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Thabena brunnifrons (Hemiptera: Issidae), New Alien Species in Taiwan, with Notes on Its Biology and Nymphal Morphology

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ABSTRACT

An alien species, *Thabena brunnifrons* (Bonfils, Attié et Reynaud, 2001), is newly reported for Taiwan. This species might have been introduced in the early 2000s based on specimen's records, and established well to date. It has been documented feeding on a large variety of plants, but the potential ecological impact economic threats of this species are not yet known. The article presents the description of 5th instar nymph of *T. brunnifrons*, lists the potential host plants, gives notes on its biology and distribution, and provides a key to species of the genus *Thabena* Stål known from Taiwan.

Key words: *Thabena brunnifrons*, alien species, distribution, nymph morphology, host plants

Introduction

Thabena brunnifrons was originally described from Réunion Island (Bonfils *et al*., 2001) as *Borbonissus brunnifrons* and then it was recorded from Singapore (Gnezdilov, 2009). Recently the species was transferred to the genus *Thabena* Stål, 1866 based on the diagnostic characteristics of carinae of metope, clavus of fore wing, and bilobed (with rudimentary anal lobe) hind wing (Gnezdilov, 2009). The genus *Thabena* comprises 14 species distributed in continental China, Indonesia, Malaysia, Philippines, Singapore, Taiwan, Thailand and Réunion Island (Gnezdilov, 2009; Gnezdilov *et al*., 2011). Except *T. brunnifrons*, there is only one species of the genus, *Thabena litaoensis* (Yang, 1994), known from Taiwan. Gnezdilov (2009) believed that the center of speciation and the center of origin of this genus were probably situated in Southeastern Asia as the majority of the species is distributed in this region. *T. brunnifrons* found in Réunion Island is the only species of the

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genus *Thabena* known from outside the Oriental region.

The objective of this study is to describe the 5th instar nymph of *T. brunnifrons*, list the potential host plants on which this species is occurring with notes on its biology, and provide the key to species of the genus *Thabena* known from Taiwan.

Materials and Methods

Genital segments of *T. brunnifrons* were macerated in 10% KOH and preserved in glycerin. Photographs of the specimens and genitalic structures were taken through a Leica MZ12.5 microscope equipped with a digital camera (Pixera Pro 600 ES), and combined using Automontage software, then adjusted using Photoshop CS4 software. The morphological terminology in this paper follows Anufriev and Emeljanov (1988) for adult and Emeljanov (2001) for nymph. Collection abbreviations are listed below:

CAS California Academy of Science, San Francisco, USA
NCHU National Chung Hsing University, Taichung, Taiwan
NMNS National Museum of Natural Science, Taichung, Taiwan
NPUST National Pingtung University of Science and Technology, Pingtung, Taiwan
NSMT National Museum of Nature and Science, Tokyo, Japan
NTU National Taiwan University, Taipei, Taiwan
TFRI Taiwan Forestry Research Institute, Taipei, Taiwan

Results

Morphology

Key to the species (adults) of *Thabena* Stål in Taiwan

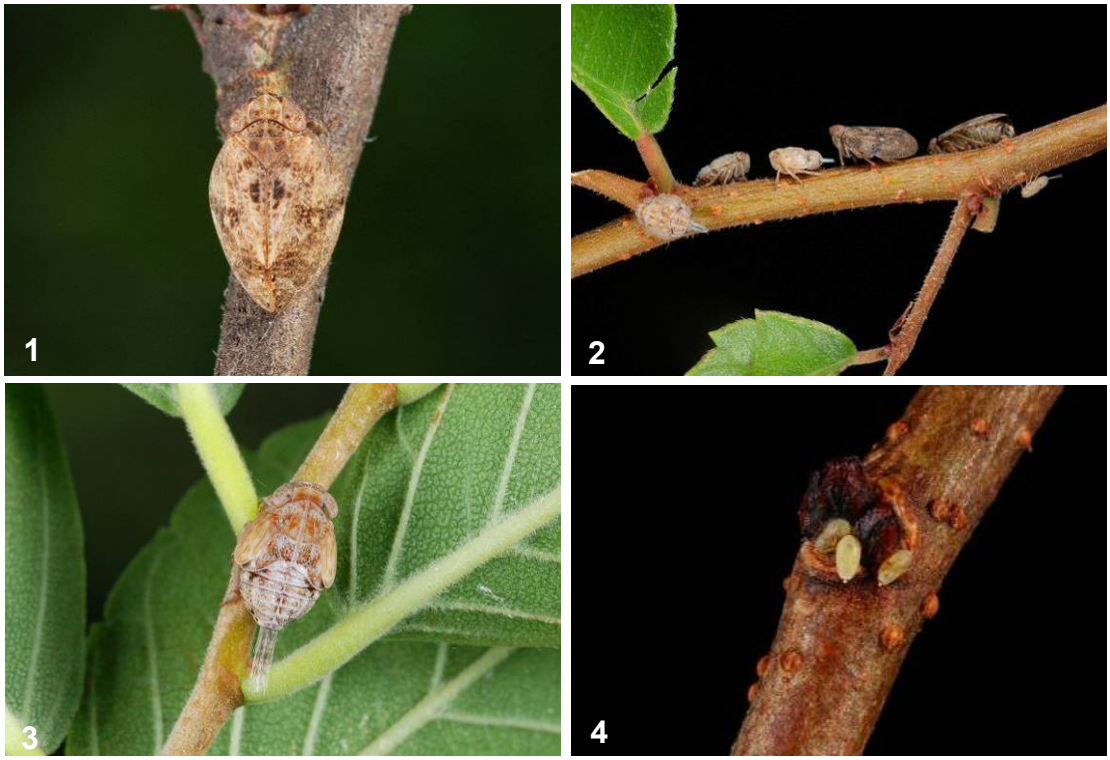
1. Body elliptic (Fig. 8, 9). Metope (frons) light brown with dark brown or black band in its upper part (Fig. 12, 13). Fore wings light brown, scattered with few dark markings and with light or green veins. Fore wings rounded apically (Fig. 16). Anterior margin of hind wing strongly convex basally (Fig. 17). Metatibiotarsal formula of hind leg 7-20-2. Relatively small species: males - 5.0-5.5 mm, females - 5.6-6.2 mm. Male anal tube wide medially and narrow basally and apically (in dorsal view) (Fig. 20). Style with large lateral tooth strongly turned outside (Fig. 21). Capitulum of style on long neck; hind margin concave. Penis not enlarged basally (in lateral view) (Fig. 22)----------
---------- *T. brunnifrons*

–. Body long-obovate (Fig. 10, 11). Metope (frons) brown grayish or dark brown without band in its upper part (Fig. 14, 15). Fore wings light brown, with scattered dark markings in large portion and green veins. Fore wings acutely rounded apically (Fig. 18). Anterior margin of hind wing widely convex basally (Fig. 19). Metatibiotarsal formula of hind leg 8-35-2. Relatively large species: males - 7.1 mm, females - 7.5 mm. Male anal tube narrow basally, wide and round apically (in dorsal view) (Fig. 23). Style with large lateral tooth basad (Fig. 24). Capitulum of style on short neck; hind margin almost straight. Penis enlarged basally (in lateral view) (Fig. 25) ---------- *T. litaoensis*

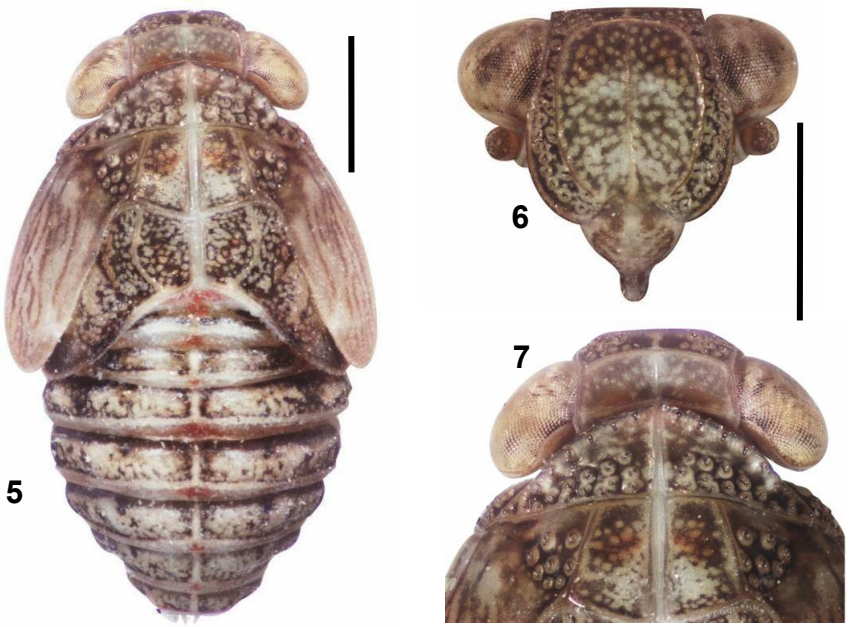
Material examined:

***Thabena litaoensis*:** TAITUNG: Litao: 1 ♂ (Paratype, dissected), 12-VIII-1987 (date is mistyped in original publication), 1 ♀ (Paratype), 13-VIII-1987, S. C. Tsaur. KAOHSIUNG: Hsenping, 1 ♂ 1 ♀, 12-VII-1984, C. T. Yang (NCHU).

***Thabena brunnifrons*:** MIAOLI: Sanyi: 1 ♀, 13-VI-2009, Y. H. Wang (NCHU). TAICHUNG: NCHU campus: 1 ♀, 6-I-2004, W. T. Wu (NMNS), 1 ♀, 3-I-2012, 1 ♂, 5-I-2012, B. H. Chiu, on *Citrus grandis*, 1 ♂, 15-XII-2011, W. H. Lin, on *Mangifera indica*, 1 ♀, 28-XI-2010, Y. Y. Tsai, 1 ♀, 26-XII-2011, C. H. Tang, 1 ♀, 21-VI-2007,

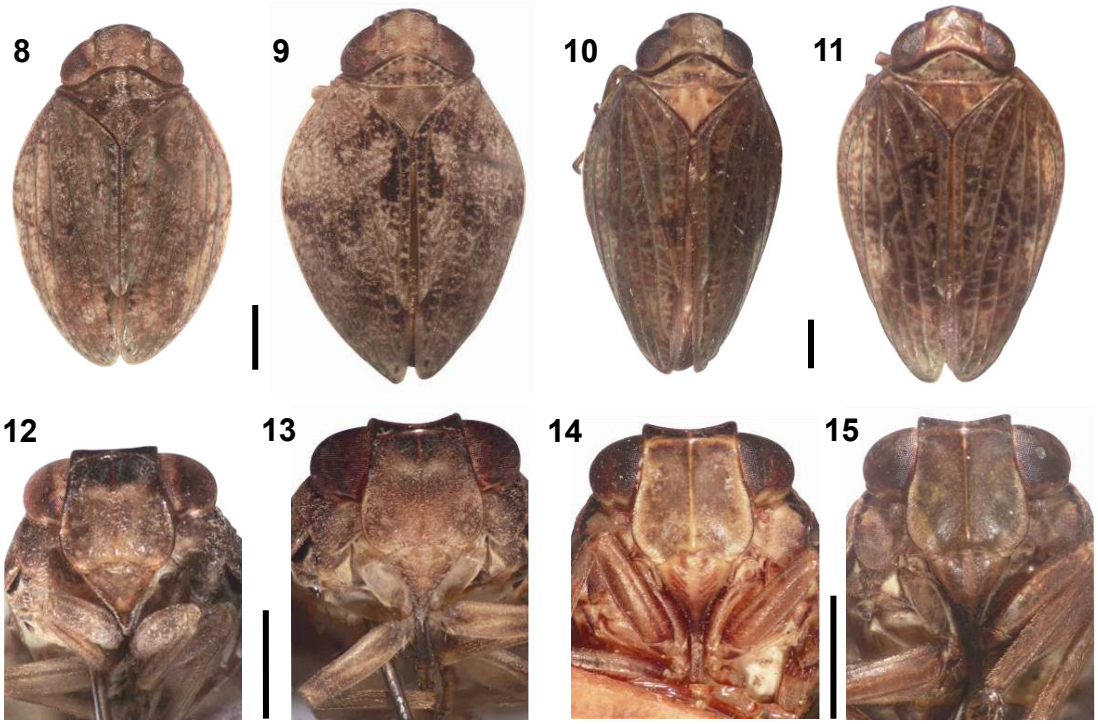


Figs. 1-4. *Thabena brunnifrons*. 1. female; 2. nymphs and adult; 3. 5th instar nymph; 4. eggs.



Figs. 5-7. *Thabena brunnifrons* 5th instar nymph; 5. dorsal view; 6. head, frontal view; 7. head, pro- and mesonotum, dorsal view. Scale = 1 mm.

Y. A. Chen; Taichung city: 1♂, 18-XII-2010, T. Hsieh, on *Cassia fistula* (NCHU), 1♂ 2♀, 25-VI-2012, 1♂, 1-VII-2012, 1 nymph, 24-VII-2012, C. L. Li, on *Pachira macrocarpa* (NMNS); Dakeng: 1♀, 28-V-2009, T. Y. Chung; Wuling farm: 1♀, 7-V-2011, H. L. Lu (NCHU); NMNS garden: 1♂ 2♀, 27-VIII-2012, on *Parsonsia laevigata*, M. L. Chan; NMNS botanical garden: 3♂ 1♀ 4 nymphs, 28-VIII-2012, on *Asclepias curassavica*, M. L. Chan, 6♂ 1♀ 1 nymph, 16-XI-2012, L. C. Chen and M. L. Chan, 2♂ 1♀, 22-I-2013, on *Mallotus japonicus*, C. H. Liu, 5 nymphs, 16-XI-2012, on *Schefflera odorata*, L. C. Chen and M. L. Chan, 4♂ 1♀, 16-XI-2012, on *Planchonella obovata*, L. C. Chen and M. L. Chan (NMNS). TAINAN: Hsinhua: 1♂, 12-V-2012, Y. E. Huang (NCHU). KAOHSIUNG: Sun Yat-sen University campus: 5♂ 1♀, 19-II-2002, T. Y. Chang; Dashu Township: 1♂ 1♀, 4-XI-2007, S. F. Lin (NPUST); Pratas Island: 1♂ 1 nymph, 1-IX-2012, M. L. Chan; 1♀ 2 nymph, 31-VIII-2012, 3♂ 1♀, 1-IX-2012, 2♂ 1♀ 4 nymph, 2-IX-2012, 1 nymph, 2-IX-2012, 3 nymphs, 2-VIII-2012, on *Morinda citrifolia*, M. L. Chan; 2♀, 31-VIII-2012, sweeping on *Premna serratifolia*, M. L. Chan, 1♀ 1 nymph, 2-IX-2012, on *Nerium oleander*, M. L. Chan; 1 nymph, 2-IX-2012, on *Guettarda speciosa*, M. L. Chan, 1 nymph, 2-IX-2012, sweeping on *Colubrina asiatica*, M. L. Chan, 1 nymph, 3-IX-2012, on *P. serratifolia*, D. C. Jiang, (NMNS). PINTUNG: Chaozhou: 7♂ 3♀ 4 nymphs, 8-IV-2012, 2♂ 4♀ 20 nymphs, 3-VII-2012, on *Zelkova serrata*, H. T. Yeh (NMNS); NPUST campus: 1♀, 3-X-2002, H. H. Chen (NPUST), 1♂, 19-I-2003, C. W. Li, 1♂, 8-XI-2003, Y. R. Chen; 1♀, 6-XII-2003, T. H. Li, 1♂, 13-XII-2004, Y. M. Wu, 1♂, 30-XI-2005, C. K. Liu, 1♀, 2-XII-2005, B. Y. Wu, 1♀, 27 Mar. 2007, Y. P. Huang; 1♂, 19-XI-2008, Y. H. Chen; 1♂, 17-X-2008, H. Y. Chen, 1♀, 3-XI-2008, Y. C. Chen, 1♂, 30-XI-2008, S. Y. Huang, 1♀, 3-XII-2008, H. M. Tu, 1♂, 14-XII-2008, Y. L. Sun, 1♂, 14-XII-2008, C. Y. Chuang, 1♂, 17-XII-2008, M. W. Hsieh, 1♀, 20-XII-2008, C. Wu, 1♀, 21-XII-2008, M. C. Lin, 1♀, 23-XII-2008, M. W. Hsieh, 1♂, 24-XII-2008, P. C. Sun, 1♂, 24-XII-2008, M. W. Hsieh, 1♂, 28-XII-2008, M. W. Hsieh, 1♂, 28-XII-2008, H. M. Tu, 1♀, 28-XII-2008, M. W. Hsieh, 1♂, 30-XII-2008, L. M. Hung, 1♀, 2-I-2009, W. T. Hsieh, 1♂, 13-XI-2009, C. Y. Chen, 1♂, 14-XII-2009, C. W. Liang, 1♀, 25-XII-2009, S. Y. Li, 1♂, 1-V-2010, R. Liao, 1♀, 16-V-2010, L. C. Li, 1♀, 18-V-2010, Y. C. Chen, 1♂, 21-V-2010, Y. C. Yen, 1♀, 31-V-2010, Y. H. Chuang, 1♀, 5-VI-2010, C. W. Chiang, 1♀, 6-VI-2010, B. H. Huang, 1♂, 25-XI-2010, Y. C. Chiang, 1♀, 4-XII-2010, F. H. Lu, 1♀, 16-XI-2011, L. Tseng, 1♀, 27-XII-2011, W. C. Kuan, 1♀, 14-V-2012, T. H. Li, 1♀, 18-V-2012, C. C. Chang; Taiwu *Township:* 1♂, 16-XI-2002, Y. Y. Li, 1♂, 25 March 2007, H. M. Huang; Wan-an *Village:* 1♂, 15-XII-2002, T. C. Liu, 1♂, 19-XII-2002, W. H. Liao, 1♂, 28-XII-2003, C. L. Li, 1♀, 28-XII-2003, T. L. Tseng, 1♀, 3-I-2004, M. H. Wu, 1 nymph, 11-VI-2005, D. Y. Tu, 1♀, 1-XII-2005, C. C. Cheng, 1♂, 6-XII-2005, Y. L. Feng, 1♀, 13-X-2007, H. H. Sun, 1♀, 20-XI-2007, C. C. Chu, 1♂, 1-XII-2007, C. C. Chu, 1♀, 24-X-2008, C. C. Chu, 1♂, 5-XI-2008, M. W. Hsieh, 1♂ 1♀, 11-XII-2008, Y. S. Hung, 1♀, 15-XII-2008, C. C. Chu, 1♀, 26-XII-2008, M. H. You, 1♀, 27-XII-2008, C. C. Chu, 1♂, 27-XII-2008, L. C. Dai, 1♀, 28-XII-2008, W. R. Chen, 1♀, 1-I-2009, Y. H. Huang, 1♀, 19-X-2009, Y. T. Hsieh, 1♀, 14-XI-2009, P. Y. Wu, 1♀, 25-XI-2009, F. K. Hsieh, 1♂, 20-XII-2009, C. H. Chiang, 1♂, 26-XII-2009, C. P. You, 1♀, 28-XII-2009, K. H. Tsai, 1♂, 2-V-2010, L. C. Tien, 1♀, 19-XI-2010, L. C. Ho, 1♂, 13-XII-2010, C. S. Lai, 1♂, 18-XII-2010, Y. H. Chuang, 1♀, 28-V-2012, B. C. Chen; Jiaping Village: 1♂, 30-XII-2010, C. W. Yu, 1♂, 30-XII-2010, Y. L. Lin; Laiyi Village: 1♀, 17-I-2004, K. J. Chen; Chunri, Tahanshan: 1♀, 2-VI-2010, Y. N. Ting; Majia, Liangshan Village: 1♀, 5-IV-2012, W. C. Li (NPUST).



Figs. 8-15. *Thabena* spp.; 8-11. dorsal view; 12-15. head, frontal view; 8, 12. *Thabena brunnifrons*, male; 9, 13. same, female; 10, 14. *Thabena litaoensis*, male (paratype); 11, 15. *Thabena litaoensis*, female. Scale = 1 mm.

***Thabaena brunnifrons* (Bonfils, Attié et Reynaud, 2001)**

Borbonissus brunnifrons Bonfils, Attié et Reynaud, 2001. Bull. Soc. Entomol. Fr. 106: 218.

Thabena brunnifrons Gnezdilov, 2009: Acta Ent. Mus. Nat. Pra. 49(1): 79.

Egg (Fig. 1A): Uniformly pale yellow, long and elliptic, with a short stem.

5th instar nymph (Figs. 5-7): Body length. 4.3-5.7 mm. Metope (frons) wide, with median carina which runs from its upper margin and with sublateral carinae joint below its upper margin. Median carina crosses sublateral carinae apically. Median and sublateral carinae do not reach metopoclypeal suture. Each lateral half of metope with 28 sensory pits (Fig. 6). Coryphe transverse, anterior margin convex, posterior margin obtusely angulate (Fig. 5). Each lateral half of pronotum (Fig. 7) with 19-20 sensory pits in discal + posterolateral groups arranged in four rows (counted from anterior row to posterior row): 8 +5-6 + 4 + 2; each paradiscal group comprises of 8 sensory pits. Mesonotum with distinct lateral carinae, with 8 sensory pits in each median paradiscal group. Metanotum with weak lateral carinae, each lateral half with 4 sensory pits arranged vertically. Each fore wing pad with 8 sensory pits arranged in 2 longitudinal rows: 3 + 5. Abdominal tergite IV with 4 sensory pits (1 on tergite and 3 on laterotergite) on each half, tergites V-VII with 6 pits (3 on tergite and 3 laterotergite), tergite VIII with 4 pits (2 on tergite and 2 on laterotergite), and tergite IX with 4 pits. Hind tibia with 3 lateral and 7 apical spines. First metatarsomere with 3 rows of spines apically - anterior (apical) row comprises 2 lateral and 12 intermediate spines, medial row with 11 spines, and posterior row with 7 spines. Second

Figs. 16-19. Wings of *Thabena* spp., 16. *Thabena brunnifrons*, male, forewing; 17. same, hindwing; 18. *Thabena litaoensis*, male (paratype), forewing; 19. same, hindwing. Scale = 1 mm.

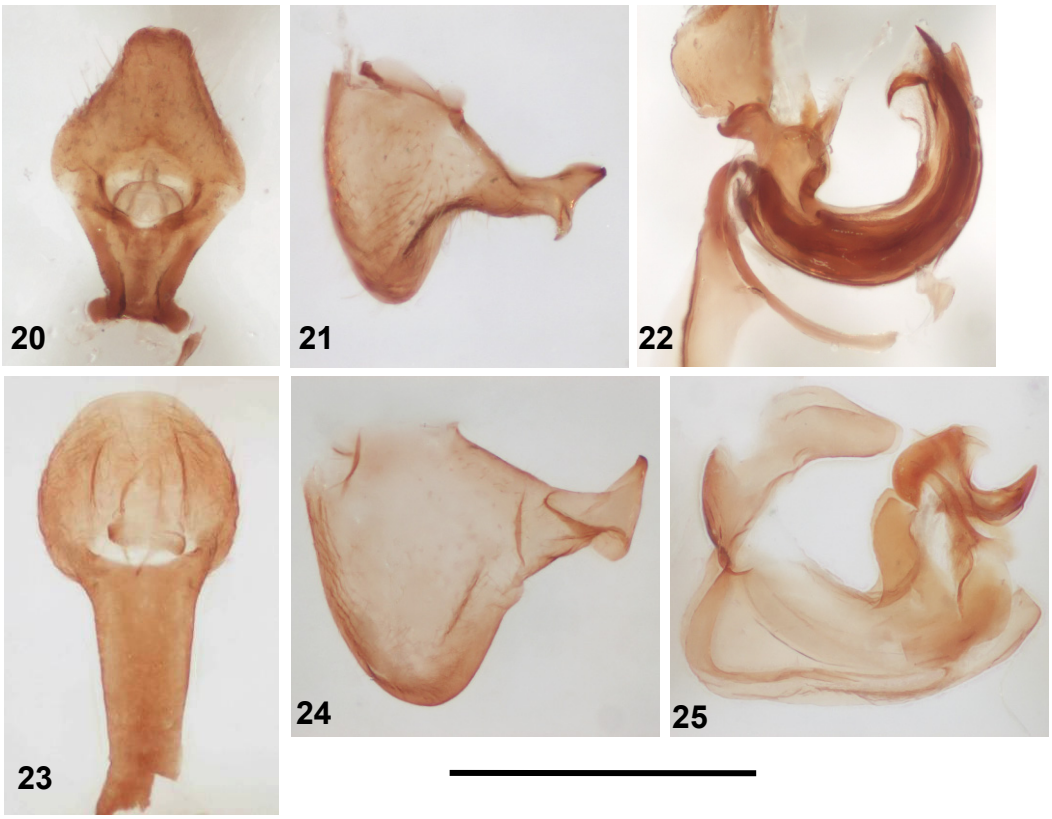
metatarsomere with single latero-apical spine.

Distribution

The species is known up to now only from three islands: Singapore, Réunion, and Taiwan. The area of origin of this species is still unknown. The pattern of species discovery is similar to it of the rapid global invasive pest, eulophid gall wasps *Quadrastichus erythrinae* Kim (Kim *et al.*, 2004). Zhang and Chen (2012) recently reviewed the genus *Thabena* Stål in China and mentioned four species. *T. brunnifrons* was not included which means that this species is not distributed in China or it is not yet introduced to this country.

Biological notes

Eggs of *T. brunnifrons* were laid among crevices of bark (Fig. 4). Living nymphs have long straight wax filaments at their abdominal apex (Fig. 3). Adult's forewings are covered by black powdery particles; the components and function of these particles is still unknown. Adults and nymphs prefer to perch on the twigs and stems (Fig. 2, 3), and move quickly to the opposite side when they are disturbed. This species occurs during all year around, and is abundant in central and southern Taiwan, mainly found in parks, gardens, campus etc, an indication that this species is strongly correlated to human activity. The individuals collected from the field could survive several days on a withered and mildewed plant appealing their strong vitality. The plants of occurrence of *T. brunnifrons* are listed in the Table 1. At least 34 species from 22 plant families are recorded indicating that *T. brunnifrons* is apparently a polyphagous species that feeds on large variety of plants. In Taiwan *T. brunnifrons* is mainly associated with tropical coastal plants such as *Morinda citrifolia*, *Guettarda speciosa, Parsonsia laevigata, Schefflera odorata*, *Planchonella*



Figs. 20-25. Male genitalia of *Thabena* spp., 20. *Thabena brunnifrons*, anal tube, dorsal view; 21. same, style, lateral view; 22. same, penis, lateral view; 23. *Thabena litaoensis* (paratype), anal tube, dorsal view; 24. same, style, lateral view; 25. same, penis, lateral view. Scale = 1 mm.

obovata, *Diospyros egbert-walkeri*, *Premna serratifolia*, some widely distributed species such as *Mallotus japonicus*, *Zelkova serrata*, and some exotic plants such as *Nerium oleander*, *Asclepias curassavica*, *Mangifera indica*, and *Pachira macrocarpa*.

Discussion

T. brunnifrons was originally found in Taiwan on *Zelkova serrata* (Ulmaceae) by the second author. Subsequently more specimens were found in the museum collections. However, while Dr. Chung-Tu Yang and his team studied Fulgoromorpha and Psylloidea of Taiwan and collected specimens extensively throughout the island since 1984, no specimen were collected before 2002. So far, we examined the collection in NCHU, NMNS, NPUST, NTU, TFRI in Taiwan, NSMT in Japan, CAS in USA, and only found *T. brunnifrons* specimens from NCHU, NMNS and NPUST. The northernmost collecting site is in Miaoli, the Central Taiwan, and the species is not found yet in Northern Taiwan which might be correlated with the fact that *T. brunnifrons* is a tropical species.

T. brunnifrons is the only issid species collected during three years (2005, 2008, 2012) of extensive investigation in Dongsha (Pratas) Island - a small island with 1.74 km^2 land area located in the southwest of Taiwan and the north of the South China Sea (Yang, 2012), This island has typical

Table 1. The list of plants from which *Thabena brunnifrons* was recorded

Family	species	Locality	reference
Anacardiaceae	*Mangifera indica* L.	Taiwan	This study
Apocynaceae	*Nerium oleander* L.	Taiwan	This study
	**Parsonsia alboflavescens* (Dennst.) Mabb.		
Araliaceae	**Schefflera odorata* (Blanco) Merr. et Rolfe	Taiwan	This study
Asclepiadaceae	**Asclepias curassavica* L.	Taiwan	This study
Bignoniaceae	*Tecoma stans* (L.) Juss. Ex Kunth	Réunion	Attié *et al.* (2008)
Bombacaceae	**Pachira macrocarpa* (Cham. et Schl.) Schl.	Taiwan	This study
Boraginaceae	*Ehretia acuminata* R. Br.	Réunion	Bonfils *et al.* (2001)
Casuarinaceae	*Casuarina equisetifolia* L.	Réunion	Attié *et al.* (2008)
Combretaceae	*Terminalia arjuna* (Roxb. Ex DC.) Wight et Am.	Réunion	Bonfils *et al.* (2001)
Ebenaceae	**Diospyros egbert-walkeri* Kosterm	Taiwan	This study
Euphorbiaceae	*Ricinus communis* L.	Réunion	Attié *et al.* (2008)
	**Mallotus japonicus* (Thunb.) Muell. Arg.	Taiwan	This study
Fabaceae	*Prosopis juliflora* (Sw.) DC.	Réunion	Bonfils *et al.* (2001)
	Acacia farnesiana (L.) Willd.		Attié *et al.* (2005)
	Acacia mearnsii De Wild.		
	Leucaena leucocephala (Lam.) de Wit		Attié *et al.* (2008)
	Albizia lebbeck (L.) Benth.		Gnezdilov (2009)
	Dichrostachys cinerea (L.) Wight et Arn.		
Malvaceae	*Abutilon exstipulare* (Cav.) G. Don;	Réunion	Attié *et al.* (2008)
	Thespesia populnea (L.) Sol. Ex Corrêa		
Oleaceae	*Olea lancea* Lam.	Réunion	Attié *et al.* (2008)
Polygonaceae	*Coccoloba uvifera* (L.) L.	Réunion	Attié *et al.* (2005)
Rubiaceae	**Guettarda speciosa* L.	Taiwan	This study
	**Morinda citrifolia* L.		
	Vangueria madagascariensis J. F. Gmel.	Réunion	Attié *et al.* (2008)
Sapindaceae	*Cossinia pinnata* Comm. Ex. Lam.	Réunion	Attié *et al.* (2008)
Sapotaceae	**Planchonella obovata* (R. Br.) Pierre	Taiwan	This study
Salicaceae	*Flacourtia indica* (Burm. F.) Merr.	Réunion	Attié *et al.* (2008)
	(formerly in Flacourtiaceae)		
Ulmaceae	**Zelkova serrata* (Thunb.) Makino	Taiwan	This study
Labiatae	*Vitex trifolia* L.	Réunion	Attié *et al.* (2005)
	Clerodendrum heterophyllum (Poiret) Aiton		Bonfils *et al.* (2001)
	Premna serratifolia L.	Taiwan	This study
Vitaceae	*Cissus anulata* Desc	Réunion	Attié *et al.* (2008)

* Plant that was found either with cluster of *T. brunnifrons*, exuviae, nymph or reared *T. brunnifrons* from nymph to adult successfully which can be considered as the host plants.

climate which is hot and humid with tropical monsoon (Wu *et al.*, 2007) and typhoons. The vegetation of the island mainly consisted of coastal shrubs and low shrubberies but much of the observed vegetation belonged to a secondary or artificial introduction due to fishery exploitation during the past hundred years and the military campus upon more than half a century ago (Wu *et al.*, 2007). *T. brunnifrons* might have been introduced to this island and adapted well in such harsh environment.

Gnezdilov (2009) suggested that the

presence of *T. brunnifrons* in Réunion Island might be caused by an introduction to the island with a cargo from Asia in historic time. Attié *et al*. (2008) who studied the patterns of trophic relationships between planthoppers and their host plants observed that *T. brunnifrons* is mostly associated with exotic plants in Réunion which may be treated as a confirmation of its alien nature.

Up to date the list of plants from which *T. brunnifrons* was collected in Taiwan has reached 12 species from 11 families and apparently much more is still unknown. Many plants from this list are common and may be easily found in human living environment such as parks and gardens. It is necessary to find out the true host plants of *T. brunnifrons* in Taiwan as some of the recorded plant species are of economic importance, and it should be monitored whether this species may achieve pest status in the future.

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References

Anufriev GA, Emeljanov AF. 1988. Suborder Cicadinea (Auchenorrhyncha). 2: 12-495. In: Ler PA (ed). Opredelitel' nasekomykh Dal'nego Vostoka SSSR (Keys to the Insects of the Far East of the USSR). Leningrad: Nauka. (in Russian).

Attié M, Bourgoin T, Veslot J, Soulier-Perkins A. 2008. Patterns of trophic relationships between planthoppers (Hemiptera: Fulgoromorpha) and their host plants on the Mascarene Islands. J Nat Hist 42 (23): 1591-1638.

Attié M, Baret S, Strasberg D. 2005. Les insectes phytophages associés à des plantes exotiques envahissantes à l'île de La Réunion (Mascareignes). Rev Ecol (Terre and Vie) 60: 107-125.

Bonfils J, Attié M, Reynaud B. 2001. Un nouveau genre d'Issidae de l'île de la Réunion: *Borbonissus* n. gen. (Hemiptera, Fulgoromorpha). Bull Soc Entomol Fr 106: 217-224.

Chan ML, Yang CT. 1994. Issidae of Taiwan (Homoptera: Fulgoroidea). Chen Chung Book, Taichung, Taiwan. 188 pp.

Emeljanov AF. 2001. Larval characters and their ontogenetic development in Fulgoroidea (Homoptera, Cicadina). Zoosyst Rossica 9(1): 101-121.

Gnezdilov VM. 2009. Revisionary notes on some tropical Issidae and Nogodinidae (Hemiptera: Fulgoroidea). Acta Entomol Mus Nat Pra 49(1): 75-92.

Gnezdilov VM, Soulier-Perkins A, Bourgoin T. 2011. Fieber's original drawings and their corresponding types for the family Issidae (Hemiptera, Fulgoromorpha) in the Muséum national d'Histoire naturelle of Paris, France. Zootaxa

2806: 24-34.

Kim IK, Delvare G, La Salle J. 2004. A new species of *Quadrastichus* (Hymenoptera: Eulophidae): a gall inducing pest on *Erythrina* spp. (Fabaceae). J Hym Res 13(2): 243-249.

Wu SP, Hwang CC, Huang HM, Chang HW, Lin YS, Lee PF. 2007. Land Molluscan Fauna of the Dongsha Island with Twenty New Recorded Species. Taiwania 52(2): 145-151.

Yang MM. 2012. A survey of terrestrial insect resources in Dongsha Atoll and the evaluation of its pattern of change. Research report of Marine National Park Headquarters. 85 pp.

Zhang Z, Chen X. 2012, A review of the genus *Thabena* Stål (Hemiptera: Fulgoromorpha: Issidae) from China with description of one new species. Entomotaxonomia 34(2): 227-232.

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新外來種棕額薩圓飛蝨生物學及若蟲形態記述

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摘　要

棕額薩圓飛蝨 (*Thabena brunnifrons* (Bonfils, Attié et Reynaud, 2001)) 首次發現於臺灣，根據檢視標本顯示，本種為外來種，可能於 2000 年代初期入侵臺灣，並適應良好。棕額薩圓飛蝨取食多種植物，對生態環境和經濟造成的威脅程度尚不清楚。本文提供第五齡若蟲的形態描述與其潛在寄主植物清單，並提供其生物學、分布資訊，以及兩種分布於臺灣之薩圓飛蝨屬 (*Thabena* Stål) 昆蟲的檢索表。

關鍵詞：棕額薩圓飛蝨、外來種、分布、若蟲形態、寄主植物。

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