

***Sarnus rhomboidalis* Fennah (Hemiptera: Fulgoroidea: Issidae) in Madagascar: new alien species for the island?**

***Sarnus rhomboidalis* Fennah (Hemiptera: Fulgoroidea: Issidae) на Мадагаскаре: новый интродуцент на острове?**

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Sarnus rhomboidalis Fennah, 1965 is redescribed and recorded for the first time from Fianarantsoa Province of Madagascar which is the first record of Neotropical issid species from Madagascar.

Sarnus rhomboidalis Fennah, 1965 переописан и впервые указан из провинции Фианарантсоа на Мадагаскаре, что является первым указанием неотропического вида Issidae для Мадагаскара.

Key words: planthoppers, invasion, Chile, Madagascar, Fulgoroidea, Issidae, *Sarnus*, alien species

Ключевые слова: фулгоровидные цикадовые, инвазия, Чили, Мадагаскар, Fulgoroidea, Issidae, *Sarnus*, завозной вид

INTRODUCTION

Family Issidae is not known from Madagascar (Gnezdilov, 2013, 2016a). However, my recent examination of the materials from Madagascar deposited in the California Academy of Sciences (USA) found out a male of *Sarnus rhomboidalis* Fennah, 1965 collected on beach vegetation of southwestern coast of the island. The genus *Sarnus* Stål, 1866 is endemic to the Neotropics and comprises currently four Chilean species (Fennah, 1965). Particularly *S. rhomboidalis* was described by R.G. Fennah (1965) from Cuesta Zapata of the Santiago Province of Chile. This species is very common in semi-arid communities (forest edge) of opened slopes of northern exposition in La Campana National Park of Chile (A.F. Emeljanov, *pers. com.*). Thus, finding of this species in Madagascar apparently is caused by invasion to the island from Chile with any cargo or may be explained by mislabeling.

Also, the recently described *Tupala occulta* Stroiński et Szwedo, 2015 from the family Dictyopharidae is closely related or even junior synonym of *Sicoris gayi* (Spinola, 1852) from Chile and possibly appeared in Madagascar due to the same reasons (Stroiński & Szwedo 2015). Further exploration of coast communities of Madagascar is in need to find out if *S. rhomboidalis* or *T. occulta* are still present on the island.

In general invasions of American Issidae to Old World are rare. Until now just one species, *Thionia simplex* (Germar, 1830), natively distributed in USA, is recorded as alien species in Europe (Gnezdilov & Poggi, 2014).

MATERIAL AND METHODS

Morphological terminology follows Gnezdilov (2003) and Gnezdilov et al. (2014). Classification of the family Issidae follows Gnezdilov (2013).

The photos were taken by a Leica MZ 95 microscope with a camera Leica DFC 290 and then assembled with the Helicon Focus 5.3 and Adobe Photoshop CS6. The drawings were made using Leica MZ95 light microscope with the drawing tube.

The specimens examined are deposited in the California Academy of Sciences, San Francisco, USA (CASC) and in the Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia (ZIN).

RESULTS

Subfamily **ISSINAE** Spinola, 1839

Tribe **ISSINI** Spinola, 1839

Genus ***Sarnus*** Stål, 1866

Sarnus rhomboidalis Fennah, 1965
(Figs 1–10)

Material examined. Madagascar: 1 male, “Madagascar, Fianarantsoa, 2 km S Mananjary,

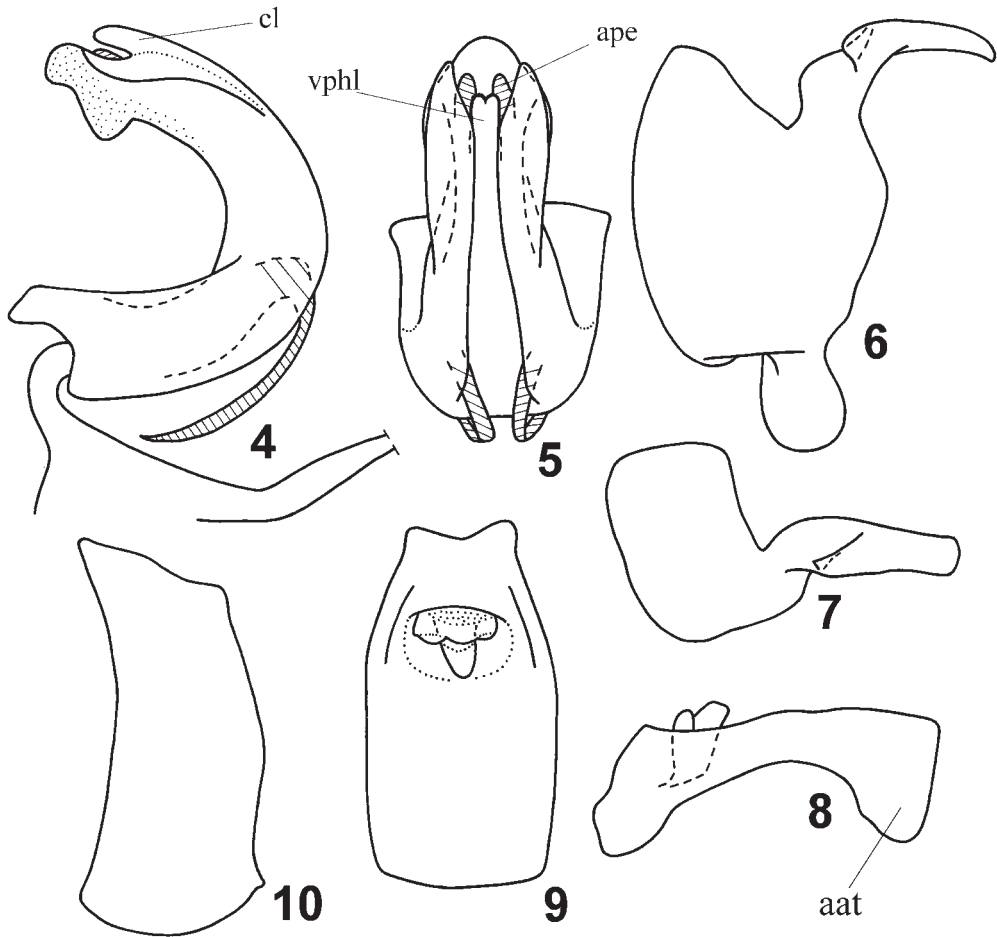
21°16′S, 48°21′E, 5 m, 13 April 1998, beach vegetation, M.E. Irwin & E.I. Schlinger leg.”, “98-MAD-8”, “CASENT 3002871” (CASC).

Other material examined. Chile: males and females, La Campana National Park, 60 km NW Santiago, 71°08′W, 32°59′S, 17–18 December 2013, A.F. Emeljanov leg. (ZIN).

Supplementary description (based on Madagascan specimen). Metope elongate, slightly convex, with weakly convex lateral margins and without median and sublateral carinae (Fig. 3). Upper margin of metope angularly concave. Metopoclypeal suture groove-shaped. Postclypeus without carina. No ocelli. Coryphe short, transverse (at least 0.2 times as long medially as wide), without carina, its anterior margin distinctly convex, posterior margin strongly concave (in dorsal view) (Fig. 2). Pedicel short, rounded. Pronotum without carina, anterior margin strongly convex, posterior margin straight. Paradiscal fields of pronotum very narrow behind eyes. Paranotal lobes of pronotum



Figs 1–3. *Sarnus rhomboidalis* Fennah (Madagascar). 1, body, lateral view; 2, body, dorsal view; 3, head, frontal view.



Figs 4–10. *Sarnus rhomboidalis* Fennah (Madagascar), male genitalia. **4**, penis and connective, lateral view; **5**, penis, ventral view; **6**, style, lateral view; **7**, style, dorsal view; **8**, anal tube, lateral view; **9**, anal tube, dorsal view; **10**, pygofer, lateral view. Abbreviations: *aat*, apical angle of anal tube; *ape*, apical aedeagal process; *cl*, collar of phallobase; *vphl*, ventral phallobase lobe.

triangular, wide. Mesonotum with lateral carinae and very weak median carina. Fore wings widely oval (Fig. 1), with wide hypostomal plate. Basal cell widely oval. Both radius and cubitus anterior with two branches, these furcations located in basal half of wing. Median with three branches, first of these furcations located at middle of wing. Clavus open (postcubitus + first anal vein running to apex of clavus). Many transverse veins present between main longitudinal veins. All veins are relief. Hind wings rudimentary. Hind tibia with two lateral spines distally and nine spines apically. First meta-

tarsomere with two lateroapical and seven intermediate spines in entire row.

Colouration. General coloration light brown yellowish with dark brown dots and stripes. Apices of rostrum and spines of legs black. Pedicel with black apical part.

Male genitalia (Figs 4–10). Hind margin of pygofer slightly convex medially (Fig. 10). Anal tube elongate and wide, widely truncate apically (in dorsal view) (Fig. 9). Apical angles of anal tube lobe-shaped, rounded, turned down (in lateral view) (Fig. 8, *aat*). Anal column short (nearly 0.25 as long as anal tube). Style with strongly concave hind

margin, posterodorsal angle almost acute (in lateral view) (Fig. 6). Capitulum of style on long and curved neck; this capitulum long and narrow, parallel-sided, not narrowing apically (in dorsal view), with wide lateral tooth (Fig. 7). Phallobase narrow and strongly curved (horseshoe-shaped) in lateral view, weakly sclerotized dorsoapically (Fig. 4). Each dorsolateral phallobase lobe with collar (Fig. 4, *cl*). Ventral phallobase lobe covered by collar folds of dorsolateral lobes, long and narrow, narrowing apically, with slightly bilobed apex (Fig. 5, *vphl*). Aedeagus with a pair of long ventral hooks (half as long as aedeagus) arising in middle part, narrowing apically and directed down (Fig. 4). Apical aedeagal processes simple, rounded apically (Fig. 5, *ape*).

Total length (male) 4.2 mm.

DISCUSSION

While native Issidae absent on Madagascar, two invasive species of Oriental origin are known from neighbouring Mascarenes (Reunion and Rodriguez Islands): *Thabena brunnifrons* (Bonfils, Attié et Reynaud, 2001) and *Euroxenus vayssieresii* (Bonfils, Attié et Reynaud, 2001) (Bonfils, Attié & Reynaud, 2001; Attié et al., 2008; Gnezdilov, 2009; Chan et al., 2013). For both species, polyphagy is confirmed: *Th. brunnifrons* is recorded from the representatives of 22 plant families, and *E. vayssieresii*, from the representatives of three plant families (Attié et al., 2005, 2008; Chan et al., 2013).

According to published data, these two issid species appeared in Reunion somewhere between 1993 and 1995 as no true issids were recorded by J.R. Williams (1982) reviewed the fauna of Issidae *sensu lato* of the Mascarenes neither Bonfils et al. (1994) who examined Auchenorrhyncha material collected on the island since 1984 to 1992. Finally both species were described from Reunion basing on the materials collected between 1995 and 2001 on secondary exotic and native vegetation from northeastern and eastern coasts of so-called “sous le vent” region (Bonfils et al., 2001). Accord-

ing to Attié et al. (2008), these species occur in the Mascarenes only on exotic plants. Important point is that these two invasive species of Oriental origin (*Th. brunnifrons* is known also from Taiwan and Singapore) are collected on the NE and E leeward coasts of Reunion, and possible invasion with the wind may be taken into attention.

Interestingly that type locality of the above-mentioned *Tupala occulta* Stroiński et Szwedó (Dictyopharidae) is Maroantsetra (Stroiński & Szwedó, 2015) which is a seaport in the Analanjirofo Region of northeastern Madagascar, and *Sarnus rhomboidalis* Fennah was collected on beach vegetation of Mananjary which is also a port in the southeastern Madagascar. In this situation, I would prefer the invasion with a cargo in historic time as an explanation of appearance of *S. rhomboidalis* in Madagascar. Such explanation was recently suggested for the Mascarene issids mentioned above (Gnezdilov, 2009), and it is more believable than suggesting any connections between Neotropical and Madagascan issid faunas via land bridges between South America and Madagascar across Antarctica in the Late Cretaceous as it was discussed for Malagasy genus *Mesodiplatys* Steinmann, 1986 (Dermaptera) discovered in Peru recently (Anisyutkin, 2014), because I treat the Issidae as a derived group of the higher Fulgoroidea with Cenozoic dispersal to New World from the Oriental Region (Gnezdilov, 2016b).

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REFERENCES

- Anisyutkin L.N. 2014. *Mesodiplatys venado* sp. nov. (Dermaptera: Diplatyidae), probable evidence of contact between Neotropi-

- cal and Malagasy faunas. *Zootaxa*, 3794(4): 593–599.
- Attié M., Baret S. & Strasberg D.** 2005. Les insectes phytophages associés à des plantes exotiques envahissantes à l'île de La Réunion (Mascareignes). *Revue d'Écologie (la Terre et la Vie)*, **60**: 107–125.
- Attié M., Bourgoïn T., Veslot J. & Soulier-Perkins A.** 2008. Patterns of trophic relationships between planthoppers (Hemiptera: Fulgoromorpha) and their host plants on the Mascarene Islands. *Journal of Natural History*, **42**(2–3): 1591–1638.
- Bonfils J., Quilici S. & Reynaud B.** 1994. Les Hémiptères Auchénorrhyncha de l'île de la Réunion. *Bulletin de la Société Entomologique de France*, **99**(3): 227–240.
- Bonfils J., Attié M. & Reynaud B.** 2001. Un nouveau genre d'Issidae de l'île de la Réunion: *Borbonissus* n. gen. (Hemiptera, Fulgoromorpha). *Bulletin de la Société Entomologique de France*, **106**(3): 217–224.
- Chan Mei-Ling, Yeh Hsin-Ting & Gnezdilov V.M.** 2013. *Thabena brunnifrons* (Hemiptera: Issidae), new alien species in Taiwan, with notes on its biology and nymphal morphology. *Formosan Entomologist*, **33**: 149–159.
- Fennah R.G.** 1965. Fulgoroidea from Southern Chile. *Bulletin of British Museum of Natural History (Entomology)*, **17**: 233–272.
- Gnezdilov V.M.** 2003. Review of the family Issidae (Homoptera, Cicadina) of the European fauna, with notes on the structure of ovipositor in planthoppers. *Chteniya pamyati N.A. Kholodkovskogo (Meetings in memory of N.A. Chokolodkovsky)*, St. Petersburg, **56**(1): 1–145. [In Russian].
- Gnezdilov V.M.** 2009. Revisionary notes on some tropical Issidae and Nogodinidae (Hemiptera: Fulgoroidea). *Acta Entomologica Musei Nationalis Pragae*, **49**(1): 75–92.
- Gnezdilov V.M.** 2013. Modern classification and the distribution of the family Issidae Spinola (Homoptera, Auchenorrhyncha, Fulgoroidea). *Entomologicheskoe obozrenie*, **92**(4): 724–738. [In Russian; English translation: *Entomological Review*, 2014, **94**(5): 687–697].
- Gnezdilov V.M.** 2016a. A review of the genus *Ikonza* Hesse with notes on evolution of the family Issidae (Hemiptera: Auchenorrhyncha: Fulgoroidea). *Entomologicheskoe Obozrenie*, **95**(1): 185–195 + 1 pl. [In Russian; English translation: *Entomological Review*, **96**(2): 225–234].
- Gnezdilov V.M.** 2016b. Planthoppers of the family Issidae (Hemiptera, Fulgoroidea) of Western Palaearctic. Thesis of Doctoral Dissertation (Dr. Sci. habilitation). St Petersburg. 44 p. [In Russian].
- Gnezdilov V.M. & Poggi F.** 2014. First record of Nearctic issid planthopper *Thionia simplex* (Hemiptera: Fulgoroidea: Issidae) from Europe. *Zoosystematica Rossica*, **23**(2): 238–241.
- Gnezdilov V.M., Holzinger W.E. & Wilson M.R.** 2014. The Western Palaearctic Issidae (Hemiptera, Fulgoroidea): an illustrated checklist and key to genera and subgenera. *Proceedings of the Zoological Institute RAS*, **318** (Supplement 1): 1–124.
- Stroiński A. & Szewo J.** 2015. Why so scarce? Dictyopharidae from Madagascar (Hemiptera: Fulgoromorpha). *Zootaxa*, 4033(3): 363–379.
- Williams J.R.** 1982. Issidae (Hemiptera: Fulgoroidea) from the Mascarenes. *Journal of Entomological Society of South Africa*, **45**(1): 43–56.

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