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

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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. chionaspis (Howard), A. connectens Silvestri, A. floccosus (Huang), A. macrochaeta Silvestri, A. perspicuosus 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. chionaspis (Howard), A. connectens Silvestri, A. floccosus (Huang), A. macrochaeta Silvestri, A. perspicuosus 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

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 Mycne mella 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.

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  Deptartimento 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.


*Dimacrocerus* Brethes, 1914: 4. Type species *Dimacrocerus platensis* Brethes, by original designation. Synonymy by Howard in Girault, 1917: 8.

A three-deep column table follows.

**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 ................................... *A. macrochaeta* 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 .......... *A. williamsi* (Annecke & Insley)

4'. — A cluster of more than 10 setae below apex of marginal vein, a few setae below marginal vein .......... *A. chionaspidis* (Howard)

5. — Flagellum uniformly colored pale brown to pale dark, without contrasting pale and dark segments .......... *A. promacchiae* Viggiani & Ren

5'. — Flagellum with contrasting pale (white to yellow) and dark segments .................. 6

6. — Scape completely dark brown, mostly infuscated below marginal vein and stigmal vein .......... *A. atomon* (Walker)

6'. — Scape mostly white, an infuscated band below apical third of marginal vein and stigmal vein .......... *A. fasciarius* sp. nov.

7. — Forewing with a row of strong setae below marginal vein ................................. *A. connectens* Silvestri

**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 infuscate behind venation or with infuscated bands of various shapes and bearing darker setae; stigmatic 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 stigmatic vein and 1 at junction of parasigma 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 cerebral plates; ovipositor at least slightly excised (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).
1. Ablerus atomon (Walker, 1847) (Figs. 1–4)

Encyrtus atomon Walker, 1847: 229. Type status unknown. Austria.
Synonymy by Ferrière, 1965: 105.

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 stantorphis, Ch. pinifoliae (Fitch), Diaspidiotus caudaticus (Borchsenius), D. hungaricus Kosztarab, D. ostreaeformis (Curtis), D. perniciosus (Comstock), D. prunorum (Laing), D. pyri (Lichtenstein), D. uvae (Comstock), Epidiaspis leperi (Signoret), Lepidosaphes conchiformis Gmelin, L. ulmi (L.), Leucaspis loewi Collée, L. pini (Hartig), L. pusilla Löw, L. signoretii Targioni-Tozzetti, Nuculaspis abietsis (Schrank), Pseudoclaudeaspis pentagona (Targioni-Tozzetti), Quadraspidiotus zonatus (Frauenfeld). Aphiellidae: Encarsia leucaspis (Mercet), (Walker 1847; Nikol’skaja & Yasnosh 1966; Annecke & Insley 1970; Hayat 1998; Viggiani & Ren 1993).

DISTRIBUTION

China (Xinjiang); 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.

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


MATERIAL

China. Fujian: 1 ♀, Shaxian, 1982, Nai-Quan Lin, by sweeping (FAFU); 2 ♀♀, Fuzhou, Jinshan, 22-VII-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


MATERIAL

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

HOSTS

The following hosts have been recorded: Aleurodidae: 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 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.

2. Ablerus calvus (Huang, 1994)


MATERIAL


MALE

Unknown.

HOST

Unknown.

DISTRIBUTION

China (Fujian).

REMARKS

Ablerus calvus resembles Ablerus macchiae (Annecke & Insley, 1970) but is distinguished from the latter by the following: antennae...
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 exserted 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

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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 mesocutum with transverse reticulate cells anteriorly and longitudinal or oblique reticulated cells posteriorly, with 1 pair of setae; each side-lobe of mesocutum 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 mesocutum, 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 Sants, 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 macchieae_ (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)


MATERIAL


HOST

Unknown.

DISTRIBUTION

China (Fujian).

REMARKS

_Ablerus floccosus_ resembles _Ablerus chionaspis_ (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


MATERIAL


HOST

The following host has been recorded: Aleurodidae: _Aleurocanthus spiniferus_ (Quaintance), (Silvestri 1927). _Saisettia_ sp. (Coccidae) recorded here for the first time.

DISTRIBUTION

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

8. _Ablerus perspeciosus_ Girault, 1916 (Figs. 18–21)


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, Quishan, 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-Tozzetti), (Girault 1916a; Gahan 1942; Tachikawa 1958; Ferrière 1965; Darling & Johnson 1984; Liao et al. 1987); _Aulacaspis difficilis_ Cockerell, _Pseudaulacaspis 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)]. Aleurodidae: _? Aleurolobus barodensis_ on _Saccharum officinarum_, (Hayat 1998). Aphelinidae: _? hyperparasitoid of Aphytis dlaspidis_ (Howard), (Compere 1926).
DISTRIBUTION
China (Fujian, Shanghai, Zhejiang, Sichuan, Shanxi, Henan), USA, Japan, Argentina, Italy, Yugoslavia, France, India.

9. *Ablerus pexus* (Huang, 1994)


MATERIAL

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)


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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