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Review of the genus *Flavinarosa* Holloway (Zygaenoidea: Limacodidae) with description of four new species

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Abstract. The genus *Flavinarosa* Holloway, 1986 is reviewed; its diagnosis is expanded. The genus includes nine species, four of them described as new: *F. luna* **sp. n.** (China: Fujian; holotype in ZFMK), *F. acantha* **sp. n.** (China: Hainan; holotype in MWM), *F. kozyavka* **sp. n.** (northern Thailand; holotype in MWM), and *F. ptaha* **sp. n.** (China: Sichuan; holotype in MWM). A key to the species is given. The systematic position and relationships of the genus are briefly discussed.

Zusammenfassung. Die Gattung *Flavinarosa* Holloway, 1986 wird revidiert und ihre Diagnose verbessert. Sie umfasst neun Arten, von denen vier hier neu beschrieben werden: *F. luna* **sp. n.** (China: Fujian; Holotypus in ZFMK), *F. acantha* **sp. n.** (China: Hainan; Holotypus in MWM), *F. kozyavka* **sp. n.** (Nordthailand; Holotypus in MWM), und *F. ptaha* **sp. n.** (China: Sichuan; Holotypus in MWM). Die systematische Stellung der Gattung wird kurz diskutiert und ein Bestimmungsschlüssel für die beschriebenen Arten gegeben.

Резюме. Род *Flavinarosa* Holloway, 1986 ревизован, его диагноз дополнен. Род в настоящее время включает 9 видов, 4 из которых прежде были неизвестны науке и описываются в этой статье: *F. luna* **sp. n.** (Китай: Фуджиань; голотип в MWM), *F. acantha* **sp. n.** (Китай: Хайнань; голотип в MWM), *F. kozyavka* **sp. n.** (северный Таиланд; голотип в MWM) и *F. ptaha* **sp. n.** (Китай: Сычуань; голотип в MWM). Дан ключ для определения всех видов. Рассмотрены филогенетические связи рода и его систематическое положение.

Introduction

The genus *Flavinarosa* Holloway, 1986 was erected with type-species *Narosa holoxanthia* Hampson, 1900 and three associated taxa: *F. holoxanthia holoxanthia* Hampson, *F. holoxanthia paucispina* (Holloway, 1986) and *F. obscura* (Wileman, 1915). The genus was established with the following diagnostic features: presence of several rows or tufts of cornuti in male genitalia and corpus bursae bearing a triangular field of scobination in female genitalia (Holloway 1986: 72). Before 1986 both species *F. holoxanthia* and *F. obscura* were associated with the genus *Narosa* Walker, 1855. Apart from these two, many other limacodid species were associated with *Narosa* on a base of yellow ground colour, smaller size, filiform male antennae and sinuous R1 in forewing. Further work on *Narosa*-complex was done by Solovyev & Witt (2009), where the diagnosis of the genus was improved and several new genera were recognized.

The number of known species of *Flavinarosa* is increased to nine with *F. holoxanthia paucispina* raised to full specific level (Solovyev & Witt 2009) and with the addition of four newly described herein. This number of taxa is not believed to be final because there are few specimens represented in entomological collections. Furthermore, the identification of the species at this time is based largely on male genitalia.

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Abbreviations

BMNH Natural History Museum [formerly British Museum (Natural History)]; London, Great Britain
MWM Entomological Museum Thomas J. Witt; Germany, Munich (later to be transferred to ZSM)
ZFMK Zoologisches Forschungsinstitut und Museum "Alexander Koenig"; Bonn, Germany

Material and methods

The material of MWM is the main basis for this study. Also material from ZFMK and BMNH was examined. In total about 70 specimens were investigated.
The genitalia of both sexes were examined using standard methods. The abdomen was macerated in 10% aqueous solution of alkali for 10 minutes whilst heating. The genitalia were dissected using micro-forceps; the aedeagus was separated and kept in "Evans blue" dye (0.1% aqueous) for 5 minutes for staining of the vesica. The complete female genitalia were stained with this dye. After this, the genitalia were mounted in Euparal and labeled.
The digital images were made using digital camera Nikon Coolpix 5400 and binocular microscopes MBS-9 and MBS-10. The images were improved and prepared for publication using Corel Draw 13 and Corel Photo-Paint 13.

Results

Flavinarosa Holloway, 1986

Moths of Borneo **1**: 72.
Type species: *Narosa holoxanthia* Hampson, 1900, by original designation.

Redescription. Moths small with forewing length 7–10 mm; wingspan 15–21 mm in males; 11–12 mm and 23–26 mm in females (Figs 1–12). Male antennae filiform. Labial palps strongly upcurved, with 2nd segment as long as 1.2 diameter of eye; terminal segment very short, 1/8–1/9 length of 2nd one. Ground colour yellowish ochre; forewings uniformly coloured, without distinct pattern, but with darker scales in medial region. Hindwings pale yellow. In forewing, vein R1 sinuous; R5 branched from common R3+R4; medial stem not divided (Fig. 13). In hindwing, common vein Sc+R1 sinuous; cross vein between Sc+R1 and radial stem of discal cell well developed, very long, set in proximal third of wing, and very characteristic for the genus (Fig. 14). Hind tibia bears 4 spurs.
Species not sexually dimorphic; females slightly larger than males, with more elongated forewings.
Male genitalia with uncus slender, usually with pair of distinct, apical, horn-shaped processes and long subapical spur (Figs 15–24). Gnathos slender, strongly curved up medially. Valvae elongated, with large cucullus, lacking saccular processes. Saccus short, ovoid. Juxta highly diagnostic, flattened, usually with different kinds of lateral lobes (Figs 25–33). Aedeagus tubular, slender, and S-shaped. Vesica with series of basal, medial and apical cornuti often associated in defined tufts. Eight tergite slightly produced (Holloway 1986: 72).

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Female genitalia with ovipositor lobes ovoid; both pairs of apophyses slender; posterior apophyses much longer than anterior ones (Figs 34–36). Antrum distinct, wide. Ductus bursae irregularly spiraled, sclerotized medially. Corpus bursae ovoid, with pair of elongated, sclerotized and wide signa (Figs 37, 38).
Immature stages unknown.
Diagnosis. The members of the genus are similar externally to *Narosa* Walker, 1855, *Heringarosa* Holloway, 1986, *Quasinarosa* Solovyev & Witt, 2009, *Tennya* Solovyev & Witt, 2009, and *Caelestomorpha* Solovyev & Witt, 2009 in their yellow ground colour, small size, filiform male antennae, and sinuous R1 in forewing. They were all previously placed in the *Narosa* complex, but *Flavinarosa* can easily be distinguished from these by the monotonous ochre forewings and uniformly yellow hindwings. In male genitalia the vesica containing a series of bristle-shaped cornuti and in female genitalia the double, wide, elongated signum are diagnostic.
Remarks. The systematic position of the genus is unclear so far, but it was considered as the probable sister genus of *Heringarosa* Holloway, 1986 (Holloway 1986: 72). The females of *Heringarosa* are still unknown, as are the larvae of both genera, but the external characters of the males and the morphology of their male genitalia are similar. Both genera have "*Narosa*"-like habitus (Holloway 1986) with yellow ground colour and are characterized by the produced abdominal 8th tergite, the uncus with two apical horn-shaped processes and slender subapical spur, the valvae without saccular processes, and the wide cucullus.
The genus ranges from India to Sundaland and includes the following nine species: *F. holoxanthia* (Hampson, 1900), *F. obscura* (Wileman, 1915), *F. paucispina* Holloway, 1986, *F. alius* Solovyev & Witt, 2009, *F. glaesa* Solovyev & Witt, 2009, *F. luna* sp. n., *F. acantha* sp. n., *F. kozyavka* sp. n., and *F. ptaha* sp. n.
The species of the genus are not separable externally, but the male genitalia are diagnostic; the most important diagnostic features in species identification are the shape of the juxta and the shape and topography of the cornuti on the vesica. A key to all species based on male genitalia is given after the species accounts.

Flavinarosa holoxanthia (Hampson, 1900) Figs 1, 15, 25, 34, 37

Narosa holoxanthia Hampson, 1900: 232. Type-locality: [NE India] "Khásis". Holotype: ♂ (BMNH) [examined].

Diagnosis. In male genitalia, the lateral lobes of juxta are ovoid, with very small, dorsad apical spur and waved upper margin; its medial incision is running up to 2/3 juxta (Figs 15, 25). The juxta is similar to those of *F. luna* sp. n., but in *F. holoxanthia* the lobes of the juxta have a small inner spur and the vesica lacks large and stout apical cornuti.
Distribution. North-eastern India (Meghalaya).
Biology. The phenological data are scanty; the flight period was recorded in mid and late July at an altitude of 800 m.

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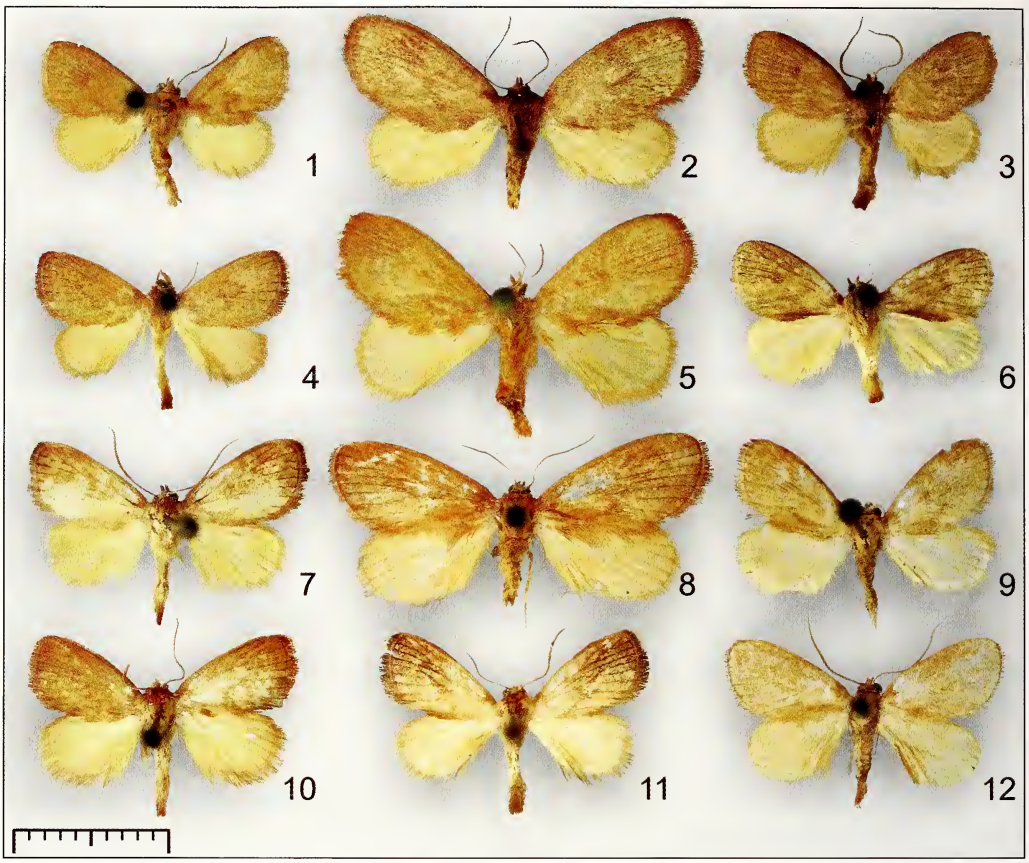

Figs 1–12. External aspect of *Flavinarosa* spp. **1.** *F. holoxanthia* (Hampson, 1900), ♂, north-eastern India, MWM. **2.** *F. obscura* (Wileman, 1915), ♀, Taiwan, MWM. **3.** *F. obscura* (Wileman, 1915), ♂, Taiwan, MWM. **4.** *F. paucispina* Holloway, 1986, ♂, Borneo, MWM. **5.** *F. paucispina* Holloway, 1986, ♀, Borneo, MWM. **6.** *F. glaesa* Solovyev & Witt, 2009, ♂, holotype. **7.** *F. alius* Solovyev & Witt, 2009, ♂, holotype. **8.** *F. alius* Solovyev & Witt, 2009, ♀, paratype, northern Vietnam, MWM. **9.** *F. luna* sp. n., ♂, paratype, China: Fujian, MWM. **10.** *F. acantha* sp. n., ♂, holotype. **11.** *F. kozyavka* sp. n., ♂, holotype. **12.** *F. ptaha* sp. n., ♂, holotype. Scale bar: 1 cm.

Flavinarosa obscura (Wileman, 1915) Figs 2, 3, 16, 26

Narosa obscura Wileman, 1915: 18. Type-locality: [Taiwan] "Kanshirei". Holotype: ♀ (BMNH) [examined].

Diagnosis. The species is distinguished from other congeners by the juxta of male genitalia where two lateral lobes divided by a medial incision running up to 1/2 juxta and each juxtal lobe with a large, triangular, pointed, small dorsal process and a larger triangular process on its outer margin (Figs 16, 26).

Distribution. Taiwan.

Biology. The moths were collected in late March, late April, early July, and early and mid September at altitudes of 130–1150 m. The early stages are unknown.

Comments. Two females are noted in the original description of *obscura* Wileman; one female was collected on 30th April 1908 (with collection number 1353) and the second

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one was taken on 8th September 1907 (with collection number 1272). It was believed before that both females were included in the type series of the species (Wang 1995: 72); moreover, both bear labels written by Wileman's hand with the inscription "Type" and "Cotype" correspondingly. However, the original description contains the following statement: "Fore wings of the September example are paler than those of the type described" which means indirectly that the specimen taken on April 30th is the holotype by original designation, whereas the other female should be regarded as a paratype.

Flavinarosa paucispina Holloway, 1986 — Figs 4, 5, 17, 27, 35, 38

Flavinarosa holoxanthia paucispina Holloway, 1986: 72. Type-locality: "Sarawak: Gunong Mulu Nat. Park, Site 25, G. Api, 900 m, lower montane forest". Holotype: ♂ (BMNH) [examined].

Diagnosis. The juxta of male genitalia has two lateral lobes divided by the medial incision running up to 1/2 juxta length (Figs 17 & 27). Each lobe is elongated, with rounded apices and similar to that of *F. kozyavka* sp. n., but in *F. paucispina* the lobes are much wider, with not so deep incision. The vesica bears very characteristic single, large, stout, claw-shaped basal cornutus.
Distribution. Peninsular Malaysia, Sumatra, Borneo (Holloway 1986: 73; 1990: 35).
Biology. The flight period falls in early February, April, and late September. The moths were taken in montane forests between altitudes of 900–1620 m.
Nomenclatorial notes. This taxon was elevated to species rank by Solovyev & Witt (2009).

Flavinarosa alius Solovyev & Witt, 2009 — Figs 7, 8, 18, 28, 36

Flavinarosa alius Solovyev & Witt, 2009. Type-locality: "Vietnam, Prov. Nghe An, Distr. Que Phong, Ban Khom, 280 m, 19°40.5' N, 104°54.1' E. Holotype: ♂ (MWM) [examined].

Diagnosis. The male genitalia are similar to those of *F. luna* sp. n. by the juxta with large, slender and pointed dorsal spurs, but the juxta of *F. alius* is weakly divided on the lateral lobes, with an indistinct medial incision; each lobe has an arcuate upper margin (not sinuous); the spurs of the lobes are longer, with the length of 1/3 of juxtal height (Figs 18, 28).
Distribution. Northern Vietnam.
Biology. The moths were collected in late January, April, mid May, and late November at altitudes of 280–1800 m.

Flavinarosa glaesa Solovyev & Witt, 2009 — Figs 6, 19, 29

Flavinarosa glaesa Solovyev & Witt, 2009. Type-locality: "Sued-Vietnam, Bao Loc, Rung Cat Tien, 1500 m, 11.32'N 107.48'E". Holotype: ♂ (MWM) [examined].

Diagnosis. The species differs from all congeners by the semilunar wide medial incision of the juxta and by the shape of the juxtal lobes with an almost straight apical margin and with a distinct small spur on the inner margin (Figs 19, 29).

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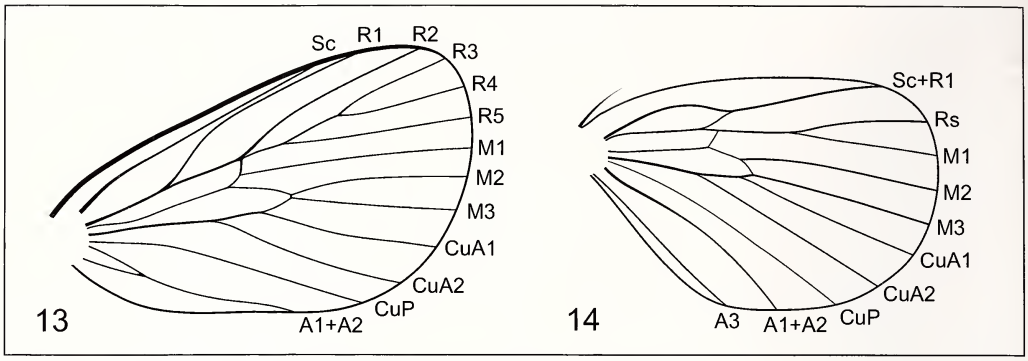

Figs 13–14. Wing venation of *Flavinarosa*. **13.** Forewing. **14.** Hindwing.

Distribution. Vietnam.
Biology. The flight period falls in late April – early May, August, and mid December. The species is known from altitudes of 900–1500 m.

Flavinarosa luna sp. n. **Figs 9, 20, 30**

Material. Holotype ♂, "[**China**] Kuatun (2300) 27.40 n. Br. | 117.408.ö.L. J. Klapperich | 10.6.1946 <"46" stamped on 1938> (Fukien)", ZFMK. – Paratypes: 1♂, **China**, same data as holotype, ZFMK; 2♂, same data but 1.vi.1938, MWM (genital slide 13809); 1♂, Kuatun, Prov. Fukien, Höne, 26.v.1939, ZFMK; 1♂, WuyShan, Jiangxi – Fujian border, 50 km SE of Yingtan, 27°56'N, 117°25'E, 1600 m, v.2002, leg. Siniaev & local coll., MWM (genital slide 13802); 1♂, Prov. Hunan, Hoengshan, 16.v.1933, Höne, ZFMK; 2♂, same data but 16.vii.1933, ZFMK; 1♀, same data but 21.vii.1933, ZFMK.

Description. Male (Fig. 9). Forewing length: 8–9 mm; wingspan: 17–18 mm. Filiform antennae as long as 2/3 of forewing costa. Otherwise identical to congeners externally. Male genitalia (Figs 20, 30). Uncus slender, with long and pointed subapical spur and with pair of weakly sclerotized, horn-shaped, small, apical processes. Gnathos slender, curved up medially with concave distal part. Valvae elongated, with small sacculus and wide cucullus; with concave costa. Saccus distinct. Juxta flattened; lateral lobes separated by deep medial incision (of 3/5 of juxta length); each lobe almost parallel-sided, with sinuous apical margin and with large inner, as long as 1/5 rest of juxta, dorsal spur. Aedeagus weakly S-curved, narrowed apically, with finger-shaped apex. Vesica basally with two tufts of hair-like cornuti, medially with row of cornuti decreasing in size, and apically with two large cornuti.
Diagnosis. The species is easily distinguished from the congeners by the shape of the juxta. It is similar to that of *F. holoxanthia*, but the juxtal lobes are almost parallel-sided in *luna* sp. n., and their inner spur is larger. From *F. alius* the new species is separated by the deeper medial incision in the juxta and by the sinuous apical margin of the juxtal lobes.
Distribution. Eastern China: Fujian, Hunan.
Biology. The moths were collected from May to mid July at altitudes of 1600–2300 m.
Etymology. "*Luna*" means "moon" in Latin. Luna was the Roman goddess of the moon, frequently depicted driving a white chariot through the night sky.

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***Flavinarosa acantha* sp. n.** **Figs 10, 23, 31**

Material. Holotype ♂, "**China** | Hainan Dao | He Ling Mts. Und | Wuzhi Shan | 1000–1800 m | E.II.–E.V.2000 Lf. | lg. J.L. Li, Slg. Maier | Museum Witt", MWM (genital slide 13829). – Paratypes: 2♂, **China**, Hainan Isl., Wuzhi-Shan Mts., 1500 m, 18°53'N, 109°43'E, 20.ii–10.iv.2001, leg. local collector, MWM (genital slide 13813).

Description. Male (Fig. 10). Forewing length 8 mm and wingspan 18 mm. Similar to congeners externally.

Male genitalia (Figs 23, 31). Uncus slender, with two small horn-like apical processes and large, slender, subapical spur. Gnathos slender, curved up medially. Valvae elongated, with concave costa and wide cucullus. Saccus rounded. Juxta flattened, with deep medial incision, as deep as 2/3 juxta length; each lateral lobe of juxta narrowed distally and pointed apically. Aedeagus slightly S-shaped. Vesica contains basally large tuft of robust cornuti and single cornutus, and medially dispersed row of cornuti of different size.

Female. Unknown.

Diagnosis. The male genitalia are similar to those of *F. kozyavka*, but the juxtal lateral lobes are narrow and pointed apically here, and the vesica bears basally a single tuft of robust cornuti and a separate single cornutus.

Distribution. Southern China: Hainan.

Biology. The moths were collected from late February to late May at altitudes of 1000–1800 m.

Etymology. "Acantha" is a Latinized form of Greek "Ακανθα", which means „thorn, prickle", because of the shape of lateral parts of the juxta.

***Flavinarosa kozyavka* sp. n.** **Figs 11, 21, 22, 32**

Material. Holotype ♂, "**Thailand** | Changwat Mae Hong Song | 10 km NE of Pai | 1560 m, 28.I.1999 | leg. A. Szabó & Z. Czere", MWM (genital slide 13820). – Paratypes: 1♂, **Thailand**, Changwat Phayao, 15 km SE Chiang Muan, 640 m, 26.xi.1998, leg. Tibor Csövári & László Mikus, MWM (genital slide 13729); 1♂, Changwat Nan, 5 km N of Bo Luang, 1000 m, 4.ii.2000, leg. Hreblay & Szabó, MWM (genital slide 13816); 1♂, Changwat Chiang Mai, 20 km NW of Mae Ai, 1650 m, 9.ix.1999 leg. A. Szabó & Z. Czere, MWM (genital slide 13817); 1♂, Changwat Mae Hong Song, 10 km NE of Pai, 1560 m, 3.xii.1998, leg. M. Hreblay, Y. Sherpa & I. Soós, MWM (genital slide 13818); 2♂, Changwat Chiang Mai, 4 km SE of Pang Faen, 1100 m, 14.xi.1999, leg. Márton Hreblay, MWM (genital slides 13819, 13822); 1♂, Changwat Chiang Mai, 7 km W of Pa Pae, 1230 m, 27.xi.1998, leg. Tibor Csôvári & László Mikus, MWM (genital slide 13821); 3♂, Chiang Mai, between Fang and Nor Lae, 1600 m, 20°02'N, 99°06'E, 28.x.2002, leg. B. Herczig & G. Ronkay, MWM (genital slide 13800); 1♂, as previous but 7.xi.2002, MWM (genital slide 13815); 1♂, Chiang Mai, Queen Sirikit Botanical Garden, km 12, Mae Rim-Sameong Rd., 715 m, 18°52.855'N, 98°51.743'E, at MV light, 19.vii.2006, leg. G. Martin, BMNH (genital slide 1429).

Description. Male (Fig. 11). Forewing length 7–9 mm and wingspan 17–19 mm. Filiform antennae as long as 2/3 of forewing costa. Externally similar to other congeners.

Male genitalia (Figs 21, 22, 32). Uncus slender, with two apical, horn-like, small processes and large, slender subapical spur. Gnathos slender, curved up medially, concave distally. Valvae elongated, with small sacculus and wide cucullus; costa concave. Saccus rounded. Juxta has two lateral lobes divided by deep incision running to 3/5

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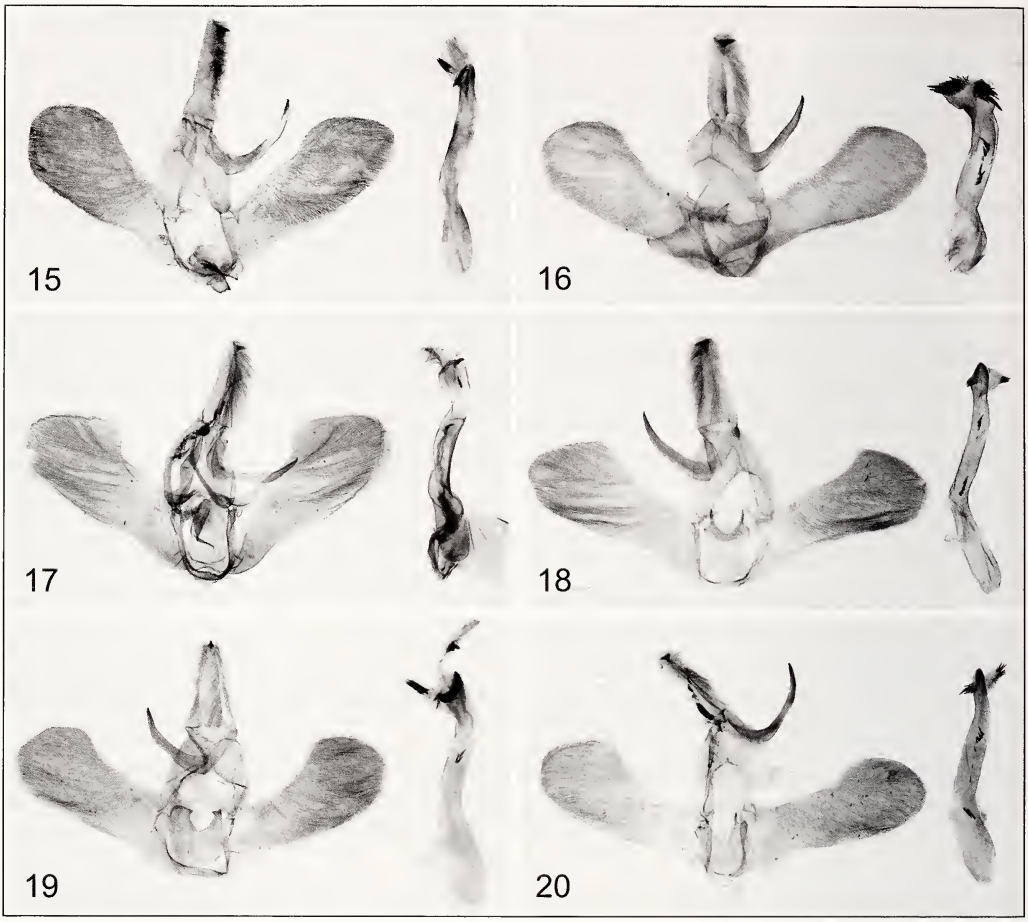

Figs 15–20. Male genitalia of *Flavinarosa* spp. **15.** *F. holoxanthia* (Hampson, 1900), north-eastern India (slide MWM 11327). **16.** *F. obscura* (Wileman, 1915), Taiwan (slide MWM 13803). **17.** *F. paucispina* Holloway, 1986, holotype (slide BM-Limac 392). **18.** *F. alius* Solovyev & Witt, 2009, holotype (slide MWM 13836). **19.** *F. glaesa* Solovyev & Witt, 2009, holotype (slide MWM 13801). **20.** *F. luna* sp. n., paratype, China: Fujian (slide MWM 13802).

length of juxta; each lobe elongated, parallel-sided, rounded apically. Aedeagus slender S-shaped; vesica contains basal two tufts of long, hair-like cornuti, medial row of few small cornuti and apical tuft of small cornuti.

Female. Unknown.

Diagnosis. The species is similar to *F. paucispina* in male genitalia but the lateral lobes of the juxta are much narrower in *F. kozyavka* and the vesica bears basally two tufts of large cornuti instead of a single stout basal cornutus in *F. paucispina*.

Distribution. Northern Thailand: Chiang Mai, Phayao, Nan.

Biology. The moths were collected late January – early February, mid July, early September, and late October – early December at altitudes of 640–1650 m. Several generations per year.

Etymology. "Kozyavka" means any small insect in Russian.

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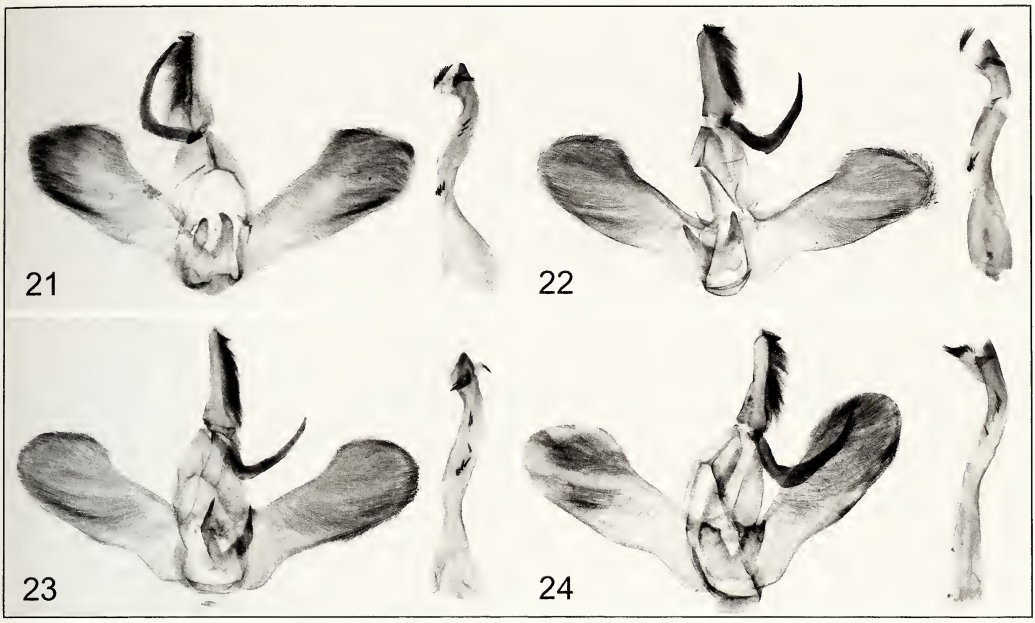

Figs 21–24. Male genitalia of *Flavinarosa* spp. **21.** *F. kozyavka* sp. n., holotype. **22.** *F. kozyavka* sp. n., paratype, BMNH (slide BM-Limac 1429). **23.** *F. acantha* sp. n., holotype. **24.** *F. ptaha* sp. n., holotype.

Flavinarosa ptaha sp. n. **Figs 12, 24, 33**

Material. Holotype ♂, "**China** | Prov. Sichuan | Siguliang Shan | Volong Reserve | 31'09" N 103'20" E | Juli 2005 leg. | team of V. Siniaev, Museum Witt", MWM (genital slide 13834). – Paratype: 1♂, **China**, Sichuan, env. Baoxing, 1600 m, 11.vii.2003, leg. S. Murzin, MWM (genital slide 13814).

Description. Male (Fig. 12). Forewing length 9–10 mm and wingspan 18–19 mm. Species not separated externally from other congeners which described in the generic account.

Male genitalia (Figs 24, 33). Uncus narrow, with long subapical spur and two small horn-like apical processes. Gnathos curved up medially, concave distally. Valvae elongated, with concave costa and wide cucullus. Juxta divided by incision running to its half on two lateral lobes. These lobes parallel-sided, with almost straight apical margin, without distinct processes. Saccus wide, ovoid. Aedeagus slightly S-curved. Vesica with two basal tufts of large cornuti and medial row of unequal in size, dispersed cornuti.

Female. Unknown.

Diagnosis. The male genitalia are similar to those of *F. luna* sp. n. but the lobes of the juxta of *F. ptaha* sp. n. lack dorsal spurs and have an almost straight apical margin, and the vesica is without large apical cornuti.

Distribution. South-western China: Sichuan.

Biology. The flight period falls in July. The moths were collected at an altitude of 1600 m.

Etymology. The species name derives from "Ptah", an Egyptian god associated with creation and the arts.

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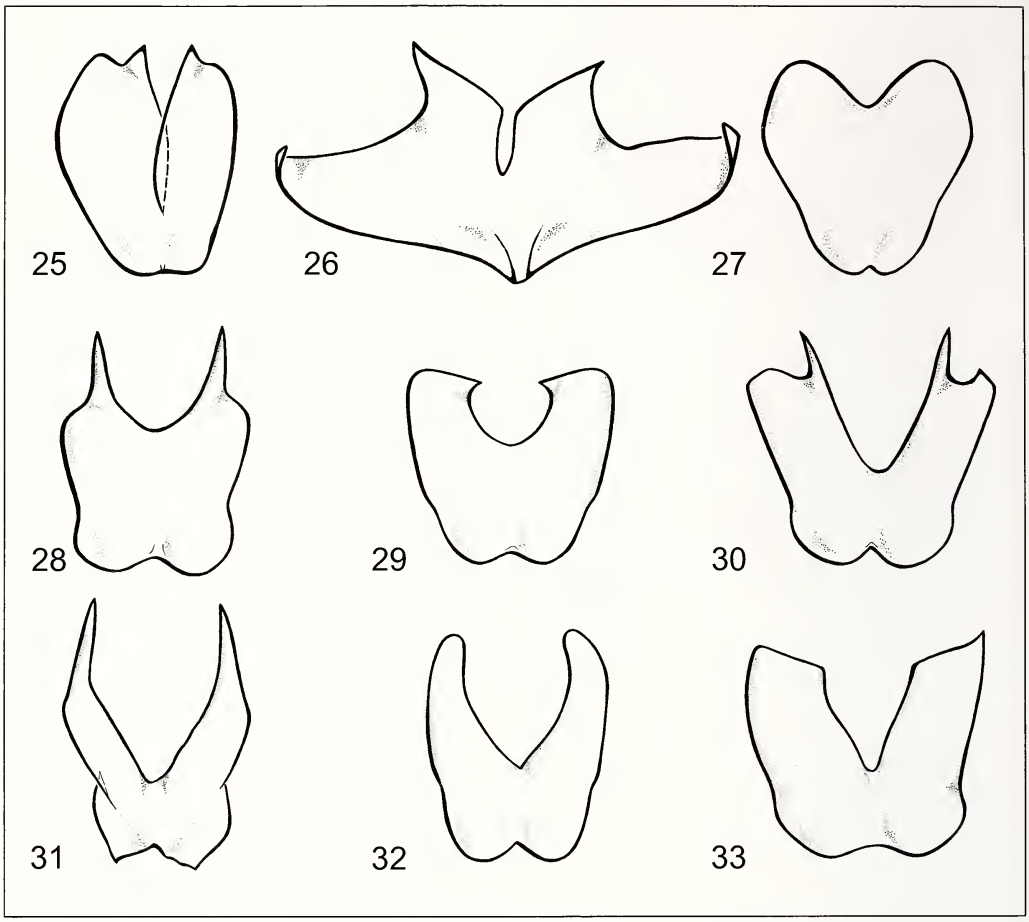

Figs 25–33. Juxta of *Flavinarosa* spp. **25.** *F. holoxanthia* (Hampson, 1900). **26.** *F. obscura* (Wileman, 1915). **27.** *F. paucispina* Holloway, 1986. **28.** *F. alius* Solovyev & Witt, 2009. **29.** *F. glaesa* Solovyev & Witt, 2009. **30.** *F. luna* sp. n. **31.** *F. acantha* sp. n. **32.** *F. kozyavka* sp. n. **33.** *F. ptaha* sp. n.

Key to species based on male genitalia

1. Vesica with single, large, claw-shaped basal cornutus as long as 2/3 width of aedeagus (Fig. 17) ..... ***paucispina***

– Vesica with basal tuft (-s) of cornuti sometimes with additional separate single cornutus **2**

2. Lateral lobes of juxta gradually narrowed distally **3**

– Lateral lobes of juxta of different shapes but not narrowed distally **4**

3. Lateral parts of juxta pointed apically (Fig. 31). Vesica basally with single tuft of large cornuti and separate single large cornutus (Fig. 23). China: Hainan ..... ***acantha*** sp. n.

– Lateral parts of juxta rounded apically (Fig. 32). Vesica basally with two tufts of large cornuti (Figs 21, 22) ..... ***kozyavka*** sp. n.

4. Lateral parts of juxta prominent, wide and triangular; width of juxta greater than its height (Figs 16, 26) ..... ***obscura***

– Lateral parts of juxta not prominent; the width of juxta is smaller than its height. Not insular species **5**

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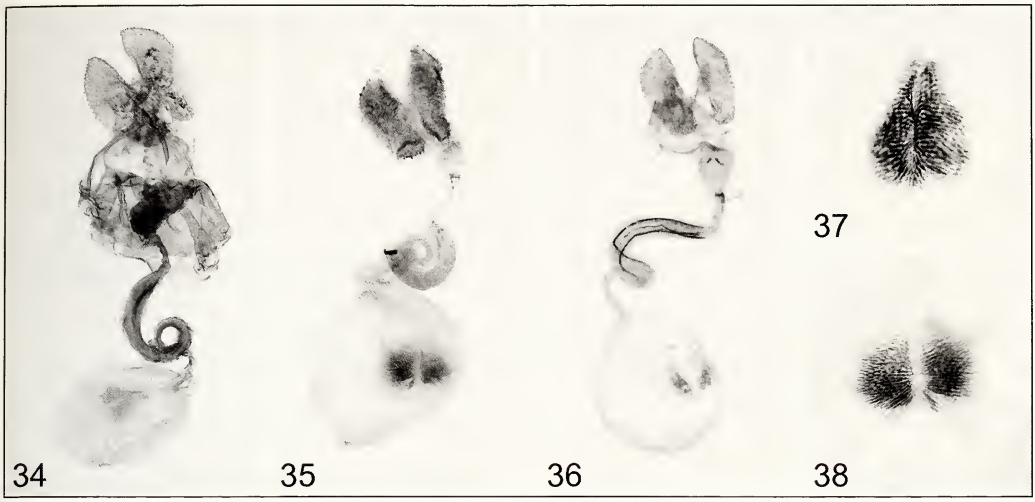

Figs 34–38. Female genitalia of *Flavinarosa* spp. **34.** *F. holoxanthia* (Hampson, 1900), Khasis, BMNH (slide 630). **35.** *F. paucispina* Holloway, 1986, Borneo, MWM (slide 11337). **36.** *F. alius* Solovyev & Witt, 2009, paratype, MWM (slide 13833; photo: V. Zolotuhin). **37.** Signum in corpus bursae of *F. holoxanthia* (Hampson, 1900), Khasis, BMNH (slide 630). **38.** Signum in corpus bursae of *F. paucispina* Holloway, 1986, Borneo, MWM (slide 11337).

5. Lateral parts of juxta with apical dorsad spur **6**
– Lateral parts of juxta without distinct apical dorsad spur **8**
6. Dorsal margin of juxtal lobes arcuate. Apical spur of juxta of 1/3 height of rest juxtal part (Figs 18, 28) ..... ***alius***
– Dorsal margin of juxtal lobes waved or sinuous. Apical spur of juxta shorter **7**
7. Lateral lobes of juxta parallel-sided; apical spur as long as 1/5 juxta (Fig. 30). Vesica with 2 large apical cornuti (Fig. 20) ..... ***luna*** sp. n.
– Lateral lobes of juxta not parallel-sided, ovoid; their apical spur smaller (Figs 15, 25) ..... ***holoxanthia***
8. Lateral lobes of juxta with laterad spur on inner margin; medial incision rounded (Figs 19, 29) ..... ***glaesa***
– Later lobes of juxta without any spur on inner margin; medial incision narrowed ventrally (Figs 24, 33) ..... ***ptaha*** sp. n.

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