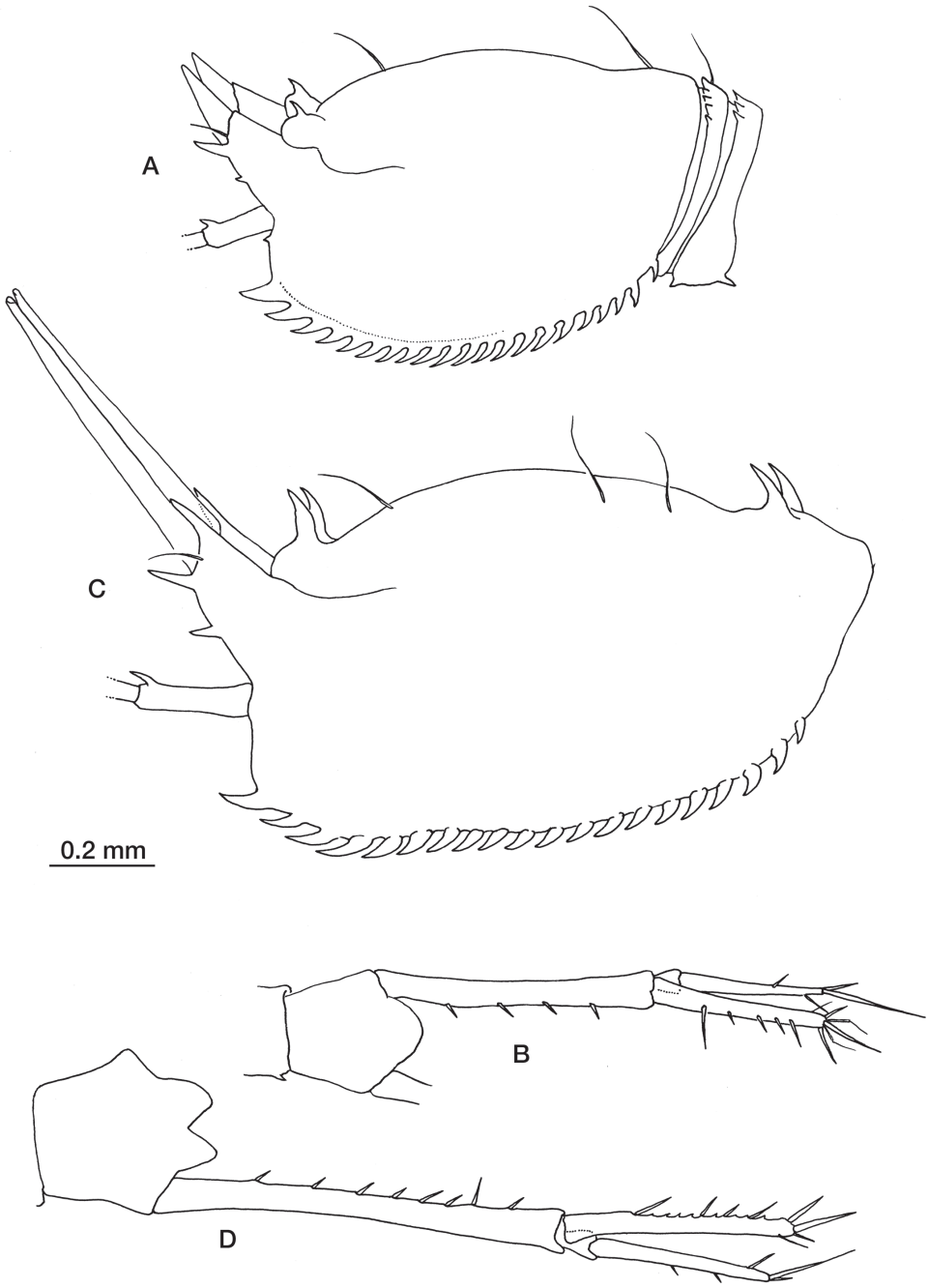

Figure 5. *Schizocuma spinoculatum* (Jones, 1984): **A** carapace in lateral view **B** uropod. *Schizocuma molosa* (Zimmer, 1907) from Bellingshausen Sea, Antarctica: **C** carapace in lateral view **D** uropod.

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The author wishes to express his sincere gratitude to Jean-Claude Sorbe (Arcachon, France) for a long and friendly collaboration and for the loan of this interesting cumacean collection. Joseph Moore was also thanked for his careful revision of the English language. Comparative Antarctic material of *Schizocuma molosa* was collected during the BENTART 06 cruise carried out under the auspices of the Spanish Ministry of Science and Technology (MCYT) Antarctic Programme (CGL2004-01856).

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