RESEARCH ARTICLE



Two new species of the genus Betacixius Matsumura, 1914 from China (Hemiptera, Fulgoromorpha, Cixiidae)

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Abstract

Two new species of *Betacixius* Matsumura, 1914 (Fulgoromorpha, Cixiidae), *B. latissimus* Zhi & Chen, **sp. nov.** and *B. maguanensis* Zhi & Chen, **sp. nov.**, are described from Yunnan Province, China. The genus is reviewed and a key to all known species is provided. The females of four Chinese species are described for the first time.

Keywords

Female genitalia, Fulgoroidea, morphology, Oriental region, taxonomy

Introduction

Betacixius is a small genus established by Matsumura (1914) for 23 species in the subfamily Cixiinae (Hemiptera, Fulgoromorpha, Cixiidae), with *B. ocellatus* Matsumura, 1914 as the type species. *Betacixius* belongs to the tribe Semonini (Emeljanov 2002) and has been taxonomically studied by various authors, with a number of species published successively (e.g. Jacobi 1944; Fennah 1956; Hori 1982; Tsaur et al. 1991; Zhang and Chen 2011).

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Recent study of some Chinese specimens has found two new species, *B. latis-simus* Zhi & Chen, sp. nov. and *B. maguanensis* Zhi & Chen, sp. nov., which are described here. Female specimens of four species are also described for the first time. So far, including the two new species, the genus currently now counts for 25 valid species and two subspecies, all distributed in the Palaearctic and Oriental regions (Bourgoin 2020).

Materials and methods

The morphological terminology and measurements follow Bourgoin (1987) and Bourgoin et al. (2015). The morphological terminology of female genitalia follows Bourgoin (1993). Body length was measured from apex of vertex to tip of forewing; vertex length was measured the median length of vertex (from apical transverse carina to tip of basal emargination). Fuchsin staining was used to highlight female genitalia structures studied. External morphology and drawings were made with the aid of a Leica MZ 12.5 stereomicroscope. Photographs were taken with KEYENCE VHX-1000 system. Illustrations were scanned with a CanoScan LiDE 200 flatbed scanner and imported into Adobe Photoshop 7.0 for labeling and figure composition. The distribution map was generated with Google Earth Pro v. 7.3.2 (Google LLC). The dissected male and female genitalia are preserved in glycerin in small plastic tubes pinned together with the specimens.

The type specimens are deposited in the Institute of Entomology, Guizhou University, Guiyang, Guizhou Province, China (**GUGC**).

Taxonomy

Betacixius Matsumura, 1914

Betacixius Matsumura, 1914: 412; Tsaur et al. 1991: 27; Zhang and Chen 2011.

Type species. *Betacixius ocellatus* Matsumura, 1914, by original designation.Diagnosis. See Zhang and Chen (2011: 48).Distribution. China, Japan, Vietnam.

Key to species of Betacixius^{*}

1	Forewing with markings	2
_	Forewing without any markings	21
2	Forewing with a large ocellate marking in apical half	3
_	Forewing without ocellate marking in apical half	6

^{*} revised from Fennah 1956; Zhang and Chen 2011

3	Forewing with an oblique, brown band extending from clavus across middle
	of corium
-	Forewing without such a band4
4	Endosoma of aedeagus with one spine, hook-shaped (Zhang and Chen 2011:
	figs 22, 23)B. flagellihamus Zhang & Chen, 2011
-	Endosoma of aedeagus with two spines, not hook-shaped5
5	Periandrium of aedeagus apically with two L-shaped processes
	B. maculosus Tsaur & Hsu, 1991
-	Periandrium of aedeagus apically with one nearly straight and one arched
	processes
6	Forewing with an oblique band extending from stigma passing through its
	middle part7
_	Forewing without such a band
7	Forewing with apical cells of M and Cu strongly infuscate
_	Forewing with apical cells not infuscate
8	Forewing with apical margin black or distinctly darkened
-	Forewing with apical margin fuscous or not distinctly darkened10
9	Frons with a pallid spot at centre of lateral margins; mesonotum testaceous
	<i>B. kumejimae</i> Matsumura, 1914
-	Frons without such spots; mesonotum, except scutellum, castaneous-piceous
10	<i>B. euterpe</i> Fennah, 1956
10	Forewing with a spot near sutural margin of clavus near union of claval veins,
	no oblique dark band at this level extending into corium
-	Forewing with an oblique dark band extending from clavus into centre of
11	corium, slightly distad of level of union of claval veins
11	Forewing basally with a broad transverse band from dorsal margin to sutural $(\Gamma_{1}^{*}, 2\Gamma)$
	margin of clavus (Fig. 3E) B. latissimus sp. nov.
-	Forewing without above band
12	Forewing basally with a light brown band
- 12	Forewing basally without band
13	Forewing with a long black stripe from base, along clavus extending to Ks
	E-arrive with each e-strike
1 /	Forewing without such a stripe
14	Forewing along the K with a black stripe widened towards the rear
	Estovino without such a string
_ 15	Anal segment symmetrical B malidae Formal 1956
1)	Anal segment asymmetrical
-	Anal segment symmetrical
10	(7hang and Chan 2011, from 10, 11) P <i>histoinus</i> 7hang & Chan 2011
	Ventral margin of period drive basely without process
- 17	Endosomo anically without spinose process
1/	Endosoma apically with one or two spinose processes
_	Endosoma apicany with one of two spinose processes

18	Spinose process on right side of periandrium medium-sized, curved upwards, apex dorsally directed; spinose process on left side parallel to periandrium for
	most potion, apex ventrocephalically directed
	B. rinkibonis Matsumura, 1914
_	Spinose process on right side of periandrium very short, nearly straight, apex
	directed cephalad; spinose process on left side generally dorsocephalically di-
	rected
19	In lateral view, apical lobe of anal segment ventrally rounded
	B. delicatus Tsaur & Hsu, 1991
_	In lateral view, apical lobe of anal segment ventrally pointed20
20	Spinose process on right side of periandrium near dorsal margin, coiled 90
	degrees to left; endosoma with two spinose processes
	<i>B. sparsus</i> Tsaur & Hsu, 1991
_	Spinose process on right side of periandrium near ventral margin, nearly
	straight, apex directed cephalad; endosoma with one spinose process
21	Endosoma of aedeagus apically with two processes
_	Endosoma of aedeagus apically with one process
22	Ventral margin of periandrium with a long process
	B. flavovittatus Hori, 1982
	Ventral margin of periandrium without process
	B. nigromarginalis Fennah, 1956
23	Frons without median carina
_	Frons with median carina
24	Body pale brown; periandrium of aedeagus with two processes on right side
	<i>B. brunneus</i> Matsumura, 1914
_	Body green; periandrium of aedeagus with one process on each side
	B. herbaceus Tsaur & Hsu, 1991

Betacixius bispinus Zhang & Chen, 2011

Figure 1A-I

Betacixius bispinus Zhang & Chen, 2011: 53, figs 1-13, 24.

Material examined. China: 1♂, Guizhou Province, Yanhe County, Mayanghe National Natural Reserve (600 m) (28°40'N, 108°19'E), 5–12 June 2007, Xiang-Sheng Chen (holotype); 1♂ 7♀♀, Guizhou Province, Yanhe County, Mayanghe National Natural Reserve (600 m), 5–12 June 2007, Xiang-Sheng Chen (paratypes); 1♂ 1♀, Guizhou Province, Tongren City, Fanjingshan National Natural Reserve (500–1800 m) (27°54'N, 108°38'E), 1–3 June 2002, Xiang-Sheng Chen; 2♂♂ 1♀, Guizhou Province, Daozhen County, Sanqiao Town (29°3'N, 107°30'E), 24 May 2002, Xiang-Sheng Chen; 1♂, Guizhou Province, Chishui City, Shizhangdong Waterfall (28°22'N,



Figure 1. *Betacixius bispinus* Zhang & Chen, 2011, female **A** genitalia, lateral view **B** genitalia, ventral view **C** anal segment, dorsal view **D** tergite IX, caudal view **E** gonapophysis VIII and gonocoxa VIII, ventral view **F** gonapophysis IX, lateral view **G** gonoplac, inner lateral view **H** posterior vagina, ventral view **I** posterior vagina, dorsal view. Scale bars: 0.5 mm.

105°43'E), 30 May 2006, Zai-Hua Yang; 2733292, Guizhou Province, Suiyang County, Kuankuoshui National Natural Reserve (28°14'N, 107°12'E), 8–9 June 2010, Pei Zhang, Bin Zhang, Yu-Jian Li, Ji-Chun Xing; 2332312, Guizhou Province, Huishui County, Duanshan Town, Guangrong Village (25°50'N, 106°37'E), 9 May 2013, Jian-Kun Long, Zai-Hua Yang; 13232, Sichuan Province, Nanchong City, Dayou Township (30°48'N, 106°41'E), 9–10 May 2008, Zheng-Guang Zhang, Zai-Hua Yang; 2332222, Yunnan Province, Longling County (24°35'N, 98°41'E), 23 May 2016, Meng-Shu Dong; 433222, Yunnan Province, Maguan County, Gulin-

qing Township (22°48'N, 103°57'E), 30–31 May 2016, Liang-Jing Yang, Qiang Luo, Ying-Jian Wang.

Supplementary description. Female genitalia. Tergite IX (Fig. 1A, B, D) moderately sclerotized, with a large nearly dumbbell-shaped wax plate. Anal segment (Fig. 1C) rectangular, widening to apex, 1.1 times wider than long in dorsal view, anal style strap-like. Gonapophysis VIII (Fig. 1E) elongate, and slightly curved upwards. Gonapophysis IX (Fig. 1F) with two middle teeth, distance ratio between distal middle tooth to apex and length of denticulate portion is 2.2. Gonoplac (Fig. 1G) rodlike, 3.5 times longer than wide in lateral view. Posterior vagina pattern as shown in Figure 1H, I.

Distribution. China (Guizhou, Sichuan, Yunnan).

Note. The female genitalia of this species are described and illustrated for the first time.

Betacixius flagellihamus Zhang & Chen, 2011

Figure 2A-I

Betacixius flagellihamus Zhang & Chen, 2011: 54, figs 14-23, 25.

Material examined. China: 13, Guizhou Province, Leishan County, Leigongshan National Natural Reserve (26°31'N, 108°17'E), 13 May 1985, Zi-Zhong Li (holotype); 73399, Guizhou Province, Leishan County, Leigongshan National Natural Reserve, 13 May 1985, Zi-Zhong Li (paratypes); 200, Guizhou Province, Guiyang City, June 1983, Students of Grade 79, Major Plant Protection (paratypes); $1 \stackrel{\circ}{_{\sim}} 2 \stackrel{\circ}{_{\sim}} \stackrel{\circ}{_{\sim}}$, Guizhou Province, Guiyang City, Forest Park (1000 m) (26°32'N, 106°45'E), 20 May 2007, Xiang-Sheng Chen (paratypes); 1 7 12, Guizhou Province, Guiyang City, Forest Park, 14–17 May 1984, collector unknown; 238 19, Guizhou Province, Duyun City, Gantang Town, Tuanzhai Village (26°16'N, 107°26'E), 12 May 2014, Ming Ning, Gai-Ping Yang; $1\sqrt[3]{5}$, Guizhou Province, Suiyang County, Kuankuoshui National Natural Reserve (28°14'N, 107°12'E), 8–9 June 2010, Pei Zhang, Bin Zhang; 3♂♂ 2♀♀, Guizhou Province, Huishui County, Duanshan Town, Guangrong Village (25°50'N, 106°37'E), 9 May 2013, Jian-Kun Long, Zai-Hua Yang; 1∂ 3♀♀, Guizhou Province, Guiyang City, Huaxi District (26°25'N, 106°40'E), 15-16 May 1982, collector unknown; 2332, Guizhou Province, Guiyang City, Huaxi District, 1 May 2008, Zheng-Guang Zhang; 13, Guizhou Province, Libo County, Maolan Town (25°23'N, 108°4'E), 9 April 2011, Jian-Kun Long; 2∂∂1♀, Guizhou Province, Guiyang City, Forest Park, 24 May 2006, Zai-Hua Yang; 3♂♂ 2♀♀, Guizhou Province, Guiyang City, Forest Park, 21 April 2010, Jun-Qiang Ni; 10 3 699, Guizhou Province, Guiyang City, Forest Park, 18 May 2012, Wei-Bin Zheng, Yong-Gang Xiao; 1Å, Guizhou Province, Guiyang City, Huaxi District, 29 April 2017, Yong-Jin Sui.

Supplementary description. *Female genitalia.* Tergite IX (Fig. 2A, B, D) moderately sclerotized, with a large nearly dumbbell-shaped wax plate. Anal segment (Fig. 2C) rectangular, widening to apex, 1.5 times wider than long in dorsal view,



Figure 2. *Betacixius flagellihamus* Zhang & Chen, 2011, female **A** genitalia, lateral view **B** genitalia, ventral view **C** anal segment, dorsal view **D** tergite IX, caudal view **E** gonapophysis VIII and gonocoxa VIII, ventral view **F** gonapophysis IX, lateral view **G** gonoplac, inner lateral view **H** posterior vagina, ventral view **I** posterior vagina, dorsal view. Scale bars: 0.5 mm.

anal style strap-like. Gonapophysis VIII (Fig. 2E) elongate, and slightly curved upwards. Gonapophysis IX (Fig. 2F) with two middle teeth, distance ratio between distal middle tooth to apex and length of denticulate portion is 2.1. Gonoplac (Fig. 2G) rod-like, 3.6 times longer than wide in lateral view. Posterior vagina pattern as shown in Figure 2H, I.

Host plant. Quercus sp. (Fagaceae).

Distribution. China (Guizhou).

Note. The female genitalia of this species are described and illustrated for the first time.

Betacixius latissimus sp. nov.

http://zoobank.org/ED00F996-CE3B-4BAB-8B3A-C3427C482BC5 Figures 3A–M, 4A–I

Type material. *Holotype*: ♂, **China:** Yunnan Province, Jinping County, Fenshuiling National Nature Reserve (22°46'N, 103°13'E), 7–8 June 2016, Liang-Jing Yang, Ying-Jian Wang; paratypes: 1♂ 1♀, same data as holotype.

Description. *Body length:* male 6.9–7.1 mm (n = 2), female 7.2 mm (n = 1).

Coloration. General color blackish brown (Fig. 3A–D). Eyes reddish brown, lateral ocelli dark red and median ocellus yellow. Vertex dark brown, pronotum yellowish to blackish brown and mesonotum blackish brown. Face generally dark brown, yellowish white above frontoclypeal suture. Postclypeus yellowish brown and anteclypeus blackish brown. Rostrum generally yellowish brown except darker tip. Forewing semitranslucent, base with a broad transverse band from dorsal margin to sutural margin of clavus; clavus with a blackish brown spot on apical third, an oblique transverse band originating from stigma extending to ventral margin. Hind tibiae yellowish brown and abdominal sternites blackish brown.

Head and thorax. Vertex (Fig. 3A, C) broad, 1.9 times wider than long; anterior margin arched convex, posterior margin slightly arched concave; median carina distinct and complete. Frons (Fig. 3D) 0.6 times as long as wide, median carina indistinct, extending from slightly above level of lateral ocelli to median ocellus. Clypeus with median carina distinct and elevated throughout. Pronotum (Fig. 3C) 1.4 times longer than vertex, posterior margin concaved in obtuse angle. Mesonotum 1.6 times longer than pronotum and vertex combined. Forewing (Fig. 3E) 1.9 times longer than wide, with nine apical and five subapical cells; fork Sc+RP slightly distad of fork CuA1+CuA2; first crossvein r-m slightly distad of fork MP; RP 2 branches, MP with four terminals: MP 1, MP2, MP3, and MP4, fork MP1+MP2 almost at same level as fork MP3+MP4. Hind tibia with three lateral spines, six apical spines; chaetotaxy of hind tarsi: 7/7, second segment of hind tarsus with three platellae.

Male genitalia. Pygofer (Fig. 3F, G) symmetrical, dorsal margin concave and U-shaped ventrally, widened towards apex; in lateral view, lateral lobes arched extended caudally. Medioventral process triangular in ventral view. Anal segment (Fig. 3F, H) long, tubular, asymmetrical, apical lobes arched extended ventrally in lateral view, left lobe larger than right one, 2.8 times longer than wide in dorsal view; anal style finger-like, not beyond anal segment. Gonostyli (Fig. 3F, G, I) symmetrical in ventral view; in inner lateral view, apical part extended, apical margin acute. Aedeagus (Fig. 3J–M) in total with four processes. Right side of periandrium with a long spinose process apically, straight for most portion, directed dorsocephalically, apex curved downwards and directed ventrocephalically; left side of periandrium apically with two medium-sized spinose processes, the upper one strongly curved and directed dorsally and the other one slightly curved and directed cephalad. Base of periandrium ventrally with several saw-like teeth. Endosoma slender, structure simple, apically with a small spinose process on left margin.



Figure 3. *Betacixius latissimus* sp. nov., male **A** habitus, dorsal view **B** habitus, lateral view **C** head and thorax, dorsal view **D** face, ventral view **E** forewing **F** genitalia, lateral view **G** pygofer and gonostyli, ventral view **H** anal segment, dorsal view **I** gonostyli, inner lateral view **J** aedeagus, right side **K** aedeagus, left side **L** aedeagus, dorsal view **M** aedeagus, ventral view. Scale bars: 0.5 mm (**C**,**D**, **F–M**); 1.0 mm (**E**).



Figure 4. *Betacixius latissimus* sp. nov., female **A** genitalia, lateral view **B** genitalia, ventral view **C** anal segment, dorsal view **D** tergite IX, caudal view **E** gonapophysis VIII and gonocoxa VIII, ventral view **F** gonapophysis IX, lateral view **G** gonoplac, inner lateral view **H** posterior vagina, ventral view **I** posterior vagina, dorsal view. Scale bars: 0.5 mm.

Female genitalia. Tergite IX (Fig. 4A, B, D) moderately sclerotized, with two connected wax plates, nearly oval. Anal segment (Fig. 4C) rectangular, 1.4 times wider than long in dorsal view, anal style strap-like. Gonapophysis VIII (Fig. 4E) elongate, and slightly curved upwards. Gonapophysis IX (Fig. 4F) with two middle teeth, distance ratio between distal middle tooth to apex and length of denticulate portion is 2.4. Gonoplac (Fig. 4G) rod-like, 3.8 times longer than wide in lateral view. Posterior vagina pattern as shown in Figure 4H, I.

Distribution. China (Yunnan).

Etymology. The specific name, derived from Latin word meaning the broadest, refers to the forewing with an extremely broad band at apex.

Remarks. Male genitalia of *B. latissimus* sp. nov. is similar to *B. herbaceus* Tsaur & Hsu, 1991, but differs in: (1) left side of periandrium with two spinose processes (in *B. herbaceus*, left side of periandrium with one spinose process); (2) spinose process on right of periandrium curved downwards (in *B.* herbaceus, spinose process in the same position curved upwards); (3) anal segment asymmetrical (the latter symmetrical); (4) forewing with one blackish brown spot and two bands (the latter without any marking).

Betacixius maculosus Tsaur & Hsu, 1991

Figure 5A-I

Betacixius maculosus Tsaur and Hsu in Tsaur et al. 1991: 31, fig. 15A-I.

Material examined. China: 3∂∂ 1♀, Taiwan Province, Nantou County (24°2'N, 121°7'E), 25 November 2002, Xiang-Sheng Chen.

Supplementary description. *Female genitalia.* Tergite IX (Fig. 5A, B, D) moderately sclerotized, with a medium-sized, nearly dumbbell-shaped wax plate. Anal segment (Fig. 5C) rectangular, slightly widening to apex, 1.1 times longer than wide in dorsal view, anal style finger-like. Gonapophysis VIII (Fig. 5E) elongate, and slightly curved upwards. Gonapophysis IX (Fig. 5F) with two middle teeth, distance ratio between distal middle tooth to apex and length of denticulate portion is 2.1. Gonoplac (Fig. 5G) rod-like, 3.4 times longer than wide in lateral view. Posterior vagina pattern as shown in Figure 5H, I.

Distribution. China (Taiwan).

Note. The female genitalia of this species are described and illustrated for the first time in detail.

Betacixius maguanensis sp. nov.

http://zoobank.org/2FF88233-4AAE-4F3E-9351-C5759FC12F4E Figures 6A–M, 7A–I

Type material. *Holotype*: ♂, **China:** Yunnan Province, Maguan County, Gulinqing Township (22°48'N, 103°57'E), 30–31 May 2016, Liang-Jing Yang, Ying-Jian Wang, Qiang Luo; paratypes: 8♂♂ 5♀♀, same data as holotype.

Description. Body length: male 5.9–6.5 mm (n = 9), female 6.7–7.0 mm (n = 5).

Coloration. General color blackish brown (Fig. 6A–D). Eyes reddish brown, ocelli light yellow. Vertex yellowish brown, pronotum yellowish brown and mesonotum black. Face generally yellowish brown, yellowish white above frontoclypeal suture. Postclypeus yellow and anteclypeus blackish brown. Rostrum generally yellowish brown. Forewing semi-translucent, clavus with a blackish brown spot on apical third,



Figure 5. *Betacixius maculosus* Tsaur & Hsu, 1991, female **A** genitalia, lateral view **B** genitalia, ventral view **C** anal segment, dorsal view **D** tergite IX, caudal view **E** gonapophysis VIII and gonocoxa VIII, ventral view **F** gonapophysis IX, lateral view **G** gonoplac, inner lateral view **H** posterior vagina, ventral view **I** posterior vagina, dorsal view. Scale bars: 0.5 mm.

stigma blackish brown. Hind tibiae light blackish brown and abdominal sternites blackish brown.

Head and thorax. Vertex (Fig. 6A, C) broad, 2.6 times wider than long; anterior margin slightly arched convex, posterior margin arched concave; median carina distinct and complete. Frons (Fig. 6D) 0.8 times as long as wide, median carina indistinct, extending from slightly above level of lateral ocelli to median ocellus. Clypeus with median carina distinct and elevated throughout. Pronotum (Fig. 6C) 2.3 times longer than vertex, posterior margin concaved in an obtuse angle. Mesonotum



Figure 6. *Betacixius maguanensis* sp. nov., male **A** habitus, dorsal view **B** habitus, lateral view **C** head and thorax, dorsal view **D** face, ventral view **E** forewing **F** genitalia, lateral view **G** pygofer and gonostyli, ventral view **H** anal segment, dorsal view **I** gonostyli, inner lateral view **J** aedeagus, right side **K** aedeagus, left side **L** aedeagus, dorsal view **M** aedeagus, ventral view. Scale bars: 0.5 mm (**C**, **D**, **F–M**); 1.0 mm (**E**).



Figure 7. *Betacixius maguanensis* sp. nov., female A genitalia, lateral view B genitalia, ventral view C anal segment, dorsal view D tergite IX, caudal view E gonapophysis VIII and gonocoxa VIII, ventral view F gonapophysis IX, lateral view G gonoplac, inner lateral view H posterior vagina, ventral view I posterior vagina, dorsal view. Scale bars: 0.5 mm.

1.7 times longer than pronotum and vertex combined. Forewing (Fig. 6E) 2.5 times longer than wide, with nine apical and five subapical cells; fork Sc+RP distad of fork CuA1+CuA2; first crossvein r-m almost at same level as fork MP; RP 2 branches, MP with four terminals: MP 1, MP2, MP3, and MP4, fork MP1+MP2 distad of fork MP3+MP4. Hind tibia with three lateral spines, six apical spines; chaetotaxy of hind tarsi: 7/7, second segment of hind tarsus with three platellae.

Male genitalia. Pygofer (Fig. 6F, G) symmetrical, dorsal margin concave and U-shaped ventrally, widened towards apex; in lateral view, lateral lobes triangularly extended caudally. Medioventral process triangular in ventral view. Anal segment (Fig. 6F, H) long tubular, symmetrical, apical lobes ventrally pointed, 2.1 times longer

than wide in dorsal view; anal style strap-like, not extending beyond anal segment. Gonostyli (Fig. 6F, G, I) symmetrical in ventral view; in inner lateral view, apical part extended, apical margin rounded. Aedeagus (Fig. 6J–M) with three processes. Right side near ventral margin of periandrium apically with a long spinose process, nearly straight, apex directed cephalad; left side near dorsal margin of periandrium with a shorter spinose process curving upwards, apex right-dorsally directed. Base of periandrium ventrally with several saw-like teeth. Endosoma slender, structure simple, apically with a small hook-like spinose process.

Female genitalia. Tergite IX (Fig. 7A, B, D) moderately sclerotized, with a large, nearly dumbbell-shaped wax plate. Anal segment (Fig. 7C) rectangular, 1.1 times longer than wide in dorsal view, anal style finger-like. Gonapophysis VIII (Fig. 7E) elongate, and slightly curved upwards. Gonapophysis IX (Fig. 7F) with two middle teeth, distance ratio between distal middle tooth to apex and length of denticulate portion is 2.0. Gonoplac (Fig. 7G) rod-like, 3.8 times longer than wide in lateral view. Posterior vagina pattern as shown in Figure 7H, I.

Distribution. China (Yunnan).

Etymology. The species name is derived from Maguan County, Yunan Province, where the type locality is located.

Remarks. Male genitalia of *B. maguanensis* sp. nov. is similar to *B. flagellihamus*. Zhang & Chen, 2011, but differs in: (1) spinose process on right of periandrium nearly straight, directed cephalad (in *B. flagellihamus*, spinose process on right of periandrium curving dorsally); (2) apical lobes of anal segment pointed ventrally (the latter rounded); (3) forewing without ocellate marking (the latter with a large ocellate marking in apical half).

Betacixius sparsus Tsaur & Hsu, 1991

Figure 8A–I

Betacixius sparsus Tsaur and Hsu in Tsaur et al. 1991: 46, fig. 23A-E.

Material examined. China: 20 3 56 9, Guangxi Province, Wuming County, Daming Mountain (23°27'N, 108°27'E), 14–15 May 2012, Zhi-Hua Fan, Hu Li, Nan-nan Yang; 11 3 11 9, Guangxi Province, Wuming County, Daming Mountain, 14–17 May 2011, Xiao-Fei Yu, Rong Huang, Xin-Feng Zhang; 43 34 9, Guangxi Province, Shangsi County, Shiwandashan National Forest Park (21°56'N, 108°6'E), 2–4 May 2011, Xiao-Fei Yu, Rong Huang.

Supplementary description. *Female genitalia.* Tergite IX (Fig. 8A, B, D) moderately sclerotized, with two nearly oval wax plates, separated from each other. Anal segment (Fig. 8C) rectangular, widening to apex, 1.1 times wider than long in dorsal view, anal style strap-like. Gonapophysis VIII (Fig. 8E) elongate, and slightly curved upwards. Gonapophysis IX (Fig. 8F) with two middle teeth, distance ratio between distal middle tooth to apex and length of denticulate portion is 2.3. Gonoplac (Fig. 8G) rod-like, 3.8 times longer than wide in lateral view. Posterior vagina pattern as shown in Figure 8H, I.



Figure 8. *Betacixius sparsus* Tsaur & Hsu, 1991, female A genitalia, lateral view B genitalia, ventral view
C anal segment, dorsal view D tergite IX, caudal view E gonapophysis VIII and gonocoxa VIII, ventral view
F gonapophysis IX, lateral view G gonoplac, inner lateral view H posterior vagina, ventral view
I posterior vagina, dorsal view. Scale bars: 0.5 mm.

Distribution. China (Guangxi, Taiwan). **Note.** The female genitalia of this species are described and illustrated for the first time.

Discussion

Prior to this study, nothing has been reported on the host plants of *Betacixius*. None-theless, we found these planthoppers most commonly in grass, shrubs, or on bamboo



Figure 9. Distribution records of the species from genus *Betacixius* 1 *B. bispinus* Zhang & Chen, 2011 2 *B. brunneus* Matsumura, 1914 3 *B. clypealis* Matsumura, 1914 4 *B. delicatus* Tsaur & Hsu, 1991 5 *B. euterpe* Fennah, 1956 6 *B. flagellihamus* Zhang & Chen, 2011 7 *B. flavovittatus* Hori, 1982 8 *B. fuscus* Tsaur & Hsu, 1991 9 *B. herbaceus* Tsaur & Hsu, 1991 10 *B. kumejimae* Matsumura, 1914 11 *B. latissimus* sp. nov. 12 *B. maculosus* Tsaur & Hsu, 1991 13 *B. maguanensis* sp. nov. 14 *B. michioi* Hori, 1982 15 *B. nelides* Fennah, 1956 16 *B. nigromarginalis* Fennah, 1956 17 *B. obliquus* Matsumura, 1914 18 *B. ocellatus* Matsumura, 1914 19 *B. pallidior* Jacobi, 1944 20 *B. rinkihonis* Matsumura, 1914 21 *B. robustus* Jacobi, 1944 22 *B. shirozui* Hori, 1982 23 *B. sparsus* Tsaur & Hsu, 1991 24 *B. tonkinensis* Matsumura, 1914 25 *B. transversus* Jacobi, 1944.

and tree leaves, at elevations up to 2600 m. Unfortunately, there is no knowledge of what plants these planthoppers really feed on, except that *B. flagellihamus* was collected on *Quercus* sp. (Fagaceae), which might be the plant on which it feeds.

Based on published data and our field surveys, the distribution of *Betacixius* is mostly restricted to the Oriental parts of China, Japan, and Vietnam, with *B. obliquus* Matsumura, 1914, occurring in both Palaearctic and Oriental regions, as the only exception (Fig. 9).

The regional studies on *Betacixius* in China are not equally efficient at finding species. To date, 23 species are known from China, of which about half that number (12 species) are known from Taiwan and only 12 species have been described from southern mainland China, which is much broader and more variant in ecological complexity compared with Taiwan. Therefore, we believe that additional comprehensive field surveys will find that the diversity of *Betacixius* in mainland China is doubtlessly richer.

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RESEARCH ARTICLE



Two new species of the genus *Indolipa* Emeljanov (Hemiptera, Fulgoromorpha, Cixiidae) from Yunnan Province, China, with a key to species

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Abstract

Two new species of *Indolipa* Emeljanov, 2001 (Fulgoromorpha, Cixiidae) from Yunnan Province, China, *I. fugongensis* Zhi & Chen, **sp. nov.** and *I. longlingensis* Zhi & Chen, **sp. nov.** are described. Color images for the adults of the two new species and line drawings for the genitalia are provided. In addition, a key to all known species of *Indolipa* Emeljanov is included.

Keywords

Fulgoroidea, morphology, Oriental region, planthopper, taxonomy

Introduction

The planthopper genus *Indolipa* was established by Emeljanov (2001) for sixteen species (previously in *Oliarus* Stål, 1862) in the tribe Pentastirini (Hemiptera, Cixiidae, Cixiinae), with *Oliarus indiensis* Van Stalle, 1991 as the type species. Recently, *Indolipa* has been studied taxonomically by Guo and Feng (2010) and Luo et al. (2019), with three Chinese species published successively. Thus, this genus so far includes nineteen

valid species in total, and all its fauna is distributed in the Oriental and Palaearctic regions (Bourgoin 2020). Previously five species in this genus have been recorded from China: *I. fopingensis* Luo, Liu & Feng, *I. gansuensis* Feng, *I. huapingensis* Luo, Liu & Feng, *I. kurseongensis* (Distant) and *I. tappanus* (Matsumura).

Recent efforts in studying specimens collected from China revealed two new species, *I. fugongensis* Zhi & Chen, sp. nov. and *I. longlingensis* Zhi & Chen, sp. nov. Hence, the species number of *Indolipa* has been raised to twenty-one, with seven species occurring in China.

Materials and methods

The morphological terminology and measurements follow Bourgoin (1987), Bourgoin (1993) and Bourgoin et al. (2015) respectively for male genitalia, female genitalia and wing venation. Body length was measured from apex of vertex to tip of forewing; vertex length was measured in the median length of vertex (from apical transverse carina to tip of basal emargination). Fuchsin staining was used to highlight female genitalia structures studied. External morphology and drawings were done with the aid of a Leica MZ 12.5 stereomicroscope. Photographs were taken with KEYENCE VHX-1000 system. Illustrations were scanned with CanoScan LiDE 200 and imported into Adobe Photoshop 7.0 for labeling and plate composition. The distribution map was generated with ARCGIS 10.5. The dissected male and female genitalia are preserved in glycerin in small plastic tubes pinned together with the specimens.

The type specimens examined are deposited in the Institute of Entomology, Guizhou University, Guiyang, Guizhou Province, China (GUGC).

Taxonomy

Indolipa Emeljanov, 2001

Indolipa Emeljanov, 2001: 72; Guo and Feng 2010: 34; Luo et al. 2019: 185.

Type species. Oliarus indiensis Van Stalle, 1991, by original designation.

Diagnosis. See Luo et al. (2019: 185).

Distribution. China (Gansu, Guangxi, Hubei, Hunan, Shaanxi, Tibet, Taiwan, Yunnan), India, Indonesia (Borneo), Malaysia, Myanmar, Singapore, Sri Lanka.

Key to species of the genus Indolipa Emeljanov

 Vertex with subapical transverse carina connected to apical border by two longitudinal distinct carinae or two indistinct elevations (Figs 1C, 3C)..... 2
 Vertex with subapical transverse carina not connected with apical border....20

2	Vertex broader than long (Figs 1C, 3C)
_	Vertex longer than or equally long as broad7
3	Vertex without median carina (Fig. 3C)
_	Vertex with median carina (Fig. 1C)
4	Right side of endosoma with one ribbon-like process, with two short laminal
	processes on the process basally (Fig. 3K) I. longlingensis sp. nov.
-	Right side of endosoma with two ribbon-like processes, without processes on
	the process basally (Luo et al. 2019: fig. 17) I. fopingensis
5	Forewing with 10 apical cells (Fig. 1E), chaetotaxy of hind tarsi: 7/7
	I. fugongensis sp. nov.
-	Forewing with 12 apical cells, chaetotaxy of hind tarsi: 7/5
6	Tegmina with one complete and nearly straight transverse fuscous fascia in basal
	area; female without an incision on the caudal margin of the pregenital sternite
	I. fusconebulosus
-	Tegmina with two narrow spots and three somewhat long curved linear
	spots in basal area; female with an incision on the caudal margin of the
	pregenital sternite I. binghami
7	Anal segment symmetrical
-	Anal segment asymmetrical 14
8	Periandrium of aedeagus without process (Van Stalle 1991: fig. 334)
	I. lawitensis
-	Periandrium of aedeagus with process(es)
9	Periandrium of aedeagus with a bifurcate process
-	Periandrium of aedeagus without bifurcate process
10	Bifurcate process of periandrium on its dorsal margin (Van Stalle 1991:
	fig. 411)I. bidiensis
-	Bifurcate process of periandrium on its ventral margin
11	Endosoma with four spinose processes basally (Van Stalle 1991: figs 347,
	348); forewing with 10 apical cells; chaetotaxy of hind tarsi: 7/5–6
	I. madrasensis
-	Endosoma with three spinose processes basally (Van Stalle 1991: figs 354,
	355); forewing with 11 apical cells; chaetotaxy of hind tarsi: 7–9/7
	I. nilgiriensis
12	Vertex 1.5 times as long as broad; periandrium of aedeagus with five spinose
	processes apically, endosoma curved in a semi-circle, and three spinose pro-
	cesses on its dorsal margin (Van Stalle 1991: fig. 341)
-	Vertex as long as broad; periandrium and endosoma of aedeagus without
	teatures as above
13	Mesonotum black with two yellow fasciae between outer carinae; perian-
	drium of aedeagus with two spinose processes on left side, endosoma with
	tive processes (Van Stalle 1991: figs 369, 370)I. indiensis
-	Mesonotum entirely black; periandrium of aedeagus with one spinose process
	on left side, endosoma with four processes (Van Stalle 1991: figs 377, 378)

14	Aedeagus with ventral margin of periandrium without laminal process; fore-
	wing with 12 apical cells15
_	Aedeagus with ventral margin of periandrium with a laminal process basally;
	forewing with 9–10 apical cells17
15	Ventral margin of periandrium with a spinose process near apex (Van Stalle
	1991: fig. 328)
_	Ventral margin of periandrium without process16
16	Pygofer with left lateral margin rounded at apex; left side of periandrium with
	a spinose process (Van Stalle 1991: figs 311-313)I. malayensis
_	Pygofer with left lateral margin slightly incised at apex; periandrium without
	process (Van Stalle 1991: figs 320-322)I. tamangensis
17	Left side of endosoma with a circle process (Tsaur et al. 1988: fig. 6C)
	I. tappanus
_	Left side of endosoma without circle process
18	Left side of endosoma with a bifurcate process
_	Left side of endosoma without bifurcate process (Luo et al. 2019: fig. 27)
	I. huapingensis
19	Right side of endosoma with two long subparallel ribbon-like processes (Guo
	and Feng 2010: fig. 9)
_	Right side of endosoma with one produced rod-like processI. kurseongensis
20	Vertex with subapical carina almost straight, median carina absent (Van Stalle
	1991: Fig. 365); pronotum black; chaetotaxy of hind tarsi: 7–8/7
	I. thekkadiensis
_	Vertex with subapical carina angulate, median carina present (Van Stalle
	1991: fig. 409); pronotum yellow; chaetotaxy of hind tarsi: 6/5
	I. brunnifrons

Indolipa fugongensis Zhi & Chen, sp. nov.

http://zoobank.org/E1D648F6-C5E8-4A0B-B780-674920F8924E Figures 1A–N, 2A–H

Type material. *Holotype*: 3, CHINA: Yunnan Province, Fugong County (26°54'N, 98°52'E), 17–18 May 2010, Pei Zhang, Yan-Li Zheng and Yi Yan. *Paratypes*: 73362, same data as holotype.

Description. Body length: male 4.9–6.2 mm (*N* = 8), female 6.0–6.8 mm (*N* = 6).

Coloration. General color dark brown (Fig. 1A–D). Eyes dark brown, ocelli yellow. Vertex dark brown. Face generally brown, margins yellow. Rostrum pale brown. Pronotum and mesonotum dark brown, carinae paler. Forewing semi-translucent, brown (sometimes blackish brown), stigma dark brown, apex of forewing with several small blackish brown spots, veins generally brown with discontinuous blackish brown markings. Hind tibiae pale brown and abdominal sternites blackish brown.

Head and thorax. Vertex (Fig. 1A, C) broad, 1.3 times wider than long; anterior margin arched convex; subapical transverse carina arc-shaped, connected with anterior

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border of vertex by two longitudinal small carinae; median carina only discernible at basal half; posterior margin nearly excavated at right angle. Frons (Fig. 1D) 1.6 times as wide as long, with median carina distinct and fork of median carina near apex. Pronotum (Fig. 1C) 1.1 times longer than vertex, posterior margin concaved in right angle. Mesonotum 1.1 times longer than pronotum and vertex combined. Forewing (Fig. 1E) 3.0 times longer than wide, with 10 apical and 5 subapical cells; fork Sc+RP basad of fork CuA1+CuA2; first crossvein r-m basad of fork MP; RP 3 branches, MP with 4 terminals: MP 1, MP2, MP3, and MP4, fork MP1+MP2 basad of fork MP3+MP4. Hind tibia with 5 lateral spines; chaetotaxy of hind tarsi: 7/7, second segment of hind tarsus without platellae.

Male genitalia. Pygofer (Fig. 1F, G) symmetrical, dorsal margin concave and Ushaped ventrally, widened towards apex and slightly convex in the middle; in lateral view, lateral lobes triangularly extended caudally. Medioventral process absent, replaced by two small projections. Anal segment (Fig. 1F, H, I) asymmetrical, in lateral view, dorsal margin almost straight, ventral margin convex in the middle, right lobe larger than left one and apical lobe extended ventrally; 2.2 times longer than wide in dorsal view; anal style finger-like, beyond anal segment. Gonostyli (Fig. 1F, G, J) symmetrical in ventral view; in inner lateral view, trapezoidal, apical margin transverse, base with a deep round excavation and a tusk-like tooth. Aedeagus (Fig. 1K-N) with total of four processes. Base of periandrium with a curved laminal process positioning slightly to right side of its ventral margin, apex acute, directed ventrocaudally. Endosoma broad, convoluted with two sinuations, a right lateral one (Fig. 1K) and a left lateral one (Fig. 1L). In the right lateral view, a large laminal structure with a ribbon-like process apically, directed left-ventrocephalically. In left lateral view, the base of endosoma with a spinose process, apex directed left-dorsocephalically; a spinose process arising from apical 1/3 of endosoma on the dorsal margin, apex directed right-caudally.

Female genitalia. Pregenital sternite (Fig. 2A) with caudal margin slightly recessed, twice wider than long. Tergite IX (Fig. 2A, C) moderately sclerotized, with a large nearly oval wax plate. Anal segment (Fig. 2B) nearly rectangular, 2.2 times longer than wide in dorsal view, anal style finger-like. Gonapophysis VIII (Fig. 2D) reduced, apex acute. Gonapophysis IX (Fig. 2E) extremely short, triangular. Gonoplac (Fig. 2F) strap-shaped. Posterior vagina as shown in Fig. 2G, H. In ventral view, left side with a nearly triangular sclerite, which with a triangular process at the base; right side with a large sclerite bent towards the dorsal surface and a small semicircular sclerite near terminal. In dorsal view, basal area with a process and an oblong sclerite, which with a triangular pouch-like structure basally.

Distribution. China (Yunnan) (Fig. 5).

Etymology. The species name is derived from Fugong County, Yunan Province, where the type locality is located.

Remarks. Male genitalia of *I. fugongensis* sp. nov. is similar to *I. kurseongensis* (Distant, 1911), but differs in: (1) the laminal process on the ventral margin of periandrium acute apically (in *I. kurseongensis*, the laminal process in the same position expanded apically); (2) in the right lateral view, base of endosoma without process (the latter with three processes); (3) left side of endosoma with two spinose processes (in *I. kurseongensis*, left side of endosoma with a S-shaped process and a Y-shaped process).



Figure 1. *Indolipa fugongensis* sp. nov., male **A** habitus, dorsal view **B** habitus, lateral view **C** head and thorax, dorsal view **D** face, ventral view **E** forewing **F** genitalia, lateral view **G** pygofer and gonostyli, ventral view **H** anal segment, dorsal view **I** anal segment, caudal view **J** gonostyli, inner lateral view **K** aedeagus, right side **L** aedeagus, left side **M** aedeagus, dorsal view **N** aedeagus, ventral view. Scale bars: 0.5 mm (**C–D**, **F–N**); 1.0 mm (**E**).



Figure 2. *Indolipa fugongensis* sp. nov., female. **A** genitalia, ventral view **B** anal segment, dorsal view **C** tergite IX, caudal view **D** gonapophysis VIII and gonocoxa VIII, ventral view **E** gonapophysis IX, ventral view **F** gonoplac, ventral view **G** posterior vagina and internal genitalia, ventral view **H** posterior vagina, dorsal view. Scale bars: 0.5 mm (**A–D, F–H**); 0.2 mm (**E**).

Indolipa longlingensis Zhi & Chen, sp. nov.

http://zoobank.org/17EE8128-B900-4BB3-8511-B6CACC988A76 Figures 3A–N, 4A–H

Type material. *Holotype*: ♂, CHINA: Yunnan Province, Longling County (24°35'N, 98°41'E), 9–11 June 2011, Jian-Kun Long. *Paratypes*: 22♂♂25♀♀, same data as holotype, Yu-Jian Li, Zai-Hua Yang and Jian-Kun Long.

Description. Body length: male 5.3–5.8 mm (N= 23), female 6.2–6.7 mm (N= 25). **Coloration.** General color black (Fig. 3A–D). Eyes brown, ocelli yellowish brown. Vertex black. Face generally blackish brown, carinae and margins brown. Rostrum brown. Pronotum dark to blackish brown, carinae paler; mesonotum black. Forewing semi-translucent, pale brown, stigma brown. Hind tibiae and abdominal sternites blackish brown.

Head and thorax. Vertex (Fig. 3A, C) broad, 1.3 times wider than long; anterior margin arched convex; subapical transverse carina arc-shaped, connected with anterior border of vertex by two longitudinal small carinae; median carina absent; posterior margin nearly excavated at right angle. Frons (Fig. 3D) 1.3 times as wide as long, with median carina distinct and fork of median carina near apex. Pronotum (Fig. 3C) 1.3 times longer than vertex, posterior margin concaved in obtuse angle. Mesonotum 1.5 times longer than pronotum and vertex combined. Forewing (Fig. 3E) 3.0 times longer than wide, with 10 apical and 5 subapical cells; fork Sc+RP slightly distad of fork CuA1+CuA2; first crossvein r-m basad of fork MP; RP 3 branches, MP with 4 terminals: MP 1, MP2, MP3, and MP4, fork MP1+MP2 distad of fork MP3+MP4. Hind tibia with 3 lateral spines; chaetotaxy of hind tarsi: 6/5, second segment of hind tarsus without platellae.

Male genitalia. Pygofer (Fig. 3F, G) symmetrical, dorsal margin concave and Ushaped ventrally, widened towards apex; in lateral view, lateral lobes trapezoidally extended caudally. Medioventral process absent, replaced by two small projections. Anal segment (Fig. 3F, H, I) asymmetrical, in lateral view, dorsal margin almost straight, ventral margin convex, right lobe larger than left one and apical lobe extended ventrally; 1.5 times longer than wide in dorsal view; anal style finger-like, beyond anal segment. Gonostyli (Fig. 3F, G, J) symmetrical in ventral view; in inner lateral view, thumbshaped, apical margin round, basal 1/3 with a deep round excavation and a tusk-like tooth. Aedeagus (Fig. 3K-N) with total of seven processes. Base of periandrium with a scoop-like laminal process positioning slightly to right side of its ventral margin, directed cephalad. Endosoma convoluted with two sinuations, a right lateral one (Fig. 3K) and a left lateral one (Fig. 3L). In the right lateral view, endosoma with a long ribbon-like process, apex slightly expanded and round, curving left-dorsocaudally; basal portion of the ribbon-like process with two short laminal processes, apex acute, directed ventrocaudally. In left lateral view, the base of endosoma with a strongly curved process, apex acute, directed dorsocaudally; a long rod-like process arising from basal 1/3 of endosoma on the dorsal margin, curving downwards, apex round, directed dorsally, base of the long process with an extremely short spinose process, apex directed dorsocaudally.

Female genitalia. Pregenital sternite (Fig. 4A) with caudal margin slightly convex in the middle, 2.3 times wider than long. Tergite IX (Fig. 4A, C) moderately sclerotized, with a large nearly oval wax plate. Anal segment (Fig. 4B) oval, 1.8 times longer than wide in dorsal view, anal style finger-like. Gonapophysis VIII (Fig. 4D) reduced, apex acute. Gonapophysis IX (Fig. 4E) comparatively short and thin. Gonoplac (Fig. 4F) strap-shaped. Posterior vagina as shown in Fig. 4G, H. In ventral view, left side with a nearly rectangular sclerite, which with a pouch-like structure at

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Figure 3. *Indolipa longlingensis* sp. nov., male **A** habitus, dorsal view **B** habitus, lateral view **C** head and thorax, dorsal view **D** face, ventral view **E** forewing **F** genitalia, lateral view **G** pygofer and gonostyli, ventral view **H** anal segment, dorsal view **I** anal segment, caudal view **J** gonostyli, inner lateral view **K** aedeagus, right side **L** aedeagus, left side **M** aedeagus, dorsal view **N** aedeagus, ventral view. Scale bars: 0.5 mm (**C–D, F–N**); 1.0 mm (**E**).

the base and terminal; in dorsal view, basal area with an irregular large sclerite, which with a process basally.

Distribution. China (Yunnan) (Fig. 5).

Etymology. The species name is derived from Longling County, Yunan Province, where the type locality is located.

Remarks. Male genitalia of *I. longlingensis* sp. nov. is similar to *I. huapingensis* Luo, Liu & Feng, 2019, but differs in: (1) left side of endosoma with a long rod-like process at basal 1/3, which with an extremely short spinose process basally (the latter in the same position with a foliaceous process, which without spinose process basally); (2) ventral margin of endosoma without process (in *I. huapingensis*, ventral margin of endosoma with a tusk-like process); (3) forewing with 10 apical cells (the latter with 9 apical cells).



Figure 4. *Indolipa longlingensis* sp. nov., female. **A** Genitalia, ventral view **B** anal segment, dorsal view **C** tergite IX, caudal view **D** gonapophysis VIII and gonocoxa VIII, ventral view **E** gonapophysis IX, ventral view **F** gonoplac, ventral view **G** posterior vagina and internal genitalia, ventral view **H** posterior vagina, dorsal view. Scale bars: 0.5 mm.



Figure 5. Distribution records of Chinese species of the genus Indolipa.

Discussion

The Chinese species *Indolipa fopingensis*, *I. fugongensis* sp. nov., *I. gansuensis*, *I. huap-ingensis*, *I. kurseongensis*, *I. longlingensis* sp. nov. and *I. tappanus* share a similar screw-shaped aedeagus, and a similar basiventral process on the periandrium. We therefore believe that these species may be closely related. Based on the complex and variable geomorphological environment and rich biological resources in China, we expect that further new collections will increase the number of new records or species.

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RESEARCH ARTICLE



Two new genera with species of the tribe Sarimini (Hemiptera, Fulgoromorpha, Issidae) from China

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Abstract

Tempsarima Chang & Chen, **gen. nov.** (Hemiptera: Issidae: Sarimini), with type species *Tempsarima bipunctata* Chang & Chen, **sp. nov.** and *Tetrichina* Chang & Chen, **gen. nov.** (Hemiptera: Issidae: Sarimini), with type species *Tetrichina trihamulata* Chang & Chen, **sp. nov.** are described and illustrated from Hainan Province of China. The female genitalia characters of Issidae are discussed.

Keywords

Female genitalia, issid, morphology, Oriental region, planthopper, taxonomy

Introduction

The new classification of Issidae Spinola, 1839 with three subfamilies (Wang et al. 2016), recently updated to four subfamilies (Zhao et al. 2019), currently groups nine tribes (Gnezdilov 2018, 2019a; Bourgoin 2020) in which hindwing characters appear to be important for issid systematics. In this frame, several new taxa were established (Wang et al. 2017; Gnezdilov 2018, 2019a; Chang et al. 2019; Zhao et al. 2019).

However, due to the classification by Wang et al. (2016) based on limited taxa analysis, many unverified taxa had to be placed in *incertae sedis* position in the classification (Bourgoin 2020) and needed to be re-examined.

The subfamily Hemisphaeriinae Melichar, 1906 sec. Wang et al. (2016) contains Hemisphaeriini Melichar, 1906, Kodaianellini Wang, Zhang & Bourgoin, 2016, Parahiraciini Cheng & Yang, 1991, and Sarimini Wang, Zhang & Bourgoin, 2016, all of Oriental, Australian, and Afrotropical region origin. The characters of hindwings as distinguishing features, make it easier to quickly recognize and define these groups (Wang et al. 2016): Hemisphaeriini, a single lobe, short and reduced or absent (Fig. 1); Kodaianellini, three lobes, with Pcu-A1 lobe distinctly thinner, less than half as wide as ScP-RP-MP-Cu lobe, A, lobe with anterior and posterior margins subparallel (Fig. 2); Parahiraciini, two lobes, with veins network-like, a deep narrow incision in apical margin of hindwing, Pcu-A, lobe distinctly wider than ScP-RP-MP-Cu lobe, A, lobe short, thin or absent, Pcu and A1 free, not partially fused (Fig. 3); and Sarimini, three developed lobes, Pcu-A1 lobe more or less as wide as ScP-RP-MP-Cu lobe and Pcu single or branched, Pcu and A, anastomosing for a shorter or longer distance, A, not branched (Fig. 4). The tribe Sarimini now contains 25 genera (Bourgoin 2020), including two recently described new genera Microsarimodes Chang & Chen, 2019 (Chang et al. 2019), and Eusarimissus Wang & Bourgoin, 2020 (Wang and Bourgoin 2020), and the transfer to the tribe Sarimini of eight genera previously in *incertae sedis* position: Balisticha Jacobi, 1941, Euroxenus Gnezdilov, 2009, Givaka Distant, 1906, Neosarima Yang, 1994, Sinesarima Yang, 1994, Sundorrhinus Gnezdilov, 2010, Tempsa



Figures 1–4. Hindwing I *Ishiharanus iguchii* (Matsumura, 1916) 2 *Kodaianella furcata* Chang & Chen, 2020 3 *Tetricodes similis* Chang & Chen, 2017 4 *Longieusarima lunulia* Wang, Bourgoin & Zhang, 2017. Scale bars: 0.5 mm.

Stål, 1866 and *Yangissus* Chen, Zhang & Chang, 2014 (Bourgoin 2020; Chang et al. 2019; Constant and Bartlett 2019; Wang et al. 2019). Currently, fourteen genera of Sarimini are recorded in China: *Euroxenus* Gnezdilov, 2009, *Eusarima* Yang, 1994, *Eusarimissus* Wang & Bourgoin, 2020, *Longieusarima* Wang, Bourgoin & Zhang, 2017, *Microsarimodes* Chang & Chen, 2019, *Neosarima* Yang, 1994, *Nikomiklukha* Gnezdilov, 2010, *Orbita* Meng & Wang, 2016, *Parasarima* Yang, 1994, *Sarima* Melichar, 1903, *Sarimodes* Matsumura, 1916, *Sinesarima* Yang, 1994; *Yangissus* Chen, Zhang & Chang, 2014, and *Tetrica* Stål, 1866 (Chan and Yang 1994; Chang et al. 2019; Chen

et al. 2014; Gnezdilov 2019b; Meng et al. 2016; Wang and Bourgoin 2020; Wang et al. 2017, 2019).

While sorting out the specimens from Hainan Province (China), we found two new genera and species belonging to the tribe Sarimini, which are described here: *Tempsarima* Chang & Chen, gen. nov. with type species *T. bipunctata* Chang & Chen, sp. nov. and *Tetrichina* Chang & Chen, gen. nov. with type species *T. trihamulata* Chang & Chen, sp. nov. In addition, the female genitalia of *T. bipunctata* Chang & Chen, sp. nov., as a special type of female genitalia in Sarimini, is recorded and discussed.

Materials and methods

The morphological terminologies follow Chan & Yang (1994) for the head and body, Bourgoin et al. (2015) for the wing venation, and Bourgoin (1987, 1993) and Gnezdilov (2002, 2003) for male and female genitalia respectively. Dry specimens were used for descriptions and illustrations. The genital segments of the examined specimens were macerated in 10% NaOH, washed in water and transferred to glycerine. Illustrations of the specimens were made with a Leica M125 and Olympus CX41 stereomicroscope. Photographs were taken with KEYENCE VHX-1000C and KEY-ENCE VHX-6000C.

The examined specimens are all deposited in the Institute of Entomology, Guizhou University, Guiyang, China (**IEGU**).

Taxonomy

Family Issidae Spinola, 1839 Subfamily Hemisphaeriinae Melichar, 1906 sec. Tribe Sarimini Wang, Zhang & Bourgoin, 2016

Tempsarima Chang & Chen, gen. nov. http://zoobank.org/565A78E1-D30B-4CDE-8414-D2A6157A8D9F Figures 5–27

Type species. Tempsarima bipunctata Chang & Chen, sp. nov., here designated.

Diagnosis. This genus is similar to the genus *Sarimodes* Matsumura, 1916, but it differs from the latter by: 1) frons smooth (Fig. 9) (frons with vertucae along lateral margin and basal part in *Sarimodes* (Meng and Wang 2016: fig. 18)); 2) forewing with ScP vein long, reaching apical margin, and MP vein forked before the middle of forewings (Fig. 10) (forewing with ScP vein surpassing the middle of forewing, but not reaching apical margin; MP vein forked near distal part in *Sarimodes* (op. cit.: fig. 19)); 3) male genitalia with genital styles irregularly triangular in lateral view; anterodorsal and ventral margins not parallel (Fig. 12) (genital styles irregularly rounded, dorsal and ventral margins not parallel in *Sarimodes* (op. cit.: fig. 22)); 4) apical part of dorsal lobe of phallobase with hooked process in lateral view (Fig. 15) (with sword-like process in *Sarimodes* (op. cit.: fig. 24)); 5) female anal tube and genitalia strongly developed and elongate, saw-like (Fig. 18) (not as above in *Sarimodes* (op. cit.: figs 28, 31)).

Description. Body medium in size.

Head and thorax. Width of head including eyes obviously narrower than pronotum (Fig. 7). Vertex (Fig. 7) irregularly quadrangular, shorter in middle than the maximum width in dorsal view, disc of vertex depressed, with median carina; anterior margin obtusely convex, posterior margin obtusely concave, lateral margins paralleled. Gena (Fig. 8) with one obvious ocellus between compound eye and antenna on each side in lateral view. Frons (Fig. 9) irregularly hexagonal, nearly flat, longer in middle than its maximum width, median carina stout and lateral carinae thin; without verrucae along basal margin and lateral margins; basal margin and frontoclypeal suture arched concaved, lateral margins not paralleled, the base narrow, the maximum width below level of antenna. Clypeus (Fig. 9) triangular, with stout median carina. Rostrum reaching mesotrochanters. Pronotum (Fig. 7) triangular, median carina stout, lateral carinae present, with sunken pits along median carina, anterior margin right-angle concaved, posterior margin straight. Mesonotum (Fig. 7) triangular, median carina obvious, lateral and sub-lateral carinae obscure. Forewings (Fig. 10) oblong, anterior and posterior margin nearly paralleled, apical margin relatively acute, longitudinal veins obvious, without obvious hypocostal plate; ScP long, reaching apical margin, nearly parallel with RP, ScP and RP have a common ScP+RP base, RP not forked, MP forking before middle of forewing, CuA forked into two branches near middle of forewing, CuP present, Pcu and A₁ uniting near middle of clavus, clavus almost 4/5 of forewing. Hindwings (Fig. 11) well developed, three-lobed, Sc+RP have a common stem, forked near apical part, MP simple, not forked, CuA forked into branches CuA, and CuA, near apical part, CuA, and CuP fused apically, with one transverse vein between RP and MP, MP and CuA1, Pcu and A11 anastomosing at a medium distance, Pcu, A11 and A₁₂ simple, non-branched, A₂ lobe developed, with A₂ vein simple. Hind tibiae each with two lateral spines near distal half.

Male genitalia. Anal tube (Fig. 13) elongate, longer than the maximum width in dorsal view. Anal style (Fig. 13) short, located near base, not surpassing the end of anal tube. Pygofer (Fig. 12) symmetrical, irregularly rectangular and broad, anterior and posterior margins parallel. Genital styles (Fig. 12) symmetrical, irregularly triangular in lateral view, anterodorsal and ventral margin nearly parallel, the width ca. 2.0 times



Figures 5–16. *Tempsarima bipunctata* Chang & Chen, sp. nov. 5 adult, dorsal view 6 same, lateral view 7 head and thorax, dorsal view 8 same, lateral view 9 head, ventral view 10 forewing 11 hindwing 12 male genitalia, lateral view 13 male anal segment, dorsal view 14 capitulum of genital styles, posterior view 15 ae-deagus and phallobase, lateral view 16 same, ventral view. Scale bars: 0.5 mm. Abbreviations: a–irregular triangular prominence, b–small claviform process, c–convex protrusion, d–duck mouth-liked process, e–long hooked process, f–lobe-like process, g–small lamina-like process, h–mushroom-liked, i–short hooked process.

than its height, bearing process near base of neck, neck of capitulum slender (Fig. 14). Phallobase (Fig. 15) symmetrical, shallowly "U"-shaped and tubular, stout, dorsal lobe developed with hooked process in lateral view. Aedeagus (Fig. 15) symmetrical, with one process in lateral view.

Female genitalia (Figs 17–27). Anal tube (Fig. 20) sclerotized, extremely narrow, and obviously longer in middle line than the width, tapering in dorsal view. Anal style (Figs 17, 20) long or short, located in base of anal tube, not surpassing the end of anal tube. Hind margin of gonocoxa VIII with endogonocoxal lobe not obvious, endogonocoxal process reduced, fused with anterior connective lamina of gonapophyses VIII (Fig. 22). Anterior connective lamina of gonapophyses VIII (Fig. 22). Anterior connective lamina of gonapophyses VIII (Fig. 22) symmetrical, strongly sclerotized, extremely narrow, long, saw-like. Posterior connective lamina of gonapophyses IX (Figs 23, 24) symmetrical, triangular, ventroposterior lobes with long flagelliform process. Gonoplacs (Figs 25, 26) symmetrical, elongate, sclerotized, tuber and tapering in lateral view; the basal part fused in dorsal view. Hind margin of sternite VII convex, with prominence in middle area in ventral view (Fig. 27).

Distribution. China (Hainan).

Etymology. The generic name is derived from a free combination between the genus names *Tempsa* Stål, 1866 (referring to the similar female genitalia) and *Sarima* Melichar, 1903 (type genus in Sarimini). The gender is feminine.

Remarks. The new genus markedly differs from the other genera in Sarimini: 1) frons smooth, with medical carina stout, reaching frontoclypeal suture (Fig. 9); 2) forewing with ScP vein long, reaching apical margin of forewings (Fig. 10); 3) male genitalia with genital styles irregularly triangular in lateral view, the width ca. 2.0 times the height (Fig. 12); 4) apical part of dorsal lobe of phallobase with hooked process (Fig. 15); 5) female genitalia with anal tube extremely narrow and long (Fig. 20), anterior connective lamina of gonapophyses VIII heavily sclerotized, long saw-like (Fig. 22), apical part of posterior connective lamina of gonapophyses IX with flagelliform process (Fig. 23), gonoplacs elongate, tubular in lateral view (Fig. 25).

Tempsarima bipunctata Chang & Chen, sp. nov.

http://zoobank.org/DE35755E-7CFB-49A2-A162-295600A2EFA4 Figures 5–27

Type material. *Holotype:* 3, CHINA: Hainan, Bawangling (22°28'N, 106°57'E), 13 March 2014, S-Y Xu and J-K Long leg.; paratypes: 103329, Hainan, Bawangling (22°28'N, 106°57'E), 30 April 2017, L-J Yang leg.; 499, Hainan, Diaoluoshan (18°39'N, 109°55'E), 15 April 2017, L-J Yang leg.

Diagnosis. This new species is distinguished by the following characters: vertex with four black brown bands along lateral margins and median carina (Fig. 7); mesonotum with each other one dark spot between lateral and sublateral carinae (Fig. 7); genital styles with irregular triangular prominence near dorsal margin at base of capitulum (Fig. 12a); dorsal lobe of phallobase with one small claviform process in base


Figures 17–27. *Tempsarima bipunctata* Chang & Chen, sp. nov. 17 female genitalia, dorsal view 18 same, lateral view 19 same, ventral view 20 female anal segment, dorsal view 21 same, lateral view 22 anterior connective lamina of gonapophyses VIII, lateral view 23 posterior connective lamina of gonapophyses VIII, lateral view 23 posterior connective lamina of gonapophyses IX, dorsal view 24 same, lateral view 25 gonoplacs, lateral view 26 same, dorsal view 27 sternite VII, ventral view. Scale bars: 1 mm (17–19), 0.5 mm (20–27). Abbreviations: tl–teeth in inner lateral margin, mf–median field, fp–flagelliform process.

(Fig. 15b), and convex protrusion near middle (Fig. 15c) and apical part with a duckbill-like process (Fig. 15d), lateral margin with one long hooked process (Fig. 15e) on each side; ventral lobe with apical part mushroom-like in ventral view (Fig. 16h); aedeagus with one short hooked process near apical 1/3 in lateral view, directing to cephalad (Fig. 15i).

Description. Body length (from apex of vertex to tip of forewings): male 7.80–8.31 mm (N = 11), female 8.80–9.30 mm (N = 7); forewing: male 6.50–7.80 mm (N = 11), female 7.60–9.30 mm (N = 7).

Coloration. General colour yellow-green (Fig. 5). Vertex (Fig. 7) yellow-brown, with four black brown bands along lateral margins and median carina, with pale yellow median carina. Frons and clypeus (Fig. 9) ochreous. Compound eyes black brown, ocelli pale ochreous (Fig. 8). Pronotum and mesonotum (Fig. 7) yellow brown, mesonotum with pair of dark spots between lateral carinae and sublateral carinae. Male forewings (Fig. 6) yellow green, with diffusely brownish irregular speckles near middle of MP vein and CuA vein, and the base of ScP+RP vein; female forewings brown. Hindwings transparent. Abdomen pale yellow-green, suffused with black-brown near middle line. Male genitalia pale yellow green. Female genitalia brown black. Tip of spines on hind tibiae and tarsi black.

Head and thorax. Head (Fig. 7) including eyes distinctly narrower than pronotum (0.77: 1.00). Vertex (Fig. 7) slightly shorter in middle than the width (0.75: 1.00). Frons (Fig. 9) longer in middle than the maximum width (1.14: 1.00), with median carina nearly reaching frontoclypeal suture, sublateral carinae obscure, nearly reaching the level of middle of frons. Pronotum (Fig. 7) shorter in midline than the width (0.31: 1.00). Mesonotum (Fig. 7) shorter in midline than its width (0.43: 1.00); the basal part forked, scutellum sunken. Forewings (Fig. 10) longer than width (2.33: 1.00), MP two branches near basal 1/3, MP₁ dividing two branches in distal 1/4, MP₂ not forked, CuA forked into two branches in middle of forewing, Pcu and A₁ uniting slightly after MP bifurcation. Hindwings (Fig. 11) with one transverse vein between CuP and Pcu near apical part, with transverse vein between Pcu+A₁₁ and A₁₂ near basal 1/3. Spinal formula of hind leg (2)7/6, 7/2.

Male genitalia. Anal tube (Fig. 13) longer than its widest breath (2.90: 1.00) in dorsal view, anterior margin arched convex, lateral margins nearly parallel at apical 2/3, the basal 1/3 part broader than apical part. Anal style (Fig. 13) small, extremely short and thin, located in basal 2/5 of anal tube, not surpassing the end of the anal pore. Pygofer (Fig. 12) with dorsal and ventral margin paralleled in lateral view. Genital styles (Fig. 12) with irregular triangular prominence at base of capitulum (Fig. 12a). Capitulum of genital styles irregularly keen-edged triangular, neck very long and obvious (Fig. 14). Phallobase (Fig. 15b) in lateral view, convex protrusion near middle (Fig. 15c) and apical part with duckbill-like process (Fig. 15d), lateral margin with one long hooked process on each side (Figs 15e, 16e), surpassing middle of phallobase, directing to cephalad, and lateral margin waved obviously, with one lobe-like process

(Fig. 15f); lateral lobe splitting into two branches, slightly shorter than the dorsal lobe, with unobvious small lamina-like process (Fig. 15g); ventral lobe slightly shorter than lateral lobe in lateral view, stout, with apical part mushroom-like (Fig. 16h) in ventral view. Aedeagus (Figs 15, 16) with one short hooked process on each side (Figs 15i, 16i) near apical 1/3 in lateral view, directing to cephalad.

Female genitalia. Anal tube (Figs 17, 20) longer in middle line than the width (3.15: 1.00), the basal 1/3 part broader, inclined to ventral margin in lateral view (Fig. 21). Anal style (Figs 20, 21) long and stout, located in basal 1/6 of anal tube, surpassing the end of anal pore. Anterior connective lamina of gonapophyses VIII (Figs 18, 22) extremely long saw-like, with a row of teeth in inner lateral margin (Fig. 22: tl). Posterior connective lamina of gonapophyses IX (Figs 23, 24) relatively broad in dorsal view, with lateral field and sublateral field unobvious, membranous, median field membranous, with deep sunken (Fig. 23: mf), apical part of ventroposterior lobes with long flagelliform process (Fig. 23: fp). Gonoplacs (Fig. 25) irregularly triangular, tapering, apical part membranous, thin tuber in latera view; fused dorsally to form a sheath surrounding the anterior connective lamina of gonapophyses VIII (Fig. 26). Hind margin of sternite VII with distinctly triangular prominence in middle area in ventral view (Fig. 19), inner margin with membranous process (Fig. 27).

Distribution. China (Hainan).

Etymology. The species name is derived from a combination of the prefix "bi-" and Latin noun "punctata", suggesting the paired dark spots of mesonotum.

Host plant. Unknown.

Tetrichina Chang & Chen, gen. nov.

http://zoobank.org/24124E55-71B3-4696-9CB9-F5D87D53BC8B Figures 28–48

Type species. Tetrichina trihamulata Chang & Chen, sp. nov., here designated.

Diagnosis. Related to the genus *Sarimodes* Matsumura, 1916, but it is distinguished as follows: frons (Fig. 32) without obvious verrucae along basal and lateral margins (frons with obvious verrucae in *Sarimodes* (Meng and Wang 2016: fig. 18)); forewings (Fig. 33) with ScP long, reaching apical margin of forewing, with short vein in base of ScP (ScP only surpassing middle of forewings, without short vein in *Sarimodes* (op. cit.: fig. 19)); genital styles (Fig. 35) irregularly elliptical in lateral view, neck of capitulum extremely long (genital styles irregularly rounded, neck of capitulum short in *Sarimodes* (op. cit.: fig. 22)).

Description. Body medium size, slightly flat in dorsal view.

Head and thorax. Width of head including eyes narrower than pronotum (Fig. 28). Vertex (Fig. 30) quadrangular, shorter in middle than its maximum width in dorsal view, disc of vertex depressed, median carina obscure, with one pit between median and lateral carinae; anterior margin obtusely convex, posterior margin arched concave,



Figures 28–39. *Tetrichina trihamulata* Chang & Chen, sp. nov. 28 adult, dorsal view 29 same, lateral view 30 head and thorax, dorsal view 31 same, lateral view 32 head, ventral view 33 forewing 34 hindwing 35 male genitalia, lateral view 36 male anal segment, dorsal view 37 capitulum of genital styles, posterior view 38 aedeagus and phallobase, lateral view 39 same, ventral view. Scale bars: 0.5 mm. Abbreviations: a–obvious triangular prominence, b–unobvious triangular prominence, c–lobed process, d–bidirectional hooked process, e–irregularly quadrangular prominence, f–lobe-like process, g–long hooked process.

lateral margins paralleled. Gena (Fig. 31) with one obvious ocellus between compound eye and antenna on each side in lateral view. Frons (Fig. 32) irregularly hexagonal, length in midline nearly equal to its maximum breadth; with median and lateral carinae, reaching frontoclypeal suture; without obvious verrucae along basal and lateral margins; basal margin obtusely concaved; frontoclypeal suture slightly arched concave, lateral margins not paralleled; the base narrow, the maximum width below level of antenna. Clypeus (Fig. 32) triangular, with median carina stout, short or long. Rostrum just reaching mesotrochanters. Pronotum (Fig. 30) triangular, with median and lateral carinae, and with two pits between median and lateral carinae, anterior margin obtusely-angle concaved, posterior margin straight. Mesonotum (Fig. 30) triangular, with median and lateral carinae, sublateral carinae obscure. Forewings (Fig. 33) irregularly oval, anterior margin distinctly arched convexly, posterior margin straight, apical margin distinctly arched, longitudinal veins obvious, with a few unobvious short transverse veins, without hypocostal plate; ScP long, reaching apical margin, ScP forked one short vein near base, ScP and RP have a common ScP+RP base, RP simple, not forked, MP and CuA forked into two branches near middle of forewing, CuP present, Pcu and A, uniting near base 2/3 of clavus, clavus almost 4/5 of forewing. Hindwings (Fig. 34) well-developed of typical Sarimini type, three lobes, ScP+PR have a common stem, forked near apical part, MP simple, not forked, CuA forked into branched CuA, and CuA, near apical part, CuA, and CuP fused apically, with one transverse vein between RP and MP, MP and CuA1, Pcu and A11 anastomosing at medium distance, Pcu, A11, and A12 not branched, A2 lobe relatively narrow, A2 vein simple. Hind tibiae each with two lateral spines near distal half.

Male genitalia. Anal tube (Fig. 36) irregularly pentagonal, longer in middle than its widest breadth in dorsal view, basal part extremely narrow, apical part broad, the maximum width near the apical part. Anal style (Fig. 36) relatively long, not surpassing the end of anal tube. Pygofer (Fig. 35) symmetrical, irregularly rectangular in lateral view, dorsal and ventral margin paralleled. Genital styles (Fig. 35) irregularly elliptical in lateral view, postero-dorsal margin long and nearly parallel to ventral margin, bearing process near base of neck. Capitulum (Fig. 37) extremely developed, neck of capitulum extremely long. Phallobase (Figs 38, 39) symmetrical, U-like tube in lateral view, apical part of dorsal lobe with hooked processes on each side in lateral view. Aedeagus (Figs 38, 39) with one hooked process on each side in lateral view.

Female genitalia (Figs 40–48). Anal tube (Figs 40, 43) elongate, longer in middle line than its width. Anal style (Fig. 43) long, located near base of anal tube, not surpassing the end of anal tube. Anterior connective lamina of gonapophyses VIII (Fig. 44) irregularly rectangular, with four keeled teeth in lateral group and three large teeth in apical group. Posterior connective lamina of gonapophyses IX (Figs 45, 46) triangular and narrow in dorsal view. Gonoplacs (Fig. 47) irregularly round, without keels. Hind margin of sternite VII with prominence in middle area in ventral view (Fig. 48).

Distribution. China (Hainan).

Etymology. The generic name is derived from the arbitrary combination of generic name "*Tetrica*" and word "China". The gender is feminine.

Tetrichina trihamulata Chang & Chen, sp. nov.

http://zoobank.org/F3785430-C2D3-402E-9A04-85744F64F56A Figures 28–48

Type material. *Holotype:* 3, CHINA: Hainan Province, Jianfengling National Park (18°42'N, 108°51'E), 20 April 2014, W-C Yang leg.; paratypes: 3332292, data same as holotype; 533, Hainan, Jianfengling (18°42'N, 108°51'E), 13–16 January 2011, J-K Long and P Zhang; 233292, Hainan, Bawangling National Nature Reserve (22°28'N, 106°57'E), 7–11 January 2011, J-K Long and P Zhang; 233, Hainan Province, Datian National Nature Reserve (19°06'N, 108°47'E), 12–13 April 2013, J-K Long, J-C Xing and Y-B Zhang leg.

Diagnosis. This new species looks like *Sarimodes clavatus* Meng & Wang, 2016 (Meng and Wang 2016: figs 17–32), but differs from the latter by: 1) vertex shorter in middle line than its maximum width, but longer in *S. clavatus*; 2) capitulum of genital styles with anterior margin with one triangular prominence near base, but in *S. clavatus* without triangular prominence; 3) phallobase with dorsal lobe with one stout bidirectional hooked process in lateral view; but with one hooked process in *S. clavatus*.

Description. Body length: male 5.02-5.64 mm (*N* = 13), female 5.73-5.82 mm (*N* = 4); forewing: male 4.13-4.57 mm (*N* = 13), female 4.70-4.88 mm (*N* = 4).

Coloration. General colour yellow-green (Figs 28, 29). Compound eyes brown, ocelli pale green (Fig. 31). Forewings (Fig. 28) yellow-green, with diffuse brownish irregular speckles near middle. Tip of spines on hind tibiae and tarsi black.

Head and thorax. Head (Fig. 30) including eyes narrower than pronotum (0.76: 1.00). Vertex (Fig. 30) shorter in middle than the width (0.63: 1.00), median carina liner. Frons (Fig. 32) slightly longer in middle than its maximum breadth (1.02: 1.00), median carina stout, lateral carinae slender. Pronotum (Fig. 30) shorter in midline than the width (0.24: 1.00). Mesonotum (Fig. 30) shorter in midline than the width (0.30: 1.00). Forewings (Fig. 33) longer than width (2.00: 1.00), RP simple, reaching apical margin, MP two branched near middle, MP₁ and MP₂ forked near distal part, CuA forked into two branches in middle of forewing, paralleling MP bifurcation, Pcu and A₁ uniting slightly before MP bifurcation. Hindwings (Fig. 34) without transverse vein between Pcu+A₁₁ and A₁₂. Spinal formula of hind leg (2)8/6, 10/2.

Male genitalia. Anal tube (Fig. 36) longer in middle than its widest breath (2.40: 1.00) in dorsal view, anterior margin obtuse convex, the base extremely narrow, the width near apical 1/4. Anal style (Fig. 36) thin, located near middle, surpassing the end of anal pore. Pygofer (Fig. 35) with anterior margin straight, posterior margin arched convex in lateral view. Genital styles (Fig. 35) with antero-dorsal margin short, anterior margin bearing obvious triangular prominence (Fig. 35a) and posterior margin bearing unobvious triangular prominence (Fig. 35b) near base of capitulum. Capitulum with of genital styles irregular triangular, with irregular lobed process in basal of capitulum (Fig. 35c), neck of capitulum extremely stout (Fig. 37). Phallobase (Figs 38, 39) with dorsal lobe simple, apical part membranous, in lateral view, with one stout bidirectional hooked process (Fig. 35d) on each side, one short directing to anterior-dorsad,



Figures 40–48. *Tetrichina trihamulata* Chang & Chen, sp. nov. 40 female genitalia, dorsal view; 41 same, lateral view 42 same, ventral view 43 female anal segment, dorsal view 44 anterior connective lamina of gonapophyses VIII, lateral view 45 posterior connective lamina of gonapophyses IX, dorsal view 46 same, lateral view 47 gonoplacs, lateral view 48 sternite VII, ventral view. Scale bars: 0.5 mm. Abbreviations: lf–lateral field of posterior connective lamina of gonapophyses IX; slf–sublateral field of posterior connective lamina of gonapophyses IX; mdp–medial dorsal process; pvd–posterior ventral lobes.

one relatively long, directing to posterior-dorsad; ventrolateral lobe with irregularly quadrangular prominence (Fig. 35e) in basal 1/3 in lateral view; lateral lobe splitting into two branches, more longer than dorsal lobes; ventral lobe shorter than lateral lobe in lateral view, apical part with lobe-liked process (Fig. 39f) in ventral view. Aedeagus (Figs 38, 39) with one extremely long hooked process on each side (Fig. 38g) in lateral view, directing to cephalad (Fig. 39g).

Female genitalia. Anal tube (Figs 40, 43) longer in middle line than the width (2.10: 1.00), apical margin arched convex, lateral margins paralleled. Anal style (Fig. 43) relatively long and stout, located in basal 1/4 of anal tube, surpassing the end of anal pore. Gonocoxa VIII relatively long and narrow, gonocoxa VIII with endogonocoxal lobe obvious, with one small claviform sclerotic process, endogonocoxal process membranous and developed (Fig. 44). Anterior connective lamina of gonapophyses VIII (Fig. 44) with four keels leading to four teeth in lateral group and three teeth in series in apical group. Posterior connective lamina of gonapophyses IX (Figs 45, 46) narrow, sub-triangular in dorsal view, lateral field membranous developed, with triangular membranous process with microvilli (Fig. 45: lf); sub-lateral field developed and sclerous, with the inner margin waved (Fig. 45: slf); median field with symmetric goblet-shaped process, apical margin in middle concave (median dorsal process) (Fig. 45: mdp); distal parts bent at obtuse angled in dorsal view (posterior ventral lobes) (Fig. 45: pvd). Hind margin of sternite VII obviously convex in medial area in ventral view (Figs 42, 48).

Distribution. China (Hainan).

Etymology. The species name is derived from a combination of the prefix "tri-" and Latin noun "hamulata", referring to the phallobase and aedeagus with three variously hooked processes.

Host plant. Unknown.

Discussion

Emeljanov (1990) proposed two types of female genitalia along with different functions: the piercing-type in order to pierce plant tissue for laying eggs, and the rakingtype in order to cover eggs with secretions of female genitalia. Bourgoin (1993) also characterized two types of female genitalia in Fulgoroidea along with their morphology: the plesiomorphic orthopteroid-type, such as species of Cixiidae, Delphacidae, and Kinnaridae, and the derived fulgoroid-type, such as in *Metaphaena basilactea* (Dictyopharidae) and other planthopper families including Issidae. In the family Issidae, most of the groups have one common type of female genitalia, which is of the representative raking-type based on fulgoroid-type structural morphology: anterior connective lamina of gonapophyses VIII irregularly rectangular, rake-like, with developed endogonocoxal process, gonoplacs rounded and membranous, as in *Tetrichina trihamulata* Chang & Chen, sp. nov. (Figs 44–47). However, in several other Issidae, another kind of female genitalia is observable with anterior connective lamina of gonapophyses VIII strongly sclerotized and narrow, bearing a row of teeth, endogonocoxal process short and degraded, the apical part of posterior connective lamina of gonapophyses IX flagelliform, gonoplacs elongate, beak-shaped and sclerotized. This type of female genitalia belongs to the fulgoroid-type from which it is derived but with a shift of the raking function, probably returning to a secondary piercing one. This type is already recorded in Issidae Hysteropterinae in Euplilis Walker, 1857, Gabaloeca Walker, 1870, and also in the Sarimini genus Tempsa Stål, 1866 (Gnezdilov 2013), and Tempsarima Chang & Chen, gen. nov. also belongs to this type. It is also known in Nogodinidae, but gonoplacs are round in Ugoa Fennah, 1945 and Jamaha Gnezdilov & O'Brien, 2008, while beak-shaped in Caudibeccus carlota (Myers) (Gnezdilov 2013). The same tendency is also observed in anterior connective laminae in the genera Colpoptera and Caudibeccus (Gnezdilov 2013: figs 17, 22). Gnezdilov (2013) proposed the term "styletization" standing for the tendency of narrowing and referring to the secondary piercing-fulgoroid type of female genitalia. The irregular triangular gonoplacs of Colpoptera sinuata Burmeister might represent a distinct transition from the rounded to the elongate beak-shaped type. In the tribe Sarimini, a similar transition is observable with Microsarimodes Chang & Chen, 2019 bearing irregular triangular gonoplacs (Chang et al. 2019: fig. 36), and the distal parts of the posterior connective laminae of gonapophyses IX slender and narrowing (Chang et al. 2019: fig. 34), standing for the transition from a non flagelliform to flagelliform conformation.

Acknowledgments

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RESEARCH ARTICLE



Description of 47 new species of the New Caledonian endemic caddisfly genus Agmina Ward & Schefter (Trichoptera, Ecnomidae)

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Abstract

New Caledonia has a rich Trichoptera fauna with over 200 known species, most of them endemic. The total diversity has been estimated as high as 300 to 600 species. The endemic genus Agmina Ward & Schefter (Ecnomidae, Trichoptera) includes 28 described species. Based on male genitalia morphology and previously published molecular data another 47 new species in the genus are described, namely Agmina tuberosa sp. nov., A. semiovale sp. nov., A. rocheta sp. nov., A. tenuisa sp. nov., A. multidentata sp. nov., A. cornuta sp. nov., A. sagittata sp. nov., A. circulata sp. nov., A. digitata sp. nov., A. longispina sp. nov., A. magnahamata sp. nov., A. longicordata sp. nov., A. campanula sp. nov., A. semicampanula sp. nov., A. cunicula sp. nov., A. cerritula sp. nov., A. monstrosa sp. nov., A. rectangulata sp. nov., A. chela sp. nov., A. piscaria sp. nov., A. amplexa sp. nov., A. caraffa, sp. nov., A. rostrata sp. nov., A. dathioensis sp. nov., A. rougensis sp. nov., A. viklundi sp. nov., A. lata sp. nov., A. falx sp. nov., A. guttula sp. nov., A. amieuensis sp. nov., A. spina sp. nov., A. complexa sp. nov., A. dognyensis sp. nov., A. mana sp. nov., A. anterohamata sp. nov., A. curvatacua sp. nov., A. recurvata sp. nov., A. taoensis sp. nov., A. triangulata sp. nov., A. bleuensis sp. nov., A. touhoensis sp. nov., A. wardi sp. nov., A. parallela sp. nov., A. christinae sp. nov., A. brevis sp. nov., A. ninguana sp. nov., and A. scopula sp. nov. Additionally, new records are provide for the species A. acula Ward, 2003, A. artarima Ward & Schefter, 2000, A. berada Ward & Schefter, 2000, A. bimaculata Ward & Schefter, 2000, A. cheirella Ward, 2003, A. comata Ward, 2003, A. diriwi Ward & Schefter, 2000, A. hamata Ward & Schefter, 2000, A. hastata Ward & Schefter, 2000, A. hirta Ward & Schefter, 2000, A. jepiva Ward & Schefter, 2000, A. joycei Ward & Schefter, 2000, A. kapiwa Ward & Schefter,

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2000, *A. kara* Ward & Schefter, 2000, *A. mariae* Ward & Schefter, 2000, *A. nodosa* Ward, 2003, *A. panda* Ward & Schefter, 2000, *A. padi* Ward & Schefter, 2000, *A. parie* Ward & Schefter, 2000, *A. rhara* Ward & Schefter, 2000, *A. urugi* Ward & Schefter, 2000, and *A. vuegi* Ward & Schefter, 2000. With a total of 75 described species *Agmina* is one of the largest animal radiations in New Caledonia. Nothing is known about the early stages of any of the species in this genus.

Keywords

caddisflies, diversity, New Caledonia, new species, rivers, streams

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Introduction

New Caledonia in the southwest Pacific is the smallest of the original biodiversity hotspots (Myers et al. 2000) and has a rich both terrestrial and freshwater insect fauna (e.g., Balke et al. 2007; Espeland and Johanson 2010a, b; Papadopoulou et al. 2013; Gibbs and Lees 2014). The islands have been shown to be especially rich in caddisflies (Trichoptera) with almost 250 described species and an estimated total of 300 to 600 species (Espeland and Johanson 2010a; Johanson and Wells 2019). The caddisfly genus Agmina Ward & Schefter, 2000 (Ecnomidae) currently contains 28 species all endemic to New Caledonia. Approximately 40% of these species were described based on single specimens and it has been predicted that the total number of species is probably much higher (Ward and Schefter 2000; Ward 2003; Johanson and Wells 2019; Wells et al. 2019). Support for this comes from a phylogenetic study showing that there are at least 47 undescribed species in the genus, making it one of the largest known animal radiations on New Caledonia (Espeland and Johanson 2010), now possibly surpassed only by eumolpine leaf beetles (Papadopoulou et al. 2013). The study by Espeland and Johanson (2010) indicated that Agmina split from its closest relatives around 36 mya just after the island reappeared from being submerged for much of the Palaeocene and first half of the Eocene (e.g., Paris 1981; Aichison et al. 1998; Crawford et al. 2003; Pelletier 2007; Cluzel et al. 2012). The earliest radiation was dated to the early Miocene. More than half the species appear to be adapted to the nutrient poor, but toxic, nickel-rich ultramafic substrate currently found on approximately one third of the island (Espeland and Johanson 2010), which generally has been shown to have a poor aquatic macroinvertebrate diversity compared to other substrates (Mary 2002).

Here we describe 47 new species in the genus *Agmina* increasing the number of known species by 270%, to 75 species. Several of the new species are based on singletons shown to be good species in the molecular phylogeny of Espeland and Johanson (2010). With this report, 286 species of caddisflies are now known from New Caledonia.

Materials and methods

The material used in this study was collected in Malaise traps and light traps on the New Caledonian Grande Terre during three expeditions between 2001 and 2006. The Malaise traps were set in place for approx. two weeks at a time, the light traps were operated overnight only. All material was sampled directly into 80% alcohol and transported to the laboratory at the Swedish Museum of Natural History (NHRS) for sorting and determination. The determinations were carried out using the information in Ward and Schefter (2000) and Ward (2003). Material of all Agmina species in the samples was included in a phylogenetic analysis (Espeland and Johanson 2010a) which resulted in a tree with seven monophyletic clades including 22 previously described species and 47 undescribed species. The seven clades are used below to group the species according to the phylogenetic position rather than morphological similarities, and diagnosis of the species groups are therefore not included. Extraction of DNA from the specimens was done from the individual abdomens, which were macerated during that process. The abdomens were dehydrated in absolute alcohol and temporarily mounted in Euparal on a microscope slide before examination and drawing. All drawings were produced in pencil on plain white A4 paper sheets using a drawing tube mounted on a Leitz Ortholux II. After the drawings were completed the abdomens were returned to the alcohol vial with the rest of the animal. Each pencil illustration was digitised in a scanner at low resolution and thereafter used as a background layer in Adobe Photoshop 8.0. The illustrations were completed after being re-drawn on a new layer using a Wacom drawing pad before the background layer was deleted. The nomenclature applied to the genitalic morphology follows that of Johanson (2017). Specimens in this study are deposited in the following repositories:

MNHN Muséum national d'Histoire naturelle, Paris, France;NHRS Swedish Museum of Natural History, Stockholm, Sweden.

Results

Descriptions

Phylum: Arthropoda von Siebold, 1848 Class: Insecta Linnaeus, 1758 Order: Trichoptera Kirby, 1813 Superfamily Hydropsychoidea Curtis, 1835 Family: Ecnomidae Ulmer, 1903 Genus: *Agmina* Ward & Schefter, 2000

Species group I, tuberosa group

Included species in this group are: Agmina tuberosa sp. nov., A. semiovale sp. nov., A. rocheta sp. nov., A. tenuisa sp. nov., A. multidentata sp. nov., and A. cornuta sp. nov.

Agmina tuberosa sp. nov.

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http://zoobank.org/69CE945D-293D-4A0F-9F82-4A13533C2724
Figs 1–5
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Diagnosis. Agmina tuberosa sp. nov. resembles many other Agmina species in having large, oval superior appendage, but is distinguished from other species by the large inferior appendages, each with a long dorsal and short ventral branch in lateral view, and the sternal processes reaching to half length of the inferior appendages. The genitalia are similar to those of *A. semiovale* sp. nov. from which it is distinguished by the presence of a row of teeth-like megasetae on the mesal margin of each paramere in dorsal view.

Etymology. *Tuberosa*, from Latin, meaning potato, named for the superior appendage being potato-shaped in lateral view.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Rivière des Lacs, 1.1 km NW Lac en Huit, 4.9 km NW summit of Pic du Grand Kaori; loc#078; 22°15.195'S, 166°52.178'E; 10.xii.2003; light trap; leg. KA Johanson; MNHN.

Paratype: New Caledonia – **Province Sud** • 1 ♂; Rivière des Lacs, above waterfall at Chutes de Madeleine; 22°13.930'S, 166°51.633'E; 243 m; 23.xi.2003; light trap; loc#042; leg. KA Johanson; NHRS.

Measurements. Fore wing length 4.2–4.8 mm (N = 2). Total length of genitalia: 0.6 mm.

Description. Genitalia: In lateral view, segment IX widely rounded anteriorly, apex located dorsally; in ventral view anteriorly widely U-shaped. Sternal processes, lateral view, with apex not exceeding posterior apex of tergum X, narrowing along their length, curved ventro-posteriorly at mid-length; in ventral view, slender, straight, slightly diverging along their length. Tergum X smoothly convex dorsally, in lateral view longer than high; in dorsal view, mesally separate, axe-shaped with straight inner margins. Parameres robust, starting before tergum X, long, narrow; in lateral view running parallel with dorsal margin of segment IX, X, and superior appendage, ending before apex of superior appendage; in dorsal view, separated and narrowing along their length, each with truncate apex, inner margin with row of megasetae. Superior appendage, in lateral view, large, oval, with posterad spine-like mesal process present on ventromesal margin exceeding the main branch posteriorly; in dorsal view uniformly narrow, running almost parallel, slightly curving inwards towards blunt apex. Mesal processes straight, orientated slightly mesally. Inferior appendage with posterad orientated long dorsal branch slightly dorsally curving at acute apex; dorsal branch widely separated from short, triangular, ventral branch; in ventral view large, wide, oval, with posterad orientated dorsal branches, ventral branch forming central lobe. Phallus, in lateral view as long as segment IX, slender and slightly curving downwards; in ventral view uniformly tapering along its length.

Additional information. This species was referred to as "sp. 26" in Espeland and Johanson (2010).



Figures 1–5. *Agmina tuberosa* sp. nov. male holotype I genitalia, left lateral view **2** genitalia, dorsal view **3** genitalia, ventral view **4** phallus, lateral view **5** phallus, ventral view.

Agmina semiovale sp. nov.

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http://zoobank.org/49E2FB6D-0222-4EFB-9DB8-273D468257B5
Figs 6–9
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Diagnosis. Agmina semiovale sp. nov. resembles many other Agmina species in having a large semi-oval shaped superior appendage in lateral view. The species is distinguished from the other species by the presence of very large parameres that partly exceeds the superior appendages dorsally as seen in lateral view, and in dorsal view forming an oval basis and two broad posterad branches. The genitalia are similar to those of *A. tuberosa* sp. nov. from which it is distinguished by the absence of a row of teeth-like megasetae on the mesal margin of each paramere.

Etymology. *Semiovale*, from Latin, meaning half oval, named for the shape of the superior appendage in lateral view.

Material examined. *Holotype*: New Caledonia – **Province Sud** • \mathcal{J} ; stream crossing Nouméa-Yaté road immediately W of turnoff to Rivière Bleue Reserve; 22°10.191'S, 166°44.474'E; 162 m; 22.xi-4.xii.2003; Malaise trap; loc#040; leg. KA Johanson; MNHN.

Measurements. For wing length 3.6 mm (N = 1). Total length of genitalia: 0.5 mm.

Description. *Genitalia*: Segment IX damaged, with sternal processes missing. Tergum X sub-rectangular; in dorsal view, mesally separate, more than two times longer than wide. Parameres robust, starting before tergum X, in lateral view long, wide at base, first half narrowing towards apex, apical half slightly widening, ventral margin slightly concave; in dorsal view, fused at base, apical 2/3^{rds} separated, each with truncated apex, lateral margins convex, mesal margins slightly concave. Superior appendages, in lateral view, longer than tergum X, longer than wide, narrowing along its length, dorsal margin straight, ventral margin convex, with posterad spine-like mesal process present on ventromesal margin not exceeding posteriorly the main branch; in dorsal view slightly curving inwards. Mesal processes straight, orientated slightly mesally. Inferior appendages missing due to damage. Phallus, in lateral view approx. as long as segment IX, three times longer than wide; in ventral view proximal half tapering along its length, apical half straight and tapering at apex.

Additional information. This species was referred to as "sp. 57" in Espeland and Johanson (2010).

Agmina rocheta sp. nov.

http://zoobank.org/02A8CFE3-5A96-47D9-BA0D-1434230634DA Figs 10–14

Diagnosis. *Agmina rocheta* sp. nov. is distinguished from the other *Agmina* species by the presence of a pair of drop-shaped superior appendages, in lateral view, each with a



Figures 6–9. *Agmina semiovale* sp. nov. male holotype **6** genitalia, dorsal part in left lateral view **7** genitalia, dorsal view **8** phallus, lateral view **9** phallus, ventral view.

very long and curved mesal process reaching as far posteriorly and above the apex of the superior appendages. It particularly resembles *A. nodosa* Ward, 2003 but in *A. nodosa* the sternal processes are simple while in *A. rocheta* sp. nov. they are bifurcated.

Etymology. *Rocheta* (noun, feminine), from Latin, meaning rocket. Named for the rocket-shaped phallus in ventral view.



Figures 10–14. *Agmina rocheta* sp. nov. male holotype **10** genitalia, left lateral view **11** genitalia, dorsal view **12** genitalia, ventral view **13** phallus, lateral view **14** phallus, ventral view.

Material examined. *Holotype*: New Caledonia – **Province Nord** • ♂; Wan Pwé On Stream, draining NNE side of Mt. Panié, 3.9 km NW Cascade de Tao; 20°31.820'S, 164°47.016'E; 18.xii.2003; light trap; loc#085; leg. KA Johanson; MNHN.

Paratype: New Caledonia – **Province Nord** • 1 ♂; same data as for holo-type; NHRS.

Type locality. New Caledonia, Province Nord, Mt. Panié.

Measurements. Fore wing length 4.1–4.3 mm (N = 2). Total length of genitalia: 0.4 mm.

Description. Genitalia: In lateral view, segment IX apex located medially, dorsal margin straight, abruptly turning downwards at apex, anterior margin convex; in ventral view anteriorly widely U-shaped. Sternal processes, lateral view, with each apex not exceeding posterior apex of tergum X, slender, apical 2/3 straight, spine-like with blunt end; in ventral view, slender, straight, apical 2/3rd parallel. Tergum X very large, in lateral view longer than superior appendage, dorsal margin almost straight, ventral margin convex; in dorsal view, mesally separate, semi-triangular, tapering posteriorly. Parameres starting before tergum X; in lateral view, long, slender, not exceeding tergum X, apical half curving upwards; in dorsal view, fused at base, apical 2/3rd separated, each with truncated apex, narrowing along their length, lateral margins straight, mesal margins slightly concave. Superior appendages, in lateral view, shorter than tergum X, tapering along its length, apex slightly curved upwards, dorsal and ventral margin convex, with posterad, long, spine-like mesal process present on meso-ventral margin exceeding posteriorly the main branch; in dorsal view almost three times longer than wide, converging posteriorly, apex truncated. Mesal processes long, directed mesad at base, crossing each other, then strongly curving posteriorly. Inferior appendages, in lateral view, with posterad orientated, long, tubular dorsal branch at base slightly curving ventrally, then straight, apex blunt; tubular ventral branch 2/3rd the length of dorsal branch, slightly curving upward towards dorsal branch, apex blunt. in ventral view broader at base, with long, slender, almost straight posteriorly orientated dorsal branches, ventral branch forming long central lobe, slightly tapering towards rounded apex. Phallus, in lateral view much shorter than segment IX, straight; in ventral view rocket-shaped.

Additional information. This species was referred to as "sp. 48" in Espeland and Johanson (2010).

Agmina tenuisa sp. nov.

http://zoobank.org/C5BBC458-D026-4B39-83B5-EECC7236D03C Figs 15–19

Diagnosis. Agmina tenuisa sp. nov. is distinguished from the other Agmina species by the presence of a pair of slender superior appendages, each with a long and slightly undulating mesal process reaching as far posteriorly and on the same height as the apex of the superior appendages; and the presence of a pair of parameres, each ending in the superior appendages and angling ventrally with apical part orientated ventrally below the superior appendages. The genitalia of Agmina tenuisa sp. nov. resemble those of



Figures 15–19. *Agmina tenuisa* sp. nov. male holotype 15 genitalia, left lateral view 16 genitalia, dorsal view 17 genitalia, ventral view 18 phallus, lateral view 19 phallus, ventral view.

Agmina padi Ward & Schefter, 2000, particularly in the shape of the inferior appendages in lateral view. *Agmina tenuisa* sp. nov. is distinguished from *A. padi* by the more slender superior appendages in lateral view, the ventral branch of the parameres exceeding below the superior appendages, and in ventral view the plate of inferior appendages has no central posterior plate.

Etymology. *Tenuisa*, from Latin, meaning slender. Named for the slender superior appendages as seen in lateral view.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Haute Yaté fauna reserve, 1760 m S bridge Pont Perignon, 50 m upstream bridge over stream; 22.14954S, 166.701211E; 180 m; 14.xii.2003–13.i.2004; Malaise trap; loc#081; leg. KA Johanson; MNHN.

Paratypes: New Caledonia – **Province Sud** • 1 3; stream crossing way to Sanatorium 2.3 km E St. Laurent, ca. 30 m downstream bridge; 22°04.484'S, 166°19.900'E; 15.xi.2003; light trap; loc#028; leg. KA Johanson; NHRS; 1 3; Koghi Mt., 522 m, source of Riv. Oueanoue; 22°10.327'S, 166°30.524'E; Malaise trap; 12–16.xi.2001; loc 138 (01-2001); leg. KA Johanson, T Pape & B Viklund; NHRS; **Province Nord** • 1 3; Mt Mé Amélié, River Fö Töpliba, upstream bridge on rd Sarraméa-Koh, at banana plantation; 21°37.940'S, 165°49.619'E; loc 144 (14-2001); Malaise trap; 18–21. xi.2001; leg. KA Johanson, T Pape & B Viklund; NHRS.

Measurements. Fore wing length 2.9–3.4 mm (N = 4). Total length of genitalia: 0.5 mm.

Description. Genitalia: In lateral view, segment IX triangular anteriorly, apex located medially; in ventral view anteriorly U-shaped. Sternal processes, lateral view, with each apex not exceeding posterior margin of tergum X, short, triangular; in ventral view, short, not reaching mid-length of inferior appendage, slightly diverging along their length, apices slightly curving mesad. Tergum X small, in lateral view around half the length of inferior appendage, dorsal margin straight, ventral margin slightly convex; in dorsal view, mesally separate, semi-trapezoid, outer margins straight, inner margin slightly convex. Parameres starting at anterior margin of tergum X; in lateral view, long, slender, widely U-shaped, with posterior end slightly diverging, apex pointing posteroventrally; in dorsal view, separated, narrow, posterior 1/3 directed posteromesad, each with short, thick, setae at apex. Superior appendages, in lateral view, slender, slightly curving upwards, more than twice as long as tergum X, with spine-like process at apex, mesal process spine-like straight, slightly curving downwards at base, exceeding posteriorly the main branch; in dorsal view around four times longer than wide, almost parallel, each slightly curving inwards toward apex with thin posteromesad orientated process with long thick seta. Mesal processes long, slender, gently curving mesad, crossing each other near apex. Inferior appendages, in lateral view, with posterodorsally orientated claw-shaped dorsal branch, ventral branch short, claw-shaped, orientated posterodorsally, originating at approx. mid-length on ventral margin of dorsal branch; in ventral view small, oval at base with slender, posteriorly orientated dorsal branches, slightly converging towards apex, ventral branches directed posterolaterally, each with claw-shaped apex. Phallus, in lateral view as long as segment IX, slightly sigmoid; in ventral view anterior half distinctly wider than posterior half.

Additional information. This species was referred to as "sp. 12" in Espeland and Johanson (2010).

Agmina multidentata sp. nov.

http://zoobank.org/4EF4D313-1216-4E31-98AF-FFD90E150F95 Figs 20–24

Diagnosis. Agmina multidentata sp. nov. is distinguished from the other Agmina species by the presence of a pair of uniformly tapering, long superior appendages having deeply undulating ventral and mesal margins along their length; the inferior append-



Figures 20–24. *Agmina multidentata* sp. nov. male holotype **20** genitalia, left lateral view **21** genitalia, dorsal view **22** genitalia, ventral view **23** phallus, lateral view **24** phallus, ventral view.

ages forming rhomboid plates in lateral view; and tergum X forms a transverse bridge. It resembles *A. cornuta* sp. nov. in the shape of tergum X, but in *A. multidentata* sp. nov. the inferior appendages are higher in lateral view and the superior appendages are more prolonged posteriorly compared to those in *A. cornuta* sp. nov.

Etymology. *Multidentata*, from Latin, meaning many teeth. Named for the ventral and mesal margins of the superior appendages with many teeth as seen in lateral view.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; Réserve spéciale de faune de la haute Yaté, along road on southern part of Marais de la Rivière Blanche, stream draining to Marais de la Rivière Blanche, 5.0 km SW Pont Pérignon; 22°09.513'S, 166°39.942'E; 180 m; 6.xi-16.xi.2003; Malaise trap; loc#011; leg. KA Johanson; MNHN.

Paratypes: New Caledonia – **Province Sud • 2** ♂; W part of Plaine des lacs, 150 m downstream bridge at La Capture; 22°15.967'S, 166°49.493'E; 261 m; 4–22.xi.2003; Malaise trap; loc#007; leg. KA Johanson; NHRS; • 1 ♂; stream crossing Nouméa-Yaté road, 1.5 km S Yaté Dam, approx. 200 m upstream the road; 22°09.931'S, 166°52.535'E; 197 m; 22.xi-17.xii.2003; Malaise trap; loc#041; leg. KA Johanson; NHRS.

Measurements. Fore wing length 2.8–3.6 mm (N = 4). Total length of genitalia: 0.5 mm.

Description. Genitalia: In lateral view, segment IX triangular anteriorly, apex located mediodorsally; in ventral view anteriorly semi-circular. Sternal processes, lateral view, with each rounded apex not exceeding posterior apex of tergum X, triangular; in ventral view, broad, reaching mid-length of inferior appendage, slightly diverging, apices curving mesad. Tergum X small, in lateral view less than half the length of superior appendage, slightly longer than high, inner and outer margins almost straight, slightly diverging anteriorly, anterior margin concave; in dorsal view, mesally connected, axeshaped. Parameres complex; in lateral view with tubular dorsal lobe running parallel with dorsal margin of tergum X and superior appendage, ending before mid-length of superior appendage; shorter, narrower, ventral lobe orientated posteroventrally; in dorsal view, dorsal lobes separated and narrowing along their length, not reaching mid-length of superior appendage, directed posteromesad, each with truncate apex. Superior appendages, in lateral view, more than twice as long as tergum X, tapering along its length with rounded base, apex semi-acute with stout megaseta orientated ventrad mesal process absent; in dorsal view uniformly narrow, running almost parallel, slightly curving inwards towards apex with stout megaseta directed mesad, inner margin dentate. Mesal processes absent. Inferior appendages, in lateral view, with posterad orientated triangular dorsal branch with acute apex; dorsal branch present as short, obtuse process at posteroventral margin in ventral view convex at base, gradually widening until mid-length, then tapering towards apex, dorsal branches orientated posteriorly, claw-shaped, with apices directed posteromesad, ventral branch barely visible as short very obtuse central lobe. Phallus, in lateral view as long as segment IX, almost straight with slightly concave margins in ventral view anterior half not distinctly wider than posterior half.

Additional information. This species was referred to as "sp. 10" in Espeland and Johanson (2010).

Agmina cornuta sp. nov.

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http://zoobank.org/F11DF372-A11F-4D40-AC2A-2625787E0DF3
Figs 25–30
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Diagnosis. Agmina cornuta sp. nov. is distinguished from the other Agmina species by the presence of a pair of almost uniformly oval superior appendages in lateral view, and a pair of branches of the inferior appendages which appear beak-like in lateral view and are approx. as long as the superior appendages. It resembles *A. multidentata* sp. nov. in the shape of tergum X, but in *A. cornuta* sp. nov. the inferior appendages are lower in lateral view and the superior appendages are rounder posteriorly compared to those in *A. multidentata* sp. nov.

Etymology. *Cornuta*, from Latin, meaning horned. Named for the shape of the inferior appendage in lateral view, which has two long, horn-shaped, dorsal branches.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Plateau de Dogny, northern part; 21°36.853'S, 165°52.548'E; loc#159 (32-2001); Malaise trap; 2–5.xii-2001; leg. KA Johanson, T Pape & B Viklund. MNHN.

Paratypes: New Caledonia – **Province Sud** • ♂; Réserve spéciale de faune de la haute Yaté, along road on southern part of Marais de la Rivière Blanche, stream draining to Marais de la Rivière Blanche, 2.25 km SW Pont Pérignon; 180 m; 6–16.xi.2003; Malaise trap; loc#010a; leg. KA Johanson; NHRS; • ♂; Mt. Dzumac, source stream of Ouinne River, near crossing point to mountain track; 22°02.073'S, 166°28.460'E; 810 m; 18.xi-4.xii.2003; Malaise trap; loc#030; leg. KA Johanson; NHRS; • ♂; Monts des Koghis, ca 300 m S Koghi Restaurant; 22.18288S, 166.50167E; 417 m; 2–16. xi.2003; Malaise trap; loc#004; leg. KA Johanson; NHRS.

Measurements. Fore wing length 3.2-4.1 mm (N = 4). Total length of genitalia: 0.5 mm.

Description. Genitalia: In lateral view, segment IX semi-triangular anteriorly, apex located dorsally; in ventral view anteriorly widely U-shaped. Sternal processes, lateral view, with each apex, not exceeding posterior apex of tergum X, very short, triangular; in ventral view, short, slender, not reaching mid-length of inferior appendage, each with apex slightly curving mesad. Tergum X small, in lateral view approx. half the length of superior appendage, outer margin irregularly convex, slightly converging towards posterior with straight inner margin; in dorsal view, mesally connected, axe-shaped with inner margins forming a right triangle. Parameres starting at tergum X, in lateral view semi-circular, each with narrow protrusion orientated posteroventrad with blunt apex, approx. half the length of the main parameres; in dorsal view, separated, slightly diverging towards apices, outer margins straight for first 2/3, then abruptly curving inwards at obtuse angle, inner margin irregularly lobed. Superior appendages, in lateral view, approx. twice as long as tergum X, semiovoid with truncated, irregularly dentate apex, mesal process absent; in dorsal view almost parallel, each gently widening to mid-length, then inner margin abruptly widening, with apical half irregularly dentate. Mesal processes absent. Inferior appendages, in lateral view, with posterad orientated long, knife-shaped dorsal branch; ventral branch present as short, obtuse process at posteroventral margin; in ventral



Figures 25–30. *Agmina cornuta* sp. nov. male holotype **25** genitalia, left lateral view **26** genitalia, dorsal view **27** end of superior appendages, showing mesal spine, dorsal view **28** genitalia, ventral view **29** phallus, lateral view **30** phallus, ventral view.

view convex at base, gradually widening for first 1/3, then abruptly narrowing towards apex, long, narrow, slightly tapering dorsal branches orientated posteriorly, slightly curving inwards, apices pointed, ventral branch indiscernible. Phallus, in lateral view shorter than segment IX, irregular; in ventral view posterior half slightly wider than anterior half.

Additional information. This species was referred to as "sp. 53" in Espeland and Johanson (2010).

Species group 2, sagittata group

This group includes the following species: Agmina sagittata sp. nov., A. circulata sp. nov., A. jepiva Ward & Schefter, 2000, A. digitata sp. nov., A. longispina sp. nov., A. urugi Ward & Schefter, 2000, A. magnahamata sp. nov., A. longicordata sp. nov., A. campanula sp. nov., A. semicampanula sp. nov., A. cunicula sp. nov., A. panda Ward & Schefter, 2000, A. cerritula sp. nov., A. monstrosa sp. nov., A. rectangulata sp. nov., A. chela sp. nov., A. mariae Ward & Schefter, 2000, and A. piscaria sp. nov.

Agmina sagittata sp. nov.

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http://zoobank.org/A1558F49-EE6D-492A-83F3-CFE38A48B280
Figs 31–35
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Diagnosis. Agmina sagittata sp. nov. is distinguished from the other Agmina species in the genitalia by the presence of a pair of inferior appendages having a ventral part that, in lateral view, reaches as far posteriorly as the sternal processes, and the apex of the sternal processes and inferior appendages are separated by a rectangular incision. It resembles *A. circulata* sp. nov. in the overall similarity of the genitalia, but *A. circulata* sp. nov. is larger than *A. sagittata* sp. nov., and in the genitalia *A. sagittata* sp. nov. has superior appendages that are more rounded in lateral view, shorter sternal processes in relation to the inferior appendages, and the sternal processes of *A. sagittata* sp. nov. is slightly wider and straighter than those of *A. circulata* sp. nov.

Etymology. *Sagittata*, from Latin, meaning arrow-shaped. Named for the inferior appendages being arrow-shaped in ventral view.

Material examined. *Holotype:* New Caledonia – **Province Nord** • ∂; Aoupinié Mt., Réserve spéciale de faune de l'Aoupinié, spring to side stream to Öröpömwati River; 21°08.386'S, 165°19.257'E; 402 m; 6–27.xii.2003; Malaise trap; loc#064; leg. KA Johanson; MNHN.

Paratypes: New Caledonia – **Province Nord** • 1 3; Réserve spéciale de faune de l'Aoupinié, ca 25 km S Poindimié, 21°08.940'S, 165°19.409'E, loc#147a (17-2001), Malaise trap; 24–28.xi.2001; leg. KA Johanson, T Pape & B Viklund; NHRS; • 1 3; ditto, except 21°09.775'S, 165°19.017'E; loc#148 (18-2001); Malaise trap; 24–28. xi.2001; leg. KA Johanson, T Pape & B Viklund; NHRS;

• 2 3; ditto, except 21°09.369'S, 165°19.209'E; loc#149 (19-2001); Malaise trap; 24–28.xi.2001; leg. KA Johanson, T Pape & B Viklund; NHRS; **Province Sud** • 3; Monts Kwa Ne Mwa, along Nouméa-Yaté road, 2.0 km E Pic Mouirange, 20 m upstream road; 22°12.356'S, 166°40.798'E; 220 m; 15–16.i.2004; light trap; loc#120; leg. KA Johanson; NHRS; • 3; Réserve spéciale de faune de la haute Yaté, along road on southern part of Marais de la Rivière Blanche, stream draining to Marais de la Rivière Blanche, 3.7 km SW Pont Pérignon; 22°09.327'S, 166°40.841'E; 180 m; 6–16.xi.2003; Malaise trap; loc#013; leg. KA Johanson; NHRS; • 1 3; Mt. Panié, Riv. Padyéém, 400 m, 22–28.xi.2001, Malaise trap 22–28.xi.2001, 20°34.122'S, 164°48.147'E, loc 146 (16-2001); leg. KA Johanson, T Pape & B Viklund; NHRS.

Measurements. Fore wing length 3.2-4.1 mm (N = 8). Total length of genitalia: 0.5 mm.

Description. *Genitalia*: Total length 0.4 mm. In lateral view, segment IX semitriangular anteriorly, apex located dorsally; in ventral view anteriorly obround. Sternal processes, in lateral view, with each apex exceeding the length of tergum X, elongated narrowly triangular with semi-acute apex, dorsal margin almost straight, ventral margin gently concave; in ventral view, longer than inferior appendage, narrowing along their length, apex acute. Tergum X in lateral view irregularly quadrilateral, slightly longer than superior appendage, longer than wide, tapering along its length; in dorsal view, mesally separate, axe-shaped, inner margins forming triangle. Parameres start-



Figures 31–35. *Agmina sagittata* sp. nov. male holotype 31 genitalia, left lateral view 32 genitalia, dorsal view 33 genitalia, ventral view 34 phallus, lateral view 35 phallus, ventral view.

ing before tergum X, in lateral view long, slowly widening along 2/3 of its length, then narrow, apex slender, multifurcated, ending before apex of superior appendage; in dorsal view, separated, long, slender, straight, apex pipe wrench-shaped. Superior appendages, in lateral view, shorter than tergum X, semi-trapezoid; in dorsal view stout, curving inwards, with rounded outer margin; mesal process, stout claw-like, directed mesad. Inferior appendages, in lateral view, with posterad orientated short, rectangular dorsal branch; ventral branch narrow, tubular with rounded apex, as long as sternal process; in ventral view sagittate, pointing anteriorly. Phallus, in lateral view shorter than segment IX, complex, ventral margin straight; in ventral view tubular, anterior end slightly wider than remainder.

Additional information. This species was referred to as "sp. 21" in Espeland and Johanson (2010).

Agmina circulata sp. nov.

http://zoobank.org/5412025A-3150-4520-B40E-1232535326C5 Figs 36–40

Diagnosis. Agmina circulata sp. nov. is distinguished from the other Agmina species in the genitalia by the presence of a pair of inferior appendages having a ventral part that, in lateral view, almost reaches as far posteriorly as the sternal processes, and with the apex of the sternal processes and inferior appendages that are separated by a rectangular incision. It resembles *A. sagittata* sp. nov. in the overall similarity in the genitalia, but *A. circulata* sp. nov. is smaller than *A. sagittata* sp. nov., and in the genitalia *A. sagittata* sp. nov. has superior appendages that are more rounded in lateral view, shorter sternal processes in relation to the inferior appendages, and the sternal processes of *A. sagittata* sp. nov. is slightly wider and straighter than those of *A. circulata* sp. nov.

Etymology. *Circulata* from Latin, meaning rounded. Named for the parametes forming a circular loop at the apex.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; W part of Plaine des lacs, 150 m downstream bridge at La Capture; 22°15.967'S, 166°49.493'E; 261 m; 4–22.xi.2003; Malaise trap; loc#007; leg. KA Johanson; MNHN.

Paratype: New Caledonia – **Province Nord** • 1 ♂; same data as for holotype, except NHRS.

Measurements. For wing length 4.6 mm (N = 1). Total length of genitalia: 0.5 mm.

Description. *Genitalia*: In lateral view, segment IX narrowly bell-shaped anteriorly, apex located medially; in ventral view anteriorly concave lens-shaped with slightly rounded lateral margins. Sternal processes, lateral view, with each apex exceeding the length of tergum X and almost superior appendage, elongated narrowly triangular with acute apex, dorsal margin relatively straight, ventral margin gently concave; in ventral view, longer than inferior appendage, narrowing along their length, apex semi-acute, outer margin slightly rounded, inner margin straight. Tergum X in lateral view semi-



Figures 36–40. *Agmina circulata* sp. nov. male holotype **36** genitalia, left lateral view **37** genitalia, dorsal view **38** genitalia, ventral view **39** phallus, lateral view **40** phallus, ventral view.

triangular with concave anterior margin, dorsal margin with central bump, longer than superior appendage, longer than wide; in dorsal view, mesally separate, golf club shaped, inner margins forming shallow triangle. Parameres starting before tergum X, in lateral view long, slowly widening along 2/3 of its length, then narrow, apex forming ring, ending before apex of superior appendage; in dorsal view, separated, long, slender, straight, apex forming ring. Superior appendages, in lateral view, shorter than tergum X, irregularly rounded; in dorsal view stout, slightly curving inwards, with rounded outer margin and gently lobed inner margin, apex directed mesad with claw like process directed posteromesad. Inferior appendages, in lateral view, with posterad orientated short, rounded dorsal branch; ventral branch spine like, gently curving dorsad, almost reaching length of sternal process; in ventral view narrowly rounded base, slightly diverging along its length towards triangular apex. Phallus, in lateral view shorter than segment IX, tubular; in ventral view tubular with rounded anterior end.

Additional information. This species was referred to as "sp. 19" in Espeland and Johanson (2010).

Agmina digitata sp. nov.

http://zoobank.org/E2576FF9-A450-4DEF-9FA2-66B45EC5B7CB Figs 41–45

Diagnosis. Agmina digitata sp. nov. is distinguished from the other Agmina species by the combination of a pair of long, straight sternal processes that form almost a right angle with the anterior margin of segment IX in lateral view; the apex almost reaching the posterior terminal part of the superior appendages; inferior appendages well hidden behind the sternal processes in lateral view; and the superior appendages in lateral view being rhomboid and slightly produced dorsally at the posterior end. It resembles *A. cunicula* sp. nov. in the shape of the genitalia in lateral view, but *A. digitata* sp. nov. can be separated from *A. cunicula* sp. nov. by the shape and larger size of the superior appendages.

Etymology. *Digitata*, from Latin, meaning digit-like. Named for the shape of the apex of the superior appendage in dorsal view, which is toe-shaped.

Material examined. *Holotype*: New Caledonia – Province Nord • ♂; 50 m upstream bridge on Hienghène-Tnèdo road, 3.9 km S summit of Mt. Tnèda, 2.2 km E Tnèdo; 20°43.085'S, 164°49.928'E; 29 m; 7.xii.2003; light trap; loc#071a; leg. KA Johanson; MNHN.

Measurements. For wing length 4.0 mm (N = 1). Total length of genitalia: 0.7 mm.

Description. Genitalia: In lateral view, segment IX triangular anteriorly, apex located medially; in ventral view, anteriorly widely U-shaped. Sternal processes, lateral view, with each apex exceeding the length of tergum X and almost superior appendage, long, slender, dorsal margin with widely triangular notch before mid-length, then straight, ventral margin slightly concave, apex acute; in ventral view, almost twice as long as inferior appendage, long, slender, straight, slightly widening at club shaped, acute apex. Tergum X in lateral view approx. same length as superior appendage, irregularly triangular; in dorsal view, mesally separate, irregularly quadrilateral, rounded antero-mesally, inner margins forming U. Parameres starting before tergum X, in lateral view slender, with two thin whip-like processes at apex almost forming a ring, barely reaching superior appendage; in dorsal view, anteriorly separated, straight, posterior half fused to complex structure, apex with central lobe and truncate lateral branches ending at base of superior appendage. Superior appendages, in lateral view, axe-blade shaped with dorsal margin slightly concave, as long as tergum X; in dorsal view stout, curving inwards, with rounded outer margin and irregular inner margin, apex fingerlike, directed mesoposterad. Inferior appendages, in lateral view, with posterad orientated, small, widely triangular dorsal branch; ventral branch narrowly triangular, apex acute; in ventral view rounded at base, margins almost parallel, posterior margin



Figures 41–45. *Agmina digitata* sp. nov. male holotype **41** genitalia, left lateral view **42** genitalia, dorsal view **43** genitalia, ventral view **44** phallus, lateral view **45** phallus, ventral view.

concave with spine-like central process. Phallus, in lateral view shorter than segment IX, tubular; in ventral view tubular, anterior end with rounded lateral lobes, posterior end convex with spine-like lateral processes.

Additional information. This species was referred to as "sp. 50" in Espeland and Johanson (2010).

Agmina longispina sp. nov.

http://zoobank.org/AB339E71-AF14-4234-A149-31843FAAA773 Figs 46–51

Diagnosis. *Agmina longispina* sp. nov. is unique in having a pair of lower parametes that are needle-like and exceed the superior appendages posteriorly, and in ventral view



Figures 46–51. *Agmina longispina* sp. nov. male holotype 46 genitalia, left lateral view 47 genitalia, dorsal view 48 parameres, dorsal view 49 genitalia, ventral view 50 phallus, lateral view 51 phallus, ventral view.
are orientated laterally before curving slightly mesally. It resembles many other species in the genus having small and almost rectangular or rhomboid superior appendages in lateral view, but is distinguished from these species by the presence of the lower parameres, as well as the straight sternal processes that are undulating in thickness. It resembles *A. longicordata* sp. nov. in the presence of a group of densely arranged setae at the posterior part of the parameres. *Agmina longispina* sp. nov. is easily separated from *A. longicordata* sp. nov. by the more rectangular shape of the inferior appendage plate in ventral view.

Etymology. *Longispina*, from Latin, *longi* and *spina* (noun, feminine) meaning long spine. Named for the shape of the sternal processes in lateral view, which are long and pointed posteriorly.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; W slope Mt. Ningua, Kwé Néco Stream, at Camp Jacob, 3.7 km WNW summit of Mt. Ningua, on Boulo-Thio Road, ca. 50 m upstream road; 21°43.613'S, 166°06.567'E; 150 m; 29.xi-12.xii.2003; Malaise trap; loc#054; leg. KA Johanson; MNHN.

Measurements. For wing length 3.9 mm (N = 1). Total length of genitalia: 0.9 mm.

Description. Genitalia: In lateral view, segment IX triangular anteriorly; apex located dorsally; in ventral view anteriorly widely bell shaped. Sternal processes, lateral view, with each apex exceeding the length of apex X, almost reaching apex of superior appendage; wide at base, then long, slender, slightly curving ventrad, apex acute; in ventral view, longer than inferior appendage, slender, slightly converging towards acute apex. Tergum X in lateral view trapezoid, tapering along its length, slightly longer than superior appendage, longer than wide; in dorsal view, mesally separate, trapezoid, tapering along its length, inner margins forming bell. Parameres comprising pair of upper and lower branches; upper branches starting before tergum X, reaching base of superior appendage, in lateral view, first half very slender, then slightly broadening along its length, spine-like at apex with multiple wide setae on ventral surface, directed ventrad; in dorsal view, first half separated, slender, gradually converging and fusing at apex forming two large lobes; lower branches starting anteriorly of upper branches, slender and undulating in lateral view, in ventral view with anterior halves orientated posteriorly before bending laterally and slightly recurving mesally before posterior end, posteriorly exceeding superior appendages. Superior appendages, in lateral view, almost rectangular, slightly wider posteriorly, shorter than tergum Xin dorsal view stout, curving inwards, outer margin rounded, inner margin relatively rounded, apex clawlike, directed mesoanteriorly. Inferior appendages, in lateral view, with posterad orientated, slender, acute dorsal branch, exceeding length of superior appendage, ventral branch half the length of dorsal branch, broader, irregularly tapering along its length, abruptly narrowing at semi-acute apex; in ventral view widely bell-shaped at base, margins almost parallel, posterior margin straight with narrowly triangular central process. Phallus, in lateral view shorter than segment IX, slender, tubular, slightly curving downwards; in ventral view largely tubular, straight, slightly wider anteriorly.

Additional information. This species was referred to as "sp. 34" in Espeland and Johanson (2010).

Agmina magnahamata sp. nov.

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http://zoobank.org/22A9C164-3B51-481E-8E55-2F829FA8E1DC
Figs 52–57
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Diagnosis. Agmina magnahamata sp. nov. resembles many other Agmina species having short superior appendages with a large, strong mesally hook-shaped process that are present in other species, particularly in the Agmina sagittata species group. Agmina magnahamata sp. nov. resembles species with straight and posteriorly wide sternal processes, like A. digitata sp. nov. and A. circulata sp. nov., from which A. magnahamata sp. nov. is distinguished by the more complex parameres in the genitalia.

Etymology. *Magnahamata*, from Latin, *magna* and *hamata* (noun feminine), meaning large hook. Named for the process originating from the superior appendage, which in dorsal view is large, broad and hook-shaped.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; western part of Mt. Ningua, Kwé Néco Stream, 3.9 km W summit of Mt. Ningua, on Boulo-Thio Road, ca. 50 m upstream road; 21°44.359'S, 166°06.009'E; 117 m; 20.xi.2003–12. xii.2003; Malaise trap; loc#035; leg. KA Johanson; MNHN.

Measurements. For wwing length 4.1 mm (N = 1). Total length of genitalia: 0.9 mm.

Description. Genitalia: In lateral view, segment IX triangular anteriorly, apex located medially; in ventral view anteriorly widely U-shaped. Sternal processes, lateral view, with each apex exceeding the length of tergum X, almost reaching posterior margin of superior appendage; wide at base, then long, relatively slender, but slightly widening towards acute apex; in ventral view, almost twice as long as inferior appendage, parallel, slightly widening towards acute apex. Tergum X in lateral view largely rectangular, twice the length of superior appendage, longer than wide; in dorsal view, mesally fused, forming rounded lobe. Parameres starting before tergum X, reaching base of superior appendage, in lateral view, slender, slightly curving downwards, apex directed postero-dorsad, ventral surface with multiple wide setae directed ventrad; in dorsal view, first half parallel, long, slender, second half widening along its length, apex club shaped, on ventral surface multiple wide setae directed mesad. Superior appendages, in lateral view, largely quadratic, with large, broad hook-like process originating dorsally on posterior margin, curving downwards and back under main part, shorter than tergum X; in dorsal view stout, directed posterad, triangular, widening posteriorly, at posterior margin large hook-shaped protrusion with apex directed meso-anterad. Inferior appendages, in lateral view, with posterad orientated dorsal branch slightly longer than ventral branch, apices of both branches slightly converging, short, semiacute, dorsal margin convex, ventral margin slightly concave; in ventral view widely bell-shaped at base, margins parallel, posterior margin concave with triangular central process. Phallus, in lateral view shorter than segment IX, slender, tubular, slightly curving downwards; in ventral view tubular, relatively wide, lateral lobes at anterior end.

Additional information. This species was referred to as "sp. 42" in Espeland and Johanson (2010).



Figures 52–57. *Agmina magnahamata* sp. nov. male holotype 52 genitalia, left lateral view 53 genitalia, dorsal view 54 parameres, dorsal view 55 genitalia, ventral view 56 phallus, lateral view 57 phallus, ventral view.

Agmina longicordata sp. nov.

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http://zoobank.org/0B452C33-EEBA-4BE5-9F7F-060DBF6AEE49
Figs 58-63
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Diagnosis. Agmina longicordata sp. nov. is distinguished from the other Agmina species by the inferior appendages in ventral view, which plate is narrowly heart-shaped and with a median process originating from the middle of its posterior margin. It is also unique by the presence of a group of small ventrally orientated setae densely arranged in a small circular area on each paramere. In addition, the sternal processes are almost boomerang-shaped, with each of the posterior part orientated in parallel. The shape of the plate formed by the inferior appendages is somewhat similar to that of *A. sagittata* sp. nov. and *A. circulata* sp. nov. but is easily separated from those species on the other characters. It resembles *A. longispina* sp. nov. in the presence of a group of densely arranged setae at the posterior part of the parameres. *Agmina longicordata* sp. nov. is easily separated from *A. longispina* sp. nov. by the oval shape of the inferior appendage plate in ventral view.

Etymology. *Longicordata*, from Latin, *longi* and *cordata*, meaning long and heart-shaped. Named for the shape of the inferior appendage, which is shaped like an elongated heart.

Material examined. *Holotype*: New Caledonia – Province Nord • ♂; Wan Pwé On Stream, draining NNE side of Mt. Panié, 3.9 km NW Cascade de Tao; 20°31.820'S, 164°47.016'E; 18.xii.2003; light trap; loc#085; leg. KA Johanson; MNHN.

Paratypes: New Caledonia – **Province Nord** • 1 ♂; same data as holotype, except NHRS; • 1 ♂; Wé Caot Stream, draining NNE side of Mt. Panié, 0.9 km NW Cascade de Tao; 20°33.311'S, 164°48.064'E; 18.xii.2003; light trap; loc#084; leg. KA Johanson; NHRS; • 1 ♂; Mt. Panié, Riv. Padyéém; 400 m; 22–28.xi.2001; Malaise trap; 22–28.xi.2001; 20°34.122'S, 164°48.147'E, loc#146 (16-2001); leg. KA Johanson, T Pape & B Viklund; NHRS.

Etymology. *Cornuta*, from Latin, meaning bill of a bird. Named for the shape of the inferior appendage in lateral view, which is long, beak-like.

Measurements. Fore wing length 2.4–4.0 mm (N = 4). Total length of genitalia: 0.7 mm.

Description. *Genitalia*: In lateral view, segment IX sharply triangular anteriorly, apex located medially; in ventral view anteriorly widely oblong. Sternal processes, lateral view, with each apex exceeding the length of superior appendage, narrowing along its length, curving downwards, apex acute, spine-like; in ventral view, robust, first half slightly diverging, second half converging, wider than first half, narrower blunt apices parallel with very straight inner margin, small spine-like process at apex, directed posteromesad. Tergum X in lateral view irregularly quadrilateral with concave anterior margin, tapering towards posterior, slightly longer than superior appendage; in dorsal view, mesally fused, inner margins forming wide U-shape with small, spine-like central process. Parameres starting around the base of tergum X, in lateral view, straight, tubular, with apex widening, sharply curving ventrad, ventral surface with large amounts of wide setae directed ventroanterad; in dorsal view, robust, finger-like,



Figures 58–63. *Agmina longicordata* sp. nov. male holotype 58 genitalia, left lateral view 59 genitalia, dorsal view 60 parameres, dorsal view 61 genitalia, ventral view 62 phallus, lateral view 63 phallus, ventral view.

outer margins convex, inner margins concave, apex rounded with large amounts of mesally directed, wide setae on inner margin. Superior appendages, in lateral view, largely rectangular, longer than wide, slightly shorter than tergum X; in dorsal view almost parallel, outer margins straight, inner margins sigmoid; bent sharply mesally at apex, ending with claw-like structure directed mesoanterad. Inferior appendages, in lateral view, with posterad orientated, rounded, lobe-like dorsal branch, ventral branch longer, tapering along its length, ventral margin straight, convex towards acute apex; in ventral view elongated cordate, posterior margin concave with large triangular central process; Phallus, in lateral view approx. half the length of segment IX, dorsal margin sigmoid, ventral margin straight; in ventral view widest at mid-length, anteriorly with lateral lobes.

Additional information. This species was referred to as "sp. 29" in Espeland and Johanson (2010).

Agmina campanula sp. nov.

http://zoobank.org/77020379-094A-4E25-AC1F-5F699F791427 Figs 64–68

Diagnosis. This species is very similar to *A. semicampanula* sp. nov., from which it is distinguished by the rectangular-shaped anterior margin of segment IX in ventral view; the angled sternal process in lateral view; and, in dorsal view, the pair of parameres that have sharply angled instead of rounded posteromesal corners.

Etymology. *Campanula*, named for the bell-shaped flowers in the genus *Campanula*, based on the shape of the inferior appendages in ventral view.

Material examined. *Holotype*: New Caledonia – Province Nord • ♂; Monts des Koghis, ca 300 m S Koghi Restaurant; 22.18288S, 166.50393E; 447 m; 15.xi.2001; Malaise trap; loc#002c (08-2001); leg. KA Johanson, T Pape & B Viklund; MNHN.

Paratypes: New Caledonia – **Province Sud** • 1 ♂; Rivière Ouanéoue, at bridge crossing road to Koghi Mountains, ca. 1.5 km from road RT1 Nouméa-Dumbea; 22°10.861'S, 166°29.531'E; 11.xi.2003; light trap; loc 024a; leg. KA Johanson; NHRS; • 1 ♂; Mt. Rembai, River Xwê Be, upstream bridge on road Sarraméa-Koh; 21°34.926'S, 165°49.305'E; loc#157 (027-2006); Malaise trap; 9–19.x.2006; leg. KA Johanson & M Espeland; NHRS.

Measurements. Fore wing length 3.1-4.0 mm (N = 4). Total length of genitalia: 0.4 mm.

Description. *Genitalia*: In lateral view, segment IX sharply triangular anteriorly, apex located medially; in ventral view anteriorly obround. Sternal processes, lateral view, with each apex almost reaching apex of superior appendage, narrowing along its length, curving downwards, apex acute; in ventral view, robust, diverging, first 2/3 of equal width, apices parallel, narrowing, acuminate. Tergum X in lateral view irregularly quadrilateral with concave anterior margin, tapering towards posterior, approx. same length as superior appendage; in dorsal view, mesally fused, forming rounded lobe, in-



Figures 64–68. *Agmina campanula* sp. nov. male holotype **64** genitalia, left lateral view **65** genitalia, dorsal view **66** genitalia, ventral view **67** phallus, lateral view **68** phallus, ventral view.

ner margins forming narrow bell. Parameres starting before tergum X, in lateral view long, slender, straight, acute apex slightly directed dorsad; in dorsal view, long, slender, widening at truncated apex, posterior margin straight. Superior appendages, in lateral view, oblong, with posterodorsal indentation, approx. same length as tergum X; in dorsal view stout, almost semi-circular with rounded outer margin, inner margin semistraight, at apex large claw-shaped structure directed anteromesad. Inferior appendages, in lateral view, with posterad orientated rectangular dorsal branch and directly adjacent slender ventral branch of equal length, whole structure semi-rectangular; in ventral view bell-flower shaped. Phallus, in lateral view slightly shorter than segment IX, posterior half tapering along its length; in ventral view tubular with small lateral lobes at anterior end. **Additional information.** This species was referred to as "sp. 24" in Espeland and Johanson (2010).

Agmina semicampanula sp. nov.

http://zoobank.org/D596A2CF-8922-4AAF-98E3-A94612D4BA3E Figs 69–73

Diagnosis. This species is very similar to *A. campanula* sp. nov., from which it is distinguished by the U-shaped anterior margin of segment IX in ventral view; the smoothly curved sternal process in lateral view; and, in dorsal view, the pair of parameres that have rounded instead of sharply angled posteromesal corners.

Etymology. Named for the similarity to the closely related species *Agmina campanula* sp. nov.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Mt. Dzumac, source stream of Ouinne River, near crossing point to mountain track; 22°02.073'S, 166°28.460'E; 810 m; 18.xi-4.xii.2003; Malaise trap; loc#030; leg. KA Johanson; MNHN.

Measurements. For wing length 4.1 mm (N = 1). Total length of genitalia: 0.5 mm.

Description. Genitalia: In lateral view, segment IX triangular anteriorly, apex located dorsally; in ventral view anteriorly widely U-shaped. Sternal process es, lateral view, with each apex almost reaching apex of superior appendage, narrowing along its length, slightly curving downwards, apex acute; in ventral view, robust, anterior half diverging, posterior half parallel, tapering along their length, apex acuminate. Tergum X in lateral view irregularly quadrilateral with concave anterior margin and convex posterior margin, tapering towards posterior, approx. same length as superior appendage; in dorsal view, mesally fused, forming slightly irregular lobes, inner margins forming acuminate triangle. Parameres starting before tergum X, in lateral view long, slender, straight, bifurcating at apex, with dorsal branch orientated sharply dorsad and ventral branch orientated sharply ventrad; in dorsal view, long, slender, straight, slightly converging along its length, slightly diverging and widening at blunt apex. Superior appendages, in lateral view, oblong with anterodorsal tooth, approx. same length as tergum X; in dorsal view stout, almost semi-circular with rounded outer margin, inner margin slightly concave, apex with short, stout, claw-shaped structure directed anteromesad. Inferior appendages, in lateral view, with both branches forming a single posterad orientated, rectangular structure with slightly dentated, truncated, posterior margin; in ventral view semi-bell-shaped, posterior margin slightly convex with shallow teeth. Phallus, in lateral view slightly shorter than segment IX, largely tubular, ventral margin straight; in ventral view tubular with small lateral lobes at anterior end.

Additional information. This species was referred to as "FP2 Agmina sp. 24" in Espeland and Johanson (2010).



Figures 69–73. *Agmina semicampanula* sp. nov. male holotype **69** genitalia, left lateral view **70** genitalia, dorsal view **71** genitalia, ventral view **72** phallus, lateral view **73** phallus, ventral view.

Agmina cunicula sp. nov.

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http://zoobank.org/9353EC29-AEB0-466F-AF10-B3FB9249C1B0
Figs 74–78
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Diagnosis. Agmina cunicula sp. nov. is distinguished from other Agmina species in having genitalia that are relatively simple, particularly in lateral view where they are composed of two visible branches, the upper including a large tergum X and the superior appendage, and the lower including the very broad sternal process that hide the inferior appendages and slightly exceed the superior appendages posteriorly. It resembles *A. digitata* sp. nov. but in lateral view *A. cunicula* sp. nov. have superior appendages that are rounded posteriorly, while trapezoid in *A. digitata* sp. nov. The inferior appendages of *A. cunicula* sp. nov. are very short and deeply divided longitudinally, while those in *A. digitata* form a wide and long plate that is not divided.

Etymology. *Cunicula*, from Latin, meaning lengthened. Named for the very long sternal processes.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; Plateau de Dogny; 846 m; 18–21.xi.2001; Malaise trap; 21°37.000'S, 165°52.500'E; loc#145 (15-2001); leg. KA Johanson, T Pape & B Viklund; MNHN.

Paratype: New Caledonia – **Province Sud** • 1 ♂; Monts des Koghis, ca 300 m S Koghi Restaurant; 22.18288S, 166.50490E; 457 m; 6.xii.2001; light trap; loc#001c (07-2001); leg. KA Johanson, T Pape & B Viklund; NHRS.

Measurements. Fore wing length 4.3–4.6 mm (N = 2). Total length of genitalia: 0.5 mm.

Description. Genitalia: In lateral view, segment IX narrowly U-shaped anteriorly, apex located medially; in ventral view anteriorly U-shaped. Sternal processes, lateral view, with each apex exceeding apex of superior appendage, narrowing along its length, straight, apex rounded, ventral margin slightly sigmoid, dorsal margin straight; in ventral view, long, almost parallel, slightly diverging towards rounded apex, lateral margin straight, medial margin convex. Tergum X in lateral view jar-shaped, with dorsal and ventral margins gently convex posteriorly; longer than superior appendage; in dorsal view, mesally fused, with lateral margins straight, mesal margin convex, narrowing towards posterior; inner margins forming bell-shaped structure with distended oval base. Parameres starting before tergum X, in lateral view slender, slightly curving downwards and widening at truncate apex; in dorsal view, long, slender, first half converging, second half diverging, widening towards apex, apex truncated, almost triangular with mesal process shaped like double-spine orientated posteromesad. Superior appendages, in lateral view, oblong, with slightly straighter anterior margin, shorter than tergum X; in dorsal view stout, slightly converging towards apex, outer margin almost straight, inner margin slightly concave, apex with thick hook-shaped structure and small spine directed anteromesad. Inferior appendages, in lateral view, very short, rounded structure with acute apex, at apex large, hook-shaped structure almost as long as main appendage, parallel with ventral margin of sternal process, then sharply bending, with apex pointing posterad; in ventral view with two posteriorly orientated branches, remainder hardly visible under sternal process. Phallus, in lateral view slightly shorter than seg-



Figures 74–78. *Agmina cunicula* sp. nov. male holotype 74 genitalia, left lateral view 75 genitalia, dorsal view 76 genitalia, ventral view 77 phallus, lateral view 78 phallus, ventral view.

ment IX, slender, tubular, with broad spine-like lateral lobe at anterior end; in ventral view tubular with anterior end slightly widening, truncate, with small spine-like lateral processes directed anterad.

Additional information. This species was referred to as "sp. 11" in Espeland and Johanson (2010).

Agmina cerritula sp. nov.

http://zoobank.org/9D73F213-BE2C-4AFD-8157-D68BE6B9734E Figs 79–83

Diagnosis. Both *Agmina cerritula* sp. nov. and *A. monstrosa* sp. nov. have genitalia with inferior appendages that are fused into a single, very long, slender and dorsally curv-



Figures 79–83. *Agmina cerritula* sp. nov. male holotype **79** genitalia, left lateral view **80** genitalia, dorsal view **81** genitalia, ventral view **82** phallus, lateral view **83** phallus, ventral view.

ing process, which make them easily recognised from other *Agmina* species. *Agmina* cerritula sp. nov. is distinguished from *A. monstrosa* sp. nov. by having less strongly narrowing sternal processes in lateral view and that the apex is more truncated, and the superior appendages are broader posteriorly compared to those in *A. monstrosa* sp. nov. *Agmina recurvata* sp. nov. have similar inferior appendages in lateral view, but in this species the long processes are paired, not simple as in *A. serricula* sp. nov.

Etymology. *Cerritula*, from Latin, meaning weird. Named for the weirdly shaped inferior appendage.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Creek Pernod, 7 m downstream bridge at Route du Carénage on Lac Yaté-Prony road; 22°10.862'S, 166°50.565'E; 162 m; 10.xii.2003; light trap; loc#076; leg. KA Johanson; MNHN.

Measurements. For wwing length 4.4 mm (N = 1). Total length of genitalia: 0.8 mm.

Description. Genitalia: In lateral view, segment IX sharply triangular anteriorly, apex located ventrally; in ventral view anteriorly oval. Sternal processes, lateral view, with each apex exceeding apex of superior appendage, robust, largely of equal width throughout its length, margins slightly sigmoid, apex widely rounded, ventrally with short spine-like process directed posteroventrad; in ventral view, very long, tapering along their length, margins almost straight, apex blunt with short, spine-like process directed posteromesad. Tergum X in lateral view saddle-shaped, anteriorly triangular with straight dorsal margin, slightly longer than superior appendage; in dorsal view, mesally fused, almost rectangular, inner margins forming wide V-shape. Parameres starting before tergum X, in lateral view slightly widening along its length, with convex dorsal margin until mid-length, then narrowing before again widening, forming loop at apex running parallel with ventral margin, and reaching ventral posterior corner of superior appendage; in dorsal view, separated, slender, first 1/3 slightly diverging, second 1/3 widening and diverging, third 1/3 initially parallel, then curving laterally and looping anterad. Superior appendages, in lateral view, axe-blade shaped with posterior margin slightly dentate, slightly shorter than tergum X; in dorsal view very stout, equally long as wide, almost rectangular, apex truncated, mesally with stout claw-like process directed anteromesad, followed by two small triangular processes of diminishing size. Inferior appendages, in lateral view, slender, longer than sternal process, initially directed posteroventrad, then greatly curving, forming a wide U-shape, with acuminate apex directed dorsad posterodorsally of apex of sternal process; in ventral view long, slender, tubular with straight margins, longer than sternal processes, apex acute. Phallus, in lateral view almost as long as segment IX, slender, tubular, straight, with long spine-like process near anterior end; in ventral view tubular, slightly wider at base with rounded lateral lobes and sheet-like structure.

Additional information. This species was referred to as "sp. 46" in Espeland and Johanson (2010).

Agmina monstrosa sp. nov.

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http://zoobank.org/9D9A3F19-BD9D-4AE9-B343-0CFC9980750C
Figs 84–88
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Diagnosis. Both *Agmina monstrosa* sp. nov. and *A. cerritula* sp. nov. have genitalia with inferior appendages that form a very long, slender and dorsally curving process, which make them easily recognised from other *Agmina* species. *Agmina monstrosa* sp. nov. is distinguished from *A. cerritula* sp. nov. by having clearly narrowing sternal processes in lateral view and that the apex is tapering into a long, ventrally orientated tip, and the superior appendages are narrowing posteriorly instead of broadening as in *A. monstrosa* sp. nov.

Etymology. *Monstrosa*, from Latin, meaning monstrous. Named for the weirdly shaped inferior appendage.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; Dumbea River, Branche Sud; 22°08.344'S, 166°30.147'E; 42 m; 3.xi.2003; light trap; loc#006; leg. KA Johanson; MNHN.

Measurements. For wing length 4.8 mm (N = 1). Total length of genitalia: 1.0 mm.

Description. Genitalia: In lateral view, segment IX sharply triangular anteriorly, apex located ventrally; in ventral view anteriorly oblong. Sternal processes, lateral view, with each apex greatly exceeding apex of superior appendage, robust, widest at midlength, then tapering along its length, with straight margins, acuminate apex strongly curving posteroventrad; in ventral view, very long, nearly parallel, tapering along their length, posterior third uniformly narrow, with acuminate apex directed mesad. Tergum X in lateral view saddle-shaped, anteriorly semi-triangular with almost straight dorsal margin, slightly longer than superior appendage; in dorsal view, mesally fused, almost rectangular, inner margins forming bell. Parameres starting before tergum X, in lateral view wide at base, then slender, apex complex with multiple branches, possibly forming a loop, reaching apex of superior appendage; in dorsal view, separated, initially converging, then twisting and diverging, slightly widening along their length, apex forming large loop covered by superior appendage. Superior appendages, in lateral view, small, cone-shaped with convex anteroventral margin, slightly shorter than tergum X; in dorsal view very stout, slightly longer than wide, apex rounded, mesally with stout claw-like process directed anteromesad, followed by small triangular process and slightly larger claw-like process. Inferior appendages, in lateral view, slender, longer than sternal process, initially directed posteroventrad, then widely curving, forming a very wide U-shape, with acuminate apex directed almost dorsad posterodorsally of apex of sternal process; in ventral view long, slender, tubular with almost straight margins, longer than sternal processes, apex acuminate. Phallus, in lateral view shorter than segment IX, slender, tubular, straight, with long spine-like process near anterior end; in ventral view tapering along its length, widening at apex, two large rounded lateral lobes at anterior end.

Additional information. This species was referred to as "sp. 7" in Espeland and Johanson (2010).



Figures 84–88. *Agmina monstrosa* sp. nov. male holotype 84 genitalia, left lateral view 85 genitalia, dorsal view 86 genitalia, ventral view 87 phallus, lateral view 88 phallus, ventral view.

Agmina rectangulata sp. nov.

http://zoobank.org/AF87DB48-A78C-4C58-BAF6-4E44DD6B5BA0 Figs 89–93

Diagnosis. The inferior appendages of *A. rectangulata* sp. nov. is unique from most other species in the genus due to being almost rectangular in ventral view; and a wide, with a convex ventral margin and presence of a posterodorsal and posteroventral process when viewed from the lateral side. The inferior appendages of *Agmina diriwi* Ward & Schefter, 2000, and *A. hexacantha* Ward, 2003 resemble those of *A. rectangulata* sp. nov. in lateral view, except lacking the posterodorsal processes, and in ventral view the shape of the appendages are different, i.e., the plate is produced posteriorly in *A. rectangulata* while excised in *A. diriwi* and *A. hexacantha*. *Agmina rectangulata* is morphologically closest to *A. chela* sp. nov. *Agmina chela* sp. nov. is distinguished from *A. rectangulata* sp. nov. by the inferior appendages having slightly larger posterodorsal process in lateral view; in ventral view, a more truncate posterior margin of inferior appendages. Furthermore, the superior appendage is clearly longer than in *A. rectangulata* sp. nov. in lateral view.

Etymology. *Rectangulata*, from Latin, meaning rectangular. Named for the shape of the inferior appendages having an almost rectangular impression.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; Plateau de Dogny; 846 m; 21°37.000'S, 165°52.500'E; loc#145 (15-2001); Malaise trap; 18–21. xi.2001; leg. KA Johanson, T Pape & B Viklund; MNHN.

Paratypes: New Caledonia – **Province Sud** • 1 ♂; same data as holotype, except NHRS; • 1 ♂; Mt. Rembai, River Xwê Be, upstream bridge on road Sarraméa-Koh; 21°33.877'S, 165°49.922'E; loc#157; Malaise trap; 9–19.x.2006; leg. KA Johanson & M Espeland; NHRS.

Measurements. Fore wing length 4.0–4.3 mm (N = 3). Total length of genitalia: 0.5 mm.

Description. *Genitalia*: In lateral view, segment IX triangular anteriorly, apex located medially; in ventral view anteriorly U-shaped. Sternal processes, lateral view, with each apex reaching apex of superior appendage, gently curving with convex dorsal margin and concave ventral margin, apex blunt; in ventral view, parallel, ventral margin convex, mesal margin straight, apex semi-acute. Tergum X in lateral view saddle-shaped, anteriorly narrowly triangular with acuminate apex, anterior margin concave, dorsal margin straight, approx. same length as superior appendage; in dorsal view, mesally fused, irregular quadrilateral, inner margin widely U-shaped. Parameres starting at base of tergum X, in lateral view wider at base, then slender, tubular, second half extremely wide sheet-like, curving laterally and ventrally, with apex below superior appendage; in dorsal view, separated, wider at base, then slender, tubular, wider, club-shaped apex with lateral spine. Superior appendages, in lateral view, nearly oblong with straighter anterior margin, similar in length to tergum X; in dorsal view converging, longer than wide, finger-shaped with rounded apex with claw-like spine directed anteromesad, two small triangular processes on mesal margin anteriorly of claw. Inferior



Figures 89–93. *Agmina rectangulata* sp. nov. male holotype 89 genitalia, left lateral view 90 genitalia, dorsal view 91 genitalia, ventral view 92 phallus, lateral view 93 phallus, ventral view.

appendages, in lateral view, with dorsoposterad orientated shorter, claw-shaped dorsal branch; ventral branch longer, strongly curving at base, then straight, orientated dorsad; in ventral view almost rectangular with oval anterior margin, posterior margin widely triangular with ventral process forming acuminate apex, dorsal processes barely exceeding posterior margin, apices rounded with triangular notch mesally, lateral margins slightly undulating. Phallus, in lateral view shorter than segment IX, dorsal margin straight, ventral margin concave; in ventral view tubular, slightly tapering towards apex, with triangular lateral lobes near anterior end.

Additional information. This species was referred to as "sp. 45" in Espeland and Johanson (2010).

Agmina chela sp. nov.

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http://zoobank.org/7547FEDE-D338-4EB3-8B5D-DE125EBE80CB
Figs 94–98
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Diagnosis. The inferior appendages of *A. chela* sp. nov. are distinguished from those of most other species in the genus due to being almost rectangular in ventral view; and a wide, with a convex ventral margin and presence of a posterodorsal and posteroventral process when viewed from the lateral side. The inferior appendages of *Agmina diriwi* Ward & Schefter, 2000, and *A. hexacantha* Ward, 2003 resemble those of *A. chela* sp. nov. in lateral view, except lacking the posterodorsal processes, and in ventral view the shape of the appendages is different, i.e., the plate is produced posteriorly in *A. chela* while excised in *A. diriwi* and *A. hexacantha*. The species that is closest morphologically is *A. rectangulata* sp. nov. *Agmina chela* sp. nov. is distinguished from *A. rectangulata* sp. nov. in the inferior appendages by the, in lateral view, slightly larger posterodorsal process; in ventral view, a more truncate posterior margin of inferior appendages; and the superior appendage is clearly longer than in *A. rectangulata* sp. nov., as seen in lateral view.

Etymology. From Greek *chela* (noun, feminine), meaning pincer-like claw. Named for the crab-claw shaped inferior appendage in lateral view.

Material examined. *Holotype*: New Caledonia, Province Sud, Monts des Koghis, ca 300 m S Koghi Restaurant, 22.18288S, 166.50490E, 457 m, 16–26.xi.2003, Malaise trap, loc#001a [KA Johanson].

Paratypes: New Caledonia – **Province Sud** • 1 ♂; Monts des Koghis, ca 300 m S Koghi Restaurant; 22.18288S, 166.50245E; 427 m; 2–16.xi.2003, Malaise trap, loc#003; leg. KA Johanson; NHRS; • 1 ♂; Monts des Koghis, ca 300 m S Koghi Restaurant; 22.18288S, 166.50167E; 417 m; 2–16.xi.2003; Malaise trap; loc#004; leg. KA Johanson; NHRS.

Measurements. Fore wing length 4.0–4.3 mm (N = 3). Total length of genitalia: 0.5 mm.

Description. *Genitalia*: In lateral view, segment IX triangular anteriorly, apex located medially; in ventral view anteriorly U-shaped. Sternal processes, lateral view, with each apex almost reaching posterior apex of superior appendage, gently curving with convex dorsal margin and concave ventral margin, apex blunt; in ventral view, long, slender, almost parallel, blunt apex. Tergum X in lateral view anteriorly narrowly triangular with acuminate apex, anterior margin straight, dorsal margin slightly concave, shorter than superior appendage; in dorsal view, mesally fused, semi-rectangular, inner margins forming very wide U-shape. Parameres starting before tergum X, in lateral view widening along its length, apex club-shaped, not exceeding superior appendage; in dorsal view, separated, straight, club-shaped apices slightly converging, with complex, sheet-like structure curving ventrally, ending just below superior appendage, anterior margin straight, apex rounded, slightly tapering along its length; in dorsal view, longer than wide, apex rounded with claw-shaped spine directed mes-



Figures 94–98. *Agmina chela* sp. nov. male holotype 94 genitalia, left lateral view 95 genitalia, dorsal view 96 genitalia, ventral view 97 phallus, lateral view 98 phallus, ventral view.

oanterad. Inferior appendages, in lateral view, with dorsoposterad orientated slightly shorter, but broader straight dorsal branch; ventral branch longer, curving at base, then straight, orientated dorsoposterad; in ventral view almost rectangular with oval anterior margin, posterior margin almost straight, narrow ventral process with blunt apex, dorsal processes clearly exceeding posterior margin, apices rounded with rounded notch mesally, lateral margins straight. Phallus, in lateral view shorter than segment IX, dorsal margin concave, ventral margin almost straight; in ventral view uniformly tapering along its length, with narrow lateral lobes at anterior end.

Additional information. This species was referred to as "sp. 55" in Espeland and Johanson (2010).

Agmina piscaria sp. nov.

http://zoobank.org/AEBF5739-478F-4FD1-B86D-E72A2A0EB6D3 Figs 99–104

Diagnosis. Agmina piscaria sp. nov. is distinguished from other Agmina species in combination of having a subapical instead of apical position of the median hooks of the superior appendage, dorsal branch of inferior appendages that are hooked mesally at their apex, seen in dorsal view, the shape of the plate formed by the inferior appendages that is narrowly parallelogram-shaped with a long central lobe, and long, straight sternal process. Also *A. amieuensis* sp. nov. and *A. christinae* sp. nov. have a subapical position of the mesal hooks of the superior appendages, but *A. amieuensis* sp. nov. is separated from *A. piscaria* sp. nov. by the tapering superior appendage in lateral view, the short sternal processes, and the different shape of the inferior appendage. *Agmina christinae* sp. nov. has a group of megasetae on the dorsobasal part of the superior appendages that are absent in *A. piscaria* sp. nov.

Etymology. *Piscaria*, from Latin, meaning fish-like. Named for the fish-shaped phallus in ventral view.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; Mt. Panié; 20.57306S, 164.77139E; 902 m; 9.xii.2003; Malaise trap; loc#075; leg. KA Johanson; MNHN.

Measurements. For wing length 4.5 mm (N = 1). Total length of genitalia: 0.6 mm.

Description. *Genitalia*: In lateral view, segment IX triangular anteriorly, apex located medially; in ventral view anteriorly oblong. Sternal processes, lateral view, with each apex almost reaching posterior apex of superior appendage, anterior half triangular, abruptly narrowing around mid-length, posterior half slender, straight with semi-acute apex, directed posteroventrad; in ventral view, anterior half robust, slightly diverging, posterior half narrower, almost parallel, apices blunt. Tergum X in lateral view anterodorsally narrowly triangular, with anterior margin concave, dorsal margin straight, ventral margin convex, shorter than superior appendage; in dorsal view, mesally fused, strongly concave anteriorly, inner margin forming U-shape. Parameres in lateral view anteriorly triangular, then abruptly narrowing, midpart very slender, curving, apex much wider, club-shaped, directed dorsad, with two warts at posterior margin; in dorsal view, widely separated, bifurcated anteriorly, slender, anterior half slightly diverging, posterior half parallel, narrowly, club-shaped at apex. Superior appendages, in lateral view, largely oval, longer than wide, with wide setae at posterior part of dorsal margin; in dorsal view robust, slightly converging, lateral margin straight, mesal



Figures 99–104. *Agmina piscaria* sp. nov. male holotype **99** genitalia, left lateral view **100** genitalia, dorsal view **101** posterodorsal part of inferior appendages, dorsal view **102** genitalia, ventral view **103** phallus, lateral view **104** phallus, ventral view.

margin convex with claw-like process directed anteromesad near rounded. Inferior appendages, in lateral view, with dorsoposterad orientated dorsal branch with rounded apex slightly longer than ventroposterad-directed narrow, acuminate, ventral branch; in ventral view rhomboid, with ventral branch forming long, acute, central process, club-shaped dorsal processes exceeding posterior margin. Phallus, in lateral view as long as segment IX, tubular, of equal width along its length, curving upwards towards posterior; in ventral view fish-shaped.

Additional information. This species was referred to as "sp. 30" in Espeland and Johanson (2010).

Species group 3, kapiwa group

Included species in this group are: *Agmina kapiwa* Ward & Schefter, 2000, *A. amplexa* sp. nov. and *A. caraffa*, sp. nov.

Agmina amplexa sp. nov.

http://zoobank.org/D8630A6F-9F11-453F-AFE0-CFBCEDB8E5EB Figs 105–109

Diagnosis. Agmina amplexa sp. nov. is unique in the genus in that the superior appendages are strongly modified with three strong hooks that are orientated mesad as seen in dorsal view. Also A. complexa sp. nov. have strongly modified superior appendages with large hooks but in A. complexa sp. nov. there are only one pair, which are strongly curved anteriorly instead of directed mesally, as seen in dorsal view.

Etymology. *Amplexa*, from Latin, meaning embrace. Named for the superior appendages in dorsal view encircling each other.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Mt. Dzumac, source stream of Ouinne River, downstream crossing point to mountain track; 22°01.997'S, 166°28.486'E; 795 m; over ca. 30 m waterfall; 18.xi-4.xii.2003; Malaise trap; loc#031; leg. KA Johanson; MNHN.

Paratype: New Caledonia – **Province Sud** • 1 ♂; Mt. Dzumac, source stream of Ouinne River, at crossing point to mountain track; 22°02.218'S, 166°28.566'E; 797 m; 18.xi.2003; light trap; loc#032; leg. KA Johanson; NHRS.

Measurements. Fore wing length 3.5–4.2 mm (N = 2). Total length of genitalia: 0.7 mm.

Description. *Genitalia*: In lateral view, segment IX narrowly U-shaped anteriorly, apex located mesally; in ventral view anteriorly ovoid. Sternal processes, lateral view, with each apex reaching posterior half of superior appendage, straight, directed posterad, narrowing along its length, apex acuminate. in ventral view, diverging, lateral margins convex, mesal margins slightly convex anteriorly, apices acuminate. Tergum X in lateral view triangular; in dorsal view, narrowly triangular with concave posterior margin. Parameres absent. Superior appendages, in lateral view, twice as long as tergum



Figures 105–109. *Agmina amplexa* sp. nov. male holotype **105** genitalia, left lateral view **106** genitalia, dorsal view **107** genitalia, ventral view **108** phallus, lateral view **109** phallus, ventral view.

X, saddle-shaped with spine like ventral process, two tubular, curving mesal processes, the anterior largely parallel with dorsal margin, apex blunt, the posterior parallel with posterior margin with acute apex; in dorsal view long, anterior half straight, parallel, curved mesad at 90 degree angle at mid-length, tapering along its length, apex claw-like directed anterad; main branch bifurcating anteriorly, with slender mesal branch

curving upwards with acuminate apex; second, narrowly triangular mesal branch originating between first mesal branch and the curve of main branch. Inferior appendages, in lateral view, with posterad orientated large, lobe-like, acute dorsal branch, ventral branch in the form of small tooth; in ventral view dorsal branch forming long, slender shape with convex margins and two slender, slightly converging posterior processes, ventral branch forming small central tooth. Phallus, in lateral view shorter than segment IX, tubular, straight, with anterior lateral lobes; in ventral view slightly wider posteriorly, thin lateral lobes anteriorly.

Additional information. This species was referred to as "sp. 8" in Espeland and Johanson (2010).

Agmina caraffa sp. nov.

http://zoobank.org/877F45E8-18AC-430F-880F-7F05FB9BA902 Figs 110–114

Diagnosis. *Agmina caraffa* sp. nov. is distinguished from all other *Agmina* species in the presence of a pair of long, slender and curving parameres, each armed with tubular megasetae at the meso-ventral face of the posterodorsal apex; and a perfect triangular superior appendage in lateral view.

Etymology. Named for the carafe-shaped phallus in lateral view.

Material examined. *Holotype*: New Caledonia – **Province Sud** • \mathcal{O} ; stream crossing Nouméa-Yaté road immediately W of turnoff to Rivière Bleue Reserve; 22°10.191'S, 166°44.474'E; 162 m; 22.xi-4.xii.2003; Malaise trap; loc#040; leg. KA Johanson; MNHN.

Measurements. For wing length 3.2 mm (N = 1). Total length of genitalia: 0.6 mm.

Description. Genitalia: In lateral view, segment IX semi-triangular with rounded apex located medially; in ventral view anteriorly widely U-shaped. Sternal processes, lateral view, with each apex barely exceeding posterior apex of tergum X, ventral margin almost straight, dorsal margin with rectangular protrusion after mid-length, apex acuminate; in ventral view, parallel, triangular with acuminate apices, rounded lobes after mid-length on lateral margin. Tergum X in lateral view pot-shaped with anterior margin concave, posterior margin straight, higher than long; in dorsal view, irregularly quadrilateral with slightly concave posterior margin. Parameres long, in lateral view slender equally wide along their length, curving upwards towards narrowly clubshaped apex with megasetae at ventral margin, ending before apex of superior appendage; in dorsal view, anterior half slender, converging, posterior half diverging, apex complex sheet-like folding, with megasetae on mesal surface. Superior appendages, in lateral view, triangular, twice as long as tergum X, apex with short spine; in dorsal view stout, longer than wide, slightly widening along their length, abruptly narrowing towards posteromesad directed spine-like apex. Inferior appendages, in lateral view, with posterad orientated large, lobe-like, blunt dorsal branch, ventral branch in the form of small tooth; in ventral view dorsal branch forming slender shape narrowing along its



Figures 110–114. *Agmina caraffa* sp. nov. male holotype **110** genitalia, left lateral view **111** genitalia, dorsal view **112** genitalia, ventral view **113** phallus, lateral view **114** phallus, ventral view.

length, with slightly convex margins, two slender, converging posterior processes, ventral branch forming central tooth. Phallus, in lateral view slightly shorter than segment IX, carafe-shaped, straight; in ventral view tubular, straight.

Additional information. This species was referred to as "sp. 15" in Espeland and Johanson (2010).

Species group 4, nodosa group

Included species in this group are: Agmina nodosa Ward, 2003, A. rostrata sp. nov., A. artarima Ward & Schefter, 2000, A. dathioensis sp. nov., A. rougensis sp. nov., A. viklundi sp. nov., A. lata sp. nov., A. falx sp. nov., A. guttula sp. nov., A. amieuensis

sp. nov., *A. spina* sp. nov., *A. complexa* sp. nov., *A. berada* Ward & Schefter, 2000, and *A. cheirella* Ward, 2003.

The species in the *nodosa* species group are characterised by having relatively short inferior appendage that is simple and curving dorsally in lateral view.

Agmina rostrata sp. nov.

http://zoobank.org/B9FD1DF2-4FF7-45D3-B794-931C0DD18D5D Figs 115–119

Diagnosis. Agmina rostrata sp. nov. is characterised by having long posteriorly orientated sternal processes that are almost parallel-sided along their length, and heavily sclerotised parameres with posterior part orientated dorsally and deeply bifurcated in lateral view. Also A. dathioensis sp. nov., A. rougensis sp. nov. and A. lata sp. nov. have long and parallel-sided sternal processes in lateral view. Agmina rostrata sp. nov. is distinguished from A. dathioensis sp. nov. in that the sternal process is orientated posteriorly, not ventrally; and from A. lata sp. nov. in the slightly narrower sternal process in lateral view, and absence of megasetae on the posterior apex of the parameres on the mesal face of the superior appendages.

Etymology. *Rostrata*, from Latin, meaning beak-shaped. Named for the medial processes on the superior appendage in ventral view, together forming a beak-shaped process.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Dumbea River, Branche Nord, 2.2 km SE summit of Mt. Piditéré; 22°07.503'S, 166°29.899'E; 25 m; 21.i.2004; light trap; loc#124a; leg. KA Johanson & C Pöllabauer; MNHN.

Paratype: New Caledonia – **Province Sud** • 1 ♂; same data as holotype; • 1 ♂; Dumbea River, Branche Sud; 22°08.344'S, 166°30.147'E; 42 m; 3.xi.2003; light trap; loc#006; leg. KA Johanson; NHRS.

Measurements. Fore wing length 2.9–3.5 mm (N = 2). Total length of genitalia: 0.5 mm.

Description. *Genitalia*: In lateral view, segment IX sharply triangular anteriorly, apex located dorsally; in ventral view anteriorly shallowly oblong. Sternal processes, lateral view, with each apex almost reaching apex of superior appendage, gently tapering along its length, slightly anti-sigmoid, apex truncated; in ventral view, parallel, of similar width throughout its length, slightly bulging at mid-length, apex acute, directed mesad. Tergum X in lateral view trapezoid, shorter than superior appendage, in dorsal view, mesally fused, semi-rectangular with rounded posterior corners, inner margin forming shallow, wide U. Parameres in lateral view complex, multi-branched, anteriorly directed posteromesad, then turning posterodorsad at 90 degree angle, gradually widening with two-pronged apex directed dorsad, mesal branch originating close to 90 degree angle, with wide circular apex; in dorsal view, widest at mid-length, there with large open beak-shaped protrusion directed mesad. Superior appendages, in lateral view, irregularly axe-blade shaped with acute, tooth-shaped apex dorsally, dorsal mar-



Figures 115–119. *Agmina rostrata* sp. nov. male holotype 115 genitalia, left lateral view 116 genitalia, dorsal view 117 genitalia, ventral view 118 phallus, lateral view 119 phallus, ventral view.

gin slightly concave, ventral margin convex; in dorsal view, obtuse triangular with apex directed mesally. Inferior appendages, in lateral view, with dorsoanterad orientated slender dorsal branch with hooked, acute apex, ventral branch directed dorsoposterad, wider, shorter, with semi-acute apex, both branches exceeding dorsal margin of sternal process; in ventral view slender, with convex lateral margins, narrow, rounded anteriorly, slightly widening towards mid-length, ventral branch forming two broad posterior processes with blunt apices. Phallus, in lateral view shorter than segment IX, slightly narrowing along its length, posterior end acute; in ventral view irregular.

Additional information. This species was referred to as "sp. 4" in Espeland and Johanson (2010).

Agmina dathioensis sp. nov.

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http://zoobank.org/AB710193-1B39-4314-8501-7E1143986475
Figs 120–124
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Diagnosis. Agmina dathioensis sp. nov. is characterised by having long posteriorly orientated sternal processes that are almost parallel-sided along their length. Also A. rostrata sp. nov., A. rougensis sp. nov., and A. lata sp. nov. have long and parallel-sided sternal processes in lateral view. Agmina dathioensis sp. nov. is distinguished from all these species by not having heavily sclerotised parameres. Agmina dathioensis sp. nov. is furthermore distinguished from A. rostrata sp. nov. and A. lata sp. nov. in that the sternal processes are orientated ventrally, not posteriorly, and from A. lata sp. nov. in the slightly narrower sternal processes in lateral view, and absence of megasetae on the posterior apex of the parameres on the mesal face of the superior appendages. Finally, A. dathioensis sp. nov. can be distinguished from A. rougensis sp. nov. by the narrower sternal processes in lateral view.

Etymology. Dathioensis, named for the Dathio River, the type locality of the species.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; Xwé Pemöu Stream, 300 m N bridge over Dathio River at Atè, 6.2 km WNW of Thio; 21.58835S, 166.15117E; 13 m; 29.xi.2003; light trap; loc#056; leg. KA Johanson; MNHN.

Measurements. For wwing length 3.9 mm (N = 1). Total length of genitalia: 0.5 mm.

Description. Genitalia: In lateral view, segment IX sharply triangular anteriorly, apex located medially; in ventral view anteriorly ovoid. Sternal processes, lateral view, with each apex almost reaching apex of superior appendage, slightly wider anteriorly, curving downwards, apex blunt forming three small lobes; in ventral view, long, robust, parallel, of equal with along their length, apex acute directed posteriorly. Tergum X in lateral view trapezoid, shorter than superior appendage, in dorsal view, mesally fused with wide bridge, wide rounded lobe, inner margin forming very shallow U. Parameres starting at tergum X, in lateral view complex folded structure with truncated apex exceeding dorsal margin of superior appendage; in dorsal view, slender, hardly discernible structure. Superior appendages, in lateral view, irregularly quadrilateral, apex, wide, truncated, almost twice the length of tergum X; in dorsal view relatively long, slender, slightly curving mesad, narrowing along its length, long acute apex sharply curving mesad. Inferior appendages, in lateral view, with dorsoanterad orientated dorsal branch, initially wider, then tapering towards apex, ventral branch with wide, clubshaped apex, both branches exceeding dorsal margin of sternal process, main structure exceeding ventral margin of superior appendage; in ventral view relatively short, with convex lateral margins, ventral branch forming two broad posterior processes with blunt apices. Phallus, in lateral view shorter than segment IX, almost straight; in ventral view irregular, with long, narrow lateral processes at posterior end.

Additional information. This species was referred to as "sp. 32" in Espeland and Johanson (2010).



Figures 120–124. *Agmina dathioensis* sp. nov. male holotype **120** genitalia, left lateral view **121** genitalia, dorsal view **122** genitalia, ventral view **123** phallus, lateral view **124** phallus, ventral view.

Agmina rougensis sp. nov.

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http://zoobank.org/C8567268-ECAA-441A-8741-11316F2B1E4D
Figs 125–129
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Diagnosis. Agmina rougensis sp. nov. is characterised by having long ventrally orientated sternal processes that are almost parallel-sided along their length. Also A. dathioensis sp. nov., A. rostrata sp. nov. and A. lata sp. nov. have long and parallel-sided sternal processes in lateral view, and A. rougensis sp. nov. is particularly similar to A. dathioensis sp. nov. by the ventral orientation of the sternal processes. Agmina rougensis sp. nov. is distinguished from A. rostrata sp. nov., A. dathioensis sp. nov., and A. lata sp. nov. by having a much more slender sternal processes in lateral view.

Etymology. Rougensis, named for Rivière Rouge, the type locality of the species.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Plaine des Gaïacs, Rivière Rouge, 14.2 km NW summit of Mt. Rouge, 50 m upstream road RT1 Nouméa-Koné; 20°31.573'S, 164°46.690'E; 23 m; 2.i.2004; light trap; loc#104; leg. KA Johanson; MNHN.

Measurements. For wing length 4.0 mm (N = 1). Total length of genitalia: 0.9 mm.

Description. Genitalia: In lateral view, segment IX sharply triangular anteriorly, apex located dorsally; in ventral view anteriorly U-shaped. Sternal processes, lateral view, with each apex exceeding apex of superior appendage, anterior half wide, tapering along its length, posterior half, long, slender, spine like with acute apex; in ventral view, robust, twice as long as inferior appendage, tapering along their length, converging, apex acute. Tergum X in lateral view quadratic with mesoanterad corner drawn out, equally long as high, in dorsal view, mesally fused with wide bridge, wide rounded lobe with two short, tooth-like protrusion, inner margin forming very shallow, wide V. Parameres starting at tergum X, in lateral view, short structure approx. four times longer than wide, with truncated apex barely exceeding the dorsal margin of superior appendage; in dorsal view, slender, hardly discernible structure. Superior appendages, in lateral view, irregular posterior half wider than anterior half, apex with claw-like process dorsally, directed ventrad, more than twice the length of tergum X; in dorsal view relatively long, slender, slightly converging towards apex, narrowing along its length, short, acute, claw-like apex sharply curving mesad. Inferior appendages, in lateral view, with dorsoanterad orientated dorsal branch, initially wider, then tapering towards apex, ventral branch with wide, club-shaped apex, ventral branch exceeding dorsal margin of sternal process, main structure slightly exceeding ventral margin of superior appendage; in ventral view narrow anteriorly, widening until mid-length, then straight, slightly narrowing, with ventral branch forming two slightly narrowing processes with rounded apex and tooth orientated mesad. Phallus, in lateral view much shorter than segment X, tubular, almost straight; in ventral view tubular with anterior triangular lateral lobes.

Additional information. This species was referred to as "sp. 44" in Espeland and Johanson (2010).



Figures 125–129. *Agmina rougensis* sp. nov. male holotype 125 genitalia, left lateral view 126 genitalia, dorsal view 127 genitalia, ventral view 128 phallus, lateral view 129 phallus, ventral view.

Agmina viklundi sp. nov.

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http://zoobank.org/02F5DAA3-FDE6-4376-87C5-61BF25805FBC
Figs 130–134
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Diagnosis. In ventral view *A. viklundi* sp. nov. is similar to *A. complexa* sp. nov. in the long, broad and slightly diverging sternal processes. In lateral view, *A. viklundi* sp. nov. is easily distinguished from *A. complexa* sp. nov. by the convex ventral margin of the sternal processes, which is straight in *A. complexa* sp. nov. Furthermore, in lateral view the superior appendages in *A. viklundi* sp. nov. are wide and rounded posteriorly, while in *A. complexa* sp. nov. these are strongly narrowing apically.

Etymology. *Viklundi*, named for one of the collectors of the holotype, Mr. Bert Viklund.

Material examined. *Holotype:* New Caledonia – **Province Sud** • ♂; Mt. Panié, Riv. Padyéém; 20°34.122'S, 164°48.147'E; 400 m; 22–28.xi.2001; Malaise trap; 22– 28.xi.2001; loc#146 (16-2001); leg. KA Johanson, T Pape & B Viklund; MNHN.



Figures 130–134. *Agmina viklundi* sp. nov. male holotype 130 genitalia, left lateral view 131 genitalia, dorsal view 132 genitalia, ventral view 133 phallus, lateral view 134 phallus, ventral view.

Measurements. For wing length 3.5 mm (N = 1). Total length of genitalia: 0.6 mm.

Description. Genitalia: In lateral view, segment IX triangular anteriorly, apex located medially; in ventral view anteriorly U-shaped. Sternal processes, lateral view, with knife-shaped with anterior half slightly narrowing, posterior end slightly wider, apex rounded; in ventral view, robust, long, of equal width along their length, apex rounded, anterior half diverging, posterior half parallel. Tergum X mug-shaped, in lateral view longer than high; in dorsal view, mesally well-separated, much longer than wide, rounded apex. Parameres in lateral view long, slender, curving upwards, small dorsal lobe at mid-length, apex club-shaped with megasetae directed ventrad, then drawn out into long acuminate process orientated dorsad, barely reaching superior appendage; in dorsal view, separated, initially converging, second half diverging widely, apex club-shaped with megasetae directed mesad. Superior appendages, in lateral view, not exceeding the length of tergum X, irregularly quadrilateral with rounded apex, claw-like process mesally on posterior margin, directed anteromesad; in dorsal view short, stout, rectangular process with large megasetae orientated mesad at mid-length of inner margin, rounded apex with long, curving, spine-like process orientated mesad. Inferior appendages, in lateral view, forming a single rounded, club-shaped structure, gently curving upwards; in ventral view slender, with slightly undulating convex lateral margins, two slightly converging, posterior processes slightly narrowing along their length, with apex directed posterolaterad. Phallus, in lateral view much shorter than segment IX, tubular, straight; in ventral view slightly wider anteriorly, tubular.

Additional information. This species was referred to as "sp. 38" in Espeland and Johanson (2010).

Agmina lata sp. nov.

http://zoobank.org/CFC62D0F-AF06-46DE-94DB-3BA8F2647E35 Figs 135–139

Diagnosis. Agmina lata sp. nov. is characterised by having long posteriorly orientated sternal processes that are almost parallel-sided along their length. Also A. dathioensis sp. nov., A. rostrata sp. nov. and A. rougensis sp. nov. have long and parallel-sided sternal processes in lateral view, but in A. dathioensis sp. nov. and A. rougensis sp. nov. the sternal processes are orientated ventrally, not posteriorly. It is distinguished from A. rostrata sp. nov. by the absence of heavily sclerotised parameres inside the superior appendages.

Etymology. *Lata*, from Latin, meaning wide. Referring to the wide sternal process in lateral view.

Material examined. *Holotype*: New Caledonia – **Province Sud** • \Im ; Réserve spéciale de faune de la haute Yaté, along road on southern part of Marais de la Rivière Blanche, stream draining to Marais de la Rivière Blanche, 2.25 km SW Pont Pérignon; 180 m; 6–16.xi.2003; Malaise trap; loc#010a; leg. KA Johanson; MNHN.



Figures 135–139. *Agmina lata* sp. nov. male holotype 135 genitalia, left lateral view 136 genitalia, dorsal view 137 genitalia, ventral view 138 phallus, lateral view 139 phallus, ventral view.

Measurements. For wing length 4.0 mm (N = 1). Total length of genitalia: 0.6 mm.

Description. Genitalia: In lateral view, segment IX rounded triangular anteriorly, apex located medially; in ventral view anteriorly U-shaped. Sternal processes, lateral view, with long, rectangular, of equal width throughout their length, dorsal margin widely triangular at mid-length, apex truncated; in ventral view, robust, slightly diverging, inner margin straight, outer margin widest before mid-length, apex truncated, slightly pointed mesally. Tergum X large, longer than wide, dorsal and ventral margins sigmoid, anterior margin concave; in dorsal view, mesally separate, longer than wide, posterior half rectangular, anterior part triangular. Parameres in lateral view long, slender, wider anteriorly, curving upwards toward apex forming looped structure not exceeding any margins of the superior appendage; in dorsal view, separated, anterior 2/3 parallel, diverging at posterior 1/3, then largely parallel, apex elongated club-shaped. Superior appendages, in lateral view, triangular, shorter than tergum X, mesal spine close to apex; in dorsal view short, triangular with convex lateral margin, apex rounded, long, thin, curved, spine-like process posteriorly on inner margin, directed mesad. Inferior appendages, in lateral view, forming a single knife-blade-shaped structure, with straight dorsal margin, convex ventral margin with shallow notch on anterior half; in ventral view slender, rounded, triangular at base, widest just before mid-length, then slightly tapering towards apex with two parallel posterior processes with rounded apex. Phallus, in lateral view much shorter than segment IX, tubular; in ventral view wider anteriorly.

Additional information. This species was referred to as "sp. 5" in Espeland and Johanson (2010).

Agmina falx sp. nov.

http://zoobank.org/53D59901-6E6F-43FB-A715-6CE02233F1F6 Figs 140–145

Diagnosis. This species is easily distinguished from other *Agmina* species in lateral view by the sickle shaped sternal processes, each being slightly curved ventrally and with a sharp apex. It also has a large, claw-like structure apically in the superior appendages and pointed megasetae at the apex of the parameres.

Etymology. From Latin *falx* (noun, feminine), meaning sickle. Named for the sickle-shaped sternal process in lateral view.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; 2.8 km ENE Bopope, at site where Rivière Kövé Tamè enters Rivière Oua Mendiou, 100 m S RPN2 Koné-Poindimié; 20°54.455'S, 165°06.300'E; 78 m; 14.i.2003; light trap; loc#119; leg. KA Johanson; MNHN.

Measurements. For wwing length 3.1 mm (N = 1). Total length of genitalia: 0.6 mm.

Description. *Genitalia*: In lateral view, segment IX rounded triangular with slightly upturned apex anteriorly, apex located ventrally; in ventral view anteriorly U-



Figures 140–145. *Agmina falx* sp. nov. male holotype 140 genitalia, left lateral view 141 genitalia, dorsal view 142 superior appendage, underside in dorsal view 143 genitalia, ventral view 144 phallus, lateral view 145 phallus, ventral view.
shaped. Sternal processes, lateral view, with sickle-shaped, curving downwards posteriorly, on dorsal margin rounded notch at mid-length; in ventral view, slender, parallel, spine-like with acute apex. Tergum X small, oblong with drawn out, ventroanterad corner, wider than long; in dorsal view, mesally fused, short, not much wider than mesal bridge, posterior margins slightly convex. Parameres originating before tergum X, in lateral view tubular, slightly wider anteriorly, then of equal width along its length, thin, tubular, blunt, process on ventral margin before mid-length; in dorsal view, anterior half tubular, nearly parallel, posterior part folding in on itself, apex truncated, mesally with long, straight, megasetae directed mesad. Superior appendages, in lateral view, curving with rounded, slightly dentate apex, dorsally with long, downwardscurving, spine-like process, exceeding main appendage; in dorsal view irregular, equally wide as high with almost straight posterolateral process, with dentate lateral margin, above this with posteromesad curving acute, spine-like process. Inferior appendages, in lateral view, forming single rounded, rhomboid process with rounded apex; in ventral view short, slender with convex margin, apex with two thin spine-like posterior processes with acute apex. Phallus, in lateral view much shorter than segment IX, tubular; in ventral view wider posteriorly, with looped lateral lopes anteriorly.

Additional information. This species was referred to as "sp. 13" in Espeland and Johanson (2010).

Agmina guttata sp. nov.

http://zoobank.org/CAB0DB4A-B613-479E-A484-79BA495DF684 Figs 146–150

Diagnosis. In ventral view, the inferior appendages of *Agmina guttata* sp. nov. form a narrow plate with a posteroapical incision laterally flanged by a row of small setae, similar to those of *A. complexa* sp. nov., *A. amieuensis* sp. nov., and *A. spina* sp. nov. *Agmina guttata* sp. nov. also have very short sternal processes in lateral view, as also present in *A. amieuensis* sp. nov. and *A. spina* sp. nov. *Agmina guttata* sp. nov. is distinguished from the similar species by the shape of the sternal process in ventral view, which is oval, almost drop-shaped.

Etymology. *Guttata*, from Latin, meaning drop-shaped. Referring to the shape of the sternal process in ventral view.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; Haute Yaté fauna reserve, 1760 m S bridge Pont Perignon, 50 m upstream bridge over stream; 22.14954S, 166.701211E; 180 m; 14.xii.2003–13.i.2004; Malaise trap; loc#081; leg. KA Johanson; MNHN.

Paratypes: New Caledonia – **Province Sud** • 2 ♂; Réserve spéciale de faune de la haute Yaté, along road on southern part of Marais de la Rivière Blanche, stream draining to Marais de la Rivière Blanche, 2.25 km SW Pont Pérignon; 180 m; 6–16.xi.2003; Malaise trap; loc#010a; leg. KA Johanson; NHRS; • 1 ♂; Rivière Ouanéoue, at bride



Figures 146–150. *Agmina guttata* sp. nov. male holotype 146 genitalia, left lateral view 147 genitalia, dorsal view 148 genitalia, ventral view 149 phallus, lateral view 150 phallus, ventral view.

crossing road to Koghi Mountains, ca. 1.5 km from road RT1 Nouméa-Dumbea; 22°10.861'S, 166°29.531'E; 11.xi.2003; light trap; loc#024a; leg. KA Johanson; NHRS; • 1 3; Réserve spéciale de faune de la haute Yaté, along road on southern part of Marais de la Rivière Blanche, stream draining to Marais de la Rivière Blanche, 1.35 km S Pont Pérignon; 22°08.496'S, 166°42.152'E; 180 m; 6–16.xi.2003; Malaise trap; loc#009a; leg. KA Johanson; NHRS; • 1 3; Réserve spéciale de faune de la haute Yaté, along road on southern part of Marais de la Rivière Blanche, stream draining to Marais de la Rivière Blanche, 3.7 km SW Pont Pérignon; 22°09.327'S, 166°40.841'E; 180 m; 6–16. xi.2003; Malaise trap; loc#013; leg. KA Johanson; NHRS; • 1 3; W slope Mt. Ningua, Kwé Néco Stream, at Camp Jacob, 3.7 km WNW summit of Mt. Ningua, on Boulo-Thio Road, ca. 50 m upstream road; 21°43.613'S, 166°06.567'E; 150 m; 29.xi-12. xii.2003; Malaise trap; loc#054; leg. KA Johanson; NHRS; **Province Nord** • 2 3; Mt. Panié, Riv. Padyéém; 400 m; 22–28.xi.2001; Malaise trap; 22–28.xi.2001; 20°34.122'S,

164°48.147'E; loc#146 (16-2001); leg. KA Johanson, T Pape & B Viklund; NHRS; • 1 ♂; Wé Caot Stream, draining NNE side of Mt. Panié, 0.9 km NW Cascade de Tao; 20°33.311'S, 164°48.064'E; 18.xii.2003; light trap; loc#084; leg. KA Johanson; NHRS.

Measurements. Fore wing length 2.4–3.8 mm (N = 11). Total length of genitalia: 0.3 mm.

Description. Genitalia: In lateral view, segment IX almost rectangular, apex located dorsally; in ventral view anteriorly slightly undulating, almost straight. Sternal processes, lateral view, with straight, gently tapering along their length, apex semiacute; in ventral view, anterior half robust, diverging, of equal width throughout their length, abruptly narrowing slightly posteriorly of mid-length, posterior part clubshaped with rounded apex. Tergum X semi-rectangular with anterior margin concave and posterior margin convex; in dorsal view, mesally fused, forming rounded lobe with shallow, wide notch at apex. Parameres originating before tergum X, in lateral view long, slender, initially trifurcated, then slender, tubular directed posterodorsad, forming complex looped structure at apex; in dorsal view, separated, initially converging, then diverging, straight, slightly widening along their length, thin, whip-like apex curving anterolaterad. Superior appendages, in lateral view, rounded, rectangular with truncated apex, as long as tergum X; in dorsal view parallel, curving mesally towards apex, anterior end triangular, lateral margin convex, mesal margin straight, claw-like mesoanterad directed process at apex. Inferior appendages, in lateral view, forming single slightly narrowing process with rounded apex exceeding lateral margin of sternal process; in ventral view slender, anterior end widely triangular, lateral margins parallel anteriorly, slightly converging posteriorly, apex with two spine-like, thin posterior processes. Phallus, in lateral view as long as segment IX, tubular, straight; in ventral view wider anteriorly, tubular.

Additional information. This species was referred to as "sp. 31" in Espeland and Johanson (2010).

Agmina amieuensis sp. nov.

http://zoobank.org/017B80BA-5FCD-4F1F-A885-37971CA3AD99 Figs 151–155

Diagnosis. In ventral view, the inferior appendages of *Agmina amieuensis* sp. nov. form a narrow plate with a posteroapical incision laterally flanged by a row of small setae, similar to those of *A. complexa* sp. nov., *A. guttata* sp. nov., and *A. spina* sp. nov. *Agmina amieuensis* sp. nov. also have very short sternal processes in lateral view, as also present in *A. guttata* sp. nov. and *A. spina* sp. nov. *Agmina amieuensis* sp. nov. is distinguished by the shape of the sternal process in ventral view, which is oval, almost drop-shaped.

Etymology. *Amieuensis*, named for Réserve Spéciale de faune du Col d'Amieu et Table Unio, the type locality of the species.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ∂; Réserve Spéciale de faune du Col d'Amieu et Table Unio, branch of Fa Tööiri Stream; 21°34.844'S,



Figures 151–155. *Agmina amieuensis* sp. nov. male holotype 151 genitalia, left lateral view 152 genitalia, dorsal view 153 genitalia, ventral view 154 phallus, lateral view 155 phallus, ventral view.

165°49.677'E; loc#155 (25-2001); Malaise trap; 30.xi-5.xii.2001; leg. KA Johanson, T Pape & B Viklund; MNHN.

Paratypes: New Caledonia – **Province Nord** • 1 3; Mt. Panié, Riv. Padyéém; 400 m; 22–28.xi.2001; Malaise trap; 22–28.xi.2001; 20°34.122'S, 164°48.147'E; loc#146 (16-2001); leg. KA Johanson, T Pape & B Viklund; NHRS; **Province Sud** • 1 3; Plateau de Dogny, source of Dogny River, ca, 100 S of loc 046 and nearly 1.0 km SE summit of Platou; 21.62095S, 165.88072E; 917 m; 25.xi-16.xii.2003; Malaise trap; loc#047; leg. KA Johanson; NHRS; • 1 3; Monts des Koghis, ca 300 m S Koghi Restaurant; 22.18288S, 166.50245E; 427 m; 2–16.xi.2003; Malaise trap; loc#003; leg. KA Johanson; NHRS; • 1 3; Monts des Koghis, ca 300 m S Koghi Restaurant; 22.18288S, 166.50167E; 417 m; 2–16.xi.2003; Malaise trap; loc#004; leg. KA Johanson; NHRS; • 2 ♂; Monts Kwa Ne Mwa, on road between Nouméa and Yaté, 2.0 km E Pic Mouirange; 22°12.356'S, 166°40.798'E; 220 m; 7–16.xi.2003; Malaise trap; loc#014; leg. KA Johanson; NHRS.

Measurements. Fore wing length 2.8–3.7 mm (N = 7). Total length of genitalia: 0.4 mm.

Description. Genitalia: In lateral view, segment IX widely bell-shaped, apex located medially; in ventral view anteriorly oval. Sternal processes, lateral view, with broad structure with semi-acute apex located ventrally, ventral margin slightly concave; in ventral view, slightly diverging, tapering along their length, apex rounded. Tergum X trapezoid with concave anterior margin; in dorsal view, mesally separate, longer than wide, inner margin convex, posterior margin slightly concave. Parameres originating at tergum X, in lateral view initially slender, widening to a folded, twisting, sheet-like structure at apex; in dorsal view, slender, gently widening along their length, initially diverging, posterior half converging, apex rounded, club-shaped. Superior appendages, in lateral view, triangular with dorsal margin convex, apex acute directed posteromesad, spine-like mesal process curving downwards with apex directed anteromesad; in dorsal view longer than wide, outer margin sigmoid, inner margin convex, two apices directed postero mesad, mesal process directed anteromesad posteriorly of both apices. Inferior appendages, in lateral view, with bifurcated anterior half, ventral process running parallel with, and exceeding ventral margin of sternal process, posterior part forming a single narrowing lobe with rounded apex exceeding posterior margin of sternal process; in ventral view posterior half forming lobe-like structure narrowing towards rounded apex. Phallus, in lateral view almost as long as segment IX, tubular, straight; in ventral view wider anteriorly, tubular.

Additional information. This species was referred to as "sp. 18" in Espeland and Johanson (2010).

Agmina spina sp. nov.

http://zoobank.org/442398D4-AA9C-4DB0-BA9E-C3D6454D5290 Figs 156–160

Diagnosis. In ventral view, the inferior appendages of *Agmina spina* sp. nov. form a narrow plate with a posteroapical incision laterally flanged by a row of small setae, similar to that of *A. complexa* sp. nov., *A. guttata* sp. nov., and *A. amieuensis* sp. nov. *Agmina spina* sp. nov. also have very short sternal processes in lateral view, as also present in *A. guttata* sp. nov. and *A. amieuensis* sp. nov. *Agmina spina* sp. nov. is distinguished from the other species by the narrow and tapering superior appendages in lateral view.

Etymology. From Latin *spina* (noun, feminine), meaning spine. Named for the spine-like shape of the superior appendage.

Material examined. *Holotype*: New Caledonia – **Province Sud** ● ♂; Plateau de Dogny; 21°37.000'S, 165°52.500'E; 846 m; loc#145 (15-2001); Malaise trap; 18–21. xi.2001; leg. KA Johanson, T Pape & B Viklund; MNHN.



Figures 156–160. *Agmina spina* sp. nov. male holotype 156 genitalia, left lateral view 157 genitalia, dorsal view 158 genitalia, ventral view 159 phallus, lateral view 160 phallus, ventral view.

Measurements. For wwing length 4.1 mm (N = 1). Total length of genitalia: 0.5 mm.

Description. *Genitalia*: In lateral view, segment IX widely bell-shaped, apex located medially; in ventral view anteriorly oval. Sternal processes, lateral view, with tapering along their length, ventral margin almost straight, apex slender, rounded; in ventral view, slightly diverging, of nearly equal width throughout their length, abruptly narrowing towards rounded apex. Tergum X almost quadratic with concave anterior and posterior margin, drawn-out anteroventral corner; in dorsal view, widely mesally separated, twice as long as wide, outer margins convex, inner margins straight, but slightly undulating. Parameres originating at tergum X, in lateral view forming complex structure with looped apex; in dorsal view, slender, anterior part slightly converging, posterior part diverging, apex not readily visible. Superior appendages, in lateral view, exceeding length of tergum X, wider at base, then slender, spine-like, straight, with acute apex; in dorsal view long, slender, slightly curving, converging towards acute apex. Inferior appendages, in lateral view, with bifurcated anterior half, ventral process straight, exceeding ventral margin of sternal process, posterior part forming a single narrowing lobe with rounded apex directed posteromesad, exceeding posterior margin of sternal process; in ventral view slender with convex margin, two acute, thin, posterior processes at apex. Phallus, in lateral view not exceeding length of segment IX, tubular, slightly curving; in ventral view wider anteriorly, with irregular lateral processes at mid-length.

Additional information. This species was referred to as "sp. 40" in Espeland and Johanson (2010).

Agmina complexa sp. nov.

http://zoobank.org/C8FC9FA5-E342-4FA7-9C98-F45945CE312A Figs 161–165

Diagnosis. In ventral view, the inferior appendages of *Agmina complexa* sp. nov. form a narrow plate with a posteroapical incision laterally flanged by a row of small setae, similar to those of *A. spina* sp. nov., *A. guttata* sp. nov., and *A. amieuensis* sp. nov. *Agmina complexa* sp. nov. are easily separated from the above similar species by the much longer and almost oval sternal process in lateral view, and the superior appendages are strongly modified and form a pair of very large, anteriorly curving hooks. *Agmina amplexa* sp. nov. also have strongly modified superior appendages but *A. amplexa* sp. nov. has three pairs of more or less mesally orientated hooks instead of a single pair of hooks that are directed anterad in *A. complexa* sp. nov., as seen in dorsal view.

Etymology. Named for the complex shape of the superior appendage.

Material examined. *Holotype*: New Caledonia – **Province Nord** • ♂; Mt. Panié, stream at camp; 20.58139S, 164.76444E; 1310 m; 9.xii.2003; Malaise trap; loc#074; leg. KA Johanson; MNHN.

Paratype: New Caledonia – **Province Nord** • 1 3; Mt. Panié, stream at camp; 20.58167S, 164.76472E; 1311 m; 9.xii.2003; Malaise trap; loc#073; leg. KA Johanson; NHRS.

Measurements. Fore wing length 3.5-4.3 mm (N = 2). Total length of genitalia: 0.8 mm.

Description. *Genitalia*: In lateral view, segment IX narrowly triangular, apex located medially; in ventral view anteriorly elongated, U-shaped. Sternal processes, lateral view, with club-shaped, dorsal margin convex, ventral margin straight, apex rounded; in ventral view, robust, slightly diverging, equally wide along their length, apex truncated. Tergum X irregular quadrilateral with concave anterior margin, convex posterior margin, lateral margins almost straight; as wide as high; in dorsal view, me-sally fused, triangular with acute apex. Parameres slender, starting before tergum X, in



Figures 161–165. *Agmina complexa* sp. nov. male holotype 161 genitalia, left lateral view 162 genitalia, dorsal view 163 genitalia, ventral view 164 phallus, lateral view 165 phallus, ventral view.

lateral view sigmoid, widening at apex with concave posterior margin; in dorsal view, separated, long, slender, straight, widening along their length, posterior half slightly wider anteriorly, then equally wide along their length, posteriorly abruptly curving lateroanterad, apex hook-shaped directed anterad. Superior appendages, in lateral view, initially triangular, greatly narrowing forming ridged, greatly curved, narrow process with acute apex directed mesad; in dorsal view forming large hook-like structures, with apices greatly curving, directed anteromesad, crossing mesally. Inferior appendages, in lateral view, with posterad orientated single branch, straight with truncate apex with dorsad directed tooth dorsally, ventral margin and apex exceeding margin of sternal process; in ventral view very slender, lateral margins convex, acute, narrow posterior processes at apex. Phallus, in lateral view tubular, straight; in ventral view slightly wider anteriorly, with triangular lateral lobes, tubular.

Additional information. This species was referred to as "sp. 22" in Espeland and Johanson (2010).

Species group 5, dognyensis-group

Included species in this group are: *Agmina dognyensis* sp. nov., *A. mana* sp. nov., *A. anterohamata* sp. nov., *A. joycei* Ward & Schefter, 2000, and *A. curvatacua* sp. nov. This is a strongly supported monophyletic group based on DNA data (Espeland and Johanson 2010a), but no morphological characters are unique for the group.

Agmina dognyensis sp. nov.

http://zoobank.org/B8A3EC2D-F3B5-49D8-A209-E558EB58BB66 Figs 166–170

Diagnosis. Agmina dognyensis sp. nov. is unique in the combination of having a long, narrow, almost straight superior appendage in lateral view together with a narrow and uniformly tapering sternal processes having a dorsad bend at mid-length. Being armed with a series of megasetae on the posterior part of both parameres is also unique for this species.

Etymology. *Dognyensis*, named for Plateau de Dogny, the type locality of the species. Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Plateau de Dogny, source of Dogny River, ca. 900 m SE summit of Plateau de Dogny; 21.61917S, 165.88072E; 919 m; 25.xi-16.xii.2003; Malaise trap; loc#046; leg. KA Johanson; MNHN.

Paratype: New Caledonia – **Province Sud** • 1 ♂; Plateau de Dogny, source of Dogny River, ca. 1.2km SE summit of Platou, ca. 200 m from waterfall; 21.62067S, 165.88290E; 915 m; 25.xi-16.xii.2003; Malaise trap; loc#048; leg. KA Johanson; NHRS.

Measurements. Fore wing length 4.1–6.0 mm (N = 2). Total length of genitalia: 1.2 mm.

Description. *Genitalia*: Total length 1.2 mm. In lateral view, segment IX low, long, rounded anteriorly, apex located slightly above mid-height of genitalia; in ventral view, anterior incision widely and deeply U-shaped. Sternal processes, lateral view, with very long, basally wide, uniformly narrowing and slightly Z-shaped, apex long, smooth, pointed posterodorsally; in ventral view, undulating and posteriorly orientated along their length, parallel-sided except narrowing at apex. Tergum X long, narrowly triangular, with convex posterior and concave dorsal margin with dorsal process at mid-length; in dorsal view, mesally separate, mesal margin convex. Parameres weakly developed; anterior part slender in lateral view, starting well below and before tergum X, short anterior part orientated posteriorly before slightly curving dorsally below mid-length of tergum X; dividing into short dorsal branch fused with dorsobasal part of superior appendage, and robust ventral branch exceeding ventral part of superior appendage and with long row of long, posteriorly orientated megasetae; in dorsal view, separated and S-shaped at base, almost invisible along tergum X and superior appendage, except ventral branch and its mesally orientated



Figures 166–170. *Agmina dognyensis* sp. nov. male holotype 166 genitalia, left lateral view 167 genitalia, dorsal view 168 genitalia, ventral view 169 phallus, lateral view 170 phallus, ventral view.

megasetae. Superior appendages, in lateral view, simple, slender, with parallel, almost straight dorsal and ventral margins; apex with small right-angled incision; in dorsal view narrow, weakly diverging from mid-length; apex rounded. Inferior appendages, in lateral view, with wide, posterodorsal corner produced into short, narrow process; ends near basis of superior appendages; in ventral view short, almost oval shield with both posterodorsal and posteroventral corners separated mesally by U-shaped ventral and V-shaped incision. Phallus, in lateral view straight, approx. as long as tergum X, posteroventrally slightly produced posteriorly; in ventral view basis wide, gradually narrowing towards rounded apex. Additional information. This species was referred to as "sp. 37" in Espeland and Johanson (2010).

Agmina mana sp. nov.

http://zoobank.org/7B1B9DE5-840F-4CB2-8609-11A396666D22 Figs 171–174

Diagnosis. *Agmina mana* sp. nov. is unique in the combination of having a long, narrow, and bifurcated superior appendage in lateral view together with a narrow and uniformly tapering sternal processes having a uniform dorsal curving along their length. Being armed with numerous megasetae on both dorsal and ventral branches of the superior appendage is also unique for this species.

Etymology. From Latin *manus* (noun, masculine) meaning hand. Named for the superior appendages shaped like an open human hand in mesal view.

Material examined. *Holotype*: New Caledonia – **Province Nord** • ♂; Mt. Panié, Riv. Padyéém; 20°34.122'S, 164°48.147'E; loc#146 (16-2001); 400 m; Malaise trap; 22–28.xi.2001; leg. KA Johanson, T Pape & B Viklund; MNHN.

Measurements. For wwing length 5.1 mm (N = 1). Total length of genitalia: 0.9 mm.

Description. Genitalia: Total length 0.9 mm. In lateral view, segment IX low, long, rounded anteriorly, apex located dorsally in genitalia; in ventral view anterior incision narrowly deeply rectangularly shaped. Sternal processes, lateral view, with basally wide, sharply narrowing into dorsally curving, slender process, apex pointed; in ventral view, parallel-sided along their length before curving slightly laterally at four-fifth their lengths, apex pointing mesally. Tergum X small, triangular, with straight posterior and dorsal margin; in dorsal view, mesally separate, mesal margin not produces mesally. Parameres weakly developed; anterior part slender in lateral view, starting well below and before tergum X, short anterior part orientated anteriorly before looping posteriorly and with basal half running along dorsal margin of superior appendages, bending dorsally at mid-length, distal half slightly undulating dorsally, not exceeding superior appendages posteriorly; in dorsal view, fused at base, before separated and orientated posteriorly; Superior appendages, in lateral view, long, shaped like an open human hand in mesal view; divided into dorsal, posteriorly orientated branch and ventrally orientated branch near basis and orientated downwards; dorsal branch with several very long, ventrally orientated megasetae; ventral branch with approx. two long megasetae orientated posteriorly; in dorsal view narrow, weakly undulating and tapering posteriorly, slightly diverging along their length; megasetae on dorsal branch confined to mesal surface; ventral branches orientated posteromesally, almost dilated and with long megasetae orientated posteriorly. Inferior appendages, in lateral view, with wide, truncated posteriorly; ends well before apex of sternal processes; in ventral view long, narrow basally, slightly widening from 1/3 but narrowing gradually towards rounded apex. Phallus, in lateral view slightly longer than superior appendage, almost straight; in ventral view almost equally wide along its length.



Figures 171–174. *Agmina mana* sp. nov. male holotype 171 genitalia, left lateral view 172 genitalia, dorsal view 173 genitalia, ventral view 174 phallus, lateral view.

Additional information. This species was referred to as "sp. 36" in Espeland and Johanson (2010).

Agmina anterohamata sp. nov. http://zoobank.org/754BE67D-11D2-4063-8AEC-D5DA9F25F047 Figs 175–179

Diagnosis. *Agmina anterohamata* sp. nov. is unique in the combination of having a long, narrow, and bifurcated superior appendage in lateral view together with a narrow and uniformly tapering sternal processes having a uniform dorsal curving along their



Figures 175–179. *Agmina anterohamata* sp. nov. male holotype **175** genitalia, left lateral view **176** genitalia, dorsal view **177** genitalia, ventral view **178** phallus, lateral view **179** phallus, ventral view.

length. Being armed with numerous megasetae on both dorsal and ventral branches of the superior appendage is also unique for this species.

Etymology. *Antero* and *hamata*, from Latin, meaning anterior and hook-shaped. Referring to the forwardly curved hook at the posterior end of the superior appendages.

Material examined. *Holotype*: New Caledonia – **Province Sud** • \Im ; Réserve spéciale de faune de la haute Yaté, along road on southern part of Marais de la Rivière Blanche, stream draining to Marais de la Rivière Blanche, 2.25 km SW Pont Pérignon, 180 m, 6–16.xi.2003, Malaise trap, loc#010a; leg. KA Johanson; MNHN.

Paratype: New Caledonia – **Province Sud** • 1 ♂; Réserve spéciale de faune de la haute Yaté, along road on southern part of Marais de la Rivière Blanche, stream draining to Marais de la Rivière Blanche, 1.35 km S Pont Pérignon; 22°08.496'S, 166°42.152'E; 180 m; 6–16.xi.2003; Malaise trap; loc 009a; leg. KA Johanson; NHRS.

Type locality. New Caledonia, Province Sud, Réserve spéciale de faune de la haute Yaté.

Measurements. Fore wing length 4.5–4.9 mm (N = 2). Total length of genitalia: 0.9 mm.

Description. Genitalia: Total length 0.9 mm. In lateral view, segment IX low, long, rounded anteriorly, apex located dorsally in genitalia; in ventral view anterior incision widely and deeply U-shaped. Sternal processes, lateral view, with slightly arrowhead shaped, narrowing from mid-length, posterior part not produced posteriorly; in ventral view, slightly narrowing till mid-length, parallel-sided from mid-length and slightly diverging along their length, each with bifurcated apex. Tergum X trapezoid with sharply pointing anteriorly and rounded pointing posteriorly; dorsal margin straight; in dorsal view, mesally separate, mesal margin indistinctly triangular. Parameres anterior part slender in lateral view, starting well below and before tergum X, short anterior part orientated posteriorly, central part orientated posterodorsally, distal part divided into branch orientated posteroventrally and dorsal branch orientated posteriorly, not exceeding superior appendages posteriorly; in dorsal view, separated along their length, bifurcated at basis, orientated posterad, few stout setae present on dorsomesal faces immediately after end of tergum X; few long megasetae present in row on plate-like mesal process; distal part completely fused with superior appendages. Superior appendages, in lateral view, long, with posterodorsal corner strongly produced into strong anteroventrally orientated hook; posteroventral corner slightly produced posterad; dorsal margin almost straight; in dorsal view slender and almost parallelsided except narrowing towards apex; apex curving mesally and anteriorly. Inferior appendages, in lateral view, with short, finger-like dorsal branch orientated posterodorsally, posteroventral corner right-angled, without branch; in ventral view forming a nearly oval shield almost completely hiding dorsal branches; dorsal branches separated by narrow, shallow incision. Phallus, in lateral view approx. as long as inferior appendages, straight, with pair of posteriorly orientated spines situated on posteroventral margin; in ventral view wide along its length.

Additional information. This species was referred to as "sp. 3" in Espeland and Johanson (2010).

Agmina curvatacua sp. nov.

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http://zoobank.org/9DA8F862-84DA-4F36-BE63-DDD97B1046AE
Figs 180–184
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Diagnosis. *Agmina curvatacua* sp. nov. is unique among the *Agmina* species in that the pair of parameres form long, needle-shaped processed exceeding the posterior margin of the superior appendages; the basis of the inside of the superior appendages have the parameres with a cluster of posteromesad megasetae; and in lateral view, the sternal process tapers posteriorly and is curved ventrally before apex.

Etymology. *Curvata* and *acua*, from Latin, curved and needle-shaped. Referring to the curved needle-shaped posterior part of the sternal processes.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; Dumbea River, Branche Sud; 22°08.344'S, 166°30.147'E; 42 m; 3.xi.2003; light trap; loc#006; leg. KA Johanson; MNHN.

Paratype: New Caledonia – **Province Sud** • 1 ♂; Dothio River, 10 m E bridge at Atè, 6.2 km WNW Thio; 21°35.288'S, 166°09.070'E; 13 m; 29.xi.2003; light trap; loc#057; leg. KA Johanson; NHRS.

Type locality. New Caledonia, Province Sud, Dumbea River.

Measurements. Fore wing length 2.7–3.7 mm (N = 2). Total length of genitalia: 0.6 mm.

Description. Genitalia: In lateral view, segment IX evenly triangular anteriorly, apex located little below midheight of genitalia; in ventral view anterior incision widely and deeply V-shaped. Sternal processes, lateral view, with almost rectangular with straight dorsal and ventral margins, posterior margin convex; in ventral view, slightly narrowing and diverging along their length, with rounded, posteriorly directed subapical region, apex narrow and curving mesally. Tergum X in lateral view rounded triangular posteriorly, dorsal margin with dorsally orientated process approx. at mid-length; longer than high; in dorsal view, mesally separate, mesal margin almost sigmoid. Parameres anterior part slender in lateral view, starting well below and before tergum X, anterior part orientated posteriorly, central part orientated posterodorsally, distal part orientated posteroventrally and exceeding superior appendages posteriorly; in dorsal view, separated along their length, broad at basis, orientated posterad, few stout setae present on dorsomesal faces immediately after end of tergum X; long megasetae present in row on small plate-like mesal process; distal part separated from superior appendages and almost tangential before curving laterally before mesally pointing end. Superior appendages, in lateral view, almost rectangular with straight dorsal and ventral margins, posterior margin convex; in dorsal view forming parallelogram-shaped lobes with almost straight lateral and undulating mesal margins. Inferior appendages, in lateral view, with short, thick dorsal and ventral branches, dorsal branch curving slightly upward into triangular apex, ventral orientated posteriorly into rounded apex; ventral branch almost reaching as far posteriorly as sternal process; in ventral view with ventral branches forming narrowly diamond-shaped plate, almost arrow-like with rounded anterior and pointed posterior ends; dorsal branches divided by narrow, V-



Figures 180–184. *Agmina curvatacua* sp. nov. male holotype **180** genitalia, left lateral view **181** genitalia, dorsal view **182** genitalia, ventral view **183** phallus, lateral view **184** phallus, ventral view.

shaped incision above ventral branches. Phallus, in lateral view straight, approx. as long as width of genitalia; in ventral view widest immediately before mid-length, distal part almost parallel-sided.

Additional information. This species was referred to as "sp. 2" in Espeland and Johanson (2010).

Species group 6, bimaculata-group

Included species in this group are: *Agmina bimaculata* Ward & Schefter, 2000, *A. re-curvata* sp. nov., *A. taoensis* sp. nov., *A. triangulata* sp. nov. and *A. acula* Ward & Schefter, 2000.

The species in the *Agmina bimaculata* species group all have inferior appendages that are more or less strongly expanded posteriorly and curving dorsally in lateral view.

Agmina recurvata sp. nov.

http://zoobank.org/BD5A7180-710A-472D-B0FA-F557B398639C Figs 185–189

Diagnosis. Agmina recurvata sp. nov. is unique among Agmina species in having left and right inferior appendages longitudinally separated along their length, each with a small mesally orientated process, and a very long posterior branch that is strongly curving postero-dorsally before meeting basis of the superior appendages. Agmina taoensis sp. nov. also has long inferior appendages that are curving dorsally, but these are fused into a plate, as seen in ventral view. Furthermore, it lacks the mesally orientated processes, and the posterior branch is much shorter and not so strongly curved dorsally. Agmina cerritula sp. nov. and A. monstrosa sp. nov. have similar inferior appendages in lateral view, but in these species the long processes are united into a single central process, not paired and lateral as in A. recurvata sp. nov.

Etymology. Recurvata, referring to the re-curved shape of the inferior appendages.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; Rivière des Lacs, 1.1 km NW Lac en Huit, 4.9 km NW summit of Pic du Grand Kaori: 22°15.195'S, 166°52.178'E; 10.xii.2003; light trap; loc#078; leg. KA Johanson; MNHN.

Paratype: New Caledonia – **Province Sud** • 1 ♂; Rivière des Lacs, above waterfall at Chutes de Madeleine; 22°13.930'S, 166°51.633'E; 243 m; 23.xi.2003; light trap; loc#042; leg. KA Johanson; NHRS.

Measurements. Fore wing length 2.1–3.6 mm (N = 2). Total length of genitalia: 0.5 mm.

Description. *Genitalia*: In lateral view, segment IX sharply triangular anteriorly, apex located dorsally; in ventral view anterior incision widely and deeply U-shaped. Sternal processes, lateral view, with dilated posteriorly, dorsal and ventral margins almost straight; in ventral view, not clearly visible as it is hidden below inferior appendages. Tergum X in lateral view almost trapezoid, with dorsally orientated pro-



Figures 185–189. *Agmina recurvata* sp. nov. male holotype 185 genitalia, left lateral view 186 genitalia, dorsal view 187 genitalia, ventral view 188 phallus, lateral view 189 phallus, ventral view.

cess at anterior corner; approx. as long as high; in dorsal view, mesally located close to each other but separate, anteromesal and posteromesal margins almost straight. Parameres anterior part slender, starting below and before anterior end of tergum X, almost straight till mid-height of posterior margin of tergum X, bending slightly ventrally and running into mid-part of superior appendage; in dorsal view, separated along their length, orientated posterad, equally narrow at basal half, few stout setae present on dorsal faces before end of tergum X; mesal lobe with setae present near basal part of superior appendage, fusing with superior appendage with long row of short megasetae. Superior appendages, in lateral view, dilated posteriorly, dorsal and ventral margins almost straight; in dorsal view forming oval lobes with almost straight lateral and convex mesal margins. Inferior appendages, in lateral view, with basal part narrowing posteriorly into very long and almost scale-like dorsally looped distal part; scale-like distal part orientated dorsally and lack setae; in ventral view separate along their lengths, not forming central plate, narrowly oval and divergent, posterior slander part orientated posteromesally. Phallus, in lateral view weakly sigmoid, approx. as long as inferior appendages; in ventral view vase shaped, with basal part almost double as wide as posterior part.

Additional information. This species was referred to as "sp. 28" in Espeland and Johanson (2010).

Agmina taoensis sp. nov.

http://zoobank.org/6FCF6DBE-DCA0-4566-AF39-99C50D410BAE Figs 190–194

Diagnosis. Agmina taoensis sp. nov. resembles A. scopula sp. nov. in several genitalic characters, particularly the shape of the inferior and superior appendages. Agmina taoensis sp. nov. is distinguished from A. scopula sp. nov. by the much shorter sternal processes that are apically rounded in ventral view, and the parameres lack clusters of stout mesally and posteriorly orientated setae.

Etymology. Taoensis, referring to Cascade de Tao, the type locality of the species.

Material examined. *Holotype*: New Caledonia – **Province Nord** • ♂; Wé Caot Stream, draining NNE side of Mt. Panié, 0.9 km NW Cascade de Tao; 20°33.311'S, 164°48.064'E; 18.xii.2003; light trap; loc#084; leg. KA Johanson; MNHN.

Measurements. For wing length 3.2 mm (N = 1). Total length of genitalia: 0.4 mm.

Description. *Genitalia*: In lateral view, segment IX rounded triangular, apex located at mid-height of genitalia; in ventral view anterior incision widely and shallowly rectangularly shaped. Sternal processes, lateral view, with half circular, with almost straight dorsal margin and strongly convex ventral margin; in ventral view, almost equally wide along their length, with rounded apex, straight and diverging along their length. Tergum X in lateral view almost rectangular, with dorsally orientated process at anterior corner; slightly shorter than high; in dorsal view, mesally separate, mesal



Figures 190–194. *Agmina taoensis* sp. nov. male holotype 190 genitalia, left lateral view 191 genitalia, dorsal view 192 genitalia, ventral view 193 phallus, lateral view 194 phallus, ventral view.

margin almost straight. Parameres slender, starting below anterior end of tergum X, almost straight till mid-height of basis of superior appendage, bending slightly ventrally before curving into posteroventral margin; in dorsal view, separated along their length, orientated posterad, equally narrow along their length, mesal lobe with setae present before superior appendage, fusing with superior appendage without long row of short megasetae. Superior appendages, in lateral view, half circular, with almost straight dorsal margin and strongly convex ventral margin; in dorsal view slightly widening along their length, each with rounded apex. Inferior appendages, in lateral view, with basal part almost rectangular, expanded into a prominent dorsally curving process being pointed apically; in ventral view almost diamond-shaped with sharply triangular lateral corners; with deep and narrow posterior incision, posterior branches orientated posteriorly and slightly diverging. Phallus, in lateral view slightly curving posteriorly at basis before sub-straight posterior main part; in ventral view vase shaped, with basal part almost double as wide as posterior part.

Additional information. This species was referred to as "sp. 6" in Espeland and Johanson (2010).

Agmina triangulata sp. nov.

http://zoobank.org/3780CF2B-093B-4BA4-8267-B42EAF488911 Figs 195–200

Diagnosis. Agmina triangulata sp. nov. resembles A. comata Ward, 2003 in the genitalia, particularly, in lateral view, the triangular shape of the superior appendages, and the presence of a cluster of mesally orientated setae on the median face of the superior appendages; the curving sternal processes and inferior appendages. Agmina triangulata sp. nov. is distinguished from A. comata in that the superior appendages are slightly more strongly produced posteriorly, the wider sternal process in lateral view, the much shorter dorsally curving branch of the inferior appendage in lateral view, and the more widely round shape of the inferior appendage in ventral view.

Etymology. *Triangulata*, from Latin, meaning triangular. Referring to the shape of the superior appendages in lateral view.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Dumbea River, Branche Nord, 2.2 km SE summit of Mt. Piditéré; 22°07.503'S, 166°29.899'E; 25 m; 21.i.2004; light trap; loc#124; leg. KA Johanson & C Pöllabauer; MNHN.

Measurements. For wing length 3.9 mm (N = 1). Total length of genitalia: 0.6 mm.

Description. *Genitalia*: In lateral view, segment IX almost triangular, apex located at mid-height of genitalia; in ventral view widely oval. Sternal processes, lateral view, with sharply triangular, longer than high; in ventral view, slender, with almost uniformly concave inner margin, apex slightly curving mesally. Tergum X triangular in lateral view, slightly longer than high; in dorsal view, almost tangential mesally at narrow apices, posteriorly convex and anteriorly concave margins; Parameres slender,



Figures 195–200. *Agmina triangulata* sp. nov. male holotype **195** genitalia, left lateral view **196** superior appendage, left lateral view of mesal surface **197** genitalia, dorsal view **198** genitalia, ventral view **199** phallus, lateral view **200** phallus, ventral view.

starting below anterior end of tergum X, almost straight till mid-height of basis of superior appendage, bending strongly ventrally before fading into posteroventral margin; in dorsal view, separated along their length, orientated posterad, slightly narrowing, with mesal lobe with small setae present before superior appendage, fusing with superior appendage and with long row of short megasetae. Superior appendages, in lateral view, sharply triangular, longer than high; in dorsal view basally narrow, expanding mesally at mid-length; apex pointing mesally; lateral margins nearly straight. Inferior appendages, in lateral view, with basal part almost rectangular, posteroventral margin parallel with posteroventral margin of sternal process, posterior corner expanded into finger-like, dorsally curved process not reaching as far posterior as apex of sternal process; in ventral view large, oval, with deep central posterior V-shaped incision; lateral processes orientated posterad and slightly mesally curving. Phallus, in lateral view substraight, slightly longer than superior appendage; in ventral view almost uniformly wide along its length.

Additional information. This species was referred to as "sp. 14" in Espeland and Johanson (2010).

Species group 7, bleuensis-group

Included species in this group are: *Agmina bleuensis* sp. nov., *A. hastata* Ward & Schefter, 2000, *A. hamata* Ward & Schefter, 2000, A. hirta Ward & Schefter, 2000, *A. touhoensis* sp. nov., *A. wardi* sp. nov., *A. vuegi* Ward & Schefter, 2000, and *A. kara* Ward & Schefter, 2000.

The species in the *Agmina bleuensis* species group are characteristic in having very long and slender sternal processes that are curving ventrally towards the apex in lateral view.

Agmina bleuensis sp. nov.

http://zoobank.org/BB45EA8B-C546-4A4F-91C5-299D585CF8B2 Figs 201–205

Diagnosis. Agmina bleuensis sp. nov. resembles most other species in the species group, particularly *A. touhoensis* sp. nov. and *A. hamata* due to the wide separation of the dorsal and ventral branches of the inferior appendages in lateral view. Agmina bleuensis sp. nov. is distinguished from the two other species by the thicker ventral branch of inferior appendages. In addition, the sternal processes of *A. bleuensis* sp. nov. is much shorter than in *A. touhoensis* sp. nov. and *A. hamata*.

Etymology. *bleuensis*, derived from Rivière Bleue, the type locality of the species.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Rivière Bleue, 2.7 km SSW of summit of Montagne Bleue; 22°05.705'S, 166°38.225'E; loc 139a (loc 4-2001); Malaise trap; 13–16.xi.2001; leg. KA Johanson, T Pape & B Viklund; MNHN.

Paratypes: New Caledonia – **Province Sud** • 2 ♂; Parc territorial de la Rivière Bleue, Riviere Bleue, 22°05.826'S, 166°38.293'E, loc#127, light trap 6–7.x.2006; leg. KA Johanson & M Espeland; NHRS; • 1 ♂; stream crossing Nouméa-Yaté road immediately W of turnoff to Rivière Bleue Reserve; 22°10.191'S, 166°44.474'E; 162 m; 5.x.2006; light trap; loc#040b; leg. KA Johanson & M Espeland; NHRS; • 1 ♂; stream draining to Rivière des Pirogues 850 m E summit of Mont Imbaah, 5.5 km E Lucky Creek in Plum; 22°16.837'S, 166°42.195'E; 31 m; 1.xii.2003; light trap, loc#060; leg. KA Johanson; NHRS.

Measurements. Fore wing length 3.6–4.9 mm (N = 5). Total length of genitalia: 0.5 mm.

Description. *Genitalia*: In lateral view, segment IX almost constituting of sternal process only; anterior apex located at mid-height of genitalia; in ventral view an-



Figures 201–205. *Agmina bleuensis* sp. nov. male holotype 201 genitalia, left lateral view 202 genitalia, dorsal view 203 genitalia, ventral view 204 phallus, lateral view 205 phallus, ventral view.

teriorly without incision. Sternal processes, lateral view, with small, slender, approx. twice as long as high, with slightly concave dorsal margin, ventral margin convex; in ventral view, slender, orientated posteriorly along their length; apex pointed. Tergum X sharply tapering dorsally, higher than long; in dorsal view, mesally separate, each with irregular mesal margin. Parameres weakly developed, with small, narrow, ventral branch before superior appendages, continues into dorsal part of superior appendage before looping downwards into ventral margin of superior appendage; in dorsal view, slender, curving mesally and ending at mid-length of superior appendages; each with wart-like structure at mid-length with few short setae. Superior appendages, in lateral view, small, slender, approx. twice as long as high, with slightly concave dorsal margin, ventral margin convex; in dorsal view parallel-sided and slightly curved mesally along their length, rounded apex with mesal tooth. Inferior appendages, in lateral view, with broad basis and two long posteriorly orientated branches; dorsal branch slightly curving upwards, ending near mid-length of superior appendage, apex needle shaped; ventral branch uniformly thick, curving slightly outwards along its length; in ventral view with shield-shaped basis; dorsal branches located laterally of ventral branches, almost straight and orientated posterad along their length; ventral branches broad and curving mesally along their length, apex on each side well separated mesally; apex widely triangular; setae present on most parts. Phallus, in lateral view almost as long as segment IX, curving posterior two-thirds.

Additional information. This species was referred to as "sp. 49" in Espeland and Johanson (2010).

Agmina touhoensis sp. nov.

http://zoobank.org/F8EBA7E0-7450-49C0-85B4-96EA74EA5B15 Figs 206–211

Diagnosis. Agmina touhoensis sp. nov. resembles most other species in the species group, particularly *A. bleuensis* sp. nov. and *A. hamata* due to the wide separation of the dorsal and ventral branches of the inferior appendages in lateral view. Agmina touhoensis sp. nov. is distinguished from *A. bleuensis* sp. nov. by the much longer sternal processes, and a dorsal branch of the inferior appendages that are almost as long as the ventral branches. It is distinguished from *A. hamata* by the wider superior appendages in lateral view, and the dorsal branch of inferior appendages that is almost straight instead of curving ventrally.

Etymology. Touhoensis, derived from Touho, the type locality of the species.

Material examined. *Holotype*: New Caledonia – Province Nord ● ♂; Ponandou Tiôgé River at Kögi, 3.9 km SSW Touho; 20°49.043'S, 165°13.551'E; 25 m; 26.xii.2003; light trap; loc#100; leg. KA Johanson; MNHN.

Measurements. For wing length 4.6 mm (N = 1). Total length of genitalia: 0.6 mm.

Description. *Genitalia*: In lateral view, segment IX almost constituting of sternal process only; anterior apex located immediately below mid-height of genitalia; in ventral view anteriorly without incision. In lateral view, sternal processes with small, almost straight dorsal margin, ventral margin pointing into triangular; in ventral view, slender, orientated posteriorly before strongly curving mesally before apex. Tergum X almost rectangular, with pointed anterodorsal corner; in dorsal view, mesally well separate, each forming narrow plate curving inwards, with slightly convex inner mar-



Figures 206–211. *Agmina touhoensis* sp. nov. male holotype 206 genitalia, left lateral view 207 right superior appendage, ventral face in dorsal view 208 genitalia, dorsal view 209 genitalia, ventral view 210 phallus, lateral view 211 phallus, ventral view.

gin. Parameres robust, tubular, starting below tergum X and ending at basal 1/3 of superior appendages, hidden behind upper branch of inferior appendages; in dorsal view, originating from transverse bow-like basis; orientated posteriorly, almost parallel, row of short megasetae present immediately after mid-length. Superior appendages, in lateral view, small, with almost straight dorsal margin, ventral margin pointing into triangular; in dorsal view bean-shaped, orientated posterad along their length, except slightly mesally orientated, rounded corners. Inferior appendages, in lateral view, with broad basis and two long posteriorly orientated branches; dorsal branch slightly undulating, ending near basis of superior appendages, apex needle shaped; ventral branch uniformly thick, curving outwards along its length; in ventral view with shield-shaped basis; dorsal branches located laterally of ventral branches, undulating and orientated posterad along their length; ventral branches broad and curving mesally along their

length and almost tangential apically; apex narrowly triangular; setae confined to distal two-thirds. Phallus, in lateral view approx. half as long as segment IX, curving downwards at mid-length; in ventral view vase-shaped, with wide rounded basis and narrow posterior half.

Additional information. This species was referred to as "sp. 23" in Espeland and Johanson (2010).

Agmina wardi sp. nov.

http://zoobank.org/D7D76454-B06E-4848-AAEA-246BE56E3DB6 Figs 212–216

Diagnosis. The long and dorsally curving inferior appendages of *A. wardi* sp. nov. makes it resembling *A. recurvata* sp. nov., *A. cerritula* sp. nov. and *A. monstrosa* sp. nov. It is distinguished from the two latter by having paired processes of inferior appendages instead of a simple process; and from *A. recurvata* sp. nov. by the posteriorly narrowing sternal processes that end in a thick, straight apical megaseta that is orientated posteroventrally.

Etymology. *Wardi*, named for John B. Ward, for his contribution to understanding the diversity of New Caledonian *Agmina* diversity.

Material examined. *Holotype*: New Caledonia – **Province Sud** • ♂; Rivière des Lacs, 1.1 km NW Lac en Huit, 4.9 km NW summit of Pic du Grand Kaori; 22°15.195'S, 166°52.178'E; 10.xii.2003; light trap; loc#078; leg. KA Johanson; MNHN.

Paratypes: New Caledonia – **Province Sud** • 1 ♂; Creek Pernod, 7 m downstream bridge at Route du Carénage on Lac Yaté-Prony road; 22°10.862'S, 166°50.565'E; 162 m; 10.xii.2003; light trap; loc#076; leg. KA Johanson; NHRS; • 1 ♂; Rivière des Lacs, above waterfall at Chutes de Madeleine; 22°13.930'S, 166°51.633'E; 243 m; 23.xi.2003; light trap; loc#042; leg. KA Johanson; NHRS.

Measurements. Fore wing length 3.8–4.0 mm (N = 3). Total length of genitalia: 0.6 mm.

Description. *Genitalia*: In lateral view, segment IX almost constituting of sternal process only; anterior apex located immediately below mid-height of genitalia; in ventral view anteriorly with widely U-shaped incision. Sternal processes, lateral view, with large, half circular with almost straight dorsal margin, without spines; in ventral view, slender and curving mesally from mid-length. Tergum X almost rectangular with posterodorsal rounded corner and anterodorsal pointed corner, in lateral view higher than long; in dorsal view, mesally situated closely but separate, each forming trapezoid lobes with straight inner margin. Parameres starting from lower anterior part of tergum X, narrow, bifurcating into dorsal and ventral branches basally in superior appendage; in dorsal view, forming pair of narrowing rays, each with small megasetae in short row located midway on mesal margin. Superior appendages, in lateral view, large, half circular with almost straight dorsal margin, without spines; in dorsal view uniformly wide along their length, parallelogram-shaped; apex strongly inwardly pointed. Infe-



Figures 212–216. *Agmina wardi* sp. nov. male holotype **212** genitalia, left lateral view **213** genitalia, dorsal view **214** genitalia, ventral view **215** phallus, lateral view **216** phallus, ventral view.

rior appendages, in lateral view, with broad basal part covered by setae separated from L-shaped mid-part that is smooth basally and with setae distally; apparently with a distal joint as long as height of tergum X; in ventral view with widely triangular basal part and truncate posterior corner; central part orientated laterally before looping mesally at mid-length; apex almost rounded. Phallus, in lateral view slightly shorter than length of segment IX, straight; in ventral view vase-shaped, with wide basis and narrow posterior half.

Additional information. This species was referred to as "sp. 39" in Espeland and Johanson (2010).

Species group 8, padi-group

Included species in this group are: *Agmina padi* Ward & Schefter, 2000, *A. parallela* sp. nov., *A. christinae* sp. nov., *A. rhara* Ward & Schefter, 2000, *A. parie* Ward & Schefter, 2000, *A. brevis* sp. nov., *A. ninguana* sp. nov., *A. diriwi* Ward & Schefter, 2000, *A. scopula* sp. nov., and *A. comata* Ward, 2003. No particular morphological characteristics are observed for this species group.

Agmina parallela sp. nov.

http://zoobank.org/581632F3-2640-4D13-ACD9-41B8676FFE24 Figs 217–221

Diagnosis. *Agmina parallela* sp. nov. unique among *Agmina* species in the superior appendage that in lateral view is almost as large as segment IX and segment X combined, and is rounded club-shaped ventrally. In addition, the inferior appendages form a long ventral plate that is almost parallel-sided along its length.

Etymology. *Parallela*, derived from parallel, referring to the inferior appendages having almost parallel-sided lateral margins in ventral view.

Material examined. *Holotype*: New Caledonia – Province Nord • ♂; Ponandou Tiôgé River at Kögi, 3.9 km SSW Touho; 20°49.043'S, 165°13.551'E; 25 m; 26.xii.2003; light trap; loc#100; leg. KA Johanson; MNHN.

Measurements. For wing length 4.5 mm (N = 1). Total length of genitalia: 0.7 mm.

Description. *Genitalia*: In lateral view, segment IX widely rounded anteriorly, almost trapezoid, apex located dorsally; in ventral view anteriorly with widely and shallow U-shaped incision. Sternal processes, lateral view, with very large, downwardly club-shaped, posterior and anterior margins almost parallel, apex widely rounded; in ventral view, absent. Tergum X deeply concave dorsally, posteriorly expanded dorsad into pointed triangular, in lateral view approx. as long as high; in dorsal view, forming small plates widely separated mesally. Parameres dorsally membranous, ventrally forming strongly sclerotised spines reaching to half-length of superior appendages; in lateral view slightly curving posteriorly; in dorsal view, separate and re-curved as basis,



Figures 217–221. *Agmina parallela* sp. nov. male holotype **217** genitalia, left lateral view **218** genitalia, dorsal view **219** genitalia, ventral view **220** phallus, lateral view **221** phallus, ventral view.

needle-shaped, almost straight after basis and pointing mesally. Superior appendages, in lateral view, very large, downwardly club-shaped, posterior and anterior margins almost parallel, apex widely rounded; in dorsal view narrow at basis, widening into mesal plates at mid-length, small mesally orientated tooth present at basis; row of long apical megasetae situated on inner surface and orientated mesally. Inferior appendages, in lateral view, with posterad orientated long dorsal branch with pointed apex; dorsal branch widely separated from ventral branch; ventral branch running parallel with dorsal branch, approx. double the width of dorsal branch and gently curving dorsally along its length; apex narrowly rounded; in ventral view rectangular plate-like ventral branch hiding dorsal branches, dorsal branches orientated posteriorly, each uniformly narrowing into acute apex. Phallus, in lateral view as long as segment IX, slender and slightly curving upwards; in ventral view equally wide along its length, double as wide as high.

Additional information. This species was referred to as "sp. 51" in Espeland and Johanson (2010).

Agmina christinae sp. nov.

http://zoobank.org/92AF7BBE-4187-439F-BE5B-EAC1AFF9321D Figs 222–226

Diagnosis. Agmina christinae sp. nov. has inferior appendages that form a ventral plate with a broad basis and a long central process, which resemble the plate of *A. piscaria* sp. nov., but the plate of *A. christinae* sp. nov. is broader than that of *A. piscaria* sp. nov. It also resembles *A. rhara* by the presence of megasetae dorsally of the basis of the superior appendages. Agmina christinae sp. nov. is easily distinguished from *A. rhara* by having two branched inferior appendages in lateral view instead of three-branched inferior appendages, and the superior appendages of *A. christinae* sp. nov. are oval while those of *A. rhara* are long and narrow.

Etymology. *Christinae*, named for one of the collectors of this species, Dr. Christine Pöllabauer.

Material examined. *Holotype*: New Caledonia – Province Nord ● ♂; stream in Creek de Bambou, 5 m N road RT7 Ouégoa-Koumac; 20°27.863'S, 164°19.784'E; 58 m; 19.xii.2003; Malaise trap; loc#087; leg. KA Johanson; MNHN.

Paratypes: New Caledonia – **Province Nord** • 1 ♂; same data as holotype, except NHRS; • 1 ♂; stream in Creek de Bambou, ca. 20 m upstream bridge on road RT7 Ouégoa-Koumac; 20°27.715'S, 164°20.978'E; 105 m; 19.xii.2003; Malaise trap; loc#086; leg. KA Johanson; NHRS.

Measurements. Fore wing length 3.8-4.5 mm (N = 3). Total length of genitalia: 0.8 mm.

Description. *Genitalia*: In lateral view, segment IX almost truncate anteriorly, apex located dorsally; in ventral view with anterior incision widely and deeply V-shaped. Sternal processes, lateral view, with large, oval, somewhat stalked basally, almost symmetrical dorsal and ventral sides; in ventral view, wide basally, narrowing



Figures 222–226. *Agmina christinae* sp. nov. male holotype **222** genitalia, left lateral view **223** genitalia, dorsal view **224** genitalia, ventral view **225** phallus, lateral view **226** phallus, ventral view.

to midway, almost parallel-sided along distal half; orientated posteriorly. Tergum X strongly concave before pointing dorsally, in lateral view slightly higher than long; in dorsal view, mesally separate, each forming short lobes with rounded margins. Parameres starting from anterior part of tergum X, posteriorly with small membranous dorsal part and sclerotised ventral part, ventral part with cluster of megasetae visible above base of superior appendages on mid-length of inner margin, a hook-like curved spine situated apically on each paramere and situated on the inside of superior appendages; in dorsal view, anterior parts fused into a V-shaped suture, basal megasetae almost meeting mesally, distal hooks curving inwards along their length, situated immediately anteriorly of large mesal processes. Superior appendages, in lateral view, large, oval, somewhat stalked basally, almost symmetrical dorsal and ventral sides; in dorsal view slightly widening, straight, and converging along their length, with long, mesal process before apex. Inferior appendages, in lateral view, with two posteriorly orientated almost parallel branches in lateral view, dorsal branch with a long and thick posteriorly orientated seta on ventral margin, apex acute; ventral branch as long as dorsal branch and with pointed apex; in ventral view, ventral branch with almost square basal half and single-rayed, narrow, tapering distal half; dorsal branches forming a pair of narrow triangular processes curving mesally at apex. Phallus, in lateral view slightly shorter than segment IX, slender and slightly curving upwards; in ventral view with triangular lateral processes on anterior half, distal half approx. equally wide.

Additional information. This species was referred to as "sp. 1" in Espeland and Johanson (2010).

Agmina brevis sp. nov.

http://zoobank.org/BC71FC71-C448-41DC-A883-E417B6F94755 Figs 227–231

Diagnosis. *Agmina brevis* sp. nov. is unique in having inferior appendages which, in lateral view, have equally short dorsal and ventral branches separated by a U-shaped cleft, and the superior appendage is approx. as high as long in lateral view.

Etymology. *Brevis*, from Latin, meaning short. Referring to the shape of the superior appendage in lateral view, being shorter than high.

Material examined. *Holotype*: New Caledonia – Province Nord • ♂; Réserve spéciale de faune de l'Aoupinié, ca 25 km S Poindimié; 21°09.775'S, 165°19.017'E; loc#148 (18-2001); Malaise trap; 24–28.xi.2001; leg. KA Johanson, T Pape & B Viklund; MNHN.

Paratype: New Caledonia – **Province Nord** • 1 ♂; Réserve spéciale de faune de l'Aoupinié, ca 25 km S Poindimié; 21°09.369'S, 165°19.209'E; loc#149 (19-2001); Malaise trap; 24–28.xi.2001; leg. KA Johanson, T Pape & B Viklund; NHRS.

Measurements. Fore wing length 4.8–5.0 mm (N = 2). Total length of genitalia: 0.7 mm.

Description. *Genitalia*: In lateral view, segment IX widely rounded anteriorly, apex located dorsally; in ventral view with anterior incision narrowly U-shaped, almost



Figures 227–231. *Agmina brevis* sp. nov. male holotype 227 genitalia, left lateral view 228 genitalia, dorsal view 229 genitalia, ventral view 230 phallus, lateral view 231 phallus, ventral view.

semi-oval. Sternal processes, lateral view, with shorter than high, slightly trapezoid; in ventral view, not clearly set off from rest of segment IX. Tergum X higher than long, convex dorsally and with small tapering dorsal process, in dorsal view, separate but almost tangential mesally, with rounded inner margins. Parameres robust, starting inside basis of tergum X, dividing before superior appendages into long, narrow and pointed dorsal branch and short, pointing ventral branch, both branches ending before midlength of superior appendage; in dorsal view, strongly fused and indistinguishable from superior appendage. Superior appendages, in lateral view, shorter than high, slightly trapezoid; in dorsal view almost parallelogram-shaped, with near parallel lateral and mesal margins; strong triangular mesally orientated tooth situated near apex. Inferior appendages, in lateral view, with almost parallel dorsal and ventral margins, posteriorly divided into short narrow triangular dorsal and almost equally short similarly shaped ventral branches widely separated by U-shaped cleft; in ventral view large, longer than wide, with convex lateral margins, narrowing at three-fourth its length; apex with central cleft; dorsal branches visible through the ventral branch, forming pair of wellseparated triangular processes. Phallus, in lateral view, slightly shorter than segment IX, uniformly slender along its length, straight; in ventral view with triangular lateral processes at basal 1/3; distal two-thirds with slightly concave lateral margins.

Additional information. This species was referred to as "sp. 33" in Espeland and Johanson (2010).

Agmina ninguana sp. nov.

http://zoobank.org/3D819D7E-ECEA-4F70-9E1B-E4BFE1059C50 Figs 232–236

Diagnosis. Agmina ninguana sp. nov. is very similar to both *A. scopula* sp. nov. and *A. hexacantha* in having very broad inferior appendages in lateral view, each with a dorsally curved ventral branch. They also have a group of mesally orientated megasetae in the central part of the mesal face of the superior appendages. Agmina ninguana sp. nov. is distinguished from *A. hexacantha* by the broader and shorter sternal processes in lateral view and from *A. scopula* sp. nov. by the straighter dorsal margin of the superior appendages and much narrower sternal process.

Etymology. *Ninguana*, derived from Mont Ningua, the type locality of the species.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; western part of Mt. Ningua, Kwé Néco Stream, 3.9 km W summit of Mt. Ningua, on Boulo-Thio Road, ca. 50 m upstream road; 21°44.359'S, 166°06.009'E; 117 m; 20.xi.2003–12. xii.2003; Malaise trap; loc#035; leg. KA Johanson; MNHN.

Paratypes: New Caledonia – **Province Sud** • 1 ♂; Dothio River, 10 m E bridge at Atè, 6.2 km WNW Thio; 21°35.288'S, 166°09.070'E; 13 m; 29.xi.2003; light trap; loc#057; leg. KA Johanson; NHRS; • 1 ♂; W slope Mt. Ningua, Kwé Néco Stream, at Camp Jacob, 3.7 km WNW summit of Mt. Ningua, on Boulo-Thio Road, ca. 50 m upstream road; 21°43.613'S, 166°06.567'E; 150 m; 29.xi-12.xii.2003; Malaise trap; loc#054; leg. KA Johanson; NHRS.



Figures 232–236. *Agmina ninguana* sp. nov. male holotype **232** genitalia, left lateral view **233** genitalia, dorsal view **234** genitalia, ventral view **235** phallus, lateral view **236** phallus, ventral view.
Measurements. Fore wing length 3.4-4.5 mm (N = 3). Total length of genitalia: 0.6 mm.

Description. Genitalia: In lateral view, segment IX narrowly rounded anteriorly, apex located dorsally; in ventral view anterior incision widely U-shaped. Sternal processes, lateral view, with large, almost half-spherical with straight dorsal margin; in ventral view, slender, basal part slightly orientated mesally, bent posteriorly at midlength. Tergum X sharply pointing dorsally, higher than long in lateral view; in dorsal view, mesally separate, each forming short lobes with almost straight inner margins. Parameres weakly developed, starting at basis of tergum X; in lateral view, bending upwards and meeting superior appendage basally at dorsal margin; in dorsal view, almost invisible, with group of stout, strictly mesally orientated megasetae. Superior appendages, in lateral view, large, almost half-spherical with straight dorsal margin; in dorsal view, narrowly parallel-sided along their length, smoothly convex lateral margins; apex with stout, finger-like spine pointing mesally. Inferior appendages, in lateral view, with ventral margin uniformly convex along its length; dorsal branch orientated strictly upwards, sharply triangular, with very long posterior margin ending in well separated ventral branch; ventral branch curving upwards along its length, with acute apex; in ventral view, with large central plate being approx. as long as wide, with convex lateral margins and triangular anteriorly; posteriorly with pair of long, widely separated processes curving mesally along their length. Phallus, in lateral view, much shorter than segment IX, straight; in ventral view, triangular with rounded anterior margin and pointed posteriorly.

Additional information. This species was referred to as "sp. 25" in Espeland and Johanson (2010).

Agmina scopula sp. nov.

http://zoobank.org/C380D645-B166-473B-9893-646C9BF5676B Figs 237–241

Diagnosis. In lateral view of the genitalia, *A. scopula* sp. nov. is similar to both *A. ninguana* sp. nov. and *A. hexacantha* in the very broad inferior appendages, each with a dorsally curved ventral branch, and presence of a group of mesally orientated megasetae in the central part of the mesal face of the superior appendages. *Agmina scopula* sp. nov. is distinguished from both *A. ninguana* sp. nov. and *A. hexacantha* by the clearly broader sternal processes in lateral view, more strongly curve of the ventral branch of the inferior appendages, and the more convex margin of the superior appendage.

Etymology. From Latin *scopula* (noun, feminine), meaning brush. Referring to the mesally orientated setae at the inner margin of each paramere.

Material examined. *Holotype*: New Caledonia – Province Sud • ♂; Sarramea, stream Xwé Wya, ca 0.9 km NE Hotel Evasion 130; 21°38.081'S, 165°51.735'E; loc#131a (10-2001); light trap; 19.xi.2001; leg. KA Johanson, T Pape & B Viklund; MNHN.



Figures 237–241. *Agmina scopula* sp. nov. male holotype 237 genitalia, left lateral view 238 genitalia, dorsal view 239 genitalia, ventral view 240 phallus, lateral view 241 phallus, ventral view.

Measurements. For wing length 5.0 mm (N = 1). Total length of genitalia: 0.7 mm.

Description. Genitalia: In lateral view, segment IX narrowly rounded anteriorly, apex located at mid-height of genitalia; in ventral view, anterior incision widely Ushaped, with slightly mesally orientated anterior corners. Sternal processes, lateral view, with large, oval, slightly deeper convex ventrally than dorsally; mesal processes exceeds apex; in ventral view, basally wide, tapering and curving inwards along their length. Tergum X sharply pointing dorsally, higher than long in lateral view; in dorsal view, mesally separate, each forming short lobes with mesally pointing anterior corner. Parameres weakly developed, starting at lower basis of tergum X; in lateral view, bending upwards and with downwardly curving rounded apex; in dorsal view, almost invisible, with group of stout, antero-mesally orientated megasetae. Superior appendages, in lateral view, large, oval, slightly deeper convex ventrally than dorsally; mesal processes exceeds apex; in dorsal view, narrowly parallel-sided and curving inwards along their length, smoothly convex lateral margins; apex with stout, finger-like spine pointing mesally. Inferior appendages, in lateral view, with basal half of ventral margin almost straight, distal half uniformly convex; dorsal branch orientated strictly upwards, widely triangular, with concave posterior margin ending in well separated ventral branch; ventral branch wide at base, tapering and curving upwards along its length, with acute apex; in ventral view, with large central plate being approx. as long as wide, with angled lateral margins and triangular anteriorly; posteriorly with pair of long, widely separated processes orientated posteriorly along their length. Phallus, in lateral view approx. as long as segment IX, straight; in ventral view, triangular with rounded anterior margin and pointed posteriorly.

Additional information. This species was referred to as "sp. 9" in Espeland and Johanson (2010).

New species records

The following records are herewith recorded as new. The material is deposited at NHRS.

Agmina acula Ward, 2003

New Caledonia – **Province Sud** • 1 ♂; Dumbea River, Branche Nord, 2.2 km SE summit of Mt. Piditéré; 22°07.503'S, 166°29.899'E; 25 m; 21.i.2004; light trap; loc#124a; leg. KA Johanson & C Pöllabauer; • 1 ♂; Dumbea River, Branche Sud; 22°08.344'S, 166°30.147'E; 42 m; 3.xi.2003; light trap; loc#006; leg. KA Johanson.

Agmina artarima Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 3; Couvelée River at Haute Couvelée, 2.8 km SV summit of Mt. Piditéré, 3.5 km (air) NNE Dumbéa; 22°07.488'S, 166°28.034'E; 27 m; 28.xi.2003; light trap; loc#051; leg. KA Johanson; • 1 3; on road between Nouméa

and Yaté, 1.0 km NW Pont des Japonais; 22°11.421'S, 166°42.840'E; 114 m; 22.xi-4. xii.2003; Malaisetrap; loc#038; leg. KA Johanson; • 1 ♂; Dumbea River, Branche Sud; 22°08.344'S, 166°30.147'E; 42 m; 3.xi.2003; light trap; loc#006; leg. KA Johanson.

Agmina berada Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 ♂; Plaine des Gaïacs, Rivière Rouge, 14.2 km NW summit of Mt. Rouge, 50 m upstream road RT1 Nouméa-Koné; 20°31.573'S, 164°46.690'E; 23 m; 2.i.2004; light trap; loc#104; leg. KA Johanson.

Agmina bimaculata Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 \Diamond ; Couvelée River at Haute Couvelée, 2.8 km SV summit of Mt. Piditéré, 3.5 km (air) NNE Dumbéa; 22°07.488'S, 166°28.034'E; 27 m; 28.xi.2003; light trap; loc#051; leg. KA Johanson; • 1 \Diamond ; Dumbea River, Branche Sud; 22°08.344'S, 166°30.147'E; 42 m; 3.xi.2003; light trap; loc#006; leg. KA Johanson; • 1 \Diamond ; Tontouta River, 4.8 km WSW summit of Mt. Vulcain, 21°55.258'S, 166°19.895'E, 41 m, 15.xii.2003, light trap, loc#083; leg. KA Johanson.

Agmina cheirella Ward, 2003

New Caledonia – **Province Sud** • 1 \Diamond ; Dumbea River, Branche Sud; 22°08.344'S, 166°30.147'E; 42 m; 3.xi.2003; light trap; loc#006; leg. KA Johanson;

Agmina comata Ward, 2003

New Caledonia – **Province Sud** • 1 ♂; Mt. Dzumac, source stream of Ouinne River, downstream crosspoint to mountain track; 22°02.330'S, 166°28.605'E; 796 m; 3.xii.2003; light trap; loc#062; leg. KA Johanson.

Agmina diriwi Ward & Schefter, 2000

New Caledonia – **Province Sud** • 2 3; Monts Kwa Ne Mwa, along Nouméa-Yaté road, 2.0 km E Pic Mouirange, 20 m upstream road; 22°12.356'S, 166°40.798'E; 220 m; 15–16.i.2004; light trap; loc#120; leg. KA Johanson; • 1 3; stream crossing way to Sanatorium 2.3 km E St. Laurent, ca. 30 m downstream bridge; 22°04.484'S, 166°19.900'E; 15.xi.2003; light trap; loc#028; leg. KA Johanson;

Agmina hamata Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 3; Plateau de Dogny; 846 m; 21°37.000'S, 165°52.500'E; loc#145 (15-2001); Malaise trap; 18–21.xi.2001; leg. KA Johanson, T Pape & B Viklund; • 1 3; Haute Yaté fauna reserve, 1760 m S bridge Pont Perignon,

50 m upstream bridge over stream; 22.14954S, 166.701211E; 180 m; 14.xii.2003–13.i.2004; Malaise trap; loc#081; leg. KA Johanson.

Agmina hastata Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 \Diamond ; Dumbea River, Branche Nord, 2.2 km SE summit of Mt. Piditéré; 22°07.503'S, 166°29.899'E; 25 m; 21.i.2004; light trap; loc#124a; leg. KA Johanson & C Pöllabauer; • 2 \Diamond ; stream crossing Nouméa-Yaté road immediately W of turnoff to Rivière Bleue Reserve; 22°10.191'S, 166°44.474'E; 162 m; 22.xi-4. xii.2003; Malaise trap; loc#040; leg. KA Johanson; • 1 \Diamond ; Dumbea River, Branche Sud; 22°08.344'S, 166°30.147'E; 42 m; 3.xi.2003; light trap; loc#006; leg. KA Johanson.

Agmina hirta Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 \Diamond ; Col d'Amieu, Fo Waau Stream, at Pont Ouaou; 21°35.559'S, 165°48.311'E; 317 m; 10.i.2004; light trap; loc#116; leg. KA Johanson.

Agmina jepiva Ward & Schefter, 2000

New Caledonia – **Province Nord** • 1 \circlearrowleft ; stream in Creek de Bambou, 5 m N road RT7 Ouégoa-Koumac; 20°27.863'S, 164°19.784'E; 58 m; 19.xii.2003; Malaise trap; loc#087; leg. KA Johanson.

Agmina joycei Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 \Diamond ; Dumbea River, Branche Nord, 2.2 km SE summit of Mt. Piditéré; 22°07.503'S, 166°29.899'E; 25 m; 21.i.2004; light trap; loc#124a; leg. KA Johanson & C Pöllabauer; • 1 \Diamond ; Dumbea River, Branche Sud; 22°08.344'S, 166°30.147'E; 42 m; 3.xi.2003; light trap; loc#006; leg. KA Johanson;

Agmina kapiwa Ward & Schefter, 2000

New Caledonia – **Province Sud** • 2 ♂; Réserve spéciale de faune de la haute Yaté, along road on southern part of Marais de la Rivière Blanche, stream draining to Marais de la Rivière Blanche, 2.25 km SW Pont Pérignon, 180 m, 6–16.xi.2003, Malaise trap, loc#010a; leg. KA Johanson; • 1 ♂; stream crossing Nouméa-Yaté road, 1.5 km S Yaté Dam, ca. 200 m upstream the road; 22°09.931'S, 166°52.535'E; 197 m; 22.xi-17. xii.2003; Malaise trap; loc#041; leg. KA Johanson.

Agmina kara Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 ♂; Col d'Amieu, Fo Waau Stream, at Pont Ouaou; 21°35.559'S, 165°48.311'E; 317 m; 10.i.2004; light trap; loc#116; leg.

KA Johanson; • 1 3; Tamoa River, 700 m S road RT1 between Nouméa and La Foa; 22°04.518'S, 166°16.592'E; 19.xi.2003; light trap; loc#033; leg. KA Johanson; • 1 3; Rivière des Lacs, above waterfall at Chutes de Madeleine; 22°13.930'S, 166°51.633'E; 243 m; 23.xi.2003; light trap; loc#042; leg. KA Johanson; • 1 3; Couvelée River at Haute Couvelée, 2.8 km SV summit of Mt. Piditéré, 3.5 km (air) NNE Dumbéa; 22°07.488'S, 166°28.034'E; 27 m; 28.xi.2003; light trap; loc#051; leg. KA Johanson.

Agmina mariae Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 3; Mt. Dzumac, source stream of Ouinne River, near crossing point to mountain track; 22°02.439'S, 166°28.646'E; 805 m; 18.xi-4.xii.2003; Malaise trap; loc#029; leg. KA Johanson; • 1 3; stream crossing way to Sanatorium 2.3 km E St. Laurent, ca. 30 m downstream bridge; 22°04.484'S, 166°19.900'E; 15.xi.2003; light trap; loc#028; leg. KA Johanson; • 1 3; Haute Yaté fauna reserve, 1760 m S bridge Pont Perignon, 50 m upstream bridge over stream; 22.14954S, 166.701211E; 180 m; 14.xii.2003–13.i.2004; Malaise trap; loc#081; leg. KA Johanson; **Province Nord** • 1 3; Ponandou Tiôgé River at Kögi, 3.9 km SSW Touho; 20°49.043'S, 165°13.551'E; 25 m; 26.xii.2003; light trap; loc#100; leg. KA Johanson; • 1 3; Mt. Panié, stream at camp; 20.58139S, 164.76444E; 1310 m; 9.xii.2003; Malaise trap; loc#074; leg. KA Johanson.

Agmina nodosa Ward, 2003

New Caledonia – **Province Sud** • 1 3; Haute Yaté fauna reserve, 1760 m S bridge Pont Perignon, 50 m upstream bridge over stream; 22.14954S, 166.701211E; 180 m; 14.xii.2003–13.i.2004; Malaise trap; loc#081; leg. KA Johanson; • 1 3; Rivière des Lacs, 1.1 km NW Lac en Huit, 4.9 km NW summit of Pic du Grand Kaori; loc#078; 22°15.195'S, 166°52.178'E; 10.xii.2003; light trap; leg. KA Johanson; • 1 3; Creek Pernod, 7 m downstream bridge at Route du Carénage on Lac Yaté-Prony road; 22°10.862'S, 166°50.565'E; 162 m; 10.xii.2003; light trap; loc#076; leg. KA Johanson; • 1 3; Mt. Dzumac, source stream of Ouinne River, downstream crossing point to mountain track; 22°01.997'S, 166°28.486'E; 795 m; over ca. 30 m waterfall; 18.xi-4. xii.2003; Malaise trap; loc#031; leg. KA Johanson.

Agmina panda Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 3; Plateau de Dogny, source Dogny River, ca. 1.4 km SE summit of Platou, ca. 20 m upstream waterfall; 21.62054S, 165.88503E; 912 m; 25.xi-16.xii.2003; Malaise trap; loc#049; leg. KA Johanson; **Province Nord** • 1 3; Aoupinié Mt., Réserve spéciale de faune de l'Aoupinié, spring to side stream to Öröpömwati River; 21°09.032'S, 165°19.179'E; 441 m; 6–27.xii.2003; Malaise trap; loc#065; leg. KA Johanson.

New Caledonia – **Province Sud** • 1 3; Parc territorial de la Rivière Bleue, Rivière Bleue; 22°05.826'S, 166°38.293'E; loc#127; light trap; 6–7.x.2006; leg. KA Johanson & M Espeland; • 1 3; lower part Rivière des Pirogues, 800 m WNW summit of Mont Imbaah, 4.7 km E Lucky Creek in Plum; 22°18.559'S, 166°41.227'E; 1.3 m; 1.xii.2003; light trap; loc#059; leg. KA Johanson; • 1 3; Rivière des Lacs, at camp-site ca. 200 m from Route du Carénage between Lac Yaté and Prony, 800 m N summit of ancient mine Anne Madeleine; 22°13.295'S, 166°50.888'E; 223 m; 10.xii.2003; light trap; loc#077; leg. KA Johanson; • 1 3; Tontouta River, 4.8 km WSW summit of Mt. Vulcain; 21°55.258'S, 166°19.895'E; 41 m; 15.xii.2003; light trap; loc#083; leg. KA Johanson; • 1 3; Dumbea River, Branche Sud; 22°08.344'S, 166°30.147'E; 42 m; 3.xi.2003; light trap; loc#006; leg. KA Johanson.

Agmina parie Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 3; Monts Kwa Ne Mwa, along Nouméa-Yaté road, 2.0 km E Pic Mouirange, 20 m upstream road; 22°12.356'S, 166°40.798'E; 220 m; 15–16.i.2004; light trap; loc#120; leg. KA Johanson; **Province Nord** • 1 3; Amoa River, ca 12 km W Poindimié; 20°58.092'S, 165°11.804'E; loc 150 (20-2001); light trap; 25–26.xi.2001; leg. KA Johanson, T Pape & B Viklund; • 1 3; Mt. Panié, Riv. Padyéém, 400 m, 20°34.122'S, 164°48.147'E, 22–28.xi.2001; Malaise trap; loc#146 (16-2001); leg. KA Johanson, T Pape & B Viklund.

Agmina rhara Ward & Schefter, 2000

New Caledonia – **Province Nord** • 1 \Diamond ; Ponandou Tiôgé River at Kögi, 3.9 km SSW Touho; 20°49.043'S, 165°13.551'E; 25 m; 26.xii.2003; light trap; loc#100; leg. KA Johanson; • 1 \Diamond ; Réserve spéciale de faune de l'Aoupinié, ca 25 km S Poindimié, 21°08.940'S, 165°19.409'E, loc#147a (17-2001), Malaise trap; 24–28.xi.2001; leg. KA Johanson, T Pape & B Viklund.

Agmina urugi Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 ♂; St. Vincent, Bongou Stream, at bridge on road to Tribu de Bangou, 700 m N RT1 Nouméa-Tontoutu road; 22°03.477'S, 166°15.718'E; 26.xi.2003; light trap; loc#050; leg. KA Johanson.

Agmina vuegi Ward & Schefter, 2000

New Caledonia – **Province Sud** • 1 ♂; Xwé Pemöu Stream, 300 m N bridge over Dathio River at Atè, 6.2 km WNW of Thio; 21.58835S, 166.15117E; 13 m; 29.xi.2003; light trap; loc#056; leg. KA Johanson; • 1 ♂; 2.8 km ENE Bopope, at site where

Rivière Kövé Tamè enters Rivière Oua Mendiou, 100 m S RPN2 Koné-Poindimié; 20°54.455'S, 165°06.300'E; 78 m; 14.i.2003; light trap; loc#119; leg. KA Johanson.

Key to described Agmina species, males

In the key, *A. touhoensis* sp. nov. is keyed out twice due to variation in relative length between the inferior appendages and sternal processes due to viewing angle of the inferior appendages.

1	Segment IX with each sternal process exceeding the inferior appendages poste-
	riorly
-	Segment IX with each sternal process reaching approximately as far posteriorly or less far posteriorly than inferior appendages
2	In ventral view, plate of inferior appendage undivided longitudinally or with-
	out posteriorly orientated lateral processes (Figs 12, 49)
_	In ventral view, plate of inferior appendage with incision on posterior margin
	(Figs 127, 168) or with posteriorly orientated lateral processes (Fig. 43)12
3	In ventral view, plate of inferior appendage with prominent apical process
	much narrower than rest of plate (Fig. 61)
_	In ventral view, plate of inferior appendage without prominent apical process
	(Figs 12, 143, 173)
4	In lateral view, plate of inferior appendage with pair of long posterodorsal
	branches (Figs 89, 94); paraprocts without cluster of megasetae
_	In lateral view, plate of inferior appendage without posterodorsal branches
	(Figs 46, 64); paraprocts with posterior cluster of megasetae (Figs 48, 60) 6
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	In lateral relations in factors are and a second to the generation being lateral to the hold the second sec
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Discussion

The first Trichoptera from New Caledonia were described by Kimmins (1953), and including the species described here this number has now risen to 286, of which all but four species are endemic. The total diversity is expected to be even higher (Espeland and Johanson 2010a, Johanson and Wells 2019), and more work is needed to fully understand the biodiversity of the New Caledonian islands. Currently, very little is known about the early stages of New Caledonian species, and nothing at all is known about the early stages of members of the *Agmina* or *Caledomina* (Mary 2017). Like other members of the Ecnomidae, larvae are probably predatory and construct tubes of silk and fine sands, attached to various substrates. Associating adults and larvae using DNA barcoding (Johanson 2007) would be an important next step to increase the knowledge about *Agmina* and New Caledonian Trichoptera as a whole, and would make them available as valuable indicators for freshwater quality.

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