

Review of the genus *Scantinius* Stål with notes on the tribe Parahiraciini Cheng & Yang (Hemiptera: Auchenorrhyncha: Fulgoroidea: Issidae)

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> Abstract

The tribe Parahiraciini Cheng & Yang, 1991 is discussed and a diagnosis to the tribe and key to the included genera are given. The genus *Scantinius* Stål, 1866 with type species *Scantinius bruchoides* (Walker, 1858) is redescribed. *Dindinga oculata* Distant, 1909 is placed as junior synonym of *S. bruchoides*. A new species, *Scantinius shelfordi* sp.n. is described from Northern Borneo and a key to the two species is given. The genus *Flavina* Stål, 1861 is transferred to the Parahiraciini from the Thioniini Melichar, 1906 and *Nilalohita* Distant, 1906 is placed in synonymy under it. *Prosonoma* Melichar, 1906 is placed in synonymy under *Bardunia* Stål, 1863. The genus *Mincopius* Distant, 1909 is transferred to the Parahiraciini from the Issini Spinola, 1839.

> Key words

Hemiptera, Auchenorrhyncha, Issidae, Parahiraciini, taxonomy, synonymy, new combination, morphology, distribution, new species.

Introduction

The tribe Parahiraciini was erected within the Issidae by CHENG & YANG (1991) for a single genus – *Parahiracia* Ouchi, 1940 – on the basis of elongate ovate body and number of median sensory pits of meso- and metanotum (10 and 8 on each side respectively) in the 5th instar larva (CHENG & YANG 1991a,b). Recently, a number of taxa have been included in the Parahiraciini. *Parahiracia* and *Clipeopsilus* Jacobi, 1944 (both formerly placed in Thioniini (METCALF 1958)) were placed in synonymy under *Fortunia* Distant, 1909 (formerly placed in Issini (METCALF 1958)). Four more genera, *Scantinius* Stål, 1866, *Pterygoma* Melichar, 1903, *Prosonoma* Melichar, 1906, and *Bardunia* Stål, 1863 were included provisionally in the Parahiraciini and two new genera, *Pinocchias* Gnezdilov & Wilson, 2005 and *Narinosus* Gnezdilov & Wilson, 2005 were described (GNEZDILOV et al. 2004; GNEZDILOV & WILSON 2005). However recent examination of a male syntype of *Pterygoma nasuta* Melichar, 1903 (ZMHB, the specimen was not dissected) showed that the genus *Pterygoma* Melichar belongs to the family Caliscelidae (GNEZDILOV & WILSON 2006).

The tribe Parahiraciini is now considered to comprise seven genera with 15 species distributed in Eastern and Southeastern Asia: *Flavina* Stål, 1861, *Mincopius* Distant, 1909, *Fortunia* Distant, 1909, *Narinosus* Gnezdilov & Wilson, 2005, *Bardunia* Stål, 1863, *Scantinius* Stål, 1866, and *Pinocchias* Gnezdilov & Wilson, 2005.

The genera of Parahiraciini are characterized by two imaginal apomorphies, which probably arose in connection with mimicry to curculionids (SHELFORD 1902) – beetle-like, convex, elongate, and apically narrowed fore wings with a net of transversal veins and long fore and middle legs. The tribe is also characterized by having well-developed three- or two-lobed (anal lobe more or less reduced) hind wings with a deep notch between remigium and vannus and a net of transversal veins in the distal part. These characters are plesiomorphies. Most of the genera excluding *Flavina* are characterized by a well-developed metopial proboscis.

The genus *Flavina* comprises 4 species: *F. granulata* Stål, 1861 described from India (STÅL 1861),

F. curculioides (Distant, 1906) described from Burma (DISTANT 1906), *F. lineata* (Walker, 1857) described from Borneo and recorded also from Singapore (WALKER 1857; DISTANT 1909), and *F. striata* Distant, 1906 described from Burma. The genus *Mincopius* includes a single species, *M. andamanensis* Distant, 1909 described from Andaman Islands (DISTANT 1909). The genus *Fortunia* comprises 4 species: *F. byrrhoides* (Walker, 1858) described from Continental China and recorded also from Vietnam (WALKER 1858; FENNAH 1978), *F. belostoma* (Jacobi, 1944) described from Continental China (JACOBI 1944), *F. sinensis* (Ouchi, 1940) described from Continental China and recorded also from Taiwan (OUCHI 1940; CHAN & YANG 1994), and *F. viridis* (Lallemand, 1942) described from Vietnam and recorded also from Thailand (LALLEMAND 1942; GNEZDILOV et al. 2004). The sole species of *Narinosus*, *N. nativus* Gnezdilov & Wilson, 2005 is distributed in Continental China (GNEZDILOV & WILSON 2005). The genus *Bardunia* comprises 2 species: *B. nasuta* Stål, 1863 described from Batjan Island in Indonesia (STÅL 1863) and *B. rugifrons* (Melichar, 1906) described from Engano Island in Indonesia (MELICHAR 1906). The genus *Scantinius* also comprises 2 species: *S. bruchoides* (Walker, 1858) is known from Malay Peninsula, Sumatra, and Dinding Islands and *S. shelfordi* sp.n. from Northern Borneo. A single species of the genus *Pinocchias*, *P. natus* Gnezdilov & Wilson, 2005 is known from Bengal in India (GNEZDILOV & WILSON 2005).

Material and methods

Morphological nomenclature follows GNEZDILOV (2003). The genital segments of the examined specimens were macerated in 10% KOH and drawn from preparations in glycerin jelly using a light microscope. Photographs of the specimens were made using Leica MZ8 with JVC video camera KY F70B, images were produced using the software Synoptics Automontage.

The type specimens of the new species are deposited in the Hemiptera collections of the Natural History Museum (London, UK) and the Zoological Institute of the Russian Academy of Sciences (St. Petersburg, Russia).

Abbreviations

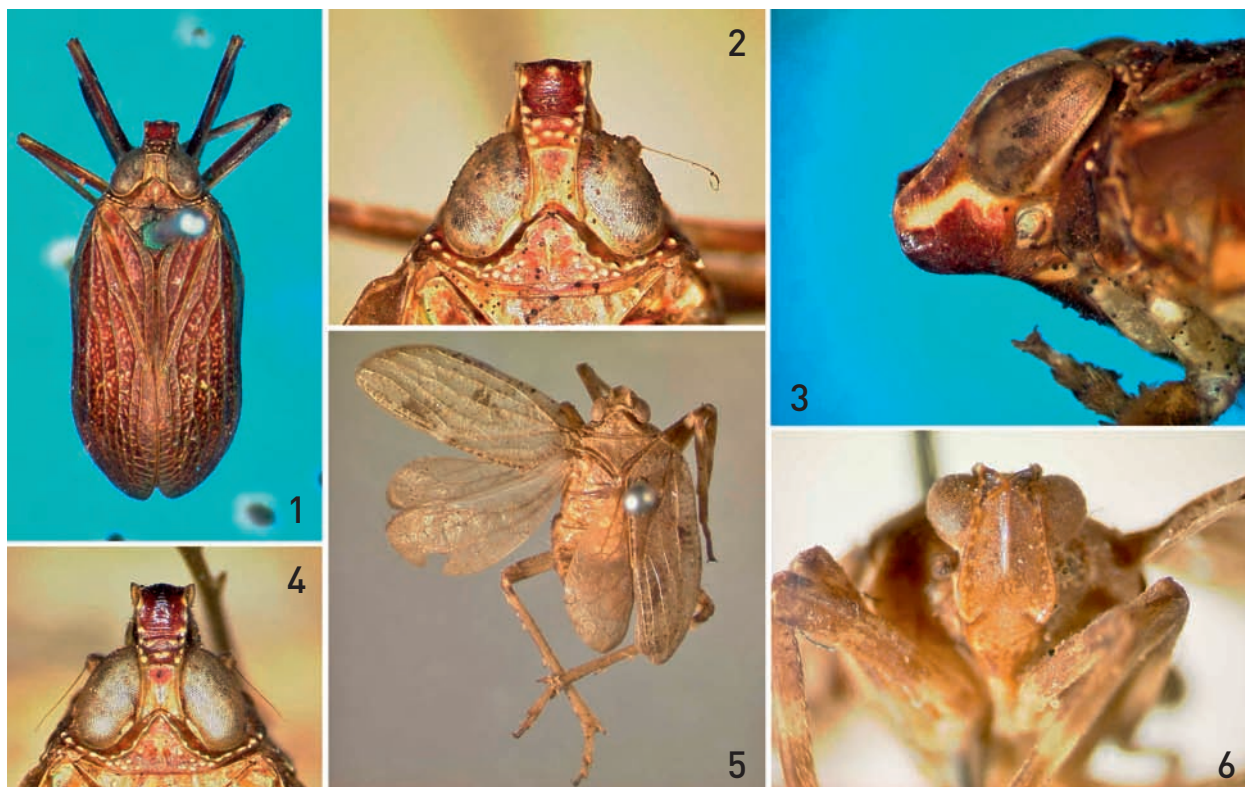
BMNH	The Natural History Museum, London, UK
NHRS	Naturhistoriska Riksmuseet, Stockholm, Sweden
ZMHB	Zoologisches Museum, Humboldt Universität, Berlin, Germany
MSNG	Museo Civico di Storia Naturale, Genova, Italy

ZIN	Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia
USNM	United States National Museum of Natural History, Washington, D.C., USA
LBOB	Lois B. O'Brien collection, Green Valley, Arizona, USA

Taxonomic part

Key to the genera

- 1 (2) Metope without proboscis (Fig. 6). Anterior margin of coryphe angularly curved (in dorsal view) (Fig. 5). Hind tibia with 5–6 lateral teeth **Flavina**
- 2 (1) Metope with proboscis. Anterior margin of coryphe straight or weakly convex (in dorsal view). Fore legs more or less flattened. Hind tibia with 1–3 lateral teeth.
- 3 (6) Metope with median and sublateral keels (Figs. 8, 10). Fore femora and tibiae weakly flattened.
- 4 (5) Fore wing with wide hypocostal plate. CuP of fore wing well marked through out its length. Metopial proboscis relatively long (Fig. 11). Lateral metopial keels far are not joining at apex of proboscis. Gonoplacs bearing two pairs of projection **Fortunia**
- 5 (4) Fore wing without hypocostal plate. CuP of fore wing well marked only proximally. Metopial proboscis relatively short (Fig. 9). Lateral metopial keels almost joining at apex of proboscis. Gonoplacs without projections **Mincopius**
- 6 (3) Metope without median and sublateral keels (Figs. 2, 12). Fore femora and tibiae strongly flattened.
- 7 (8) Metopial proboscis cylindrical. Lateral keels of metope are not reaching apex of proboscis. Aedeagus without ventral hooks **Pinocchias**
- 8 (7) Metopial proboscis more or less flattened dorso-ventrally and laterally (Figs. 2, 3). Lateral keels of metope are reaching apex of proboscis. Aedeagus with a pair of ventral hooks.
- 9 (10) Metopial lateral keels are not turning to apex of proboscis but to postclypeus. Hind wing with wide anal lobe **Scantinius**
- 10 (9) Metopial lateral keels are turning to apex of proboscis. Hind wing with narrow anal lobe.
- 11 (12) Metopial proboscis with glossy swelling apically (Fig. 12) **Bardunia**
- 12 (11) Metopial proboscis without glossy swelling apically **Narinosus**



Figs. 1–6. Parahiraciini: general view. **1–3:** *Scantinius bruchoides* Walker, 1858, 2, 3: Syntype. **1:** Body, dorsal view. **2:** Head, dorsal view. **3:** Head, lateral view. **4:** *Scantinius shelfordi* sp.n., holotype: Head, dorsal view. **5–6:** *Flavina granulata* Stål, 1861, syntype. **5:** Body, dorsal view. **6:** Head, ventral view.

Scantinius Stål, 1866

Figs. 1–4

Type species: *Issus bruchoides* Walker, 1858.

Description. **Head.** Metope strongly extended to form a proboscis, with only lateral keels which very weak near the clypeus, but do not turn to apex of proboscis; median and sublateral keels absent (Figs. 2–4). Coryphe narrow and long, anterior margin straight or weakly convex, posterior margin angulately concave (Figs. 2, 4). Lateral margins of coryphe keel-shaped. **Thorax.** Anterior margin of pronotum strongly protruding, acutely angulated, posterior margin straight. Scutellum with median groove and very weak lateral keels. Fore wings narrow, and narrowing apically, with short and very narrow hypocostal plate presented only basally (Fig. 1). Costal margin of wing concave near the base of abdomen. Distal parts of wings cover each other, with transversal veins; R2 M2–3 CuA3–5. Hind wings well developed, same length as fore wing, trilobed, with wide anal lobe. Hind wing with coupling lobe; R1 M2 CuA2 CuP1 Pcu1 A₁2 A₂1. All longitudinal veins of hind wings except A₂ have numerous branches in apical part. Between remigium and vanus a deep notch present and anal lobe is separated by a weak notch. Fore femora and tibiae are flattened

dorso-ventrally. Middle femora are weakly flattened dorso-ventrally. Hind tibia with 2 lateral teeth and 4 intermediate apical socle setae. Metatarsomere I with 4–5 intermediate apical socle setae.

Male terminalia. Pygofer narrow, hind margin convex (Figs. 15, 22). Phallobase proximally joined with pygofer. Each dorso-lateral phallobase lobe with 1–2 semicircular processes at ventral margin. Ventral phallobase lobe long, reaching apex of aedeagus, narrows to widely rounded apex bearing weak notch (Fig. 14). Aedeagus with a pair of ventral hooks narrowing apically, flattened. Hooks arise in apical part of the aedeagus, crossing, 1/3 as long as aedeagus. Apical aedeagal processes long, wide, scarcely narrowing to apex, covered by small teeth apically. Style with straight hind margin. Lateral tooth of style's capitulum in shape of wide plate situated perpendicular to capitulum. Apical tooth short.

Female terminalia. Sternum VII with strongly trapezoidally concaved hind margin. Ovipositor generally similar to that in the tribe Issini (GNEZDILOV 2002). Anal tube wide, narrow basally and apically. Anal column short and narrow. Gonoplacs rounded, without projections. Furka of gonoplacs sclerotized only basally. Lateral fields of gonoplacs well pigmented. First and second gonoplac lobes completely fused. Proximal part of posterior connective laminae of go-



Figs. 7–12. Parahiraciini: general view. **7–9:** *Mincopius andamanensis* Distant, 1909, syntype. **7:** Body, dorsal view. **8:** Head, ventral view. **9:** Head, lateral view. **10–11:** *Fortunia byrrhoides* (Walker, 1858), syntype. **10:** Head, dorso-frontal view. **11:** Head, lateral view. **12:** *Bardunia nasuta* Stål, 1863, syntype, body, dorsal view.

napophyses IX convex with very weak incision. Distal parts of the laminae convex. Lateral fields weakly protruding. Median field with a pair of short lobes apically. Gonospiculum bridge large, flattened laterally. Gonocoxa VIII with straight hind margin which

weakly lobe-shaped proximally. Each anterior connective lamina of gonapophyse VIII with 3 teeth in apical group and 3 keeled teeth in lateral group. Endogonocoxal process narrows apically; apex simple.

Remarks. The genus *Scantinius* was erected by STÅL (1866) for a single species – *Issus bruchoides* Walker, 1858, described from Sumatra (WALKER 1858). Recently, the genus *Dindinga* Distant, 1909 (type species: *Dindinga oculata* Distant, 1909) described from Dinding Islands and Perak in Malaysia (DISTANT 1909) was placed in synonymy under *Scantinius* (LIANG 2001). Further to this synonymy, examination of the type species of both genera shows that *Dindinga oculatus* is a junior synonym of *Issus bruchoides* (Walker, 1858). The male from Dinding Islands differs from that from Sumatra only in the longer apex of the style's capitulum (Figs. 16–19), which should be treated as intra-specific variability. However, recently examined material of the genus from Northern Borneo belongs to a new species described below.

According to SHELFORD (1902) *S. shelfordi* sp.n. (*S. bruchoides* after SHELFORD) “occurs not uncommonly at Kuching on fallen logs or on living wood”. Shelford supposed that *S. shelfordi* sp.n. mimics beetles of the genus *Mecysolobus* (*Alcides* sp. after SHELFORD) (Curculionidae) which is “frequently found beneath the bark of fallen logs, sometimes in the same logs on the surface of which is found the mimic”. This supposition is supported by the following morphological features of the species which are characters also for the tribe (after SHELFORD 1902 with additions): hard convex and elongate fore wings, deceptively powerful legs with flattened femora and tibiae, long metopial proboscis.

Scantinius bruchoides (Walker, 1858)

Figs. 1–3, 13–20

- *Issus bruchoides* Walker, 1858: 90.
- *Dindinga oculata* Distant, 1909: 82, syn.n.
- *Scantinius oculatus*: Liang, 2001: 237.

Description. **Thorax.** Pronotum with weak median keel. Fore wing: M2 CuA3–5.

Coloration. General coloration reddish-brown. Preocular areas of head with transversal light yellow stripe. Clypeus, base of metope, and precostal area of fore wings dark brown or black. Upper part of metope including apex of proboscis and pronotum with light yellow tubercles. Rostrum greenish with dark brown apex. Veins of fore wings greenish apically. Hind wings brown. Female with abdominal sternum III yellowish and sternum VII yellowish-light-brown. Each fore tibiae with large bright spot basally. Hind tibiae with greenish apices.

Male terminalia. Anal tube wide, narrows basally and apically, its lateral margins weakly turned down (Fig. 20). Each dorso-lateral phallobase lobe

with two semicircular processes at ventral margin: one large basal process and one small subapical process (Fig. 13). Style with caudo-dorsal angle narrowly rounded (Fig. 16). Capitulum of style broad, weakly narrowed apically (in dorsal view) on long neck (Figs. 17, 19).

Measurements. Body length, males: 5.0–7.5 mm, females: 5.1–8.0 mm.

Material. Syntype ♂ [*Scantinius bruchoides*], “54/76 Sumatra” (BMNH); syntype ♂ [*Dindinga oculata*], “Dindings 96–85” (BMNH); Syntype ♀ [*D. oculata*], Perak (BMNH); 1♂, Malay Penin.[sula], Kedah, nr. Jitra, Catchment area, 11.iv.1928, H.M. Pendlebury leg., coll. F.M.S. Museums (BMNH); 1♀, W. Malaysia, Selangor, Bengi, forest, 24.xi.–1.xii.1986, M.R. Wilson leg. (BMNH); 1♂, Malaysia, Pahang, 8.5 km E Fraser's Hill Gap, 1.viii.1992, C.W. & L. O'Brien leg. (LBOB); 1♀, Penang Is., Baker leg. (USNM).

Scantinius shelfordi sp.n.

Figs. 4, 21–25

- *Scantinius bruchoides*: Shelford, 1902: 265.

Description. **Thorax.** Pronotum sometimes with weak median keel. Fore wing: M 2–3 CuA 3–4.

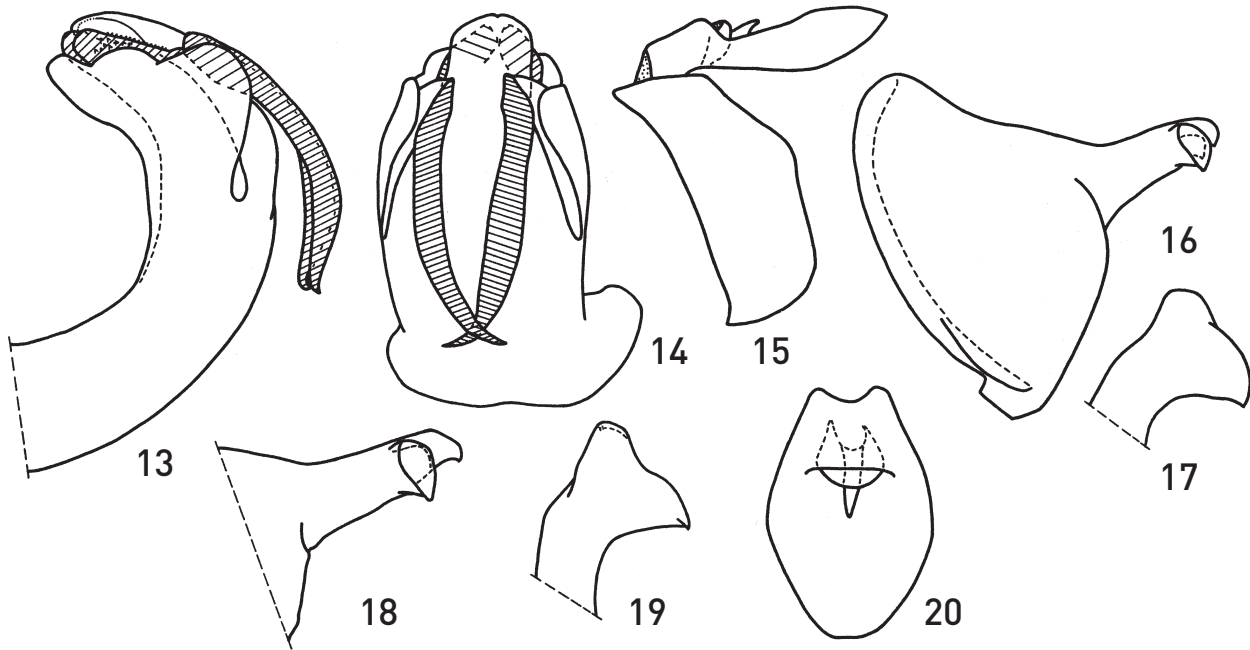
Coloration. General coloration reddish-brown. Fore wings of females with veins reddish-brown or greenish. Male with light-greenish-brown fore wings bearing greenish veins. Hind wings transparent with reddish-brown veins or brown. Hind tibiae sometimes greenish. Females with abdominal sternum III yellowish with brown corners and sternum VII yellowish-laight-brown.

Male terminalia. Anal tube approximately oval, narrows basally, widely rounded apically (Fig. 23). Each dorso-lateral phallobase lobe with single large semicircular basal process at ventral margin (Fig. 21). Style with caudo-dorsal angle widely rounded (Fig. 24). Capitulum of style strongly narrows apically (in dorsal view) on short neck (Fig. 25).

Measurements. Body length, male: 7.9 mm, females: 8.2–8.6 mm.

Material. Holotype ♂, “N. Borneo, Kuching. Capt. Mar. 7.00 by Dyak coll. Pres. 1900 by R. Shelford, 1900, 10252” (BMNH). – Paratypes 1♀, “N. Borneo, Kuching. Capt. 1899 by Dyak coll. Pres. 1899 by R. Shelford, 1900, 10251” (BMNH); 1♀, Sarawak, Batu Niah, 29.xi.–27.xii.1980, A. Harman leg., coll. A. Harman & M. Salton (ZIN).

Etymology. The species name is derived from the last name of the first collector of the species R. Shelford.



Figs. 13–20. *Scantinius bruchoides* (Walker, 1858): male genitalia. **13–17, 20:** Syntype from Sumatra. **18, 19:** Dinding Islands. **13:** Penis, lateral view. **14:** Penis, ventral view. **15:** Pygofer and anal tube, lateral view. **16:** Style, lateral view. **17, 19:** Capitulum of style, dorsal view. **18:** Capitulum of style, lateral view. **20:** Anal tube, dorsal view.

Key to the species

- 1 (2) Apex of metopial proboscis with small light yellow tubercle medially (Fig. 2). Style with narrowly rounded caudo-dorsal angle (Fig. 16). Capitulum of style weakly narrows apically (in dorsal view) (Figs. 17, 19) on long neck (Figs. 16, 18). Each dorso-lateral phallobase lobe with two semicircular processes at ventral margin (Fig. 13) *S. bruchoides*
- 2 (1) Apex of metopial proboscis without tubercle medially (Fig. 4). Style with widely rounded caudo-dorsal angle (Fig. 24). Capitulum of style strongly narrowed apically (in dorsal view) on short neck (Figs. 25). Each dorso-lateral phallobase lobe with single semicircular process at ventral margin (Fig. 21) *S. shelfordi*

Discussion

Examination of the type-species of the genera *Bardunia* Stål, 1863 and *Prosonoma* Melichar, 1906, including the female syntype specimen of *Bardunia nasuta* Stål, 1863 (BMNH, the specimen was not dissected) and the male syntype of *Prosonoma rugifrons* Melichar, 1906 (MSNG, the specimen was dissected) suggests that these two species should be considered congeneric

and *Prosonoma* is here synonymized with *Bardunia*. Examination of the type-species of the genera *Flavina* Stål, 1861 and *Nilalohita* Distant, 1906 including the female syntype of *Flavina granulata* Stål, 1861 (NHRS, the specimen was not dissected) and the female syntype of *Nilalohita curculioides* Distant, 1906 (BMNH, the specimen was not dissected) suggests that the two species are congeneric and thus *Nilalohita* is synonymized here with *Flavina*. The latter genus belongs to the tribe Parahiraciini based on the apomorphies connected with mimicry.

Bardunia Stål, 1863: 589

Type species: *Bardunia nasuta* Stål, 1863: 589.

= *Prosonoma* Melichar, 1906: 235, **syn.n.** Type species: *Prosonoma rugifrons* Melichar, 1906: 236.

Bardunia rugifrons Melichar, 1906: 236, **comb.n.** (*Prosonoma*)

Flavina Stål, 1861: 209

Type species: *Flavina granulata* Stål, 1861: 212.

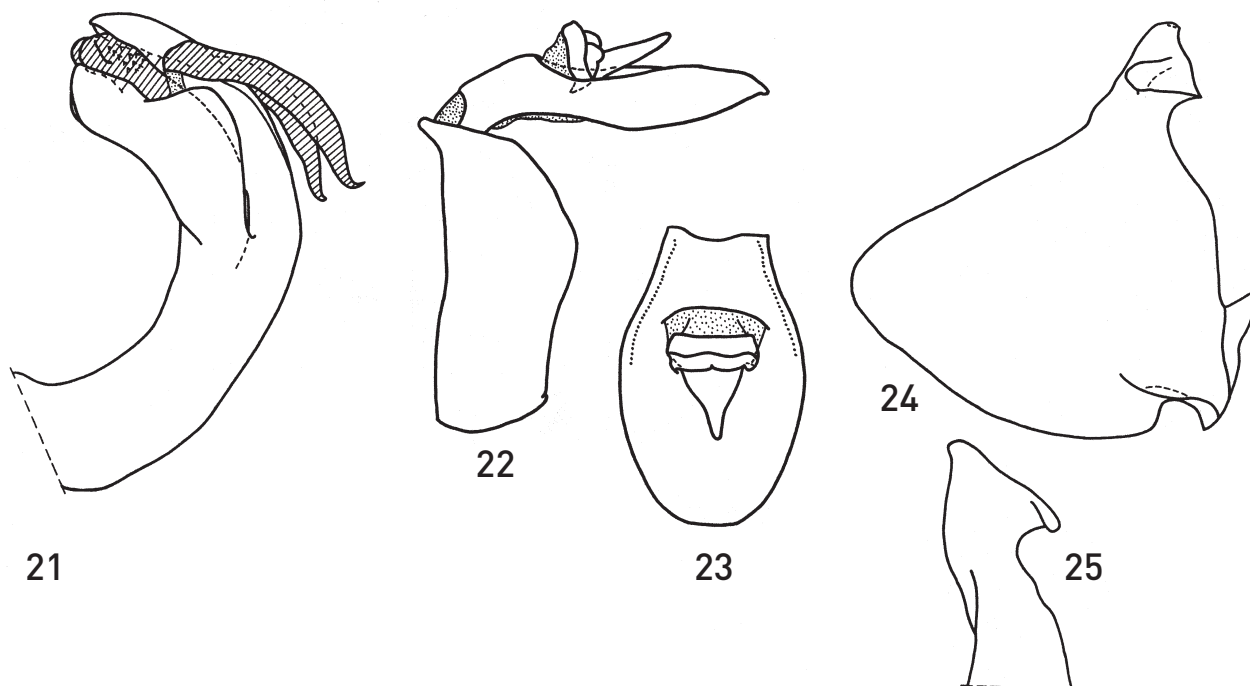
= *Nilalohita* Distant, 1906: 358, **syn.n.** Type species: *Nilalohita curculioides* Distant, 1906: 358.

Flavina curculioides Distant, 1906: 358, **comb.n.** (*Nilalohita*)

Flavina lineata Walker, 1857, **comb.n.**

Issus lineatus Walker, 1857: 154.

Nilalohita lineata: Metcalf, 1958: 187.



Figs. 21–25. *Scantinius shelfordi* sp.n., holotype: male genitalia. **21:** Penis, lateral view. **22:** Pygofer and anal tube, lateral view. **23:** Anal tube, dorsal view. **24:** Style, lateral view. **25:** Capitulum of style, dorsal view.

Note. The species provisionally placed in the genus *Flavina*.

The type-species of *Mincopius* Distant, 1909, *Mincopius andamanensis* Distant, 1909 (BMNH, the female syntype was not dissected) was studied. According to the external morphology the genus *Mincopius* also belongs to the tribe Parahiraciini.

Evolution in Issidae as a whole has proceeded towards a coleopterization of fore wings and a reduction in size of the hind wings. In this sense, Thioniini can be considered the most primitive tribe of the family and the Parahiraciini are likely nested in it. Considering the structure of fore wings, metope, and legs ancestral Parahiraciini were probably similar to representatives of *Flavina*, which possess three-lobed hind wings with a wide anal lobe as do species of *Scantinius*. Thus, it is possible that *Scantinius* was separated from the common stem of Parahiraciini far basally and has kept this plesiomorphic feature (wide anal lobe of hind wings, metopial proboscis). There also appears to be considerable similarity, perhaps even mimicry, to certain Curculionidae or spiders. According to this supposition “metope without proboscis” is a primitive condition, while “metope with proboscis” is an advanced condition of the character; similarly, “weakly flattened legs” is plesiomorphic, while “strongly flattened legs” is apomorphic. “Reduced anal lobe” and “reduced ventral hooks of aedeagus” have likely been achieved independently in different groups. “Flattened proboscis” is the plesiomorphic condition in comparison with

an advanced “cylindrical proboscis”, because the proboscis is a process of the normally flat metope. The arrangement of the lateral keels of the metope depends on the length and shape of the proboscis. So, “lateral keels of metope reaching apex of metopial proboscis” is the plesiomorphic character state and “lateral keels of metope surrounding proboscis and reach postclypeus” is the apomorphic state. Consequently, *Flavina* appears as the sister group of the remaining Parahiraciini.

Flavina is distinguished by two plesiomorphies: flat metope without proboscis (in other genera metope strongly extended to form a proboscis) and weakly flattened fore legs. All other genera of the tribe are characterized by metopial proboscis. *Mincopius* is characterized by having a short proboscis, the CuP of fore wing well marked only proximally, and weakly flattened fore legs. *Flavina*, *Fortunia*, *Narinosus*, and *Bardunia* are very close on a structure of aedeagus and style. *Fortunia* differs from other genera with metopial proboscis in wide hypocostal plate of fore wings and gonoplacs bearing two pairs of projections. *Narinosus* is similar to *Fortunia* externally, but differs in the absence of median and sublateral keels of metope and lateral keels of metope reaching apex of metopial proboscis, but not postclypeus. The latter feature closing the *Narinosus* to *Bardunia* (GNEZDILOV & WILSON 2005), which is clearly distinguished by the glossy swelling of apex of metopial proboscis and lateral metopial keels almost joining at apex of proboscis.

The genus *Pinocchias* differs from all these genera in possessing a long cylindrical metopial proboscis and an aedeagus without ventral hooks (GNEZDILOV & WILSON 2005).

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