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Two new species of the genus *Ganisa* WALKER, 1855 from Sulawesi and Flores, Indonesia (Lepidoptera: Eupterotidae)

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Abstract

Two new species of the genus *Ganisa* WALKER, 1855 (Eupterotidae) from Indonesia are described: *Ganisa pulupuluana* NÄSSIG, IGNATYEV & WITT nov.sp. from Sulawesi, [Selatan, Tanah Toraja], Polo-Polo [= Pulu-Pulu], 2000 m, and *Ganisa floresiaca* NÄSSIG nov.sp. from Flores, (W), Prov. Nusa Tenggara Timur, Gunung Ranaka (E), 1270 m. The male holotypes of both species are deposited in Senckenberg-Museum, Frankfurt am Main; holotypes, variability and male and female (where known) genitalia are illustrated in colour, and their relationships to other Indonesian *Ganisa* species are briefly discussed.

Key words: biogeography, zoogeography, genitalia morphology, taxonomy.

¹Studies in Eupterotidae, no. 10. (No. 9 see: Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. 30 (1/2): 83-92.) — Corresponding author.

Zusammenfassung

Zwei neue Arten der Gattung *Ganisa* WALKER, 1855 (Eupterotidae) von Indonesien werden beschrieben: *Ganisa pulupuluana* NÄSSIG, IGNATYEV & WITT nov.sp. von Sulawesi, [Selatan, Tanah Toraja], Polo-Polo [= Pulu-Pulu], 2000 m, und *Ganisa floresiaca* NÄSSIG nov.sp. von Flores, (W), Prov. Nusa Tenggara Timur, Gunung Ranaka (E), 1270 m. Die männlichen Holotypen von beiden Arten, deponiert im Senckenberg-Museum, Frankfurt am Main, die Variabilität und die männlichen sowie (wo bekannt) weiblichen Genitalapparate werden in Farbe abgebildet und die Beziehungen zu den anderen indonesischen *Ganisa*-Arten kurz diskutiert.

Introduction

The Indonesian island of Sulawesi is still very much “terra incognita” as far as the bombycoid family Eupterotidae is concerned (HOLLOWAY et al. 2001: 258, NÄSSIG & SCHULZE 2007). Earlier authors such as SWINHOE (1901, 1904) or NIEUWENHUIS (1948) described only species from smaller islands close to Sulawesi but not from the main island itself. Further material of the family from this region was received in Europe only during the last two to three decades, either collected on scientific expeditions specifically targeting the insect fauna of Sulawesi or obtained from Indonesian insect collectors and traders. Surprisingly, the eupterotid material lately collected on Sulawesi nearly always represents undescribed taxa, the first of which were recently described (NÄSSIG & SCHULZE 2007) and others are to be described in a small series of forthcoming publications. Even fewer species of Eupterotidae are known from the Indonesian islands further to the east, usually none at all from most of the islands, and the number of known species increases only on the islands on the Sahul shelf, close to New Guinea and Australia. No species at all appear reported from the island of Flores. Recent contributions to the knowledge of the Indonesian and Philippine Eupterotidae were published by NÄSSIG (1989, 1995, 2000) and NÄSSIG & TREADAWAY (2009).

The taxonomy of the family Eupterotidae remains largely unresolved. Recent studies have clarified the nomenclature of the family (NÄSSIG & OBERPRIELER 2007) and of the 53 currently recognised genera (NÄSSIG & OBERPRIELER 2008) and have begun to address the composition of natural groups (subfamilies) in the family (OBERPRIELER et al. 2003) and their relationships (ZWICK 2008). One such group is the “*Ganisa* group”, an informal collective group proposed by OBERPRIELER et al. (2003) and NÄSSIG & OBERPRIELER (2008) for a number of genera not readily attributable to the formal subfamilies of Eupterotidae, including Eupterotinae, in which most of these genera had been placed before (FORBES 1955, HOLLOWAY et al. 2001). Thus far no obvious synapomorphies are apparent for this assortment of genera, and it may even represent a paraphyletic grade from which some of the other eupterotid groups could have arisen (OBERPRIELER et al. 2003).

Part of the difficulty of properly delineating the *Ganisa* group is that its core genus, *Ganisa* WALKER, 1855, is in a state of considerable taxonomic confusion (NÄSSIG & OBERPRIELER 2008). Most of the known species were described from the Indian subcontinent, southern China and Sundaland, but only the fauna of the latter region has been re-

viewed by HOLLOWAY (1982, 1987), who correctly associated at least 7 species with the genus. Many other species formerly included in *Ganisa* have been misplaced because earlier authors like STRAND (1922) used a misidentified type species (see FLETCHER & NYE 1982, HOLLOWAY 1982, 1987). In addition, several undescribed species of *Ganisa* are known especially from China and the Philippines but also from some other places, and the species of the genus may ultimately count between one and two dozen.

On external habitus two species groups may be differentiated in *Ganisa*, though further study is required to determine whether either or both would represent natural (monophyletic) units:

1. the *postica* group, comprising the type species of the genus, *G. postica* WALKER, 1855, and similar pale greyish-brown species with rounded wings in ♂♂, on average of smaller wingspan than the second group, although a few species reach the same dimensions. This group occurs across the entire range of the genus from the Indian subcontinent to Flores and Sulawesi (except the Philippines proper) and seemingly also further north in China than the second group.
2. the *similis* group, based on *G. similis* MOORE, 1884 and similar blackish-grey species with a generally more rectangular, sometimes nearly falcate fw. apex in ♂♂. This group has a more restricted range from approximately the eastern Himalaya, southern China and Indochina across Sundaland to the Philippines, excluding areas east of Sundaland (Wallacea, Moluccas etc.) and the northernmost regions of China.

To our knowledge, *Ganisa* has so far not been recorded from islands east of Sundaland, even the Philippine material in some collections not having been specifically dealt with in the literature. Among material of *Ganisa* collected on Sulawesi and Flores during the last decade of the 20th century, two new species could readily be recognised on their different habitus as well as their geographical location, and subsequent studies of their genitalia supported their distinctiveness at species level. These two species are here described as new.

Abbreviations

Abbreviations of collections:

- BMNHThe Natural History Museum (formerly British Museum (Natural History)), London, U.K.
- CWANPrivate collection of Wolfgang A. NÄSSIG, now in SMFL.
- CMWM.....Museum Thomas WITT, München (Munich); assigned to ZSM, Munich, Germany.
- SMFL.....Lepidoptera collection in the Senckenberg-Museum, Frankfurt am Main (with the number of the Lepidoptera type catalogue of the Senckenberg-Museum), Germany.
- ZSM.....Zoologische Staatssammlung, München (Munich), Germany.

Other abbreviations and conventions:

fw.....forewing(s).

GP no.....dissection/genitalia slide no. (Genitalpräparatenummer), ex CWAN, now in SMFL, or in CMWM.

HT.....holotype.

hw.....hindwing(s).

lfw.....length of the forewing, measured in a straight line from the base of the wing to the most distant point of the apex, without the width of the thorax and without the tegulae.

PT.....paratype(s).

uns.....underside.

ups.....upperside.

Descriptions of the new species

***Ganisa pulupuluana* NÄSSIG, IGNATYEV & WITT, nov.sp.**

M a t e r i a l : Holotype: ♂, Indonesia, Sulawesi [Selatan, Tanah Toraja], Polo-Polo [= Pulu-Pulu], 2000 m, XII. 1995, [leg.] einh. Samml., c/o SCHNITZLER. In CWAN in SMFL, SMFL type catalogue no. 4245. — Paratypes (23 ♂♂, 2 ♀♀), all Indonesia, Sulawesi: 2 ♀♀, Puncak Palopo, 900-1300 m, VI. 1998, leg. local collectors; GPs 7506 & 11653 CMWM. 20 ♂♂, same locality: 1 ♂ X.1997, 1 ♂ XI.1997, 2 ♂♂ II.1998, 3 ♂♂ III. 1998, 1 ♂ IV. 1998, 12 ♂♂ VI. 1998 (in part via CRBP). 1 ♂, South, Tarifa, 1000-1500 m, II. 1997, leg. local coll., via CRBP. 2 ♂♂, South, Mt. Sampuraga, 2°10' S, 120°45' E, 1400 m, leg. SINIAEV & TARASOV, via CRBP. — ♂ GPs 7501, 7502, 7504, 7505, 11654, 12075, 12094, 12095, 12096 CMWM. — All PT in CMWM.

D e r i v a t i o n o m i n i s : The new species is named after its type locality, Pulu-Pulu in Torajaland.

Description and diagnosis

♂♂ (Figs 1, 3-6): Lfw. 30-35 mm, average 32.5 mm ± 1.29 s.d. (n = 24), HT 35 mm. Wingspan approximately 62 mm.

Ground colour usually pale greyish-brown (Figs 1-3, ♂♂ and ♀♀ similar) but sometimes darker, at least partially (Figs 4-6). Pattern variable: crenulate lines indistinct to strongly developed, or strong and combined with partially intense darkening of ground colour (see Figs). Usually 3[-4] crenulate lines between discal spot and postmedian line, the latter double; inner line usually stronger and blackish except in apical part, where it becomes indistinct and bends towards the costa, parallel to crenulate lines, and is replaced by blackened outer line, leading straight into apex (“apical stria”); this outer line in some specimens indistinct in middle, in others a proper duplicate of postmedian. Discoidal spots on all wings often indistinct, a few black scales surrounded by a narrow

whitish-grey ring, in other specimens a prominent black dot almost without pale ring. In distal part of fw. in submarginal area often black scales, in dark specimens usually contrasted with whitish ones along the veins, appearing like little arrows. Hw. similar to fw., pattern less distinct and without prominent postmedian. Uns. with simplified pattern, less contrasting (except discoidal patches) and less developed than ups.

♀ ♀ (Fig. 2): Lfw. 34-40 mm, average 37 mm (n = 2).

Wing colour and pattern of sexes very similar (including variability); ♀ ♀ only slightly different in wingshape (fw. apex pointed), size (larger) and antennae (shorter rami).

♂ g e n i t a l i a (Fig. 9): Uncus with lateral processes widely separate and distinct short median tip. Gnathos (see comments below) well-developed, rather evenly rounded in middle. Distally free ventral part of valves (i.e., of the sacculus) ending directly in a hook bent dorsad, sacculus without separate straight end.

♀ g e n i t a l i a (Fig. 10): Bursa small, soft, without sclerotisation, indistinct. Bursal opening with few sclerotised specialisations, indistinct.

P r e i m a g i n a l i n s t a r s . Unknown.

P h e n o l o g y a n d e c o l o g y . The type series of 26 specimens was collected over 7 months (II., III., IV., VI., X., XI. and XII.), indicating the occurrence of more than one generation per year. The elevations as recorded range from 900-2000 m, corresponding to lower montane zones but also including the lower regions of the upper montane zone. The collecting localities appear to correspond largely with secondary mountain forest biotopes. Judging from its dark coloration and the habits of all other known *Ganisa* species, *G. pulupuluana* is nocturnal.

Comments

Ganisa pulupuluana evidently belongs to the *G. postica* group, as outlined above, but is unusually large, in fact exceeding the size of many species of the *G. similis* group, which on average are larger than those of the *G. postica* group. Only a single species of the *G. postica* group, referred to as the “Bornean mountain race of *Ganisa plana* WALKER, 1855” by HOLLOWAY (1987: 69, pl. 8. fig. 8; genitalia fig. 125) from Sundaland (known from Borneo and Sumatra) is approximately of the same size. This “Bornean mountain race” appears to represent a species distinct from *G. plana* and will be dealt with in a forthcoming publication on the entire Sundanian fauna of *Ganisa*. *Ganisa pulupuluana* differs from both the Sundanian species (“races”) of *G. “plana”* in having the distally free costal part of the valves approximately as long as the sacculus (without the hook) or slightly shorter, whereas in the Sundanian *G. “plana”* its length usually clearly exceeds that of the sacculus (see HOLLOWAY 1987: figs 124-125). In this feature, *G. pulupuluana* is more similar to the more distantly related *Ganisa similis* from Borneo (see HOLLOWAY 1987: genitalia fig. 123). The ♀ genitalia of *G. pulupuluana* were not compared in detail with those of other species, which are generally rare in collections and not always reliably associated with the ♂ ♂.

In *Ganisa* (as in eupterotids in general) the uncus is strongly modified (see OBERPRIELER et al. 2003: 106), in that the dorsum and dorsal processes are almost completely reduced and only the lateral processes retained (thus resembling a deeply bifid uncus), with sometimes only a tiny double median tip discernible as representing the remnants of the dorsal

processes, and in that the uncus basis is firmly fused so that the lateral prongs are immovable.

Further, the differentiation between gnathos and transtilla is often difficult in Bombycoidea (KRISTENSEN 2003, ZWICK 2009: 148). Based on the insertion of the relevant structure (either at the lateral base of the uncus [= gnathos] or at the dorsal base of the valves [= transtilla]), Eupterotidae generally seem to only possess a gnathos (see OBERPRIELER et al. 2003: 106). However, in *Ganisa* this structure is inserted more or less along the rim of the tegumen ring, between the lateral base of the uncus and the dorsal base of the valves (in *G. pulupuluana* definitively closer to the latter), so that a clear definition of this well-developed structure is problematic. It is here provisionally interpreted as a gnathos, in compliance with the situation in other eupterotid genera.

***Ganisa floresiaca* NÄSSIG, nov.sp.**

M a t e r i a l : Holotype: ♂, Indonesia, Flores (W), Prov. Nusa Tenggara Timur, Gunung Ranaka (E), 3 km S Mano (18 km SE Ruteng), prim. forest, 1270 m, 17.-21. IV. [19]96, leg./ex coll. Dr. R. BRECHLIN; GP CWAN/SMFL 2050/08. In CWAN in SMFL, SMFL-no. 4246. — Paratypes (in total 4♂♂): 3♂♂, same data as holotype. 1♂, Flores, 9 km S Ruteng, Golo Luseng, 1820 m, 27.II.-9.III. 1992, leg. U. PAUKSTADT; GP CWAN/SMFL 2051/08. All in CWAN in SMFL, SMFL-nos. 4247-4250.

D e r i v a t i o n o m i n i s : The new species is named after the Indonesian island on which it is found, Flores.

Description and diagnosis

♂♂ (Figs 7-8): Lfw. 23-26 mm, average 24.2 mm ± 1.09 s.d. (n = 5), HT 24 mm. Wingspan approximately 46 mm.

Ground colour pale greyish-brown, with less well developed pattern and evidently no very dark forms (as can be concluded from the small series known). Fw. postmedian black line not extending to apex but leading parallel to crenulate lines in a semicircular curve to costa, due to inner postmedian line being well developed and outer one weak to almost absent, demarcated only by black patches on veins. Fw. with 3-4 crenulate lines (a 5th sometimes partially indicated) between postmedian and discal spot, the latter conspicuously black and usually well-developed, without whitish ring, distal blackish pattern in submarginal area along veins still showing its origin from crenulate line. Hw. usually without discal spot, pattern hardly visible. Uns. with simplified pattern, less contrasting (except discal patches) and less developed than on ups.

♂ **g e n i t a l i a** (Fig. 11): Much smaller than in *G. pulupuluana*; lateral prongs of uncus less widely separated, with less strongly developed median tip. Gnathos well developed, with rounded prolongation in middle. Sacculus of valve much less pronounced than in any other species of *Ganisa*, much shorter than in Sundanian *G. "plana"*, without distal hook (only a weak triangle instead), costal part of valves clearly exceeding sacculus in length.

♀. Unknown.

P r e i m a g i n a l i n s t a r s . Unknown.

Phenology and ecology. The 5 specimens of the type series were collected between February and April. The elevations recorded range from 1270-1820 m, mainly corresponding with the upper part of the lower montane zones. The collecting localities are in areas of more or less primary mountain forest. The species is again likely to be nocturnal.

Comments

Ganisa floresiaca also belongs to the *G. postica* group but is a small species. It may be distinguished from most other species of the group by having the fw. postmedian black line not extending to the apex but running parallel with the crenulate lines to the costa, whereas in other species the apical end of the inner postmedian bends off to the costa, where it fades and is replaced by a short black “apical stria” (a part of the outer line) weakly joined to the tip of the remaining postmedian and directly leading into the apex. In *G. floresiaca* such an “apical stria” is not developed and the inner postmedian is fully retained. Its fw. pattern (especially the postmedian line not extending to the apex) and the ♂ genital structure (especially the short sacculus without distal hook) may be interpreted as plesiomorphic traits, retained by an outlying member of the group isolated early on a remote island. The alternative explanation (a secondary reduction at least of the sacculus) cannot be ruled out, however, although the fw. pattern variation appears to offer a “one way” explanation.

Flores is part of the Lesser Sunda Island arc; the closest known localities for other *Ganisa* species are on Java and Bali on the Sunda Shelf, about 420 km to the west. The only known Balinese species also belongs to the *G. postica* group and is of similar size as *G. floresiaca* but its sacculus shows the clear distal hook (GP 2070/09 CWAN/SMFL) that is typical of the Sundanian and continental species, and its fw. postmedian also ends in an “apical stria” running into the apex.

No *Ganisa* species are yet known from Lombok, Sumbawa, Sumba or other islands between Bali and Flores, although the genus might be expected to occur there as well.

Discussion

The two new species represent significant range additions for *Ganisa* to the south-east. Only as yet unpublished records from the Philippines (NÄSSIG & TREADAWAY 2009) and probably others from Palaeartic Asia are from even further to the east. Based on present knowledge, the two new species from Flores and Sulawesi are the eastern-most species of the genus within Indonesia. However, collecting further to the east (e.g., on the Moluccan islands) has been much less extensive, and additional material from there may become available with future collecting activities (though only few expeditions yielded Eupterotidae from eastern Indonesia).

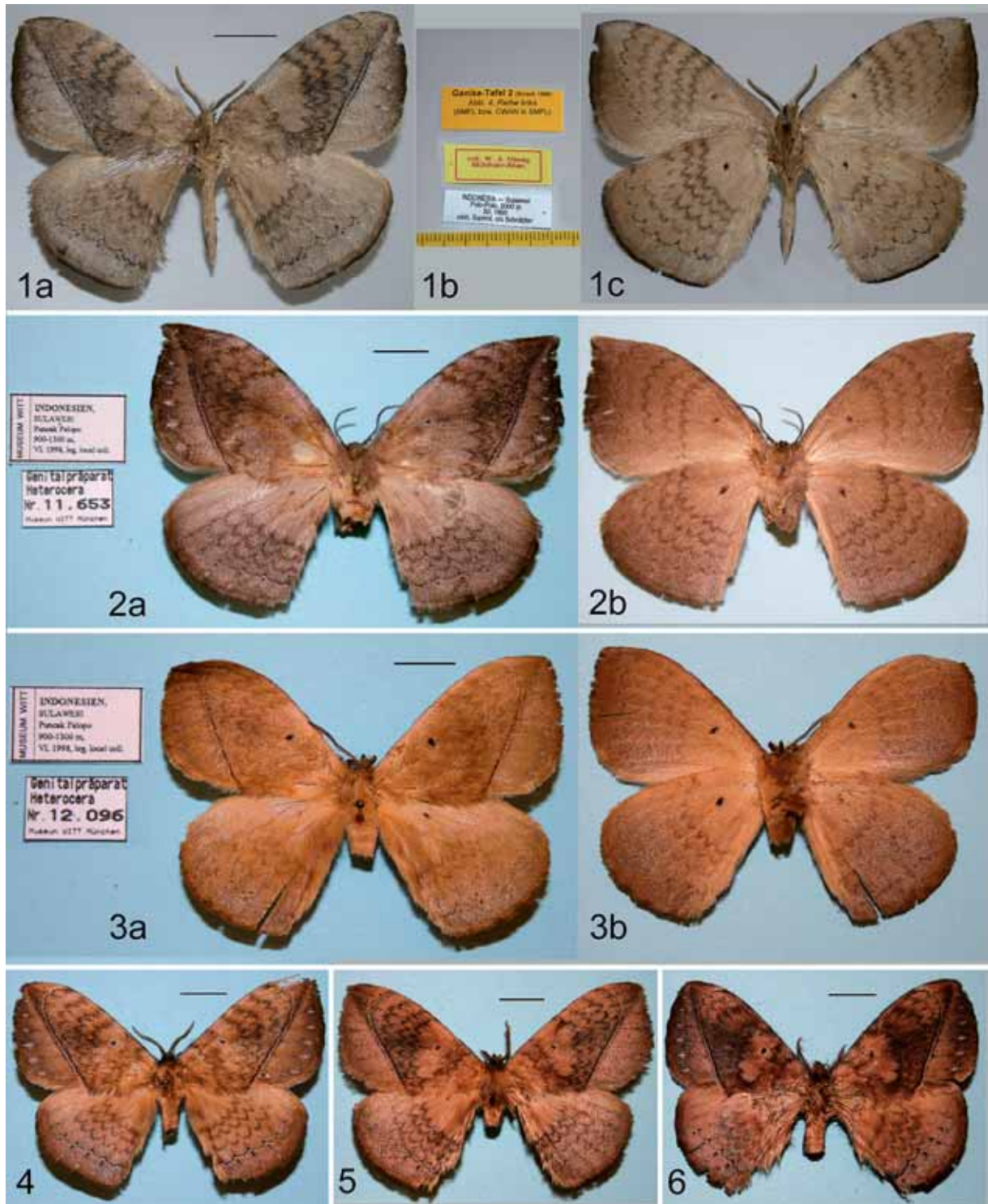
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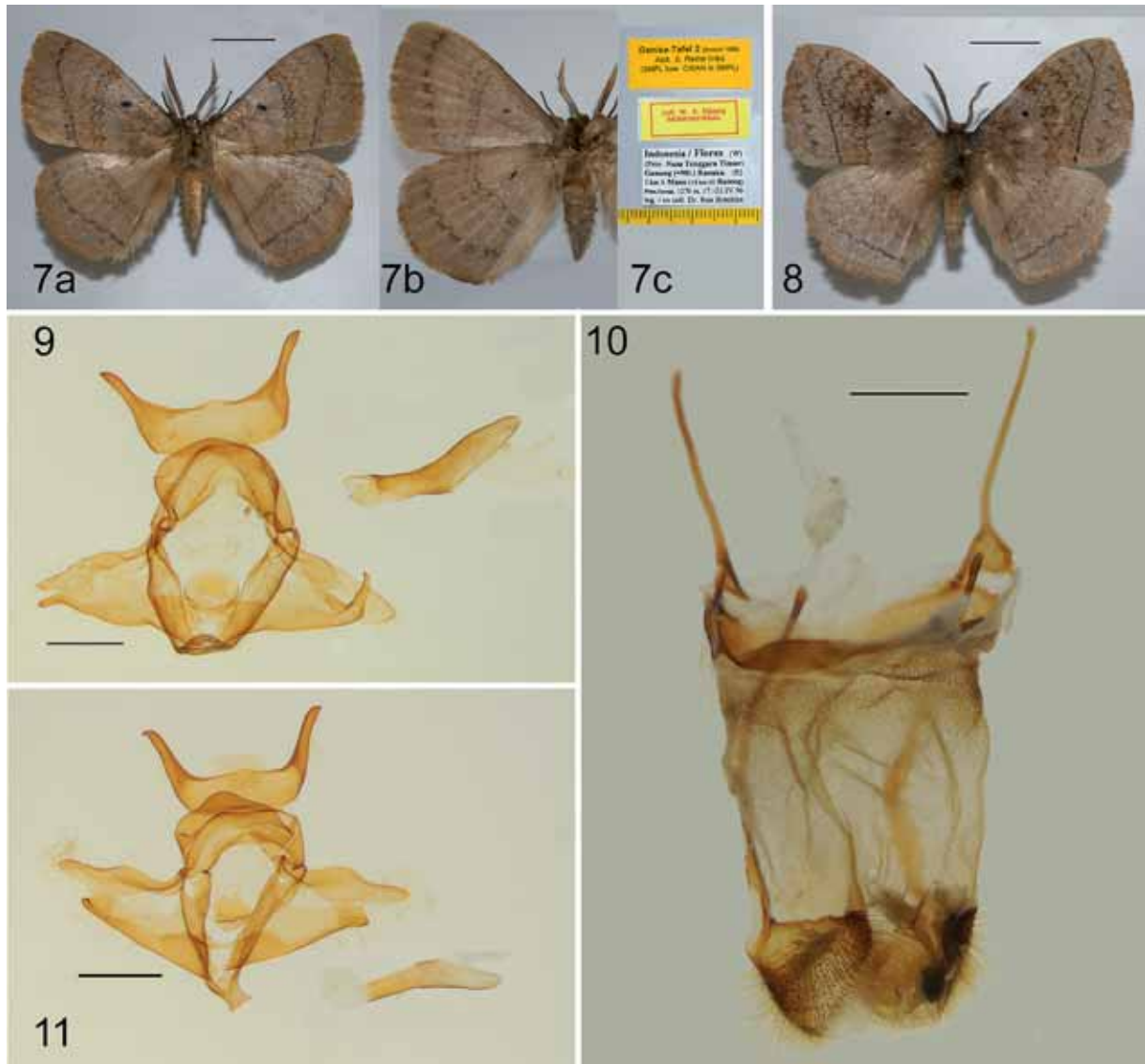
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Figs 1-6: *Ganisa pulupuluana* nov.sp. **Fig. 1:** HT ♂; **1a:** upperside, **1b:** labels, **1c:** underside; in SMFL. **Fig. 2:** Dark PT ♀; **2a:** upperside, **2b:** underside; in CMWM, GP 11653. **Fig. 3:** Light PT ♀; **3a:** upperside, **3b:** underside; in CMWM, GP 12096. **Fig. 4:** Light, contrasting PT ♂, in CMWM, GP 12094. **Fig. 5:** Contrasting PT ♂, in CMWM, GP 11654. **Fig. 6:** Dark, contrasting PT ♂, in CMWM, GP 7502. — Specimens not to the same scale; scale bar = 1 cm. Photographs W.A. NÄSSIG.



Figs 7-8: *Ganisa floresiaca* nov.sp. **Fig. 7:** HT ♂; **7a:** upperside, **7b:** underside, **7c:** labels; in SMFL. **Fig. 8:** Darker PT ♂, in SMFL. — Specimens not exactly to the same scale; scale bar = 1 cm. Photographs W. A. NÄSSIG. — **Genitalia: Figs 9-10:** *Ganisa pulupuluana* nov.sp. **Fig. 9:** PT ♂, GP 7504 CMWM. **Fig. 10:** PT ♀, GP 7506 CMWM. — **Fig. 11:** *Ganisa floresiaca* nov.sp., HT ♂, GP 2050/08 CWAN in SMFL. — ♂ genitalia of *Ganisa* are symmetrical; the differences between right and left valves in Figs 9 and 11 are caused by different angles under which they were flattened and just show different views of the sacculus structures. — Specimens not exactly to the same scale; scale bar = 1 mm. Photographs J.-P. KOPELKE & W.A. NÄSSIG.

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