

## **The Species of Genus *Ablerus* Howard (Hymenoptera: Chalcidoidea: Azotidae) from China, with Description of a New Species**

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# The species of genus *Ablerus* Howard (Hymenoptera: Chalcidoidea: Azotidae) from China, with description of a new species

Zhu Hong Wang<sup>1,2</sup>, Jian Huang<sup>1,2,\*</sup>, and Andrew Polaszek<sup>3</sup>

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## Abstract

The Chinese species of the genus *Ablerus* Howard (Hymenoptera: Chalcidoidea: Azotidae) are recorded, including 10 described species, *Ablerus atomon* (Walker), *A. calvus* (Huang), *A. chionaspidis* (Howard), *A. connectens* Silvestri, *A. floccosus* (Huang), *A. macrochaeta* Silvestri, *A. perspiciosus* Girault, *A. pexus* (Huang), *A. promacchiae* Viggiani & Ren, *A. williamsi* (Annecke & Insley), and 1 new species, *Ablerus fasciarius* Wang, Huang & Polaszek **sp. nov.** A key to the females of Chinese *Ablerus* species is provided.

Key Words: Aleyrodidae; Diaspididae; hyperparasitoid

## Resumen

Se registran las especies chinas del género *Ablerus* Howard (Hymenoptera: Chalcidoidea: Azotidae), incluyendo 10 especies descritas, *Ablerus atomon* (Walker), *A. calvus* (Huang), *A. chionaspidis* (Howard), *A. connectens* Silvestri, *A. floccosus* (Huang), *A. macrochaeta* Silvestri, *A. perspiciosus* Girault, *A. pexus* (Huang), *A. promacchiae* Viggiani y Ren, *A. williamsi* (Annecke y Insley), y 1 especie nueva, *Ablerus fasciarius* Wang, Huang y Polaszek **sp. nov.** Se provee una clave de las hembras de las especies de *Ablerus* en China.

Palabras Clave: Aleyrodidae; Diaspididae; hiperparasitoide

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*Ablerus* (Hymenoptera: Chalcidoidea: Aphelinidae) was established by Howard for the species described originally as *Centrodora clisiocampae* Ashmead, from District of Columbia, USA (Howard 1894). The genus was treated separately from *Azotus* Howard for many years, although Girault (1913) synonymized *Azotus* with *Ablerus*. Hayat (1983), however, noted that although these genera are very similar, they were distinguished by the following characters: dark setae arranged in groups on the disc of the forewing and a swollen stigmal vein in *Azotus*; and the sparse discal setae not arranged in groups and thin stigmal vein in *Ablerus*. Shafee & Rizvi (1984) re-synonymized *Azotus* with *Ablerus*, and Hayat (1994) followed Girault (1913) and transferred all species of *Azotus* to *Ablerus*, except those already transferred to *Ablerus* by other authors, and placed *Myocnemella* Girault, 1913 in synonymy with *Ablerus*. Currently, *Ablerus* is regarded as the sole genus within the family Azotidae (Heraty et al. 2013).

*Ablerus* includes 94 species worldwide (Noyes 2015), of which 10 are known from China. Compere (1926) first recorded *Ablerus perspiciosus* Girault (as *Azotus silvestrii* Compere) from Shanghai, followed by descriptions of new species and records of other species described by Silvestri (1927), Liao et al. (1987), Viggiani & Ren (1993), Huang (1994), Xu & Huang (2004), and Li et al. (2012). Huang (1994) recorded 6 species (as *Azotus*), including 3 new species, and provided a key.

In this paper, the 10 species of *Ablerus* from China are recorded, and 1 new species, *Ablerus fasciarius* Wang, Huang & Polaszek **sp. nov.**, is described. A key to Chinese *Ablerus* species is provided.

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## Materials and Methods

Specimens of *Ablerus* were preserved in 75% ethanol after emergence. The body color was described and photographed from ethanol-preserved specimens before clearing and slide-mounting. Specimens were slide-mounted for species identification following the method outlined by Noyes (1982). The specimens in ethanol were photographed with a MicroPublisher 5.0 RTV camera attached to a Zeiss Stemi 2000-C stereo zoom trinocular microscope with Auto-Montage software and Sony DSC-T900 camera. Slide-mounted specimens were photographed using a Nikon DS-Ri2 camera with NIS-Elements D software attached to a Nikon Ni microscope equipped with differential interference contrast. Body length was measured from ethanol-preserved specimens before they were slide-mounted, and all other measurements were taken from slide-mounted specimens. Type material and other specimens examined in this study were deposited in the College of Plant Protection, Fujian Agriculture and Forestry University, Fuzhou, China (FAFU).

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Morphological terminology follows Hayat (1998), and the following abbreviations are used: F1, F2, etc. = antennal funicle segments 1, 2, etc.; T1, T2, etc. = gastral tergites 1, 2, etc.

ABBREVIATIONS OF TYPE DEPOSITORIES

DEZP	Deptartamento di Entomologia e Zoologia Agraria, Università di Napoli, Portici, Italy
FAFU	College of Plant Protection, Fujian Agriculture and Forestry University, Fuzhou, China
GEIG	Guangzhou Entomological Institute, Guangzhou, China
IARI	Indian Agricultural Research Institute, Delhi, India
IEUN	Istituto de Entomologia Agraria, Università degli Studi di Napoli, Portici, Italy
NHM	Natural History Museum, London, United Kingdom
PPRI	Plant Protection Research Institute, Pretoria, South Africa
USNM	U.S. National Museum of Natural History, Washington, District of Columbia
ZDAMU	Department of Zoology, Aligarh Muslim University Aligarh, India

Results

Genus *Ablerus* Howard, 1894

- Ablerus* Howard, 1894: 7. Type species *Centrodora clisiocampae* Ashmead, by monotypy.
- Azotus* Howard, 1898: 138. Type species *Azotus marchali* Howard, by monotypy. Synonymy by Girault, 1913: 189.
- Myocnemella* Girault, 1913: 195. Type species *Myocnemella bifasciata* Girault, by original designation. Synonymy by Hayat, 1994: 83.
- Dimacrocerus* Brethes, 1914: 4. Type species *Dimacrocerus platensis* Brethes, by original designation. Synonymy by Howard in Girault, 1917: 8.

DIAGNOSIS

Female. Body either flattened and elongate, or convex and shorter, usually dark. Head dark or white to yellow with darker bands; mandible with 2 or 3 teeth and a truncation; maxillary palp 2-segmented, labial palp 1-segmented. Antennal segments usually with contrasting white and dark segments, antennal formula 1,1,4,1, with 1 or 2 anelli; F3 usually shorter than both F2 and F4. Pronotum entire and usually long; mid-lobe of mesoscutum with 2–6 setae, each side-lobe of mesoscutum with 2 setae, each axilla with 1 seta, mesoscutellum broader than long and shorter than mid-lobe of mesoscutum, with 2–4 setae; propodeum distinctly longer than metanotum, at least 0.5 times of mesoscutellum; propodeal spiracles with anterior grooves; mesopostphragma large and long. Forewing either uniformly infusate behind venation or with infuscated bands of various shapes and bearing darker setae; stigmal vein either with a thin or swollen stigma; postmarginal vein absent; submarginal vein with 1 seta; marginal vein with 3–4 setae; usually 1 seta present on stigmal vein and 1 at junction of parastigma and submarginal vein; disc sparsely or densely setose, or setae arranged in groups and/or tufts. Tarsal formula 5–5–5. Gaster generally longer than head plus thorax; hypopygium usually prominent, extending nearly to level of cereal plates; ovipositor at least slightly exerted (Hayat 1998).

Male. Similar to female. Antennal segments, except F3, elongate with more longitudinal sensilla, and more or less uniformly colored (Hayat 1998).

DISTRIBUTION

Cosmopolitan.

HOSTS

Hyperparasitoids of other hymenopteran primary parasitoid species, including other chalcidoids. Coccoid hosts recorded in the literature are secondary hosts (Hayat 1998). Some species are confirmed as oophagous (Polaszek 1991).

Key to Species (Females) of *Ablerus* from China

- |      |  |  |
|------|--|--|
| 1.—  | Mid-lobe of mesoscutum with 1 pair of setae .....  | 2                                      |
| 1'.— | Mid-lobe of mesoscutum with 2 pairs of setae or more .....   | 7                                      |
| 2.—  | Forewing with a row of strong setae below marginal vein. ....  | <i>A. macrochaeta</i> Silvestri        |
| 2'.— | Forewing without a row of strong setae below marginal vein. ....                                     | 3                                      |
| 3.—  | Antenna with scape expanded, not more than 3.0 times as long as width .....                          | 4                                      |
| 3'.— | Antenna with scape cylindrical, more than 3.0 times as long as width. ....                           | 5                                      |
| 4.—  | Only 5 or 6 setae below apex of marginal vein, basal half of forewing asetose. ....                  | <i>A. williamsi</i> (Annecke & Insley) |
| 4'.— | A cluster of more than 10 setae below apex of marginal vein, a few setae below marginal vein .....   | <i>A. chionaspidis</i> (Howard)        |
| 5.—  | Flagellum uniformly colored pale brown to pale dark, without contrasting pale and dark segments .... | <i>A. promacchia</i> Viggiani & Ren    |
| 5'.— | Flagellum with contrasting pale (white to yellow) and dark segments. ....                            | 6                                      |
| 6.—  | Scape completely dark brown, mostly infusate below marginal vein and stigmal vein. ....              | <i>A. atomon</i> (Walker)              |
| 6'.— | Scape mostly white, an infuscated band below apical third of marginal vein and stigmal vein .....    | <i>A. fasciarius</i> sp. nov.          |
| 7.—  | Forewing with a row of strong setae below marginal vein. ....  | <i>A. connectens</i> Silvestri         |

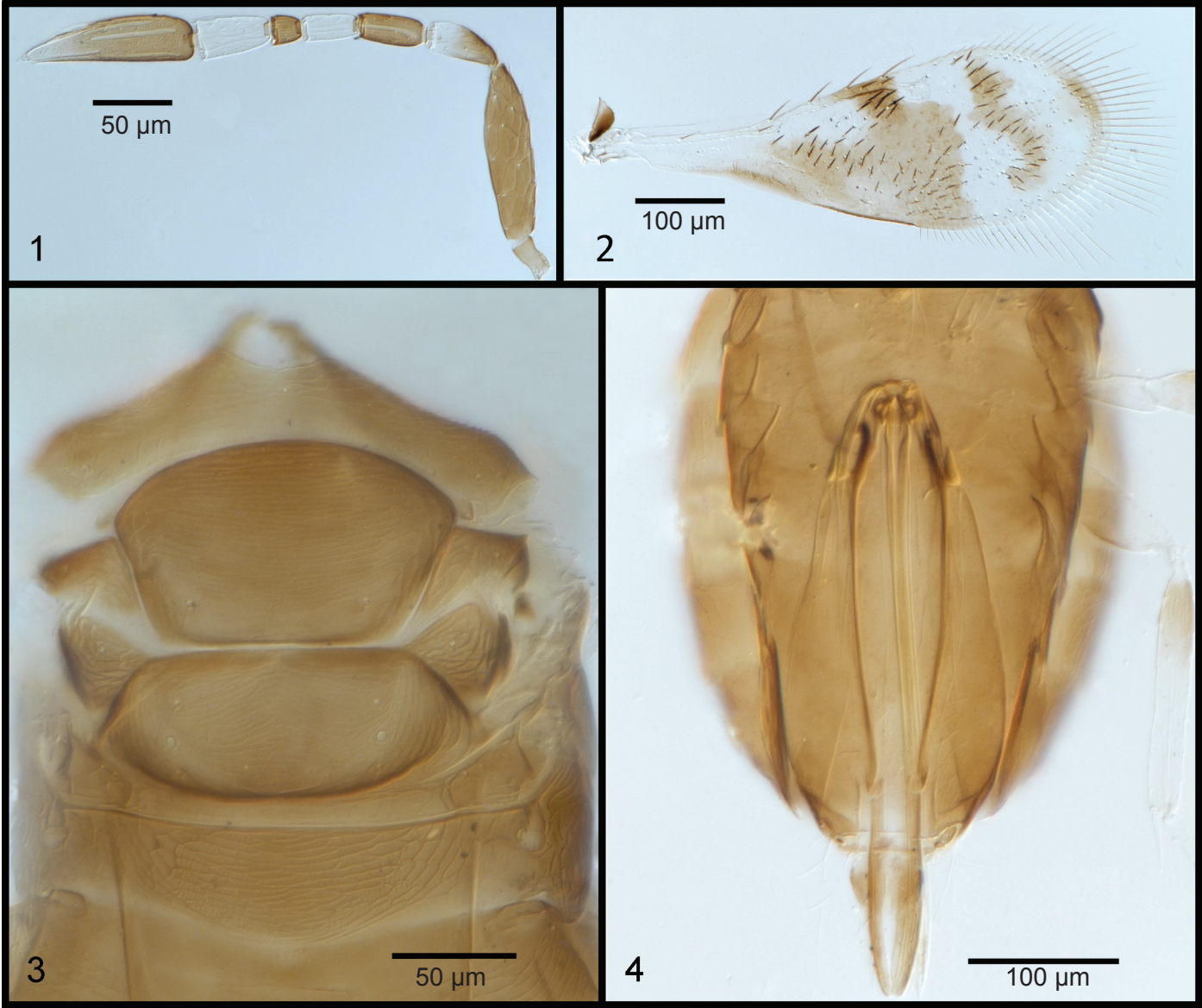
- 7'.— Forewing without a row of strong setae below marginal vein. . . . . 8
- 8.— Forewing with speculum extending from stigmal vein distally to apex of wings . . . . . *A. calvus* (Huang)
- 8'.— Forewing without speculum extending from stigmal vein distally to apex of wings . . . . . 9
- 9.— Forewing with 2 complete and 1 short infuscated bands. . . . . *A. perspicuosus* Girault
- 9'.— Forewing with 1 infuscated band, or band not distinct . . . . . 10
- 10.— Forewing with infuscated surface extending from basal cell to apex of stigmal vein . . . . . *A. floccosus* (Huang)
- 10'.— Forewing with numerous, dense, dark and coarse setae extending from basal cell to apex of stigmal vein. . . . . *A. pexus* (Huang)

1. *Ablerus atomon* (Walker, 1847) (Figs. 1–4)

*Encyrtus atomon* Walker, 1847: 229. Type status unknown. Austria. *Azotus mokrzejckii* Nowicky, 1926: 108. Holotype ♀. Poland: Bobrowa. Synonymy by Ferrière, 1965: 105.

*Azotus marchali* Howard, 1898: 139. Holotype ♂. France: Paris (USNM). *Azotus atomon* (Walker, 1847): Ferrière, 1965: 105.

*Azotus pinifoliae* Mercet, 1912: 141. Syntypes 1 ♀, 1 ♂. Spain: Madrid. Synonymy by Ferrière, 1965: 105. *Ablerus atomon* (Walker, 1847): Hayat, 1994: 84.



Figs. 1–4. *Ablerus atomon* (female). 1. Antenna; 2. forewing; 3. mesosoma; 4. ovipositor.



## MATERIAL

China. Xinjiang: 1 ♀, Yining, 23-VII-2010, Hong-Ying Hu, by sweeping (FAFU); 1 ♀, Hutubi, 23-VII-2005, Hong-Ying Hu, by sweeping (FAFU); 1 ♀, Zeketai, 2-VIII-2006, Hong-Ying Hu, by sweeping (FAFU).

## HOSTS

The following hosts are recorded: Diaspididae: *Diaspidiotus gigas* (Thiem & Gerneck), (Li et al. 2011); *Chionaspis stantophris*, *Ch. pinifoliae* (Fitch), *Diaspidiotus caucasicus* (Borchsenius), *D. hungaricus* Kosztarab, *D. ostreaeformis* (Curtis), *D. perniciosus* (Comstock), *D. prunorum* (Laing), *D. pyri* (Lichtenstein), *D. uvae* (Comstock), *Epidiopsis leperii* (Signoret), *Lepidosaphes conchiformis* Gmelin, *L. ulmi* (L.), *Leucaspis loewi* Colvée, *L. pini* (Hartig), *L. pusilla* Löw, *L. signoreti* Targioni-Tozzetti, *Nuculaspis abietis* (Schrank), *Pseudaulacaspis pentagona* (Targioni-Tozzetti), *Quadrastidiotus zonatus* (Frauenfeld). Aphelinidae: *Encarsia leucaspidis* (Mercet), (Walker 1847; Nikol'skaja & Yasnosh 1966; Annecke & Insley 1970; Hayat 1979; Darling & Johnson 1984; Hayat 1994; Yasnosh 1995; Noyes 2015)

## DISTRIBUTION

China (Xijiang); Azerbaijan, Georgia, Iran, Turkey, Russia, Austria, Czechoslovakia, France, Germany, Italy, Hungary, Poland, Spain, Sweden, Switzerland, America, Argentina, Egypt, Australia.

## REMARKS

*Ablerus atomon* was first recorded from China by Li et al. (2011), reared from *Diaspidiotus gigas* (Thiem & Gerneck) in Xinjiang. However, *A. atomon* was considered as a hyperparasitoid of scale insects (Nikol'skaja & Yasnosh 1966), and the above scale insect hosts are probably the secondary hosts for *A. atomon*.

2. *Ablerus calvus* (Huang, 1994)

*Azotus calvus* Huang, 1994: 7, 129. Holotype ♀. Paratypes 9 ♀♀. China: Fujian (FAFU).

*Ablerus calvus* (Huang, 1994): Xu & Huang, 2004: 325.

## MATERIAL

China. Fujian: Holotype ♀, Fuzhou, Forest Park, 12-XI-1989, Jian-Qing Huang, by yellow pan trap (FAFU); Paratypes, 9 ♀♀, same data as holotype, except 23-V, 13-VI, 2-XII-1989 (FAFU); 1 ♀, Fuzhou, Forest Park, 8-VII-1989, Zhi-Shan Wu, by sweeping (FAFU).

## MALE

Unknown.

## HOST

Unknown.

## DISTRIBUTION

China (Fujian).

## REMARKS

*Ablerus calvus* resembles *Ablerus macchiai* (Annecke & Insley, 1970) but is distinguished from the latter by the following: antenna

with F1 relatively short, clava about as long as or slightly longer than F1–F3 combined; forewings with speculum extending from stigmal vein distally to apex of wings; legs mostly dark brown.

3. *Ablerus chionaspidis* (Howard, 1914) (Figs. 5–8)

*Azotus chionaspidis* Howard, 1914: 85. Holotype ♀. Japan: Tokyo (USNM).

*Azotus qadrii* Agarwal, 1964: 328. Holotype ♀. Paratype 1 ♂. India: Aligarh (ZDAMU). Synonymy by Hayat, 1998: 130.

*Azotus greatheadii* Annecke & Insley, 1970: 234. Holotype ♀. Paratypes 29 ♀♀, 18 ♂♂. Uganda: Lugazi (PPRI). Paratypes in BMNH and USNM. Synonymy by Hayat, 1998: 130.

*Ablerus chionaspidis* (Howard, 1914): Hayat, 1994: 84.

## MATERIAL

China. Fujian: 1 ♀, Shaxian, 1982, Nai-Quan Lin, by sweeping (FAFU); 2 ♀♀, Fuzhou, Jinshan, 22-VIII-1985, Nai-Quan Lin, by sweeping (FAFU); 1 ♂, Longyan, 14-VII-1986, Gao-Sheng Liu, by sweeping (FAFU); 1 ♂, Zhangping, 17-VII-1986, Gao-Sheng Liu, by sweeping (FAFU); 1 ♀, 1 ♂, Fuzhou, Jinshan, 1987, Nai-Quan Lin, by yellow pan trap; 1 ♀, Fuzhou, Forest Park, 25-VII-1989, Zhi-Shan Wu, by sweeping (FAFU).

## HOSTS

The following hosts have been recorded: Diaspididae: *Chionaspis difficilis*, (Howard 1914; Mercet 1922); *Aulacaspis pentagona*, (Mercet 1922); *Aonidiella orientalis* on *Eugenia jambolana*, *Duplachionaspis* sp. on *Dichantium annulatum*, ? *Melanaspis glomeratus* on sugar cane, (Hayat 1998).

## DISTRIBUTION

China (Fujian), Uganda, Japan, India.

4. *Ablerus connectens* Silvestri, 1927

*Ablerus connectens* Silvestri, 1927: 53. Holotype ♀. Sri Lanka: Colombo (DEZP).

## MATERIAL

No specimens examined, and recorded from China by Viggiani & Ren (1993).

## HOSTS

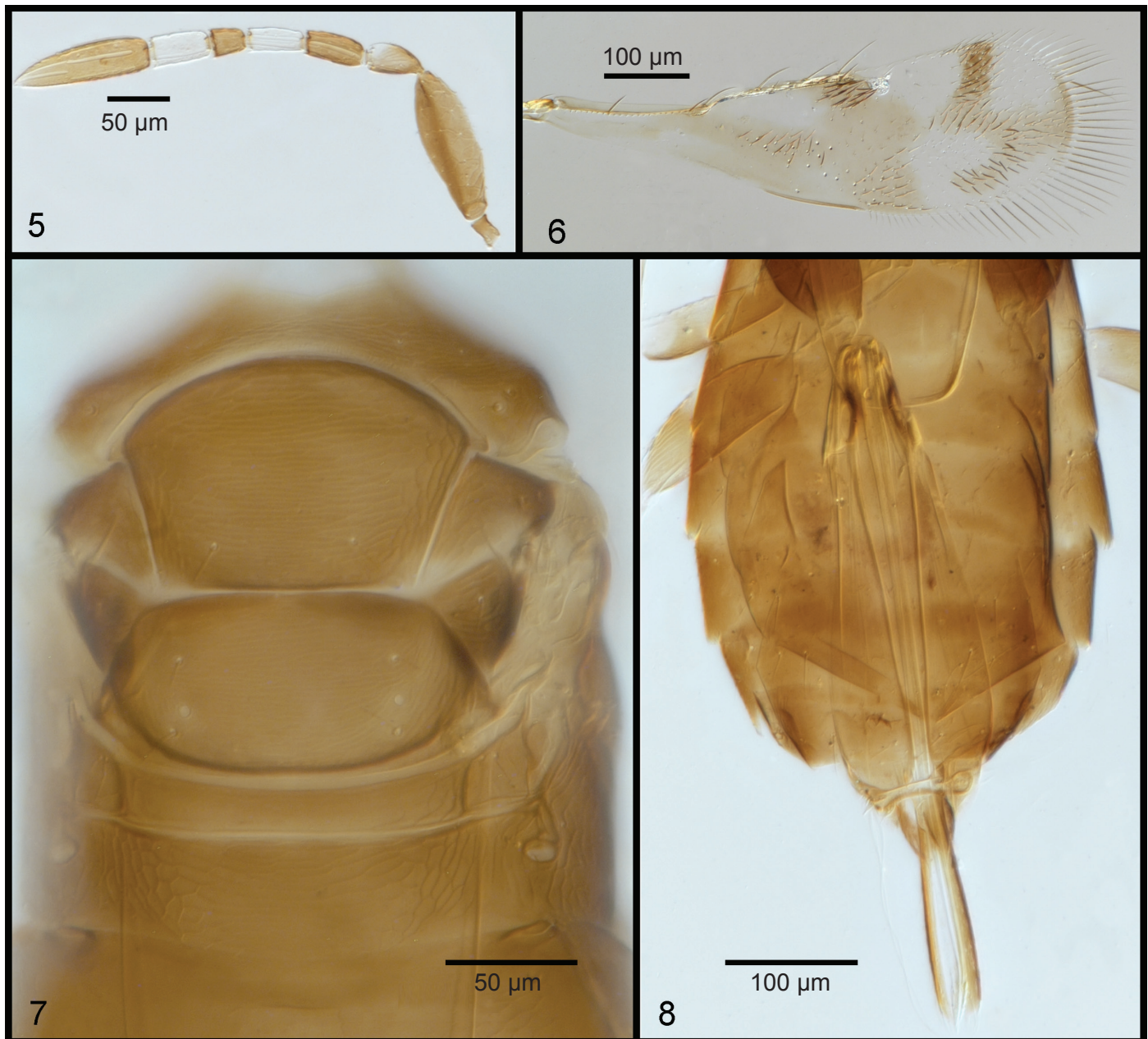
The following hosts have been recorded: Aleyrodidae: *Aleurocanthus woglumi* (Ashby), (Silvestri 1927); *Aleurocanthus spiniferus* (Quaintance), (Viggiani & Ren 1993).

## DISTRIBUTION

China (Guangdong, Guangxi), Sri Lanka.

## REMARKS

*Ablerus connectens* was originally described by Silvestri (1927) from Sri Lanka, based on the female only, and was recorded from China by Viggiani & Ren (1993), reared from *Aleurocanthus spiniferus* (Quaintance) in Guangdong and Guangxi. Viggiani & Ren (1993) also first recorded the male of *A. connectens* and pointed out it is very similar



Figs. 5–8. *Ablerus chionaspidis* (female). 5. Antenna; 6. forewing; 7. mesosoma; 8. ovipositor.

to the female according to the collected specimens, and depicted the male antenna and genitalia.

5. *Ablerus fasciarius* Wang, Huang & Polaszek **sp. nov.** (Figs. 9–17)

DESCRIPTION

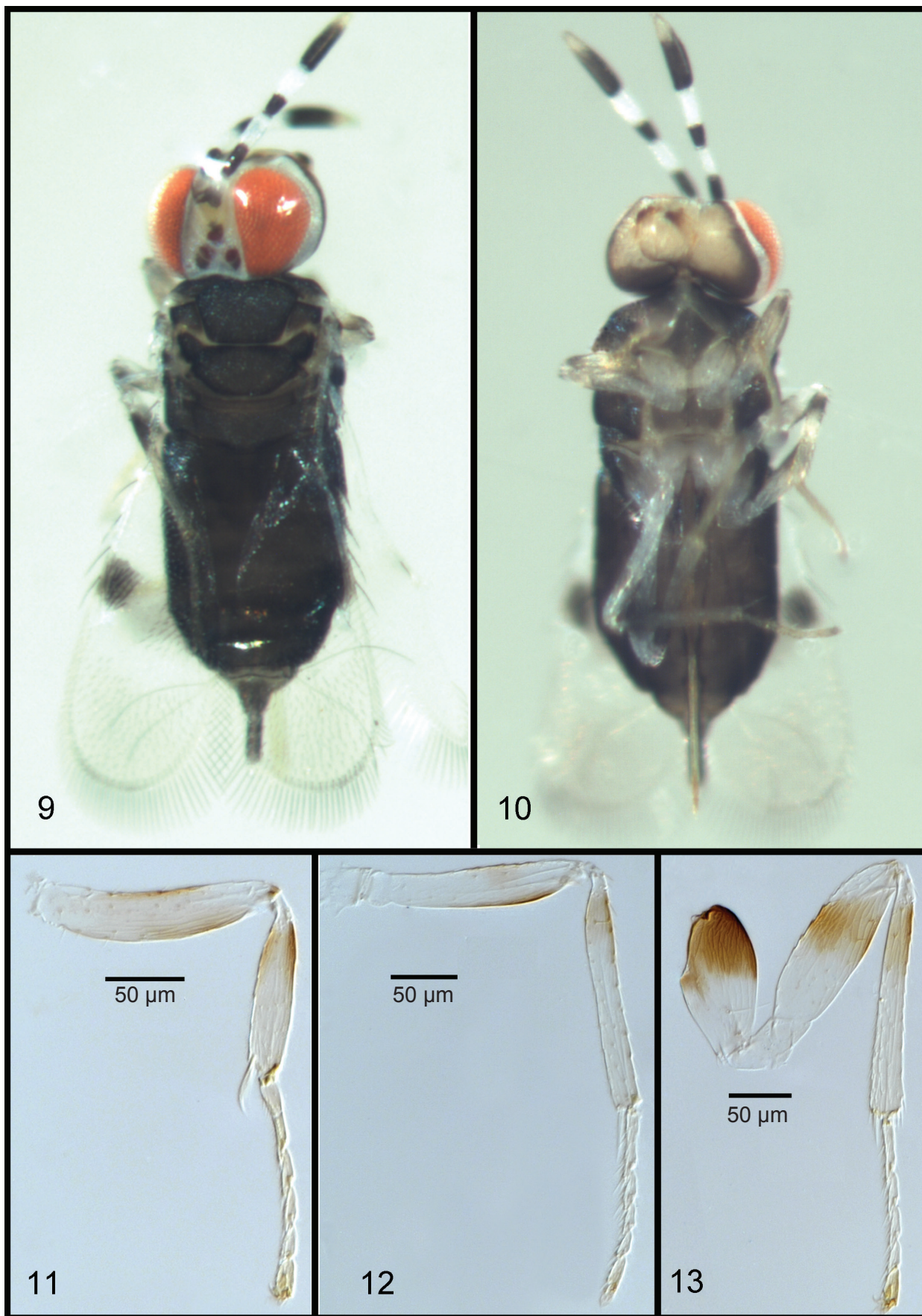
**Holotype female.** Body length: 0.75 mm (excluding exerted part of ovipositor).

**Color.** Head with frontovertex silvery white, eyes red and ocelli red brown; occiput mostly, except for 2 small oval areas above, dark brown; a narrow dark brown band across face above toruli and extending on malar space below eyes, and merging with the dark brown occiput; areas above this band along eyes nearly white, face and malar space below this band brown; mouth space brown yellow, mandible

apically dark brown. Mesosoma and metasoma dark brown to dark, apex of ovipositor white. Antenna with most of radicle, ventral margin and apicad of scape, basad of pedicel, F1, F3 and most of clava dark brown to dark; rest of scape and pedicel, F2 and F4 white; apex of clava brown yellow. Forewing hyaline and about apical fourth of wings slightly infuscate, with an infuscated crossband below apical third of marginal vein and stigmal vein, and a cluster of dark bristles below the apex of marginal vein. Legs white to brown yellow, except basal half of hind coxae dark brown, femora apically and tibiae basally pale brown to dark brown, the 5th tarsi pale brown.

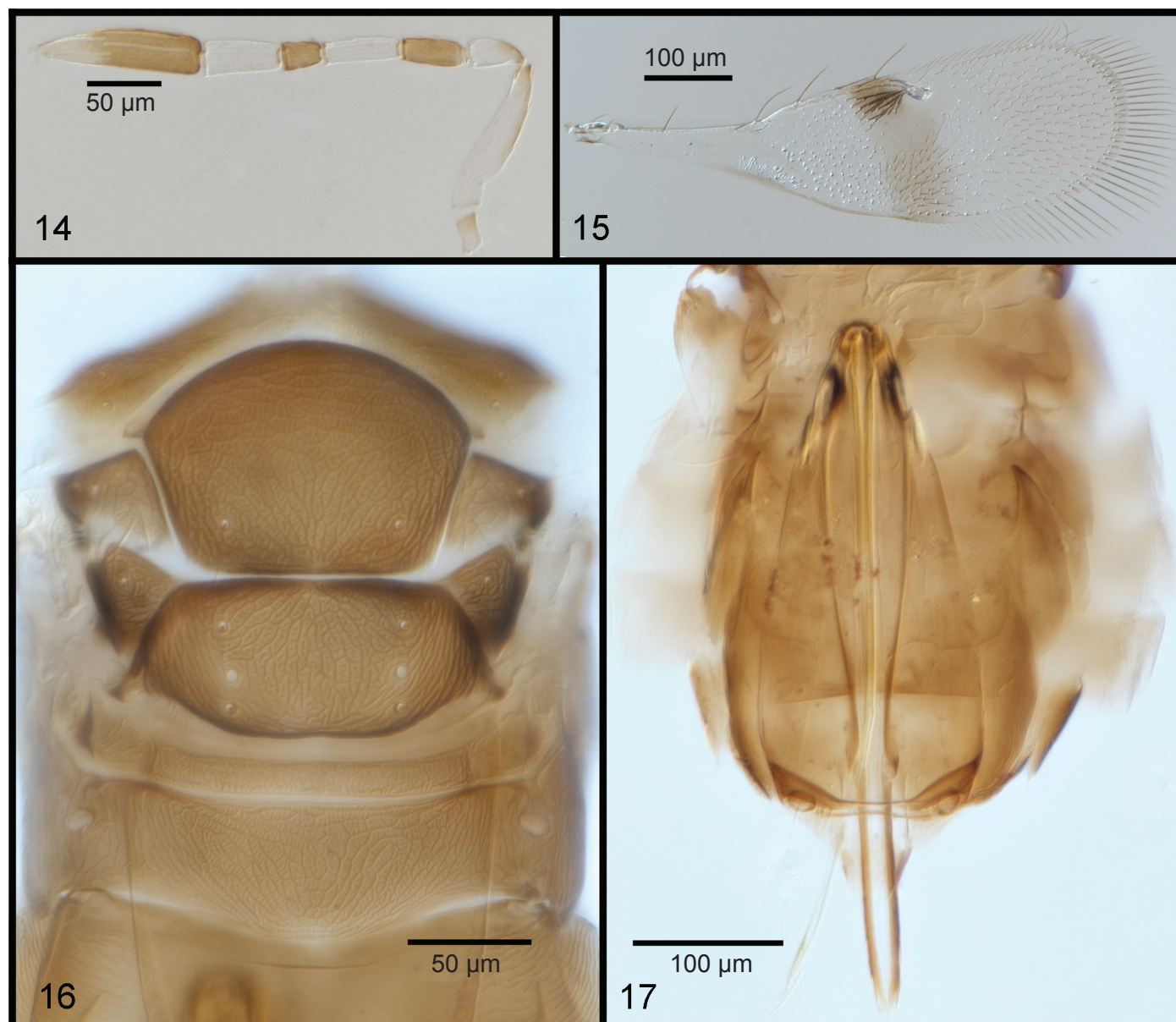
**Head.** Eyes bare. Mandible with 3 teeth and a truncation. Antenna with scape 4.5 times as long as wide; pedicel 1.7 times as long as wide, slightly shorter than F1; F2 and F4 equal in length, 3 times and 2.1 times as long as wide, respectively; F3 shortest, 1.25 times as long as wide, 0.48 times as long as F2 and F4 respectively; F1–F4 each with 2–4





Figs. 9–13. *Ablerus fasciarius* sp. nov. (female). 9. Body, dorsal view; 10. body, ventral view; 11. foreleg; 12. mid-leg; 13. hind leg.





**Figs. 14–17.** *Ablerus fasciarius* sp. nov. (female). 14. Antenna; 15. forewing; 16. mesosoma; 17. ovipositor.

multiporous plate sensilla; clava 4.18 times as long as wide, with 6 or 7 multiporous plate sensilla in 2 rows.

**Mesosoma.** Vertex reticulate. Notum of mesosoma with distinct reticulate cells and irregular sculpture in these cells; mid-lobe of mesoscutum with transverse reticulate cells anteriorly and longitudinal or oblique reticulated cells posteriorly, with 1 pair of setae; each side-lobe of mesoscutum with 2 setae; each axilla with 1 seta, distance between axillae about 2.67 times as long as axilla; scutellum transverse, 0.69 times as long as mid-lobe of mesoscutum, with oblique or longitudinal reticulations medially and oblique stripes laterally, bearing 2 pairs of setae, placoid sensilla distantly placed, slightly closer to hind pair than to fore pair of setae; metanotum narrow, with sculptures; propodeum long, 0.88 times as long as scutellum and 4.2 times as long as metanotum, with oblique or longitudinal reticulations medially and oblique stripes laterally; mesopostphragma, measured from apex of scutellum, 3.04 times as long as scutellum. Forewing narrow, 3.13 times as long as maximum width

of wing disc; marginal fringe 0.46 times as long as maximum width of disc; disc with dense setae except basal cell and asetose area below a cluster of dark bristles on the infuscated crossband extending to around stigmal vein, ciliation on disc inside the infuscated crossband unusual, consisting of dense, fine setae with a rather large base; 1 seta on submarginal vein and 1 seta premarginal vein, 1 seta below the end of submarginal vein, 3 setae on anterior margin of marginal vein; stigmal vein with a slender neck and expanded apex, postmarginal vein absent.

**Metasoma.** The apex of metasoma projecting; ovipositor long, basally located at the base of T1, projecting beyond the apex of metasoma, 2.61 times as long as mid-tibia, 3rd valvula 0.94 times as long as mid-tibia.

#### MALE

Unknown.



## TYPE MATERIAL

Holotype ♀, China, Fujian, Fuzhou, Jinshan, 26-IX-2013, Zhu-Hong Wang, ex. unidentified diaspidid scale (Hemiptera: Diaspididae) on bamboo (FAFU). Paratypes 2 ♀♀, same data as holotype (FAFU).

## HOST

Unidentified Diaspididae scale on bamboo.

## DISTRIBUTION

China (Fujian).

## REMARKS

*Ablerus fasciarius* **sp. nov.** resembles *Ablerus similis* (De Santis, 1948) with regard to the forewing having an infuscated crossband, but is distinguished from the latter by the following characters: an infuscated crossband below apical third of marginal vein and stigmal vein (in *A. similis*: below marginal vein), and a cluster of dark bristles below the apex of marginal vein (in *A. similis*: without a cluster of dark bristles); the asetose area below a cluster of dark bristles on the infuscated crossband, ciliation on disc inside the infuscated crossband unusual, consisting of dense, fine setae with a rather large base (in *A. similis*: the setae arranged on most of the infuscated crossband, the disc inside the infuscated crossband asetose).

*Ablerus fasciarius* **sp. nov.** also resembles *Ablerus macchiai* (Annecke & Insley, 1970) and *Ablerus separaspidis* (Annecke & Insley, 1970) with regard to the forewing having an infuscated crossband below marginal vein, but is distinguished from them by the different form of the infuscated crossband and ciliation on disc of forewing.

## ETYMOLOGY

The species name is derived from the Latin word *fasciarius* = banded, referring to the forewing with an infuscated crossband.

6. *Ablerus floccosus* (Huang, 1994)

*Azotus floccosus* Huang, 1994: 8, 136. Holotype ♀. Paratypes 2 ♀♀, 2 ♂♂, China: Fujian (FAFU).

*Ablerus floccosus* (Huang, 1994): Xu & Huang, 2004: 328.

## MATERIAL

China. Fujian: Holotype ♀, Fuzhou, Forest Park, 17-VI-1989, Zhi-Shan Wu, by sweeping (FAFU); Paratypes 2 ♀♀, 2 ♂♂, Sanming, 8-VII-1987, Chang-Ming Liu, by yellow sticky trap (FAFU).

## HOST

Unknown.

## DISTRIBUTION

China (Fujian).

## REMARKS

*Ablerus floccosus* resembles *Ablerus chionaspidis* (Howard, 1914), but is distinguished from the latter by the following characters: antenna with scape and pedicel mostly whitish; forewings without pale area

below the marginal vein, but with numerous, dense, black and coarse setae, and a group of denser and coarser setae below the distal portion of marginal vein.

7. *Ablerus macrochaeta* Silvestri, 1927

*Ablerus macrochaeta* Silvestri, 1927: 48. Type status unknown, ♀, ♂. Indocina [Vietnam]: Van Phu (Tonkino).

## MATERIAL

Bangladesh. 1 ♀, Chittagong I-1991, ex *Saisettia* sp. (NHM). No Chinese specimens examined. Recorded from Guangdong [Canton], China by Silvestri (1927: 51).

## HOST

The following host has been recorded: Aleyrodidae: *Aleurocanthus spiniferus* (Quaintance), (Silvestri 1927). *Saisettia* sp. (Coccidae) recorded here for the first time.

## DISTRIBUTION

China (Guangdong), Bangladesh, Vietnam (Van Phu).

8. *Ablerus perspicuosus* Girault, 1916 (Figs. 18–21)

*Ablerus perspicuosus* Girault, 1916b: 292. ♀. Japan: Nishigahara (Lectotype ♀, USNM).

*Azotus silvestrii* Compere, 1926: 9. Holotype ♀. Paratype 1 ♀. China: Shanghai (USNM). Synonymy by Gahan, 1942: 47.

*Azotus kashmirensis* Narayanan, 1961: 22. Holotype ♀. Paratype 1 ♂. India: Kashmir (IARI). Synonymy by Hayat, 1998: 123.

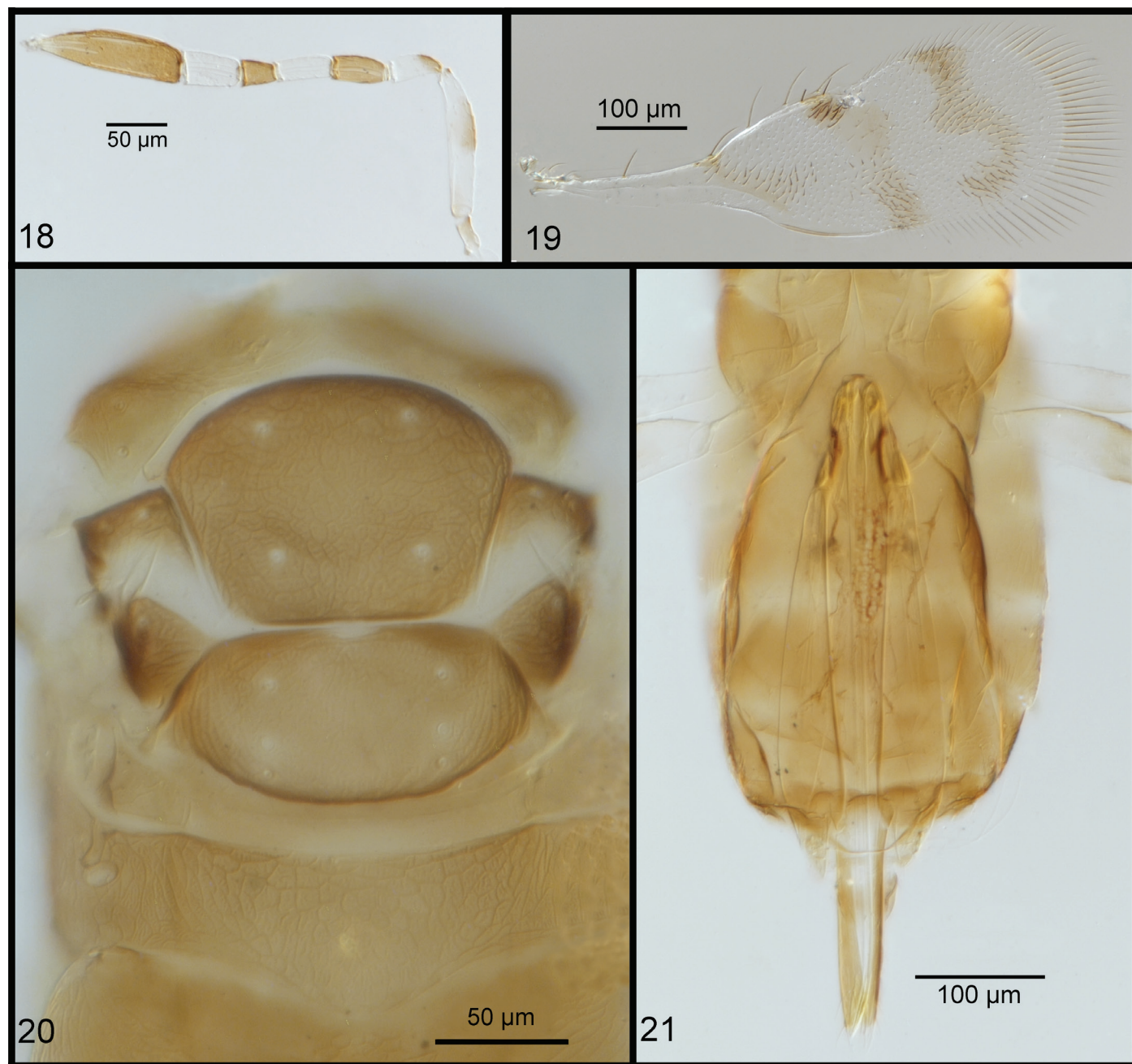
*Azotus bimaculatus* Khan & Shafee, 1976: 172. Holotype ♀. India: Aligarh (ZDAMU). Synonymy by Hayat, 1998: 123.

## MATERIAL

China. Fujian: 2 ♀♀, Sanming, 8-VII-1987, Chang-Ming Liu, by yellow sticky trap (FAFU); 1 ♀, Fuzhou, Jinshan, 1987, Nai-Quan Lin, by yellow pan trap (FAFU); 1 ♀, Shanghang, Qiushan, 21-VII-1988, Nai-Quan Lin, by sweeping (FAFU); 1 ♀, Fu'an, Xibing, 27-IX-1988, Chang-Fu Lin, by sweeping (FAFU); 1 ♀, Jianyang, 29-IX-1991, Mei-Xing Lin, ex. *Cornuaspis gloverii* (Parkard) on *Citrus*.

## HOSTS

*Cornuaspis gloverii* (Parkard) on *Citrus*. The following additional hosts have been recorded: Diaspididae: ? *Chrysomphalus aonidum* (L.) on *Aucuba japonica*, (Compere 1926); *Pseudaulacaspis pentagona* (Tarigoni-Tozzettii), (Girault 1916a; Gahan 1942; Tachikawa 1958; Ferrière 1965; Darling & Johnson 1984; Liao et al. 1987); *Aulacaspis difficilis* Cockerell, *Pseudoaonidia duplex* (Cockerell), *Chrysomphalus aonidum* L., (Tachikawa 1958; Liao et al. 1987); *Lepidosaphes ulmi*, *Quadraspidiotus gigas*, (Ferrière 1965); *Melanaspis obscura* (Comstock), (Darling & Johnson 1984); *Quadraspidiotus perniciosus* [apparently on apple trees], (Hayat 1998). Aleyrodidae: ? *Aleurolobus barodensis* on *Saccharum officinarum*, (Hayat 1998). Aphelinidae: ? hyperparasitoid of *Aphytis diaspidis* (Howard), (Compere 1926).



Figs. 18–21. *Ablerus perspicuosus* (female). 18. Antenna; 19. forewing; 20. mesosoma; 21. ovipositor.

#### DISTRIBUTION

China (Fujian, Shanghai, Zhejiang, Sichuan, Shanxi, Henan), USA, Japan, Argentina, Italy, Yugoslavia, France, India.

#### 9. *Ablerus pexus* (Huang, 1994)

*Azotus pexus* Huang, 1994: 8, 130. Holotype ♀. China: Fujian (FAFU).

*Ablerus pexus* (Huang, 1994): Xu & Huang, 2004: 332.

#### MATERIAL

China. Fujian: Holotype ♀, Chong'an, Sangang, 20-XI-1989, Jia-She Wang, by yellow pan trap (FAFU).

#### MALE

Unknown.

#### HOST

Unknown.

#### DISTRIBUTION

China (Fujian).

#### REMARKS

*Ablerus pexus* is similar to *Ablerus plesius* (Annecke & Insley, 1970), from which it is separated by the following characters: antenna with F1



basally white and apically dark brown, longer than the pedicel and about as long as F2; forewings subapically with different form of transverse stripe, and basally with relatively numerous, black and coarse setae.

#### 10. *Ablerus promacchiae* Viggiani & Ren, 1993

*Ablerus promacchiae* Viggiani & Ren, 1993: 220. Holotype ♀. China: Guangdong (GEIG); Paratype 1 ♀ in IEUN.

#### MATERIAL

No specimens examined, and originally described from Guangdong and Guangxi, China, by Viggiani & Ren (1993).

#### HOST

Unknown.

#### DISTRIBUTION

China (Guangdong, Guangxi).

#### REMARKS

*Ablerus promacchiae* resembles *Ablerus macchiae* (Annecke & Insley, 1970) but is distinguished from the latter by the following characters: antenna with F1 not longer than F2, mid-lobe of mesoscutum with only 2 setae, narrower forewings and longer fringe (Viggiani & Ren 1993).

#### 11. *Ablerus williamsi* (Annecke & Insley, 1970)

*Azotus williamsi* Annecke & Insley, 1970: 244. Holotype ♀. Paratypes 1 ♀, 2 ♂♂. Mauritius: Tamarin (PPRI).

*Ablerus williamsi* (Annecke & Insley, 1970): Hayat, 1994: 84.

#### MATERIAL

China. Fujian: 1 ♀, Shaxian, 1980, Nai-Quan Lin, by sweeping.

#### HOST

The following host has been recorded: Diaspididae: *Aulacaspis tegalensis*, (Annecke & Insley 1970).

#### DISTRIBUTION

China (Fujian), Mauritius.

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