

# Revision of the subgenus *Arctata* ROEPKE, 1949 of the genus *Nyctemera* HÜBNER, 1820 with description of three new species and four new subspecies (Lepidoptera: Erebidae, Arctiinae, Arctiini)

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**Abstract:** The Indo-Australian subgenus *Arctata* ROEPKE, 1949 (stat. rev.) of the genus *Nyctemera* HÜBNER, 1820 is revised. The subgenus is divided into four species-groups. All 21 known species of the subgenus are treated, including three new species: *Nyctemera (Arctata) toradjana* sp. n., *N. (A.) celebensis* sp. n. and *N. (A.) goliath* sp. n.; as well as four new subspecies: *Nyctemera (Arctata) scalarium balinensis* ssp. n., *N. (A.) scalarium timorana* ssp. n., *N. (A.) toxopei ceramensis* ssp. n. and *N. (A.) robusta busanica* ssp. n. Four lectotypes are designated: *Deilemema arctata javana* REICH, 1932 (male, in ZMHU Berlin); *Deilemema arctata kinabaluensis* REICH, 1932 (female, in ZMHU); *Migoplastis philippinensis* ROTHSCHILD, 1933 (male, in BMNH London); and *Nyctemera toxopei* VAN ECKE, 1926 (male, in RMNH Leiden). *Deilemema arctata javana* REICH, 1932, syn. n., is synonymised with *Leptosoma scalarium* SNELLEN VAN VOLLENHOVEN, 1863. Of three taxa the status is revised and four taxa have become a new status (see checklist). Of all species and subspecies the imagines and genitalia are depicted and discussed.

**Key words:** Indo-Australia, new taxa, species-groups.

## Revision des Subgenus *Arctata* ROEPKE, 1949 der Gattung *Nyctemera* HÜBNER, 1820 mit Beschreibung von drei neuen Arten und vier neuen Subspecies (Lepidoptera: Erebidae, Arctiinae, Arctiini)

**Zusammenfassung:** Die indoaustralische Untergattung *Arctata* ROEPKE, 1949 (stat. rev.) der Gattung *Nyctemera* HÜBNER, 1820 wird revidiert. *Arctata* unterteilt sich in vier Artengruppen. Alle 21 bekannten Arten des Subgenus werden behandelt, einschließlich dreier neuer Arten: *Nyctemera (Arctata) toradjana* sp. n., *N. (A.) celebensis* sp. n. und *N. (A.) goliath* sp. n., dazu vier neue Unterarten: *Nyctemera (Arctata) scalarium balinensis* ssp. n., *N. (A.) scalarium timorana* ssp. n., *N. (A.) toxopei ceramensis* ssp. n. und *N. (A.) robusta busanica* ssp. n. Vier Lectotypen werden designiert: *Deilemema arctata javana* REICH, 1932 (Männchen, in ZMHU Berlin); *Deilemema arctata kinabaluensis* REICH, 1932 (Weibchen, in ZMHU); *Migoplastis philippinensis* ROTHSCHILD, 1933 (Männchen, in BMNH London); und *Nyctemera toxopei* VAN ECKE, 1926 (Männchen, in RMNH Leiden). *Deilemema arctata javana* REICH, 1932, syn. n., wird synonymisiert mit *Leptosoma scalarium* SNELLEN VAN VOLLENHOVEN, 1863. Für drei Taxa gibt es eine Statusrevision, vier Taxa erhalten neuen Status (siehe Checkliste). Für alle Taxa (Arten und Unterarten) werden Imagines und Genitalien abgebildet und diskutiert.

## Introduction

The genus *Nyctemera* HÜBNER, 1820 is in the Indo-Australian region very rich in species. About 70 species are recognized and new species are still being discovered, mainly by more detailed study of the genitalia, because mimicry is a common feature in this genus. In the past species were described mainly based on wing pattern, and this resulted in many species being placed unjustifi-

ably in the genus. Black and white patterned species from other genera, like *Utetheisa* HÜBNER, 1819, were removed from the genus and transferred to its correct position, for the first time by HOLLOWAY (1988) and later by DE VOS (2007), but even black and white species belonging to other families like Geometridae and Noctuidae have been transferred from *Nyctemera* in the past by several authors. Still, after many revisions, the genus seems to be a heterogenous group of species, the subgenera more or less grouping the more allied species: *Coleta* ROEPKE, 1949, *Nyctemera* HÜBNER, 1820, *Luctuosana* DE VOS, 2010, *Arctata* ROEPKE, 1949, *Deilemema* HÜBNER, 1820, *Orphanos* HÜBNER, [1825] and *Tritomera* DE VOS & DUBATOLOV, 2010.

Especially the composition of species in the subgenus *Arctata* ROEPKE, 1949 was still uncertain. Many species were placed in this subgenus just by resembling wing pattern while the genitalia of many of those species still were not studied. A thorough study of all, what we know now, 21 species placed in *Arctata* revealed that the genitalia show some differences which divides the species in at least four species-groups but which provides not enough evidence to consider those to belong to different subgenera. Strong diagnostic characters like structure of valves, uncus and phallus in the male genitalia and the structure of the female genitalia, especially the combination of these, place the species in subgenus *Arctata* and show distinct differences with the other recognized subgenera mentioned above. Of some species treated here the species-group position is still uncertain, those seem to have intermediate characters and appear to be the connection to other species-groups or might even form a group of their own. A molecular analysis of all *Nyctemera* species, not only subgenus *Arctata*, is very much needed, hopefully revealing and confirming the correct position of all species without being misled by similar wing pattern or misunderstood structures of genitalia, but it is expected that the actual opinion on the (sub-)genus for the greater part is correct.

## Abbreviations used

BM	Initials of genitalia dissection numbers pre-registered in the BMNH collection, but made by the author (Rob DE VOS).
BMNH	The Natural History Museum, London (United Kingdom), formerly British Museum (Natural History).
BPBM	Bernice P. Bishop Museum, Gressitt Center for Research, Honolulu, Hawaii (USA).
CAH	Private collection Armin HAUENSTEIN (Germany).
CCGT	Private collection Colin G. TREADAWAY (now in SMFL) (Germany).

CJSD	Private collection Dr. Josef SETTELE (Germany).
CKC	Private collection of Karel ČERNÝ (Austria).
CMWM	Museum Witt, collection of Thomas WITT (München, Germany), assigned to ZSM.
CPK	Private collection of Peter KAUTT (Germany).
Fw.	Forewing[s].
Fwl.	Forewing length.
HT	Holotype[s].
Hw.	Hindwing[s].
LT	Lectotype[s].
MCSN	Museo Civico di Storia Naturale “Giacomo Doria”, Genua (Italy).
MCZR	Museo Civico di Zoologica, Rome (Italy).
MPMP	National Museum of the Philippines, Manila (Philippines). – This collection was entirely destroyed during the Pacific war [world war 2] between the USA and the Japanese Empire (see MERRILL 1945).
NEV	Nederlandse Entomologische Vereniging (Dutch Entomological Society), Leiden (The Netherlands).
NSMT	National Science Museum, Tokyo (Japan).
OXUM	Hope Entomological Collections, University Museum Oxford (United Kingdom).
PLT	Paralectotype[s].
PT	Paratype[s].
RMNH	Naturalis Biodiversity Center, Leiden (The Netherlands) (formerly Rijksmuseum van Natuurlijke Historie).
RV	Initials of prepartate numbers which were made by the author (Rob DE VOS).
SEHU	Insect Museum, Faculty of Agriculture, Sapporo (Japan).
SMFL	Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main (Germany), Lepidoptera collection.
SNSD	Senckenberg Naturhistorische Sammlungen Dresden (Germany).
ST	Syntype[s].
WT	Initials of prepartate numbers pre-registered in the CMWM collection (of Thomas WITT), but made by the author (Rob DE VOS).
ZFMK	Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn (Germany).
ZMHU	Museum für Naturkunde Berlin (formerly Zoologisches Museum der Humboldt-Universität, Berlin) (Germany).
ZIMH	Zoologisches Institut und Museum, Hamburg (Germany).
ZMAN	Naturalis Biodiversity Center, Leiden (The Netherlands) (formerly Zoologisch Museum Amsterdam).
ZSM	Zoologische Sammlung des Bayerischen Staates, München (Germany).

## Material and methods

For the study of the species it was necessary to dissect the genitalia of at least one male and female when available. The dissected genitalia are put in cold KOH 10 % for one night. After washing and cleaning from fat, scales and dirt in 30% alcohol the genitalia were stained in a solution of chlorazol-black in 30% alcohol and affixed in 95% alcohol. Then the genitalia were prepared for preservation in Euparal Essence (to prevent air bubbles)

and after a few minutes put on a glass slide in a few drops of Euparal medium on the standard as used in the Natural History Museum in London: abdomen on left side, genital armature top right, phallus bottom right. To prevent the smaller parts, like phallus, from floating the Euparal drops were left to dry at least 24 hours without glass cover in a closed petri-dish (to protect against dust). The next day a proper sized glass cover was put on the prepartate in the sticky Euparal with addition of a few fresh drops of Euparal. This complete prepartate is left to dry for weeks to months in the petri-dish. Proper slide labels are added after completely drying, so therefore it is necessary to write prepartate number and details on the petri-dish cover and to scratch the number on the glass slide to avoid mixing up with other drying slides. Slides were studied with a Wild M3 binocular microscope with magnifications 60–400×. Digital photographs were made with a motorized Zeiss V20 binocular microscope and a digital Axio MRc5 camera controlled by Axiomanager M2 software.

## Checklist of *Nyctemera* (*Arctata*) ROEPKE, 1949, stat. rev.

### The *arctata* species-group

*arctata* WALKER, 1856 [mainland of Southeast Asia: South China to Vietnam]

= *maculosa* WALKER, 1864

*albofasciata* (WILEMAN, 1911) [Formosa, one from Luzon]

= f. *tamahonis* (MATSUMURA, 1931) (infrasubspecific)

*zerenoides* (BUTLER, 1881), stat. rev. [South Sumatra, one from East Java]

*scalarium* (SNELLEN VAN VOLLENHOVEN, 1863), stat. rev.

*scalarium scalarium* (SNELLEN VAN VOLLENHOVEN, 1863) [Malayan Peninsula, Sumatra, Java]

= *javana* (REICH, 1932) syn. n.

*scalarium balinensis* ssp. n. [Bali]

*scalarium tenuifascia* SNELLEN, 1898 stat. n. [Lombok]

*scalarium regalis* ROEPKE, 1954 stat. n. [Flores]

*scalarium timorana* ssp. n. [Timor]

*montana* HOLLOWAY, 1976 [North Borneo]

### The *hyalina* species-group

*hyalina* (BETHUNE-BAKER, 1910)

*hyalina hyalina* (BETHUNE-BAKER, 1910) [West New Guinea]

*hyalina stresemanni* (ROTHSCHILD, 1915) stat. n. [Seram]

*hyalina diaphana* ROEPKE, 1949 stat. n. [Sulawesi]

*kinabaluensis* REICH, 1932 [North Borneo]

*toradjana* sp. n. [Sulawesi]

*celebensis* sp. n. [Sulawesi]

### The *browni* species-group

*undulata* DE VOS & ČERNÝ, 1999 [Mindanao]

*palawanica* DE VOS & ČERNÝ, 1999 [Palawan]

*browni* (SCHULTZE, 1908) [mainly Luzon, also Negros, Mindanao, Bongao/Tawi-Tawi]

= *conjuncta* (WILEMAN, 1915)

- angustipennis* KISHIDA, 1994 [North Luzon]  
*consobriniformis* DE VOS & ČERNÝ, 1999 [Mindanao, one on Leyte]  
*gratia* (SCHULTZE, 1910) [mainly North Luzon, also Negros, Mindoro]  
 = *venata* (WILEMAN, 1915)  
 = *philippinensis* (ROTHSCHILD, 1933)

### The *luzonensis* species-group

- luzonensis* (WILEMAN, 1915)  
*luzonensis luzonensis* (WILEMAN, 1915) [North Luzon]  
*luzonensis squalida* DE VOS & ČERNÝ, 1999 [Southeast Luzon]  
*luzonensis apoensis* KISHIDA, 1994 *stat. rev.* [Mindanao, Negros]  
 = *kishidai* DE VOS & ČERNÝ, 1999 (unnecessary replacement name)  
*lunulata* DE VOS & ČERNÝ, 1999 [Mindanao]  
*owadai* KISHIDA, 1994 [North Luzon]  
*toxopei* VAN ECKE, 1926  
*toxopei toxopei* VAN ECKE, 1926 [Buru]  
*toxopei ceramensis ssp. n.* [Seram]  
*robusta* DE VOS & ČERNÝ, 1999  
*robusta robusta* DE VOS & ČERNÝ, 1999 [Central and Northeast Mindanao]  
*robusta busanica ssp. n.* [South Mindanao]  
*goliath sp. n.* [East Java]

## Descriptions

### *Nyctemera* HÜBNER, 1820

#### Subgenus *Arctata* ROEPKE, 1949

Type species: *Nyctemera arctata* WALKER, 1856 (designated by ROEPKE 1949: 50).

#### Diagnosis

ROEPKE (1949) stated in his argumentation for designating the subgenus *Arctata*: “The weak structure of the insect, the peculiar markings, the neuration, the simple uncus and the spiculus in the phallus seem to justify the erection of a sub-genus, for which I propose the name *Arctata*.”

Indeed the original *arctata* species-group is characterised by its subhyaline, somewhat fragile broad wings which is also found in the *hyalina* species-group. However, the revised subgenus contains the *browni* and the *luzonensis* species-groups with stronger and more elongated wings. The “peculiar markings” refer to the usually convex dark pattern with dots and patches and deeply indented pattern along the veins. This is common in all four species-groups but less pronounced in the *luzonensis* group. The “neuration” or venation is in all *Nyctemera* species of similar scheme and only differs in minor details and is therefore not usable for the designation of subgenera or species-groups. The “simple uncus” can only refer to the species *arctata* WALKER, 1856 and closely allied species in comparison with those from the other subgenera *Nyctemera* HÜBNER, 1820, *Luctuosana* DE VOS, 2010, *Orphanos* HÜBNER, [1825] and *Tritomera* DE VOS &

DUBATOLOV, 2010, which in many cases have hooks and wing-like structures. However, in the revised subgenus *Arctata* the other species-groups have in many cases more complicated unci like in the *hyalina* group and *luzonensis* group. The “spicula” or cornutus in the phallus is in some species-groups absent, in others more developed than in the *arctata* group. The most conspicuous and reliable character of the subgenus is not mentioned by ROEPKE (1949): in the male the single long apical process on the valvae which is curved in dorsal direction; all other subgenera in *Nyctemera* have the apical process curved in ventral direction or have a totally different structure with two processes or none at all.

The antennae are without exception all strongly bipectinate with a stronger pectination in the male than in the female. All species have the abdomina yellow with black bands or dorsal dots. Head, patagia and tegulae are all patterned with one or a few black dots.

The female genitalia in general have a large sternite on the 7<sup>th</sup> abdominal segment, in many cases this part is removed in the preparations to have a view at the lamella vaginalis and ductus; the antrum may be slightly sclerotised or not at all; the ductus bursae is well developed but usually not very long; the cervix bursae in some species is strongly developed but usually slightly swollen; the bursa copulatrix is globular or oval with or without one signum which is scobinated, circular or elongated boat-shaped.

### *arctata* species-group

#### Diagnosis

Yellow abdomen with black bands or dorsal spots. Generally with broad forewings, grey-brown to darker brown convex pattern on white ground, in some species consisting of more or less confluent dots and patches, leaving a white oblique fascia open. Hindwing in most species white with a row of brown marginal dots or patches, in some (sub-)species confluent to form a complete marginal band with convex dark pattern.

Male genitalia with beak-shaped uncus with dorsally running keel and lateral ridges. Valvae with a dorsally bend conspicuous apical process which can be quite large and its shape is diagnostic for the species. Phallus is diagnostic for the species-group: short, straight with a constriction in the middle at the ventral side. Distally phallus half open and diverging resembling a spoon, with a long and narrow vesica, with one distal cornutus which is directed caudally.

Female with a large sternite. Ductus bursae short and wide, not sclerotised. Bursa copulatrix globular with one small circular scobinated signum. In some species the bursa has two additional large sclerotised folds laterally.

The distribution is exclusively on the mainland of the Oriental region and the Sunda Islands.



***Nyctemera (Arctata) arctata* WALKER, 1856**

(Figs. 1–3, 72, 100, 128, 153, 180, 207.)

*Nyctemera arctata*: WALKER (1856: 1664); ROEPKE (1948: 213 [in part]; 1949: 49 [in part]; 1957: 149 [in part]); CHANG (1989: 135) [in part]; INOUE & KISHIDA (1992: 169); KISHIDA (1994: 13); DE VOS & ČERNÝ (1999: 154).

*Deilemera arctata*: SWINHOE (1891: 477; 1892: 147; 1903: 64); KIRBY (1892: 425); PAGENSTECHE (1901: 163) [in part]; SEITZ (1915: 275); VAN EECKE (1927: 223); BRYK (1937: 88) [in part].

*Dilemera (sic) arctata*: HAMPSON (1894: 45); SWINHOE (1895: 18).

*Arctata arctata*: WATSON et al. (1980: 16).

*Nyctemera arctata arctata*: DE VOS (2002: 7).

*Nyctemera maculosa*: WALKER ([1865]: 198); MOORE (1865: 803); KIRBY (1892: 420).

**Material examined:** About 500 specimens in BMNH, CKC, CMWM, MCZR, OXUM, RMNH, SMFL, SNSD, ZMHU, ZSM, including the holotype of *arctata*. **HT *arctata*:** ♂, Cherra Punjee [OXUM]. The syntypes (♂ & ♀) of *maculosa* from “Hindostan” should be in the BMNH but were not found there.

**Diagnosis:** Fwl. 26–27 mm. A rather large species, white with a pale brown convex pattern of dots and patches, on the fw. a characteristic oval white fascia, a smaller white area in the subbasal field and some white in the wing margin. Hw. white with usually a complete row of brown marginal spots. Head, thorax and abdomen yellow with black thoracic dots and abdominal bands. There is little variation in the pattern of this species.

♂ genitalia robust with extremely large apical extension on the valva resembling a machete. Uncus beak-shaped but not very broad, dorsally with a sharp central ridge running over the uncus. Phallus slightly bend and constricted in the middle ventrally, vesica long and narrow with a thorn-shaped cornutus distally.

♀ genitalia with large triangular-shaped lamella vaginalis, short and broad ductus bursae and an oval-shaped bursa. An oval signum in the middle of the left side which is irregular edged with small blunt teeth.

**Distribution:** A wide distribution on the mainland of Oriental Asia, from Nepal and Northeast India to Vietnam, Thailand and the Malayan Peninsula, also recorded from the Nicobar Islands.

***Nyctemera (Arctata) albofasciata* (WILEMAN, 1911)**

(Figs. 4–6, 73, 101, 129, 154, 181, 208.)

*Deilemera albofasciata*: WILEMAN (1911: 31).

*Deilemera arctata albofasciata*: SEITZ (1915: 275); BRYK (1937: 88).

*Deilemera arctata f. albofasciata*: MATSUMURA (1930: 61).

*Deilemera arctata*: MATSUMURA (1931: 952) *nec* WALKER, 1856.

*Nyctemera arctata*: ROEPKE (1948: 213) *nec* WALKER, 1856.

*Nyctemera arctata scalarium*: ROEPKE (1949: 49) [in part].

*Nyctemera arctata albofasciata*: ROEPKE (1957: 149); HOLLOWAY (1976: 6); CHANG (1989: 136); INOUE & KISHIDA (1992: 169); DE VOS & ČERNÝ (1999: 154).

*Deilemera arctata f. tamahonis*: MATSUMURA (1931: 953).

*Nyctemera arctata albofasciata f. tamahonis (sic)*: INOUE & KISHIDA (1992: 169).

**Material examined:** More than 400 specimens in BMNH, CKC, CMWM, RMNH, ZMHU, including the HT of *albofasciata*. — **HT *albofasciata*:** ♀, Formosa, Kaegi District, 7–10,000 ft., VII. 1909 [BMNH]. — The ♂ “holotype” of *tamahonis* MATSUMURA, 1931 has no type status since it was described as an infraspecific taxon. The specimen is deposited in SEHU.

**Diagnosis:** Fwl. 25–26 mm. This species is closely allied to *Nyctemera arctata* and its similar wing pattern previously led to the general opinion that both, *arctata* and *albofasciata*, were conspecific. It is somewhat smaller and has a similar wing pattern, but the white fascia on the fw. is not oval-shaped but more or less diverging from tornus to costa and with usually a brown spot in this fascia at the end of the cell. At wingbase a white rectangular bar with a brown basal spot. Fw. margin as in *arctata*, with white veins crossing the brown marginal field and with white confluent spots at the termen, the largest in the middle. The bipectinate antenna in ♂ with longer pectination than in *arctata*. Black abdominal bands more extended than in *arctata*. There is no significant variation in wing pattern.

♂ genitalia with valva shorter and with a much broader apical process than in *arctata*. Uncus similar as in *arctata*. Phallus straight and in the middle ventrally constricted, vesica with long, but broader than in *arctata* and thorn-shaped cornutus much larger than in *arctata*.

♀ genitalia with large U-shaped lamella vaginalis (in *arctata* triangular), ductus bursae broad and with globular bursa copulatrix. Signum at the left side of the bursa and similar as in *arctata* but more regular edged.

**Distribution:** Restricted to the island Taiwan (Formosa), but one ♂ specimen has been recorded from South Luzon (Mt. Isarog), which might have been a migrating individual or imported by ship.

***Nyctemera (Arctata) zerenoides* (BUTLER, 1881),****stat. rev.**

(Figs. 7–8, 74, 102, 130, 155, 182, 209.)

*Trypheromera zerenoides*: BUTLER (1881: 380); KIRBY (1892: 423).

*Deilemera zerenoides*: SWINHOE (1903: 64); ROTHSCHILD (1920: 133).

*Nyctemera mülleri (sic) f. zerenoides*: SEITZ (1915: 275).

*Deilemera mülleri (sic)*: VAN EECKE (1928: 67) [in part].

*Deilemera muelleri f. zerenoides*: BRYK (1937: 91).

*Nyctemera arctata zerenoides*: ROEPKE (1957: 149); CHANG (1989: 136).

**Material examined:** 16 specimens in BMNH and RMNH, including the HT of *zerenoides*. — **HT *zerenoides*:** ♀, Sumatra [BMNH].

**Diagnosis:** Fwl. 24–26 mm. Much more fragile and smaller than the previous species. More resembling the next species, *scalarium* SNELLEN VAN VOLLENHOVEN, 1863, but with some important distinguishing characters which are compared here. The dominantly white fw. with a pale brown pattern of incomplete median, submarginal and marginal transverse row of dots. Costa of the same brown as the dot pattern, as well as a streak on vein A2+3 in the basal field and two cell streaks. Hw. white, usually

with some marginal dots of different sizes but some specimens without any spots. *Nyctemera scalarium* with more extended and darker brown pattern. Termen of the fw. slightly convex, not straight as in *scalarium*. Dorsal black dots on the abdomen smaller than in *scalarium*.

♂ genitalia with narrow uncus, in *scalarium* the uncus is broader, beak-shaped. Valve in *zerenoides* at costa of cucullus arched but without the squarish extension as seen in *scalarium*. Apical process of *zerenoides* more or less spoon-shaped and slightly curved at its base, in *scalarium* the apical process is straight and not spoon-shaped. Tegumen of *zerenoides* narrow, in *scalarium* much broader. Phallus of *zerenoides* short and slightly curved and constricted in the middle, in *scalarium* the phallus is longer, straight and not constricted. Vesica of both species distally with long thorn-like cornutus, but in *zerenoides* smaller and narrower than in *scalarium*.

♀ genitalia with in *zerenoides* a large and heavy sclerotised lamella vaginalis, in *scalarium* smaller and less sclerotised. Bursa copulatrix in *zerenoides* globular with some folds but without sclerotisation, small signum present in the centre of the upper half, in *scalarium* the bursa copulatrix with two complicated sclerotised folds, in the centre of the upper part a small signum.

**Distribution:** So far only known from the southern half of Sumatra, and one ♀ specimen from G. Malang, East Java, in BMNH. The species is much rarer than the next species and is found at altitudes of over 2000 m.

***Nyctemera (Arctata) scalarium* (SNELLEN VAN VOLLENHOVEN, 1863), stat. rev.**

***Nyctemera (Arctata) scalarium scalarium* (SNELLEN VAN VOLLENHOVEN, 1863)**

(Figs. 9–16, 75, 103, 156, 183, 210.)

*Leptosoma scalarium*: SNELLEN VAN VOLLENHOVEN (1863: 50); BUTLER (1880: 673).

*Trypheromera scalarium*: KIRBY (1892: 423).

*Nyctemera scalarium*: SNELLEN (1898: 24); VAN EECKE (1927: 223).

*Nyctemera (Trypheromera) scalarium*: PAGENSTECHE (1901: 153).

*Deilemema arctata* f. *scalarium*: BRYK (1937: 88).

*Nyctemera arctata scalarium*: ROEPKE (1948: 213 [in part]; 1949: 49 [in part]; 1957: 149); CHANG (1989: 136).

*Deilemema arctata javana*: REICH (1932: 237); BRYK (1937: 89), syn. n.

*Nyctemera arctata*: ROEPKE (1948: 213) [in part]

**Material examined:** About 700 specimens in BMNH, CKC, CMWM, MCSN, RMNH, ZFMK, ZMHU, ZSM, including the types of *scalarium* and *javana*. – HT *scalarium*: ♀, Java, [name of collector illegible] [RMNH]. – LT *javana*: ♂, herewith designated from the ST series (1 ♂, 1 ♀): Java occ., Preanger (Gede), 1894–5., Type, leg. PRILLWITZ, *Deilemema arctata* ssp. nov. *javana* ♂, Coll. STAUDINGER, det. Paul REICH [ZMHU]; PLT *javana*: ♀, Mssn. G., *Abraxas Nyctemera* M. Java, Type, *Deilemema arctata* ssp. nov. *javana* ♀, det. Paul REICH [ZMHU].

**Diagnosis:** Fwl. 26–27 mm. Resembling the previous species and generally confused with it. This (sub-)spe-

cies is however larger, has a stronger and darker pattern of brown dots and is also distinguished by the straight termen in the ♂♂, which is slightly convex in *zerenoides*. The species has a cline from Sumatra to Central Java with the dark pattern gradually reducing, but in East Java populations are mixed with darker patterned specimens resembling the darker subspecies *balinensis* (see below).

Uncus in ♂ genitalia beak-shaped, much broader than in *zerenoides*. Valva with distinct squarish extension on the costa of the cucullus, there is somewhat variation in size and shape between specimens but it is always present and not as shallow as in *zerenoides*. Apical process straight, slightly curved at its base but not so strong and spoon-shaped as in *zerenoides*. Phallus longer than of *zerenoides*, straight without constriction in the middle, distally half open and diverging, vesica distally with thorn-like cornutus, larger than of *zerenoides*.

Lamella vaginalis in ♀ genitalia large and the distal rim strongly sclerotised and with a caudal “U”-shaped sclerotised band. A short and wide ductus bursae and a large globular bursa copulatrix with two longitudinal folds which are strongly sclerotised. The sclerotisation can vary between specimens and is sometimes much extended that both are connected to form a half band around the bursa. Between both folds a small signum is present consisting of small chitinous teeth, the edge of the signum is irregular and can vary between specimens.

**Distribution:** The subspecies *scalarium* has its distribution from the Malayan Peninsula in Pahang to Sumatra, West Java (where it is most abundant) and East Java. It is apparently a mountain species which is found at altitudes between 1000 and 2100 m although there are some rare records from lower altitudes.

***Nyctemera (Arctata) scalarium balinensis* ssp. n.**

(Figs. 17–18, 76, 104, 131, 157, 184, 211.)

**Holotype** ♂: Nederlands Indië, Bali, Batoeriti, 1100 m, XII. 1939, leg. J. P. A. KALIS, coll. J. M. A. VAN GROENENDAEL [RMNH].

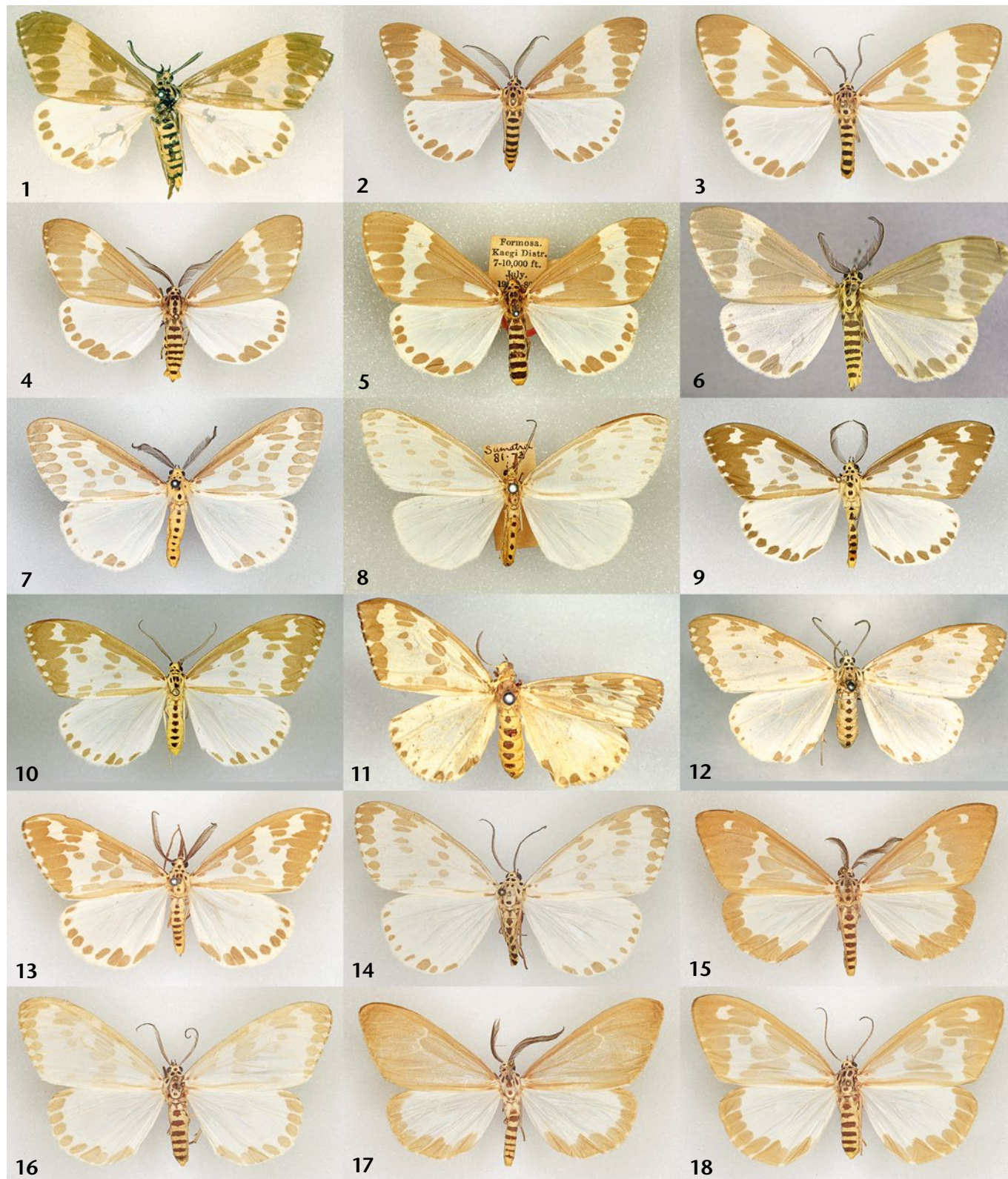
**Paratypes** (in total 6 ♂♂, 6 ♀♀): 6 ♂♂, 4 ♀♀, as HT, but dates [1 ♀] iv. 1936, [1 ♂, 2 ♀♀] x. 1939, [4 ♂♂, 1 ♀] xi. 1939, [1 ♂] XII. 1939 [RMNH]; 2 ♀♀, Indonesia, Western Lesser Sunda Isl., Bali, Jimbaran, 35 m, leg. U. & L. H. PAUKSTADT [CMWM].

**Further material examined:** 115 specimens in BMNH, CMWM and RMNH, including the types of *balinensis*.

**Etymology:** The subspecies *balinensis* is named after the island Bali, where this subspecies is found.

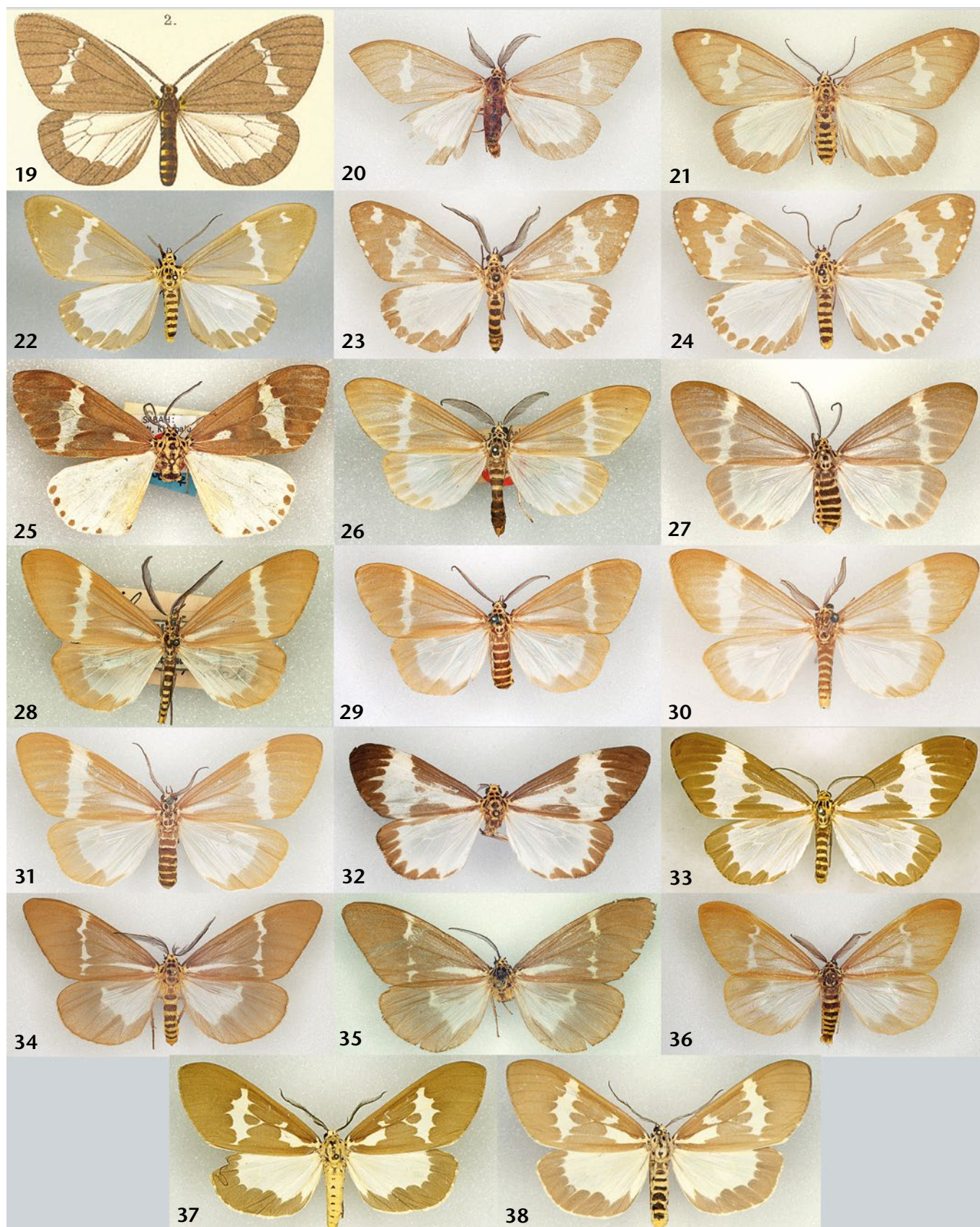
**Diagnosis:** Fwl. 24–27 mm. In general the same construction of wings and genitalia as the nominotypical subspecies. The brown pattern on the fw. much more extended than in subspecies *scalarium*, some ♂ specimens (like in the HT) uniformly brown without a trace of white. The variation in dark pattern is enormous but never matching the phenotype of *scalarium*. ♀♀ usually less extremely suffused, always with at least traces of white, leaving a white fascia and basal streak or in some specimens resembling the ♂ pattern of ssp. *scalarium*. The hw. with more or less confluent marginal dots or





Figs. 1–3: *Nyctemera (Arctata) arctata*. Fig. 1: HT ♂, Cherra Punjee, India (OXUM); Fig. 2: ♂, Kachin State, Myanmar (ZMAN); Fig. 3: ♀, Kachin State, Myanmar (ZMAN). — Figs. 4–6: *N. (A.) albofasciata*. Fig. 4: ♂, Prov. Taitung, Taiwan (ZMAN); Fig. 5: HT ♀, Formosa (BMNH); Fig. 6: HT *tamahonis*, ♂, Taiwan (SEHU). — Figs. 7–8: *N. (A.) zerenoides*. Fig. 7: ♂, Mt. Korintji, Sumatra (BMNH); Fig. 8: HT ♀, Sumatra (BMNH). — Figs. 9–18: *N. (A.) scalarium*. Fig. 9: ssp. *scalarium*, ♂, Sumatra (CMWM); Fig. 10: ssp. *scalarium*, ♀, Sumatra (RMNH); Fig. 11: ssp. *scalarium*, HT ♀, West Java (RMNH); Fig. 12: ssp. *scalarium*, LT *javana* ♀, West Java (ZMHU); Fig. 13: ssp. *scalarium*, ♂, Preanger, West Java (RMNH); Fig. 14: ssp. *scalarium*, ♀, Kramat Wangi, West Java (ZMAN); Fig. 15: ssp. *scalarium* (dark form), ♂, Djoenggo Ardjoeno, East Java (ZMAN); Fig. 16: ssp. *scalarium* (dark form), ♀, Djoenggo Ardjoeno, East Java (ZMAN); Fig. 17: ssp. *balinensis*, HT ♂, Batoeriti, Bali (ZMAN); Fig. 18: ssp. *balinensis*, PT ♀, Batoeriti, Bali (ZMAN). — Specimens not to the same scale.





Figs. 19–24: *Nyctemera (Arctata) tenuifascia*. Fig. 19: ssp. *tenuifascia*, HT ♀, from SNELLEN (1898: pl. 1, fig. 2); Fig. 20: ssp. *tenuifascia*, ♂, Mt. Rinjani, Lombok (RMNH); Fig. 21: ssp. *tenuifascia*, ♀, Mt. Rinjani, Lombok (RMNH); Fig. 22: ssp. *regalis*, HT ♀, Flores (RMNH); Fig. 23: ssp. *timorana*, PT ♂, Mt. Mutis, Timor (ZMAN); Fig. 24: ssp. *timorana*, PT ♀, Mt. Mutis, Timor (ZMAN). — Fig. 25: *N. (A.) montana*, HT ♀, Mt. Kinabalu, Sabah, Borneo, Malaysia (BMNH). — Figs. 26–31: *N. (A.) hyalina*. Fig. 26: ssp. *hyalina*, HT ♂, Arfak Mts, Dutch New Guinea (BMNH); Fig. 27: ssp. *hyalina*, ♀, Demaisi, Arfak Mts, Papua Barat, Indonesia (ZMAN); Fig. 28: ssp. *stresemanni*, HT ♂, Seram (BMNH); Fig. 29: ssp. *stresemanni*, ♀, Manusela, Seram (BMNH); Fig. 30: ssp. *diaphana*, HT ♂, Minahassa, North Sulawesi (ZMAN); Fig. 31: ssp. *diaphana*, ♀, Malino–Goa, Central Sulawesi (ZMAN). — Figs. 32–33: *N. (A.) kinabaluensis*. Fig. 32: ♂, Mt. Kinabalu, Sabah, Borneo, Malaysia (BMNH); Fig. 33: LT ♀, Mt. Kinabalu, Sabah, Borneo, Malaysia (ZMHU). — Figs. 34–35: *N. (A.) toradjana*. Fig. 34: HT ♂, Gn. Rantemario, SW Sulawesi (ZMAN); Fig. 35: PT ♀, Gn. Rantemario, SW Sulawesi (ZMAN). — Fig. 36: *N. (A.) celebensis*, HT ♂, Poloka, Sulawesi Tengah (ZMAN). — Figs. 37–38: *N. (A.) undulata*. Fig. 37: HT ♂, Mindanao, Philippines (CMWM); Fig. 38: PT ♀, Mindanao, Philippines (CMWM). — Specimens not to the same scale.



patches, forming a marginal band with the white veins crossing. Yellow abdomen with black bands in stead of dorsal dots.

Genitalia (RV1368 ♂, RV1369 ♀) as described with subspecies *scalarium*.

**Distribution:** The subspecies is found on Bali, Indonesia, isolated from the western populations of *scalarium* on Java. In the easternmost part of Java some similar dark specimens are found sympatrically with typical *scalarium* phenotypes. It is hard to consider these to belong to *balinensis* too but those certainly take part in a cline of darker specimens towards the East. Such specimens may be considered to be dark forms of *scalarium* s. str.

***Nyctemera (Arctata) scalarium tenuifascia* SNELLEN, 1898, stat. n.**

(Figs. 19–21, 77, 105, 132, 158, 185, 212.)

*Nyctemera tenuifascia*: SNELLEN (1898: 26); PAGENSTECHE (1898: 198; 1901: 123); SWINHOE (1903: 84); SEITZ (1915: 271); BRYK (1937: 82)

*Nyctemera tenuifascia tenuifascia*: ROEPKE (1949: 60)

**Material examined:** 8 specimens in BMNH and RMNH. The HT was originally in the PAGENSTECHE collection in Wiesbaden but couldn't be traced there. The fine colour drawing of SNELLEN (1898: Plate 1, fig. 2) however leaves no doubt about its identity. — HT: ♀, Lombok, Sambalan, 4000 ft., iv. 1896, FRUHSTORFER [current deposition unknown, neither found in Wiesbaden nor in Munich nor anywhere else].

**Diagnosis:** Fwl. 26–28 mm. Only one ♂ specimen is known (in RMNH) which has only an irregular edged narrow white fascia on the pale brown fw. which does not reach costa or tornus. The hw. white with a dark marginal band with convex pattern between the veins. The ♀ is almost identical to the ♂ but in some specimens the white can be extended into a broader fascia and a small white irregular subapical spot and a narrow white basal streak. Hw. as in ♂.

♂ genitalia (RV1361) as described for *scalarium*. The squarish extension on the cucullus somewhat more shallow, the uncus slightly more arched. In the studied ♀ genitalia (RV1362) the sclerotised folds on the bursa copulatrix are connected to a half band, the signum seems to be less developed. Both can be due to specimens variation. There is no significant difference to consider this to be a true species since all other characters are matching *scalarium*.

**Distribution:** The subspecies *tenuifascia* is restricted to Lombok, Indonesia.

***Nyctemera (Arctata) scalarium regalis* ROEPKE, 1954, stat. n.**

(Figs. 22, 186, 213.)

*Nyctemera regalis*: ROEPKE (1954: 258).

**Material examined:** 4 ♀♀ specimens in CMWM and RMNH, including the HT. — HT: ♀, Central Flores, 1200 m, 30. xii. 1952, leg. J. M. A. VAN GROENENDAEL [RMNH].

**Diagnosis:** ♂ unknown. — Fwl. ♀ 27 mm. The ♀♀ resemble those from Lombok (ssp. *tenuifascia*) but with redu-

ced white, leaving a narrow irregular fascia which runs from tornus to costa. An irregular subapical spot present. In the hindwings the marginal band consists of semiconfluent brown patches leaving white traces, while the entire dorsum is brown (in all other subspecies not entirely brown).

♀ genitalia (RV1376) identical to those of subspecies *scalarium*.

**Distribution:** The subspecies *regalis* is restricted to Flores, Indonesia.

***Nyctemera (Arctata) scalarium timorana* ssp. n.**

(Figs. 23–24, 78, 106, 133, 159, 187, 214.)

**Holotype** ♂: Indonesien, Timor, Prov. Nusa Tenggara Timur, Mt. Mutis Süd, 5 km N Fatumnasi, 1730 m, Primärwald, 26. iii. 1996, leg. Dr. R. BRECHLIN [CMWM].

**Paratypes:** 2 ♀♀, Indonesien, Timor, Prov. Nusa Tenggara Timur, Mt. Mutis Süd, Fatumnasi, 1460 m, 21.–23. iii. 1996, leg. Dr. R. BRECHLIN [CMWM].

**Material examined:** The HT and two PT in CMWM were studied, no other material available.

**Etymology:** The name is derived from its origin, the island of Timor.

**Diagnosis:** Fwl. ♂ 24 mm, ♀ 25 mm. ♂ and ♀ are almost identical. Fw. with reduced brown pattern leaving an irregular fascia which is connected with a white wedge-shaped field from base to fascia with three rounded patches in the ♂ which can be (partly) confluent to form one large patch in the ♀. An irregular white subapical spot present which is distinctly larger than in *tenuifascia* and *regalis*. Along the termen a row of small white spots. Hw. white with a marginal band of semiconfluent and separate brown patches, in the tornus larger and with brown tornal streak along the dorsum reaching half way.

Genitalia both ♂ (RV1404) and ♀ (RV1405) identical to those of subspecies *scalarium*.

**Distribution:** The subspecies was found so far on the Indonesian part of Timor.

***Nyctemera (Arctata) montana* HOLLOWAY, 1976**

(Figs. 25, 188, 215.)

*Nyctemera montana*: HOLLOWAY (1976: 6; 1988: 73).

**Material examined:** The ♀ HT and two ♀♀ PT in BMNH were studied, no other material available. — HT: ♀, [Malaysia, Borneo], Sabah, Mt. Kinabalu, 2110 m, vii.–ix. 1965, leg. BANKS, BARLOW & HOLLOWAY [BMNH].

**Diagnosis:** The ♂ is unknown. — Fwl. 28–30 mm. One of the largest *Nyctemera* species. Forewings chocolate brown with convex pattern, an irregular edged white fascia which runs from vein A2+3 to the costa, a club-shaped basal streak with a very fine baseline, veins from termen to fascia finely white, some veins at termen with extended white. Hindwings white with along the margin a row of small brown marginal spots and a longitudinal tornal spot.

♀ genitalia (BM2103) with a large lamella vaginalis and a narrow folded “V”-shaped ostium rim. Ductus bursae



rather long and of moderate width and sclerotised, a globular bursa copulatrix without sclerotised folds. One small oval bowl-shaped signum with tiny spines.

**Distribution:** Only known from Mt. Kinabalu, Northeast Borneo.

### *hyalina* species-group

#### Diagnosis

Closely allied to the *arctata* species-group. Forewings broad, with grey-brown to dark brown convex pattern on white ground with a transverse fascia. Hindwing white with a marginal band with deeply cut convex dark pattern, in some species confluent to form a complete band. Both wings subhyaline.

Male genitalia with elongate saddle-shaped uncus and apex with a hammer-head, which are the most important differences with the *arctata* species-group. Valvae elongate with a large dorsally bend apical process which can be quite large, in most species spatula-shaped. Phallus short, slightly sinuous and distally half open and widening. Vesica wide, usually bilobed and without cornutus (in *arctata* species-group with distal cornutus and not bilobed), with an exception in one species.

Female with lamella vaginalis rather small. Ductus bursae wide with a slightly sclerotised antrum and a slightly swollen cervix bursa. Bursa copulatrix large, globular and without signum (in *arctata* group with one signum).

The species-group is widely distributed in Borneo, Sulawesi, the Moluccas and West New Guinea.

#### *Nyctemera (Arctata) hyalina* (BETHUNE-BAKER, 1910)

#### *Nyctemera (Arctata) hyalina hyalina* (BETHUNE-BAKER, 1910)

(Figs. 26–27, 79, 107, 134, 160.)

*Deilemema hyalina*: BETHUNE-BAKER (1910: 448).

*Nyctemera hyalina*: SEITZ (1915: 273); BRYK (1937: 64); ROEPKE (1949: 64); KISHIDA (1994: 13).

**Material examined:** The HT and 22 additional specimens have been studied in BMNH, CKC, CMWM and RMNH. — HT: ♂, North New Guinea, Arfak, 1200 m, II.–III. 1909, leg. C. B. PRATT [BMNH].

**Diagnosis:** Fwl. 21–26 mm. Fw. and hw. subhyaline, white with grey-brown to dark brown pattern. Fw. with an almost straight narrow fascia with marginally convex indented pattern along the veins. A faint short basal streak present at wingbase. Hw. white with the dark marginal band convex indented and crossed by white veins.

♂ genitalia with a narrow elongated uncus with a hammer-head apical part which is higher than in *kinabaluensis*. Valva elongated with a large spatula-shaped apical process which is more gradually curved and with a rounder apex than in *kinabaluensis*. A small costal process on the cucullus, in *kinabaluensis* much smaller, shallow and hardly visible. Phallus short, slightly curved and

with a wide open distal part which is broadened like a spoon. Double lobed vesica without cornutus.

♀ genitalia with a sclerotised flattened antrum which is curled for 90°. Cervix bursae slightly swollen. Bursa copulatrix large, globular and without signum.

**Distribution:** The subspecies *hyalina* is endemic to the Arfak Mountains in the Birdshead Peninsula in West Papua.

#### *Nyctemera (Arctata) hyalina stresemanni* (ROTHSCHILD, 1915) stat. n.

(Figs. 28–29, 80, 108, 135, 161, 189.)

*Deilemema stresemanni*: ROTHSCCHILD (1915: 214).

*Nyctemera stresemanni*: BRYK (1937: 81).

*Nyctemera hyalina*: sensu KISHIDA (1994: 13) [in part].

**Material examined:** The HT and 62 additional specimens were studied in BMNH. — HT: ♂, Seram, Mansela [sic = Manusela], 650 m, 1912, leg. E. STRESEMANN [BMNH].

**Diagnosis:** Fwl. 22–27 mm. Similar to subspecies *hyalina* but generally larger. The white basal streak on the fw. more distinct and longer, the white fascia similar but with less indented margins. Hw. margin broader and less indented, not completely crossed by white veins.

Genitalia as described with subspecies *hyalina*.

**Distribution:** The subspecies *stresemanni* is mainly found on Seram, Indonesia, but there is one ♀ specimen in the BMNH collection from Buru.

#### *Nyctemera (Arctata) hyalina diaphana* ROEPKE, 1949 stat. n.

(Figs. 30–31, 81, 109, 136, 162, 190.)

*Nyctemera diaphana*: ROEPKE (1949: 64); KISHIDA (1994: 13).

**Material examined:** The HT, “allotype”, the two PT and 42 additional specimens in BMNH, CKC, CMWM and RMNH have been studied. — HT: ♂, [Sulawesi], Minahassa, 1920 [coll. P. J. VAN DEN BERGH] [RMNH].

**Diagnosis:** Fwl. 27–28 mm. The largest of the three subspecies. Similar in appearance to subspecies *stresemanni* but forewing with broader fascia and longer basal streak. Hw. margin like in *stresemanni*.

Genitalia as described in subspecies *hyalina*.

**Distribution:** The subspecies *diaphana* is widely distributed on Sulawesi and is found at altitudes from 900 to 1700 m.

#### *Nyctemera (Arctata) kinabaluensis* (REICH, 1932)

(Figs. 32–33, 82, 110, 137, 163, 191.)

*Deilemema arctata kinabaluensis*: REICH (1932: 238); BRYK (1937: 89).

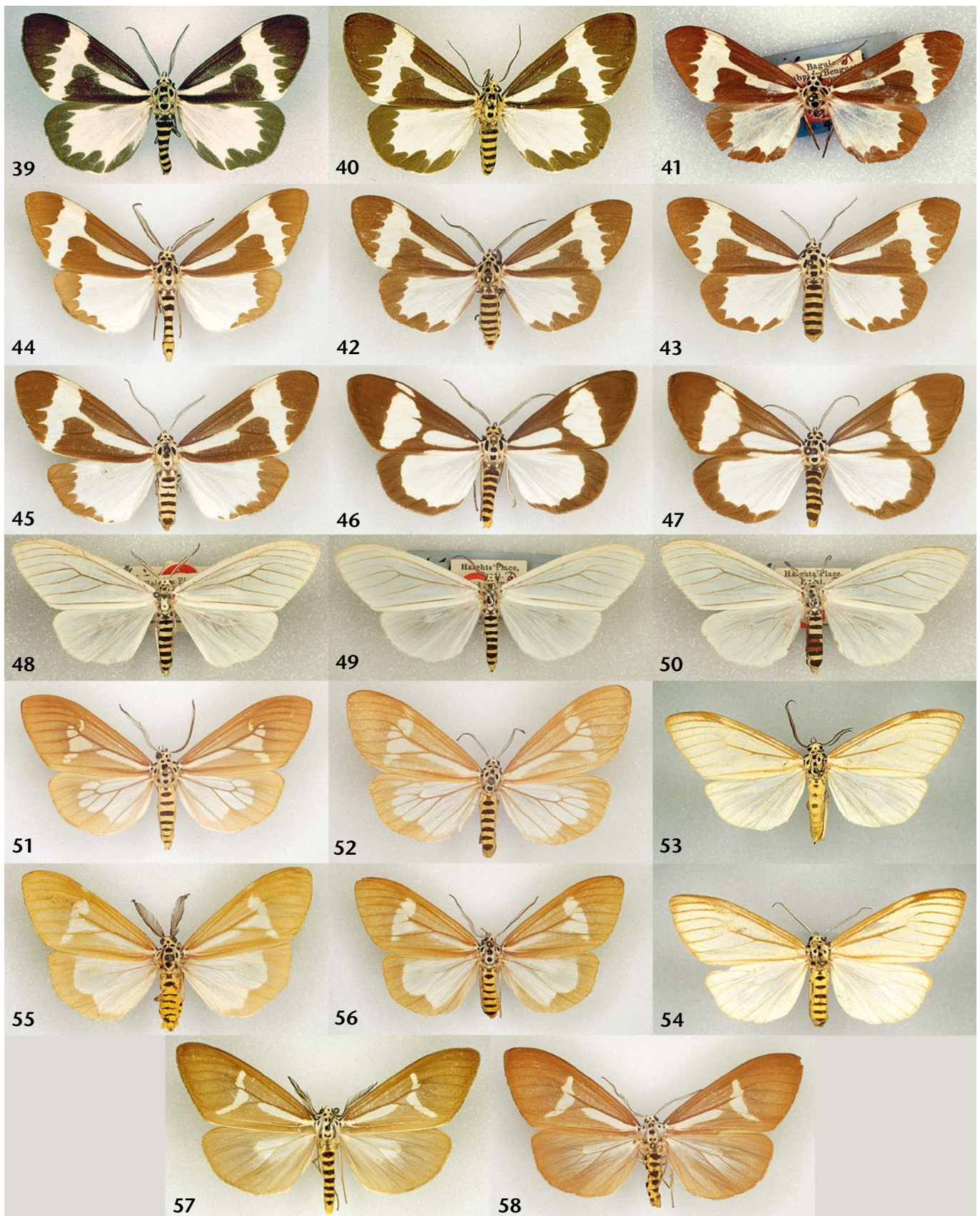
*Nyctemera arctata scalarium* sensu ROEPKE (1949: 50) nec SNELLEN VAN VOLLENHOVEN, 1863.

*Nyctemera arctata kinabaluensis*: HOLLOWAY (1976: 6).

*Nyctemera kinabaluensis*: HOLLOWAY (1988: 72); KISHIDA (1994: 13); DE VOS & ČERNÝ (1999: 158).

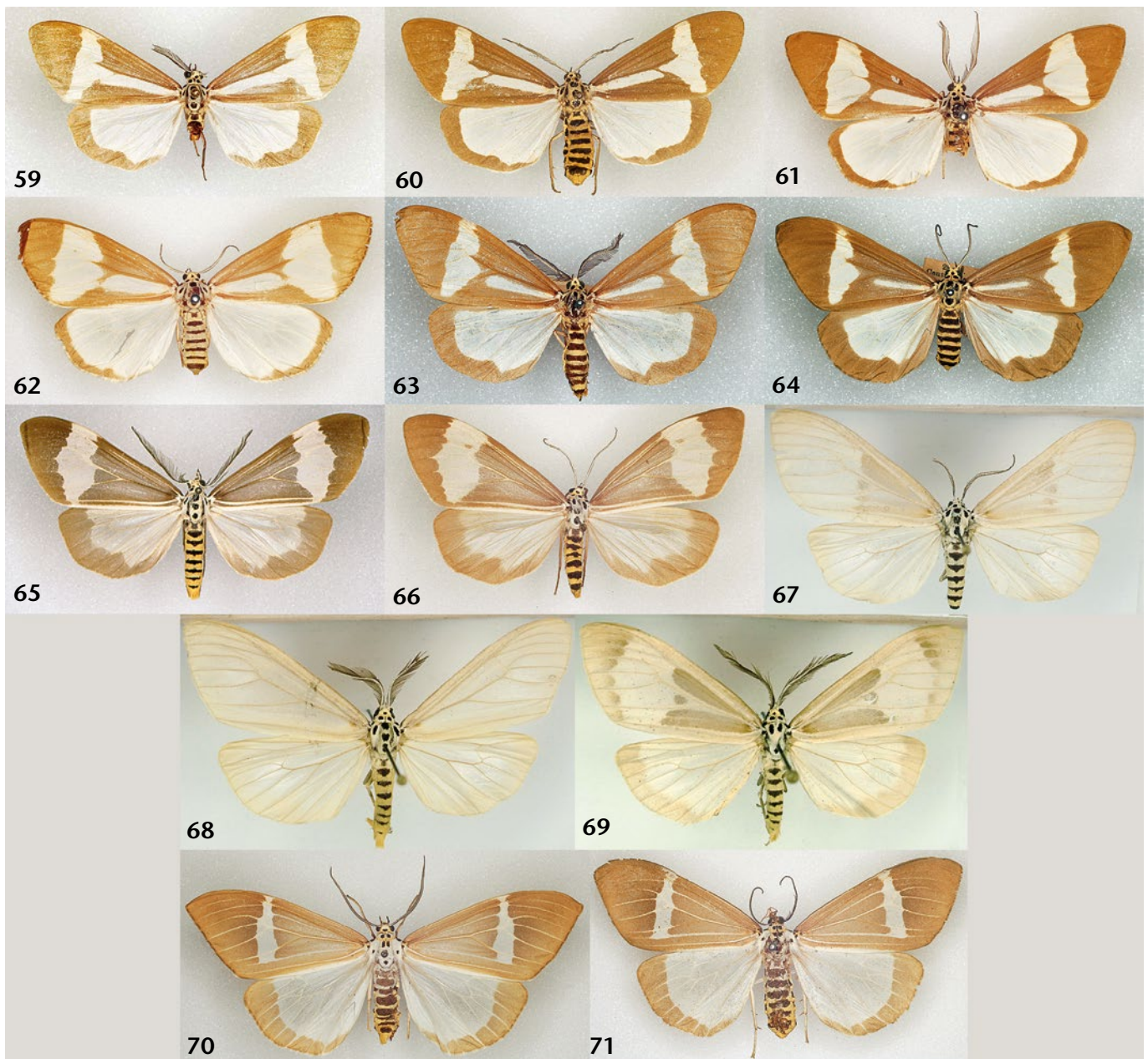
**Material examined:** The LT, PLT and 15 additional specimens have been studied in BMNH, BPBM, MCZR, SMFL and ZMHU. — LT: ♀,





Figs. 39–40: *Nyctemera (Arctata) palawanica*. Fig. 39: PT ♂, Palawan, Philippines (SMFL); Fig. 40: HT ♀, Palawan, Philippines (CMWM). — Figs. 41–43: *N. (A.) browni*. Fig. 41: HT *conjuncta* ♂, Luzon, Philippines (BMNH); Fig. 42: ♂, Chatol, North Luzon, Philippines (ZMAN); Fig. 43: ♀, Banaue, North Luzon, Philippines (ZMAN). — Figs. 44–45: *N. (A.) angustipennis*. Fig. 44: ♂, Mt. Polis, Ifugao, North Luzon, Philippines (ZMAN); Fig. 45: ♀, Mt. Polis, Ifugao, North Luzon, Philippines (ZMAN). — Figs. 46–47: *N. (A.) consobriniformis*. Fig. 46: HT ♂, Bukidnon, Mindanao, Philippines (ZMAN). Fig. 47: PT ♀, Bukidnon, Mindanao, Philippines (ZMAN). — Figs. 48–50: *N. (A.) gratia*. Fig. 48: LT *philippinensis* ♂, Luzon, Philippines (BMNH); Fig. 49: HT *venata* ♂, Luzon, Philippines (BMNH); Fig. 50: PT *venata* ♀, Luzon, Philippines (BMNH). — Figs. 51–54: *N. (A.) luzonensis*. Fig. 51: ssp. *luzonensis*, ♂, Chatol, North Luzon, Philippines (ZMAN); Fig. 52: ssp. *luzonensis*, ♀, Ifugao, North Luzon, Philippines (ZMAN); Fig. 53: ssp. *squalida*, HT ♂, South Luzon, Philippines (SMFL); Fig. 54: ssp. *squalida*, PT ♀, South Luzon, Philippines (CKC). — Figs. 55–56: *N. (A.) apoensis*. Fig. 55: ♂, Bukidnon, Mindanao, Philippines (ZMAN); Fig. 56: ♀, Bukidnon, Mindanao, Philippines (ZMAN). — Figs. 57–58: *N. (A.) lunulata*. Fig. 57: HT ♂, Bukidnon, Mindanao, Philippines (CMWM); Fig. 58: PT ♀, Bukidnon, Mindanao, Philippines (ZMAN). — Specimens not to the same scale.





**Figs. 59–60:** *Nyctemera (Arctata) owadai*. **Fig. 59:** ♂, Mt. Polis, Ifugao, North Luzon, Philippines (ZMAN); **Fig. 60:** ♀, Dalton Pass, Nueva Viscaya, Luzon, Philippines (RMNH). — **Figs. 61–64:** *N. (A.) toxopei*. **Fig. 61:** ssp. *toxopei*, HT ♂, Ehu, Buru (RMNH); **Fig. 62:** ssp. *toxopei*, PT ♀, Buru (RMNH); **Fig. 63:** ssp. *ceramensis*, HT ♂, Seram (BMNH); **Fig. 64:** ssp. *ceramensis*, PT ♀, Seram (BMNH). — **Figs. 65–69:** *N. (A.) robusta*. **Fig. 65:** ssp. *robusta*, HT ♂, Bukidnon, Mindanao, Philippines (CMWM); **Fig. 66:** ssp. *robusta*, PT ♀, Bukidnon, Mindanao, Philippines (ZMAN); **Fig. 67:** ssp. *busanica*, HT ♀, Mt. Busa, Mindanao, Philippines (CMWM); **Fig. 68:** ssp. *busanica*, PT ♂, Mt. Busa, Mindanao, Philippines (CMWM); **Fig. 69:** ssp. *busanica*, PT ♂, Mt. Busa, Mindanao, Philippines (CMWM). — **Figs. 70–71:** *N. (A.) goliath*. **Fig. 70:** HT ♂, Tosari, East Java (RMNH); **Fig. 71:** PT ♀, Tosari, East Java (RMNH). — Specimens not to the same scale.

designated herewith from the ST series (3 ♀♀): Borneo, Kinabalu, 1893, leg. WATERSTRADT [ZMHU]; PLT: 2 ♀♀, data as LT [ZMHU].

**Diagnosis:** Fwl. 24–28 mm. Resembles *Nyctemera arctata* in appearance but the wingshape is different with a more oblique termen and the wings are subhyaline. White fw. with dark brown strongly convex pattern and with the fascia broadly connected with the white streak below the cubital vein. In this connection the brown pattern is reduced to some oval patches. Margin on fw. and hw. strongly convex, indented along the veins but not interrupted like in *arctata*. Hw. somewhat squarish, termen not rounded like in other species in the *hyalina* group.

♂ genitalia with uncus narrow and elongate like in *hyalina*, but the apical hammer-head part much more shallow than in *hyalina*. Valva elongated with rudimentary costal process on the cucullus, apical process acutely curved with an angle of 90°, the apical part of the process gradually tapering. Phallus straight with diverging distal mouth and with a bilobed vesica without cornutus.

♀ genitalia similar as in *hyalina* but with a more swollen cervix bursae. Bursa copulatrix without signum.

**Distribution:** *Nyctemera kinabaluensis* is apparently endemic to the Kinabalu Mountain region in Northeast Borneo, Sabah, Malaysia.

***Nyctemera (Arctata) toradjana* sp. n.**

(Figs. 34-35, 83, 111, 138, 164, 192.)

**Holotype** ♂: Indonesia, SW Sulawesi, ca. 30 km NE of Enrekang, Gn. Rantemario, Gowa Camp, 1800 m, 6. xi. 1993, undisturbed lower montane forest along Sg. Gowa Sarumpa'pa, 3°24'45" S, 120°0'0" E, at light, J. P. & M. J. DUFFELS [RMNH].

**Paratypes** (in total 3 ♂♂, 1 ♀): 1 ♂, 1 ♀, [same as HT but date:] 7. xi. 1993 [RMNH]; 2 ♂♂, Indonesia, Sulawesi Tengah, Puncak Palopo, 2°55' S, 120°5' E, 900-1300 m, i. 1997, leg. R. BRECHLIN [CMWM].

**Etymology:** The species is named in honour of the Toradja people which inhabit the distribution area of the species.

**Diagnosis:** A robust species, dark brown with a narrow straight fascia reaching the costa on the stretched fw. and a very broad dark brown hindwing margin which encloses the white center.

**Description:** Fwl. ♂ 27-29 mm, ♀ 30 mm. Head yellow, with a black dot on frons and vertex. Labial palpa slender, shorter than in the next species, *Nyctemera celebensis* sp. n., dark grey, ventrally and at apex pale yellow. Antennae black, flagellum laterally thinly white, bipectinate with long pectination, in ♀ flagellum entirely black and with thinner and shorter pectination.

Patagia yellow with a central black patch. Tegulae yellow, basally black and with a central black longitudinal patch, apically with yellow long hairy scales. Thorax yellow with dorsally two anterior black spots and a central and posterior black band. Ventrally thorax yellow with two pair of black lateral spots. Legs with coxa yellow, anterior coxa at outer half black, mid and posterior coxa distally with a black spot. Femur, tibia and tarsi grey-brown, bone-white posteriorly.

Abdomen yellow with a broad black band on each segment, ventrally these bands are crossed by a yellow longitudinal central line. The anal tuft is yolk-yellow.

Fw. long, stretched triangular and semihyaline. Termen straighter than in *celebensis*. Ground colour brown, distinctly darker than in *celebensis*. The wingfold with a narrow white streak from base to fascia, gradually narrowing. White fascia straight, narrow and usually undulate, at the end of the cell it follows the venation, and reaching costa (in *celebensis* it does not reach the costa). In some specimens with extended white pattern the fascia is somewhat broader and not undulate. Hw. semihyaline, white ground colour enclosed by the broad brown costal margin, very broad wingmargin, which can reach the middle of the hw., and brown dorsum. Underside identical to upperside on both wing pairs.

♂ genitalia (prep. RV 1363) with uncus short and saddle-shaped, at base with a strong triangular thorn, in the middle broadend and the apical part hammer-shaped with a sharp apex. Tegumen strong, broadly arched. Saccus wide and deep. Valva rather long and stretched. Cucullus with a triangular costal lobe at the inside of the valva. Sacculus divided from valva apex by a interruption of the rim. Apical process on the outside of the

valva long, spoon-shaped and broadened in the middle, curved upwards. Phallus short, somewhat constricted in the middle and diverging distally. Vesica bilobed without cornutus.

♀ genitalia (prep. RV 1373) with antrum slightly sclerotised, broadly ribbon-shaped. Cervix bursae not sclerotised, globular with ductus seminalis originating at the right side in the middle. Bursa copulatrix large, globular without any signum.

**Distribution:** The species is found in the northwestern part of the southwestern peninsula of Sulawesi, in the province Sulawesi Selatan, near Palopo and Rantepao. This montane species is collected at altitudes between 900 and 1800 m.

***Nyctemera (Arctata) celebensis* sp. n.**

(Figs. 36, 84, 112, 139, 165.)

**Holotype** ♂: Indonesia, Sulawesi Tengah, Lore Lindu N.P., 10 km SE Poloka, 1900 m, 26. iii. 1985, M. J. & J. P. DUFFELS, Stat. 57, Disturbed lower montane forest, ML-light, canopy [RMNH].

**Paratypes** (in total 10 ♂♂): 2 ♂♂, Indonesia, Sulawesi Tengah, Lore Lindu N.P., Rano Rano, 1600 m, 10 km NE Gimpu, [1 ♂] 13. iii. 1985, Stat. 40, [1 ♂] 14. iii. 1985, Stat. 41, J. P. & M. J. DUFFELS, Lower montane forest, ML-light [RMNH]. 1 ♂, S. Sulawesi, Mt Sampuraga, 2°13' S, 120°45' E, 1.-6. ii. 1995, 1400 m, leg. SINJAEV & TARASOV [CMWM]. 6 ♂♂, Sulawesi Tengah, Tarifa, 1000-1500 m, xii. 1997, leg. R. BRECHLIN [CMWM]. 1 ♂, Sulawesi Selatan, Nr. North border, Puncak Dingin, 1700 m, x. 1985, Shinji NAGAI [BMNH].

**Etymology:** The name of this species refers to the old name of Sulawesi, Celebes, because it is found in the heart of the island.

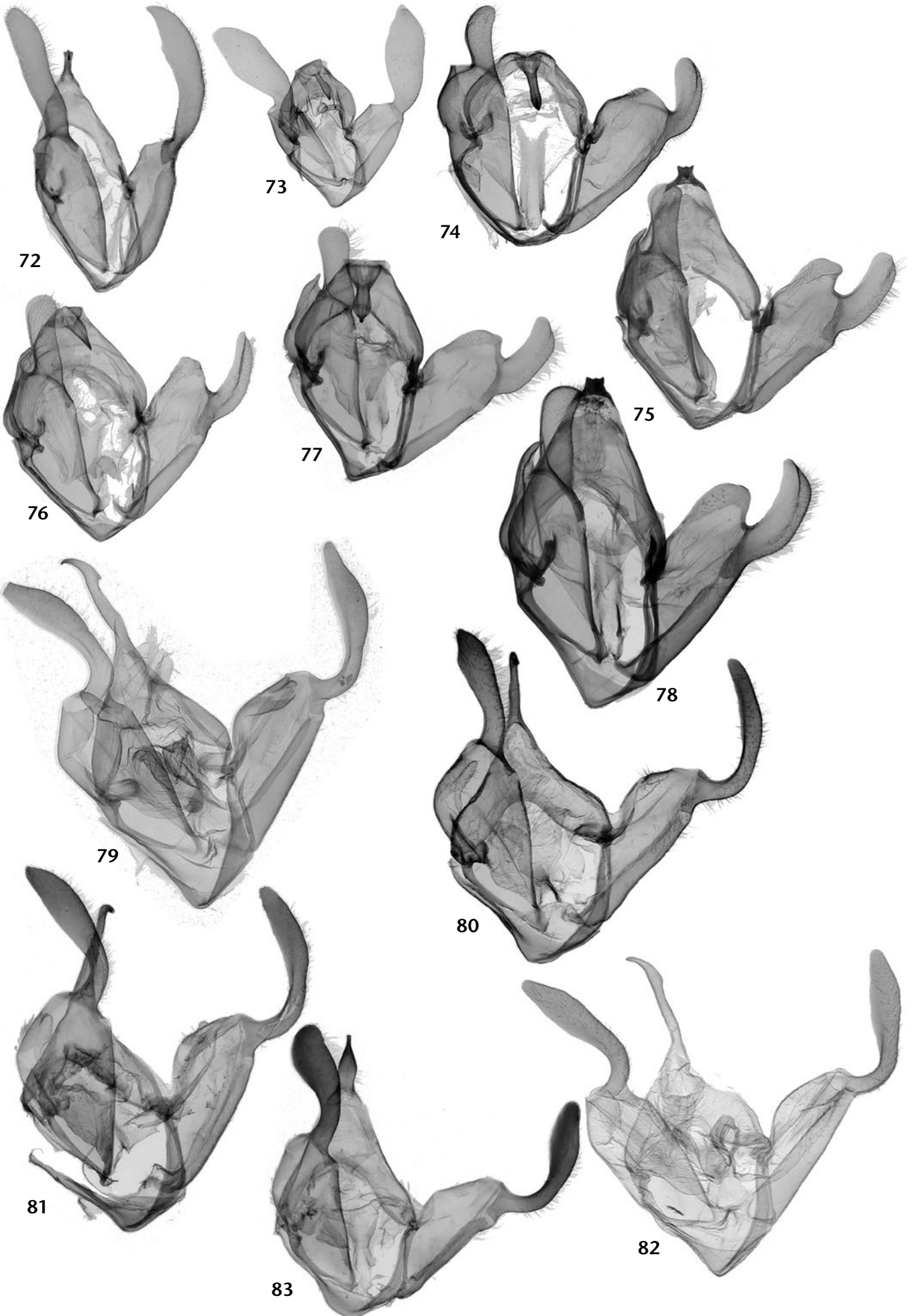
**Diagnosis:** A species with semihyaline stretched triangular forewings, pale brown with a narrow undulate white fascia which is gradually curved inwards and not reaching the costa. Very broad pale brown hindwing margin but with dorsum white.

**Description:** ♀ unknown. — Fwl. ♂ 26-29 mm. Head pale yellow, with frons black and a black spot on the vertex. Labial palpa rather long and slender, grey-brown, ventrally and at apex pale yellow. Antennae dark brown, flagellum laterally white, bipectinate with long pectination.

Patagia pale yellow with a central black patch. Tegulae pale yellow, basally black and with a central black longitudinal patch, apically with pale yellow long hairy scales. Thorax pale yellow with dorsally two confluent anterior black spots, a large central patch and two confluent posterior spots. Ventrally thorax pale yellow with two pair of large black lateral patches. Legs with coxa

**Figs. 72-83:** ♂ genitalia. **Fig. 72:** *Nyctemera (Arctata) arctata*, prep. RV1367. **Fig. 73:** *N. (A.) albofasciata*, prep. BM4053. **Fig. 74:** *N. (A.) zerenoides*, prep. RV1377. **Fig. 75:** *N. (A.) scalarium scalarium*, prep. RV1379. **Fig. 76:** *N. (A.) scalarium balinensis*, prep. RV1368. **Fig. 77:** *N. (A.) scalarium tenuifascia*, prep. RV1361. **Fig. 78:** *N. (A.) scalarium timorana*, prep. RV1404. **Fig. 79:** *N. (A.) hyalina hyalina*, prep. BM4058. **Fig. 80:** *N. (A.) hyalina stresemanni*, prep. RV1394. **Fig. 81:** *N. (A.) hyalina diaphana*, prep. RV1370. **Fig. 82:** *N. (A.) kinabaluensis*, prep. BM3985. **Fig. 83:** *N. (A.) toradjana*, prep. RV1363. — Genitalia to individually different scales.





pale yellow, anterior coxa at outer half black, mid and posterior coxa distally black. Femur, tibia and tarsi grey-brown, bone-white posteriorly.

Abdomen pale yellow with a black band on each segment, ventrally these bands are crossed by a yellow longitudinal central bar. The anal tuft is yolk-yellow, mixed with some blackish hairy scales.

Fw. long, stretched triangular and semihyaline. Ground colour paler brown than the similar previous species, *Nyctemera toradjana* sp. n. Somewhat resembling *hyalina diaphana* but that species has the fw. less stretched, a much broader, straight, white fascia and a straight hw. termen from dorsum to apex, while in *celebensis* the termen is rounded. The wingfold with a thin white streak from base to one-third of the winglength. White fascia narrow and undulate, especially at the end of the cell where the fascia borders the cell, gradually curved inwards and not reaching costa. Hw. semihyaline, white ground colour enclosed by the pale brown costa, broad wing margin and narrow pale brown dorsum. The brown pattern on both wing pairs is convex between the veins, underside identical to upperside on both wing pairs.

♂ genitalia (prep. RV 1372) with uncus broadly beak-shaped with a sharp dorsal keel and a short, blunt apex. Tegumen broad and strong, saccus wide and rather deep. Valva long and stretched, cucullus with a stretched triangular costal lobe at the inside of the valve, ending in a sharp thorn. Sacculus widely divided from the apex of the valve by a gap in the rim. Apical process much shorter than in other members of the *hyalina* group, finger-shaped, at base curved upwards, apex of process rather sharp. Phallus straight and slender with a small globular vesica. Vesica with one long thorn-shaped cornutus.

**Taxonomical note:** The systematical position of this species is somewhat unclear. Judged by wing pattern only it very much resembles the previous species *toradjana* and is placed next to it without any doubt. However, when the valva and phallus are involved it seems to fit more in the *browni* species-group and judged by the peculiar uncus it seems appropriate to place it in the *luzonensis* species-group. As long as there are no ♀♀ known to have further distinguishing characters and as long there is no molecular study done on this species for the time being it is placed next to the similarly patterned *toradjana*.

**Distribution:** The species is found in the central part of Sulawesi in the wide surrounding of Lake Poso in the southern part of Sulawesi Tengah and the northern part of Sulawesi Selatan. It is a montane species which is collected at altitudes between 1400 and 1900 m.

### ***browni* species-group**

#### **Diagnosis**

Abdomen yellow or white with yellow, usually with black bands, in one species with dorsal spots. Forewings robust,

more or less stretched, brown to darker brown convex pattern on white ground, usually with a white streak below the cell running from base to the white fascia. Hindwing white with a more or less complete marginal band with convex dark pattern.

Male genitalia with beak-shaped uncus with dorsally running keel and lateral ridges. Valvae broadly based with a dorsally bend conspicuous apical process which can be quite large and its shape is diagnostic for the species. Phallus is diagnostic for the species-group: short, bend and diverging distally. Vesica not very long, in some species with a distal cornutus.

Female with a large lamella vaginalis. Ductus bursae short and rather wide, not sclerotised, in some species with a large cervix bursae. Bursa copulatrix globular with a boat-shaped oval or longitudinal scobinated signum.

The *browni* species-group is exclusively found in the Philippine Archipelago.

### ***Nyctemera (Arctata) undulata* DE VOS & ČERNÝ, 1999**

(Figs. 37–38, 85, 113, 140, 166, 193, 216.)

*Nyctemera undulata*: DE VOS & ČERNÝ (1999: 164).

**Material examined:** The HT and 3 PT (2 ♂♂ and 1 ♀) were examined in CMWM, no other material available. — HT: ♂, Philippinen, Mindanao, Bukidnon, Mt. Kitanglad Süd, Intavas, 2200 m, 15. VIII.–15. IX. 1993, leg. V. SINIAEV [CMWM].

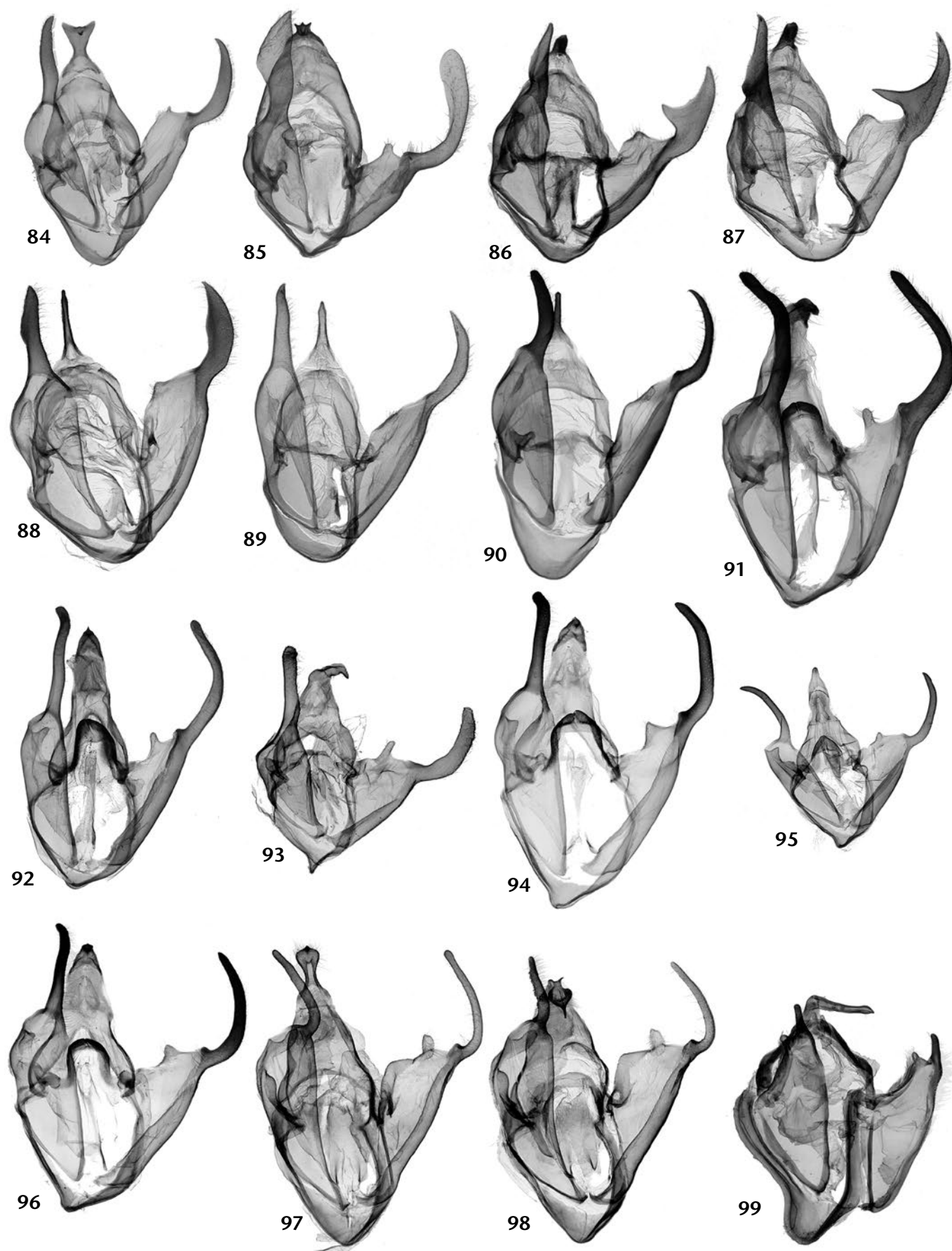
**Diagnosis:** Fwl. 28 mm. This species takes a peculiar position in the *browni* species-group and shows some intermediate characters with the *arctata* species-group. The yellow abdomen has, in the ♂, small dorsal black dots, in the ♀ black bands. The antennae resemble those from the *arctata* group, not so well arranged pectination as in the other species of the *browni* group. The fw. are strong and more or less stretched like in the rest of the *browni* group. The chocolate brown convex pattern resembles that of the *arctata* group but is more confluent, leaving a narrow white fascia and white basal streak with strong convex pattern. White hw. with a complete marginal band but with strong convex pattern and crossed by some thin white veins.

♂ genitalia with uncus beak-shaped, with sharp lateral ridges and rather sharp dorsal keel. Valva with large spatula-shaped process. Cucullus with small folded costal process. Phallus short and thick, distally at ventral side deeply split open. One cornutus, axe-shaped with a thick rim at longest side.

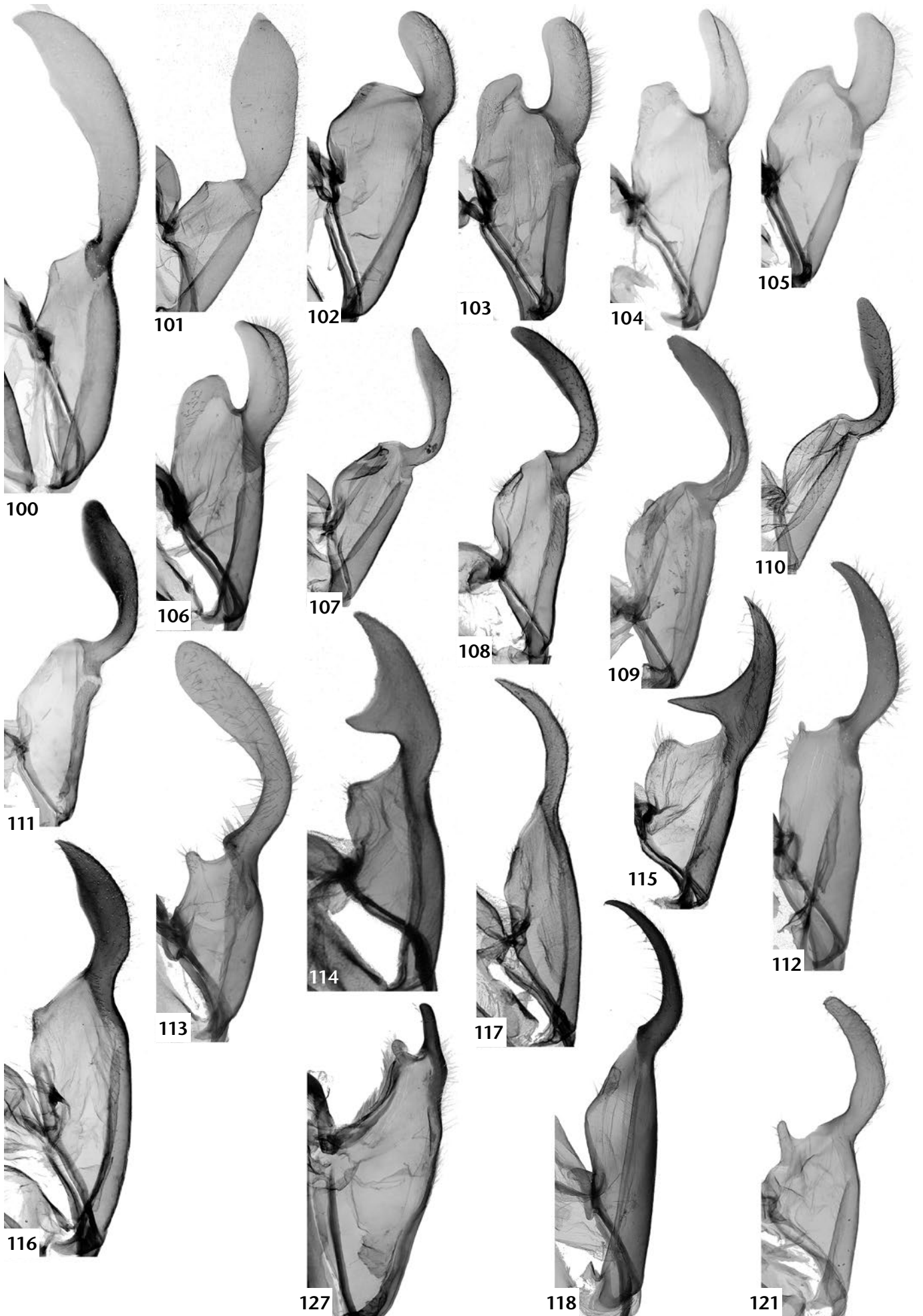
♀ genitalia with sides of lamella postvaginalis wrinkled, with about 5 ridges between ostium and apophyses anteriores. Globular bursa copulatrix with one small and bowl-shaped signum, accompanied by some tiny chitinous drops.

**Distribution:** The species has been found on Mindanao, Province Bukidnon, Philippines.

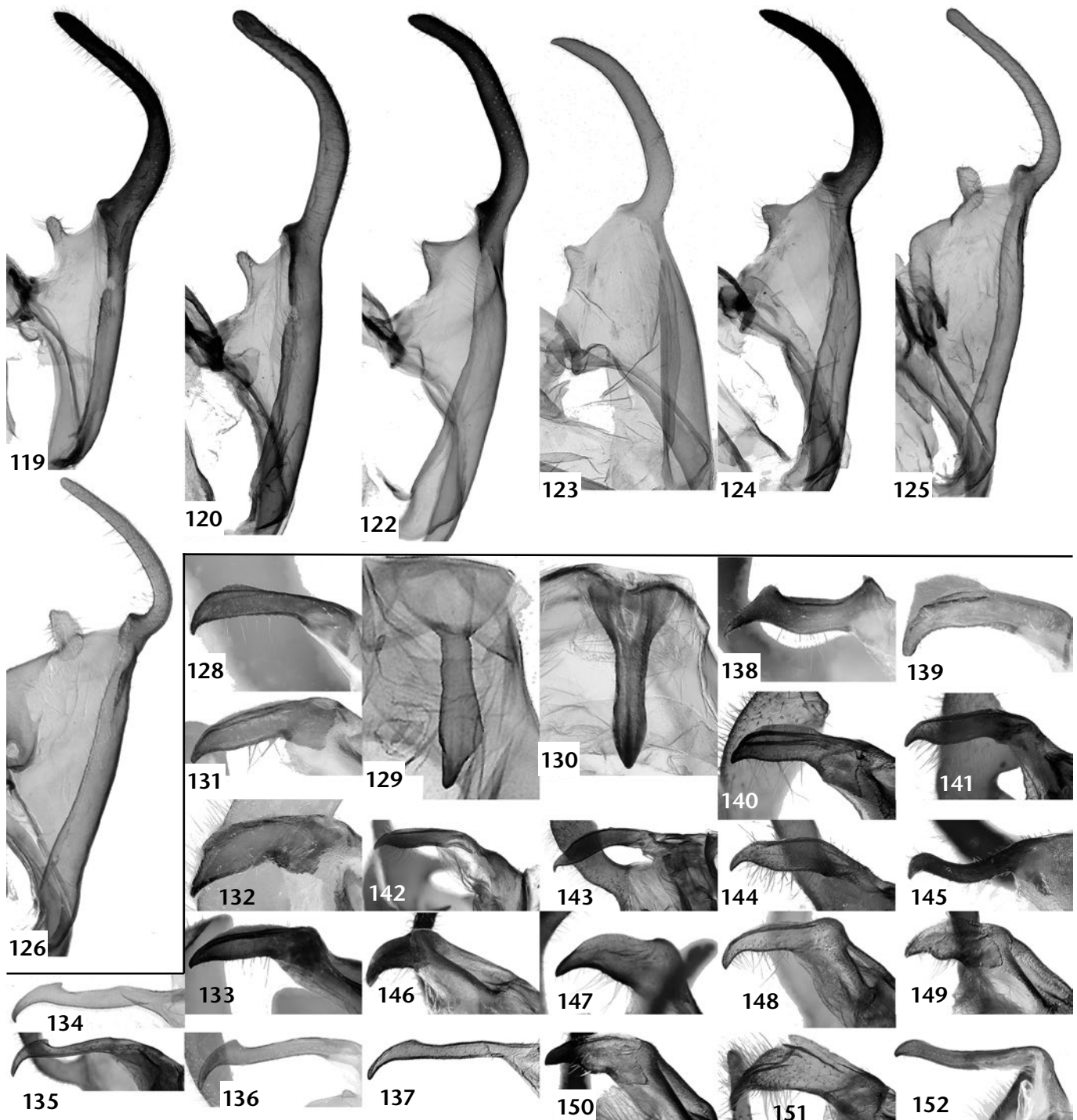




Figs. 84–99: ♂ genitalia. Fig. 84: *Nyctemera (Arctata) celebensis*, prep. RV1372. Fig. 85: *N. (A.) undulata*, prep. RV349. Fig. 86: *N. (A.) palawanica*, prep. WT19.922. Fig. 87: *N. (A.) browni*, prep. RV1396. Fig. 88: *N. (A.) angustipennis*, prep. RV345. Fig. 89: *N. (A.) consobriniformis*, prep. WT19.921. Fig. 90: *N. (A.) gratia*, prep. RV1398. Fig. 91: *N. (A.) luzonensis luzonensis*, prep. RV1400. Fig. 92: *N. (A.) luzonensis apoensis*, prep. RV1402. Fig. 93: *N. (A.) lunulata*, prep. RV341. Fig. 94: *N. (A.) owadai*, prep. RV1391. Fig. 95: *N. (A.) toxopei toxopei*, prep. BM4059. Fig. 96: *N. (A.) toxopei ceramensis*, prep. RV1392. Fig. 97: *N. (A.) robusta robusta*, prep. RV348. Fig. 98: *N. (A.) robusta busanica*, prep. RV1084. Fig. 99: *N. (A.) goliath*, prep. RV1360. — Genitalia to individually different scales.







**Figs. 100–127:** Inner view of right valve of ♂ genitalia. **Fig. 100:** *Nyctemera (Arctata) arctata*, prep. RV1367. **Fig. 101:** *N. (A.) albofasciata*, prep. BM4053. **Fig. 102:** *N. (A.) zerenoides*, prep. RV1377. **Fig. 103:** *N. (A.) scalarium scalarium*, prep. RV1379. **Fig. 104:** *N. (A.) scalarium balinensis*, prep. RV1368. **Fig. 105:** *N. (A.) scalarium tenuifascia*, prep. RV1361. **Fig. 106:** *N. (A.) scalarium timorana*, prep. RV1404. **Fig. 107:** *N. (A.) hyalina hyalina*, prep. BM4058. **Fig. 108:** *N. (A.) hyalina stresemanni*, prep. RV1394. **Fig. 109:** *N. (A.) hyalina diaphana*, prep. RV1370. **Fig. 110:** *N. (A.) kinabaluensis*, prep. BM3985. **Fig. 111:** *N. (A.) toradjana*, prep. RV1363. **Fig. 112:** *N. (A.) celebensis*, prep. RV1372. **Fig. 113:** *N. (A.) undulata*, prep. RV349. **Fig. 114:** *N. (A.) palawanica*, prep. WT19.922. **Fig. 115:** *N. (A.) browni*, prep. RV1396. **Fig. 116:** *N. (A.) angustipennis*, prep. RV345. **Fig. 117:** *N. (A.) consobriniformis*, prep. WT19.921. **Fig. 118:** *N. (A.) gratia*, prep. RV1398. **Fig. 119:** *N. (A.) luzonensis luzonensis*, prep. RV1400. **Fig. 120:** *N. (A.) luzonensis apoensis*, prep. RV1402. **Fig. 121:** *N. (A.) lunulata*, prep. RV341. **Fig. 122:** *N. (A.) owadai*, prep. RV1391. **Fig. 123:** *N. (A.) toxopei toxopei*, prep. BM4059. **Fig. 124:** *N. (A.) toxopei ceramensis*, prep. RV1392. **Fig. 125:** *N. (A.) robusta robusta*, prep. RV348. **Fig. 126:** *N. (A.) robusta busanica*, prep. RV1084. **Fig. 127:** *N. (A.) goliath*, prep. RV1360. — Genitalia details to individually different scales.

**Figs. 128–152:** Uncus of ♂ genitalia. **Fig. 128:** *Nyctemera (Arctata) arctata*, prep. RV1367. **Fig. 129:** *N. (A.) albofasciata*, prep. BM4053. **Fig. 130:** *N. (A.) zerenoides*, prep. RV1377. **Fig. 131:** *N. (A.) scalarium balinensis*, prep. RV1368. **Fig. 132:** *N. (A.) scalarium tenuifascia*, prep. RV1361. **Fig. 133:** *N. (A.) scalarium timorana*, prep. RV1404. **Fig. 134:** *N. (A.) hyalina hyalina*, prep. BM4058. **Fig. 135:** *N. (A.) hyalina stresemanni*, prep. RV1394. **Fig. 136:** *N. (A.) hyalina diaphana*, prep. RV1370. **Fig. 137:** *N. (A.) kinabaluensis*, prep. BM3985. **Fig. 138:** *N. (A.) toradjana*, prep. RV1363. **Fig. 139:** *N. (A.) celebensis*, prep. RV1372. **Fig. 140:** *N. (A.) undulata*, prep. RV349. **Fig. 141:** *N. (A.) palawanica*, prep. WT19.922. **Fig. 142:** *N. (A.) browni*, prep. RV1396. **Fig. 143:** *N. (A.) angustipennis*, prep. RV345. **Fig. 144:** *N. (A.) consobriniformis*, prep. WT19.921. **Fig. 145:** *N. (A.) gratia*, prep. RV1398. **Fig. 146:** *N. (A.) luzonensis luzonensis*, prep. RV1400. **Fig. 147:** *N. (A.) luzonensis apoensis*, prep. RV1402. **Fig. 148:** *N. (A.) lunulata*, prep. RV341. **Fig. 149:** *N. (A.) owadai*, prep. RV1391. **Fig. 150:** *N. (A.) toxopei ceramensis*, prep. RV1392. **Fig. 151:** *N. (A.) robusta robusta*, prep. RV348. **Fig. 152:** *N. (A.) goliath*, prep. RV1360. — Genitalia details to individually different scales.

***Nyctemera (Arctata) palawanica* DE VOS & ČERNÝ, 1999**

(Figs. 39–40, 86, 114, 141, 167, 194, 217.)

*Nyctemera palawanica*: DE VOS & ČERNÝ (1999: 158).

**Material examined:** The HT and PT (2 ♂♂, 3 ♀♀) were studied in CCGT, CMWM, CPK and SMFL, no other material available. — HT: ♀, Philippinen, Insel Palawan, Mt. Magcasaw, Mainit, Brooke's Point, 3.–6. x. 1996, 600–900 m, leg. BAL, col. BRECHLIN [CMWM].

**Diagnosis:** Fwl. 26–28 mm. A large species which externally resembles the two next species, *N. browni* and *angustipennis*. Fw. with dark brown convex pattern deeply indented. Basal streak white and connected with white fascia by a narrow stripe. Fascia from costa to tornus gradually and slightly narrowing. Hw. white with dark brown margin, brown pattern convex and deeply indented. Tornus with large oblong patch which is characteristic.

♂ genitalia with uncus beak-shaped, dorsally with a gully, running to the apex. Valves with a very characteristic apical process, broad, half disc-shaped, somewhat resembling that of *browni*, but less concave. Cucullus with a reduced costal process marked by setae at this position. Phallus curved, distally split open at ventral side for about one third of its length. Vesica trunk-shaped. No cornutus.

♀ genitalia with lamella postvaginalis without any distinct ridges. Bursa copulatrix large, globular, with one signum, long and slender, reaching into ductus bursae and nodded at distal part.

**Distribution:** The species is found in the southern part of Palawan Island, Philippines.

***Nyctemera (Arctata) browni* (SCHULTZE, 1908)**

(Figs. 41–43, 87, 115, 142, 168, 195, 218.)

*Deilemema browni*: SCHULTZE (1908: 31); KISHIDA (1994: 13); DE VOS & ČERNÝ (1999: 157).*Deilemema arctata browni*: SEITZ (1915: 275); BRYK (1937: 89).*Nyctemera arctata browni*: CHANG (1989: 136).*Nyctemera arctata*: ROEPKE (1948: 213) nec WALKER, 1856 (in part).*Deilemema conjuncta*: WILEMAN (1915: 111).*Nyctemera conjuncta*: BRYK (1937: 60).*Nyctemera arctata scalarium*: ROEPKE (1949: 49) nec SNELLEN VAN VOLLENHOVEN, 1863 (in part).

**Material examined:** The HT of *conjuncta* and 149 additional specimens in BMNH, BPBM, CKC, RMNH, CCGT, CMWM and ZMHU have been studied. The HT of *browni* has not been studied; according to MERRILL (1945) the entire collection was destroyed in the war. There is no doubt about its identity. — HT *browni*: ♀, Philippines, Manilla, P.I., leg. Rev. Robert BROWN [MPMP; lost in WW2]; HT *conjuncta*: ♀, Philippines, Benguet Prov., Baguio, 3. xi. 1912, A. E. WILEMAN [BMNH].

**Diagnosis:** Fwl. 22–25 mm. Fw. similar as in *palawanica* and *angustipennis*. The hw. are diagnostic, in *browni* with a small brown tornal patch (in *palawanica* this patch long and in *angustipennis* without patch).

♂ genitalia with the uncus rather flat beak-shaped. Most distinguishing is the peculiar apical process on the valva

which is lunular shaped with long and sharp apexes (in *palawanica* this process is smaller and concave disc-shaped). Phallus longer and straighter than in *palawanica*, vesica split into two branches, without cornutus.

♀ genitalia with a short and broad ductus bursae, cervix bursae slightly broader. Bursa copulatrix elongate with a long and narrow boat-shaped signum.

**Distribution:** The main distribution of this species in the Philippines is on Luzon, but there are also rare records from Negros, Mindanao and Bongao (Tawi-Tawi islands).

***Nyctemera (Arctata) angustipennis* KISHIDA, 1994**

(Figs. 44–45, 88, 116, 143, 169, 196, 219.)

*Nyctemera angustipennis*: KISHIDA (1994: 13); DE VOS & ČERNÝ (1999: 163).

**Material examined:** The HT of *angustipennis* is in the NSMT and has not been studied but there is no doubt about its identity. 54 additional specimens have been studied from CAH, CCGT, CKC, CMWM and RMNH. — HT: ♂, Philippines, Luzon, Mountain Prov., Mt. Data, 2250 m, 12.–15. vii. 1985, leg. M. OWADA [NSMT].

**Diagnosis:** Fwl. 27–31 mm. The largest of the three similar species of the *browni* phenotype. Most distinguishing are the hw. in which the convex patterned margin is gradually narrowing without a tornal patch. The fw. termen is almost straight, in *browni* and *palawanica* the termen is more rounded.

♂ genitalia with uncus narrow, laterally beak-shaped. Valva elongated with a large apical process, more or less machete-shaped with a slight broadening in the middle. Costal process reduced to a shallow wart with setae. Phallus very conspicuous, short, broad and widely diverging distally with a broad vesica and a large conical cornutus with thorn.

♀ genitalia with broad ductus bursae and an extremely large cervix bursae, almost as large as the folded pear-shaped bursa copulatrix. Signum narrow boat-shaped, shorter than in *browni* and *palawanica*.

**Distribution:** Restricted to North Luzon, Philippines, most abundant on Mt. Polis.

***Nyctemera (Arctata) consobriniformis* DE VOS & ČERNÝ, 1999**

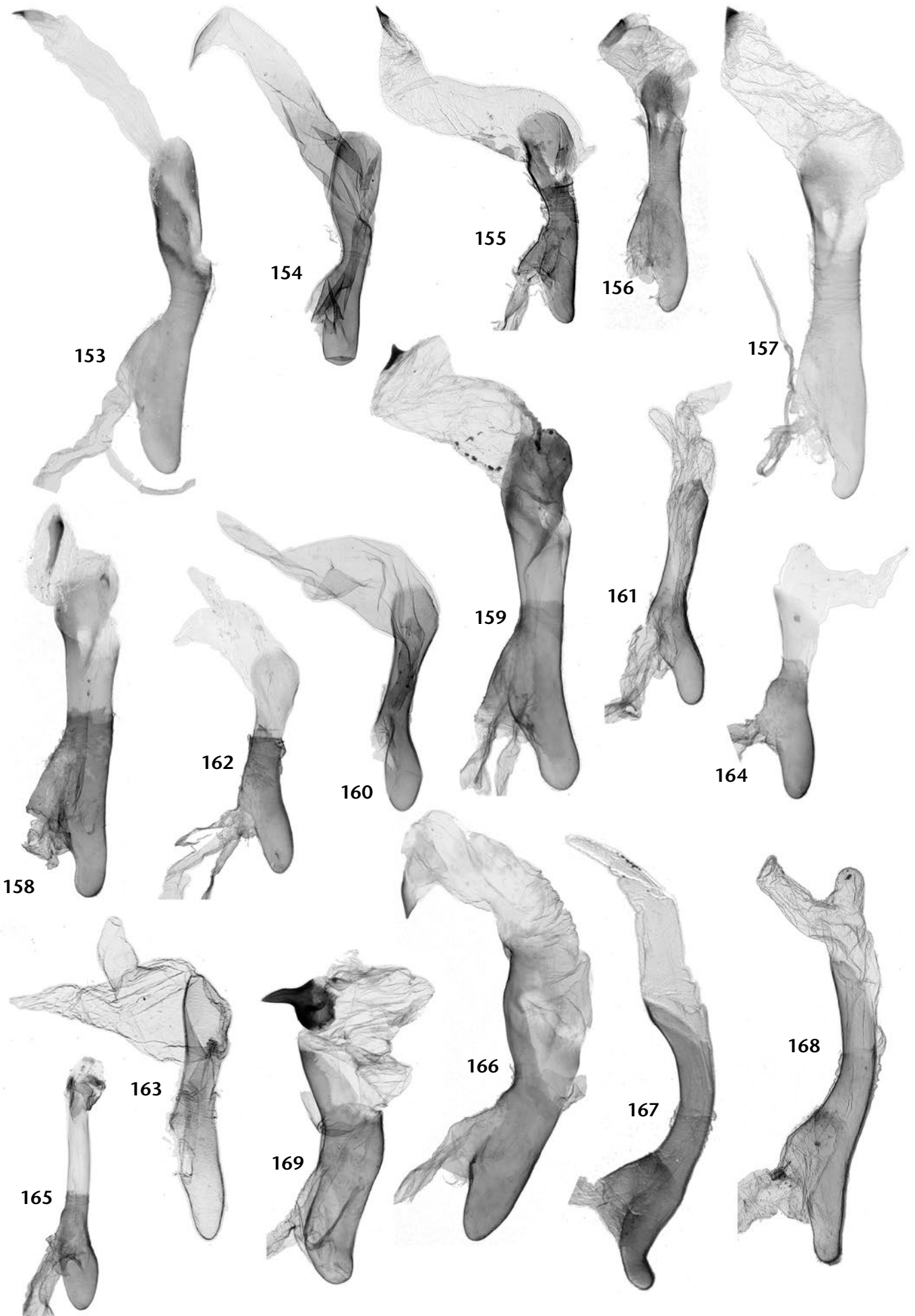
(Figs. 46–47, 89, 117, 144, 170, 197, 220.)

*Nyctemera consobriniformis*: DE VOS & ČERNÝ (1999: 155).

**Material examined:** The HT and 47 PT have been studied in CCGT, CKC, CMWM and RMNH. — HT: ♂, Philippinen,

**Figs. 153–169:** Phallus of ♂ genitalia. **Fig. 153:** *Nyctemera (Arctata) arctata*, prep. RV1367. **Fig. 154:** *N. (A.) albofasciata*, prep. BM4053. **Fig. 155:** *N. (A.) zerenoides*, prep. RV1377. **Fig. 156:** *N. (A.) scalarium scalarium*, prep. RV1379. **Fig. 157:** *N. (A.) scalarium balinensis*, prep. RV1368. **Fig. 158:** *N. (A.) scalarium tenuifascia*, prep. RV1361. **Fig. 159:** *N. (A.) scalarium timorana*, prep. RV1404. **Fig. 160:** *N. (A.) hyalina hyalina*, prep. BM4058. **Fig. 161:** *N. (A.) hyalina stresemanni*, prep. RV1394. **Fig. 162:** *N. (A.) hyalina diaphana*, prep. RV1370. **Fig. 163:** *N. (A.) kinabaluensis*, prep. BM3985. **Fig. 164:** *N. (A.) toradjana*, prep. RV1363. **Fig. 165:** *N. (A.) celebensis*, prep. RV1372. **Fig. 166:** *N. (A.) undulata*, prep. RV349. **Fig. 167:** *N. (A.) palawanica*, prep. WT19.922. **Fig. 168:** *N. (A.) browni*, prep. RV1396. **Fig. 169:** *N. (A.) angustipennis*, prep. RV345. — Genitalia details to individually different scales.





Mindanao, Bukidnon, 40 km NW Maramag, Dalongdong, 800 m, Talakag, 7°53' N, 123°54' E, Waldrand, 1.–3. x. 1988, leg. ČERNÝ & SCHINTLMEISTER [RMNH].

**Diagnosis:** Fwl. 23–26 mm. In general the wing pattern follows that of *browni* and allies but the pattern is much more regular without strong convex arches. Pattern dark grey brown. Large white basal streak between vein 1 and 2 and a white dorsal streak of equal length. White fascia not crossed by dark veins, except for the subcostal vein.

Hw. white with dark grey brown margin, with convex tooth at vein 2. Margin from tornus to apex broadening.

♂ genitalia with beak-shaped uncus, with rounded dorsal keel and rather blunt apex. Valva narrow, elongated, with a simple finger-shaped apical process, curved in dorsal direction. Costal process reduced to a small ridge with setae. Phallus narrow, coecum hook-shaped. Vesica rather short, trunk-shaped, without cornutus.

♀ genitalia with antrum broad and flat, asymmetrically changing in large cervix bursae which has many folds and pleats. Bursa copulatrix with one long and slender signum which is distally elongated and narrowing.

**Distribution:** Mainly found in the mountain regions of Mindanao. 1 specimen collected on Leyte (CMWM).

### *Nyctemera (Arctata) gratia* (SCHULTZE, 1910)

(Figs. 48–50, 90, 118, 145, 171, 198, 221.)

*Deilemema gratia*: SCHULTZE (1910: 164).

*Nyctemera gratia*: BRYK (1937: 63); KISHIDA (1994: 15); DE VOS & ČERNÝ (1999: 180).

*Nyctemera tripunctaria gratia*: SEITZ (1915: 267); ROEPKE (1957: 158).

*Nyctemera tripunctaria tripunctaria*: ROEPKE (1949: 61), nec LINNAEUS, 1758 (in part).

*Deilemema venata*: WILEMAN (1915: 111).

*Nyctemera venata*: BRYK (1937: 86).

*Migoplastis philippinensis*: ROTHSCHILD (1933: 192).

**Material examined:** The HT of *venata*, the LT + PLT of *philippinensis* and 127 additional specimens in BMNH, CKC, CAH, RMNH, CCGT, CMWM, ZMHU and ZIMH have been studied. The ST of *gratia* have not been studied; according to MERRILL (1945), the entire collections of MPMP were destroyed during world war II. — **ST series *gratia*:** ♂, ♀ (unspecified numbers): Philippines, Luzon, Province of Benguet, Pauai. 2250 m, leg. R. C. MCGREGOR [MPMP; lost in WW2]. **HT *venata*:** ♂, Philippines, Luzon, Panai, 14. xi. 1912, leg. A. E. WILEMAN [BMNH]. **LT *philippinensis*:** ♂, designated herewith from the ST series (3 ♂♂, 1 ♀): Philippines, Luzon, Panai, Hights Place, 2100 m, XI–XII. 1912, leg. A. E. WILEMAN [BMNH].

**Diagnosis:** Fwl. 26–28 mm. A conspicuous species with pure white fw. and hw. The veins of the fw. suffused with grey-brown, specimens from Negros usually with more extended grey suffusion along the veins of the fw. and slightly grey accentuated veins on the hw.

♂ genitalia with a worm-like uncus with sharp apex, valva similar of that of *consobriniformis*, elongated and narrow, with a finger-shaped apical process but in *gratia* narrower and more curved. Costal process reduced to a ridge with few setae. Phallus straight, vesica lobed without cornutus.

♀ genitalia with a broad ductus bursae. Bursa copulatrix globular with a signum consisting of a long string of boat-shaped scobinated parts.

**Distribution:** The main distribution is in the mountain ranges of North Luzon, but it is also recorded from the islands of Mindoro and Negros.

### *luzonensis* species-group

#### Diagnosis

Abdomen yellow with black bands, thorax in some species white. Forewings robust like in the *browni* group, elongated triangular, brown to grey-brown concave or convex pattern on white ground, most species with a white streak below the cell running from base to the white fascia but in some others lacking. Hindwing white with a complete marginal band with concave or convex dark pattern.

Male genitalia with beak-shaped uncus with dorsally running keel and lateral ridges. Valvae broadly based with a dorsally bend finger-shaped apical process which is diagnostic for the species, costal cucullus process well developed. Phallus is diagnostic for the species-group: long, distally strongly curved with a broad part at origin of ductus ejaculatorius, coecum long. Vesica narrow, trunk-shaped without cornutus.

Female with a large simple lamella vaginalis. Ductus bursae long and narrow, not sclerotised. Bursa copulatrix globular with a small scobinated boat-shaped circular signum.

The *luzonensis* species-group is widely distributed in the Philippine Archipelago, Sulawesi, the Moluccas and represented in the Sunda Islands by one species.

### *Nyctemera (Arctata) luzonensis* (WILEMAN, 1915)

#### *Nyctemera (Arctata) luzonensis luzonensis* (WILEMAN, 1915)

(Figs. 51–52, 91, 119, 146, 172, 199, 222.)

*Deilemema luzonensis*: WILEMAN (1915: 111).

*Deilemema arctata luzonensis*: BRYK (1937: 89).

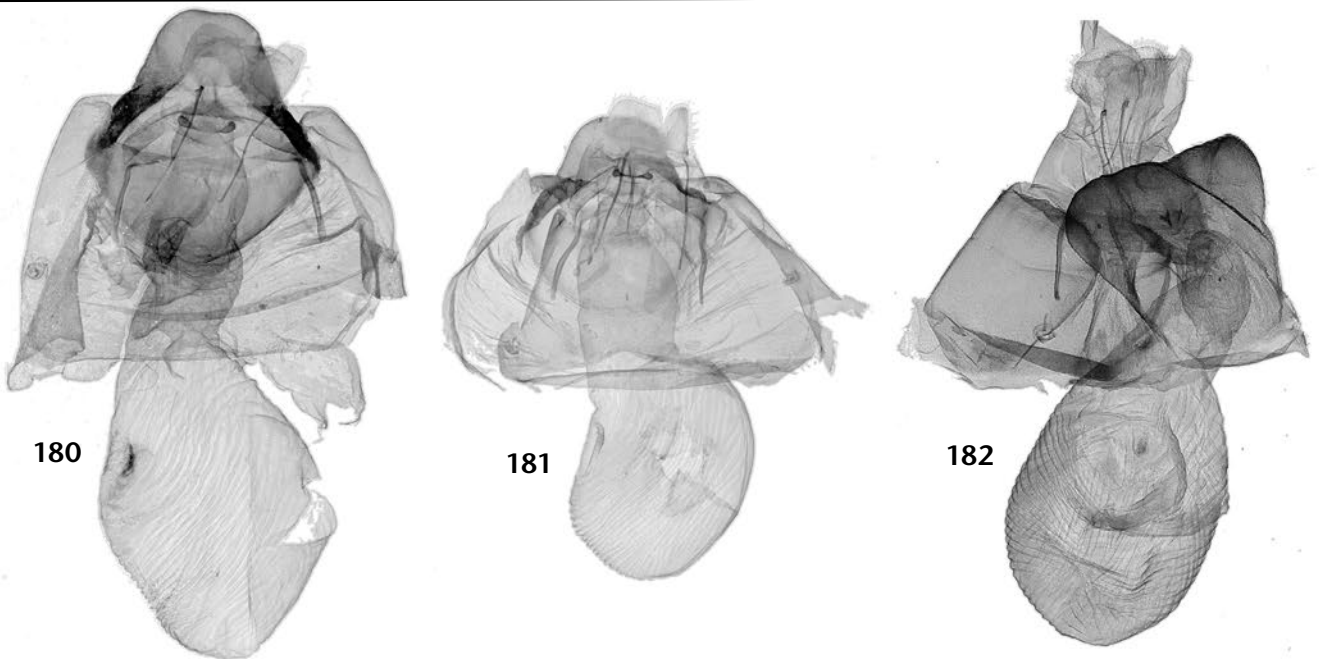
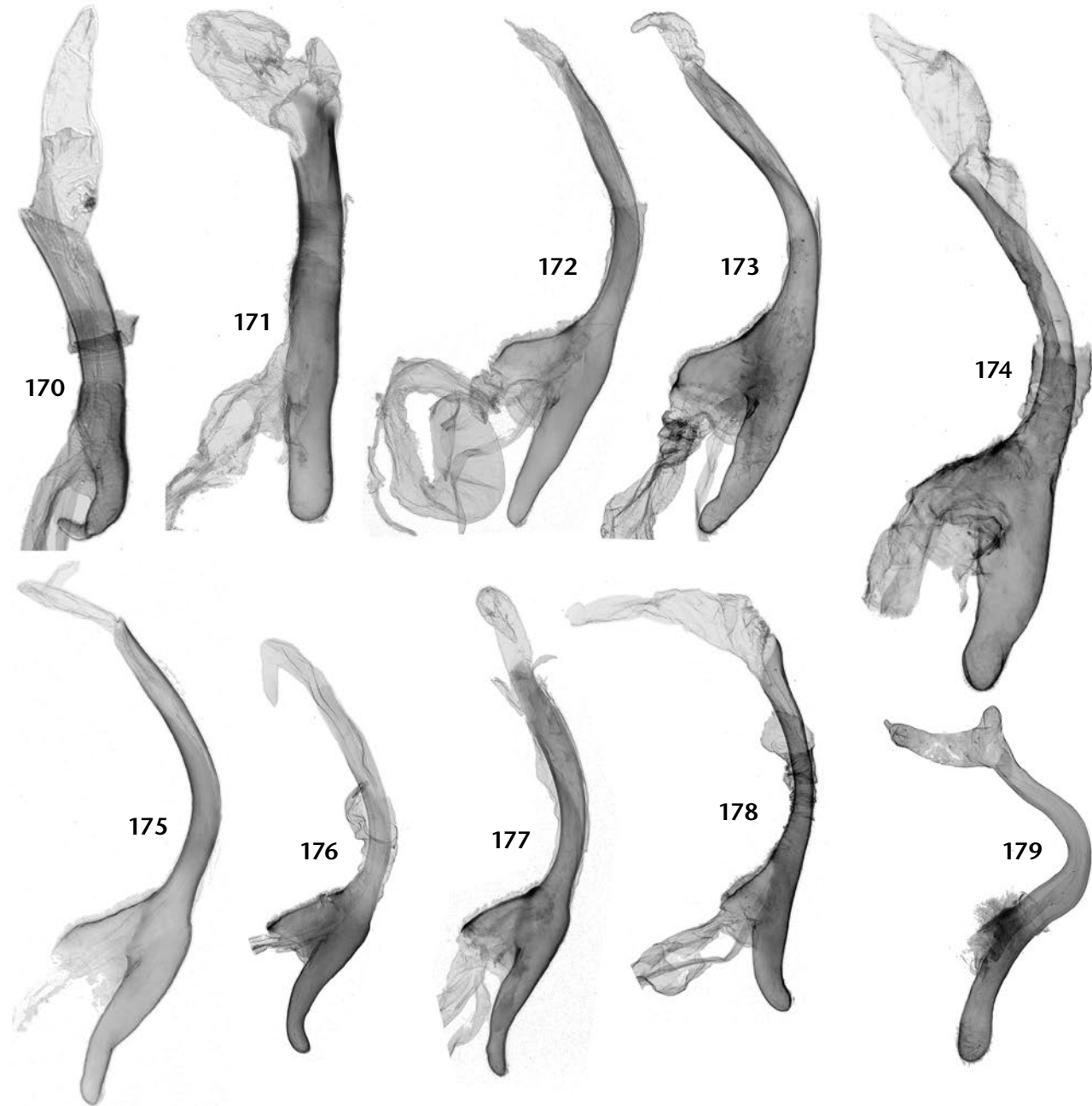
*Nyctemera luzonensis*: KISHIDA (1994: 15).

*Nyctemera arctata scalarium*: ROEPKE (1949: 49), nec SNELLEN VAN VOLLENHOVEN, 1863 (in part).

**Material examined:** The HT of *luzonensis* and 332 additional specimens in BMNH, BPBM, CKC, CAH, CJSD, RMNH, CCGT, CMWM, SMFL and ZMHU have been studied. — **HT:** ♂, Philippines, Luzon, Pauai, 2. XII. 1912, 2100 m, leg. A. E. WILEMAN [BMNH].

**Figs. 170–179:** Phallus of ♂ genitalia. — **Fig. 170:** *Nyctemera (Arctata) consobriniformis*, prep. WT19.921. **Fig. 171:** *N. (A.) gratia*, prep. RV1398. **Fig. 172:** *N. (A.) luzonensis luzonensis*, prep. RV1400. **Fig. 173:** *N. (A.) luzonensis apoensis*, prep. RV1402. **Fig. 174:** *N. (A.) lunulata*, prep. RV341. **Fig. 175:** *N. (A.) owadai*, prep. RV1391. **Fig. 176:** *N. (A.) toxopei toxopei*, prep. BM4059. **Fig. 177:** *N. (A.) toxopei ceramensis*, prep. RV1392. **Fig. 178:** *N. (A.) robusta robusta*, prep. RV348. **Fig. 179:** *N. (A.) goliath*, prep. RV1360. — **Figs. 180–182:** ♀ genitalia. — **Fig. 180:** *Nyctemera (Arctata) arctata*, prep. RV1374. **Fig. 181:** *N. (A.) albofasciata*, prep. RV1375. **Fig. 182:** *N. (A.) zerenoides*, prep. RV1380. — Genitalia and details to individually different scales.





**Diagnosis:** Fwl. 25–28 mm. The subhyaline wings have a grey-brown pattern. Fw. with a white streak below the cubital vein from base to fascia. The fascia usually incomplete, not reaching costa and dorsum. Diagnostic for the species are the dark veins crossing the white areas on fw. and hw.

♂ genitalia with a broad and robust beak-shaped uncus. Valva broadly based triangular with a well developed finger-shaped costal process on the cucullus. Apical process long and narrow, strongly curved upwards. Phallus long, distally curved, with a broad base and a long coecum. Vesica short, narrow and trunk-shaped. No cornutus.

♀ genitalia with a large simple lamella vaginalis, ductus bursae long and narrow. Globular bursa copulatrix with a relatively small circular scobinated signum near the base of the ductus bursae.

**Distribution:** The subspecies *luzonensis* is most abundant in the mountain areas of the northern part of Luzon in the provinces Benguet, Ifugao, Mountain Province and Nueva Vizcaya, Philippines.

*Nyctemera (Arctata) luzonensis squalida* DE VOS & ČERNÝ, 1999

(Figs. 53–54.)

*Nyctemera luzonensis squalida*: DE VOS & ČERNÝ (1999: 178).

**Material examined:** The ♂ HT and the two PT (♂ and ♀) have been studied in SMFL and CKC. No other material available. — HT: ♂, Philippines, S. Luzon, Mt. Isarog, i. 1984, leg. LUMAWIG, coll. TREADAWAY [assigned to SMFL].

**Diagnosis:** Fwl. 26–27 mm. Fw. pale yellow, reddish brown pattern reduced and only visible on veins. At the end of subcostal vein a reddish brown patch. Along margin of fw. apex, faded reddish brown, giving the wing a somewhat smokey appearance. Fringes pale yellow. Hw. and fringes bone-white. Veins and narrow fringe line reddish brown.

Genitalia in general identical to those of *luzonensis*.

**Distribution:** This subspecies *squalida* has only been found on Mount Isarog in the province of Camarines Sur in the southeastern part of Luzon, Philippines. Until now only 3 specimens are known.

*Nyctemera (Arctata) luzonensis apoensis* KISHIDA, 1994 stat. rev.

(Figs. 55–56, 92, 120, 147, 173, 200, 223.)

*Nyctemera apoensis*: KISHIDA (1994: 17).

*Nyctemera kishidai*: DE VOS & ČERNÝ, 1999 syn. n. (unnecessary replacement name).

**Material examined:** 162 specimens have been studied in BPBM, CKC, CCGT, CMWM and RMNH, excluding the HT which is in NSMT. — HT: ♂, Philippines, Mindanao, Davao, Upper Baracatan, Apo Range, Mt. Talamo, 1100 m, 17.–19. VIII. 1985, leg. M. OWADA [NSMT].

**Diagnosis:** Fwl. 24–28 mm. The wingshape and genitalia are identical to those from subspecies *luzonensis*. KISHIDA (1994) mentions that the pectination of the ♂ antenna of *apoensis* is longer than that of *luzonensis* but

this could not be confirmed. The visual pectination very much depends in the way of preparation and how the pectination is folded.

Most distinguishing characters differentiating *apoensis* from *luzonensis* are that, in *apoensis*, there are no dark veins crossing the white areas on both wings and the black abdominal bands are narrower. The concave wing pattern is less pronounced, more smoothly. Specimens from Mindanao seem to have a more extended dark pattern compared to those from Negros. In specimens from Mindanao the white fascia does not reach the costa of the fw., while in those from Negros it does. The hw. dorsum of specimens from Mindanao is brown while those from Negros have a white dorsum.

The fact that there are no significant differences in the ♂ and ♀ genitalia, the similar wing shape and basal pattern and the parasymphatric distribution, justifies to consider *apoensis* to be a subspecies of *luzonensis*.

**Distribution:** The subspecies *apoensis* is distributed on Mindanao and Negros, Philippines.

**Taxonomical note:** *Nyctemera (Orphanos) apoensis* SEMPER, 1899 belongs to another subgenus and externally can not be confused with *apoensis*. The one-letter difference is an unjustified reason to homonymise it with *apoensis*. Therefore *kishidai* DE VOS & ČERNÝ, 1999 is regarded to be an unnecessary replacement name.

*Nyctemera (Arctata) lunulata* DE VOS & ČERNÝ, 1999

(Figs. 57–58, 93, 121, 148, 174, 201, 224.)

*Nyctemera lunulata*: DE VOS & ČERNÝ (1999: 171).

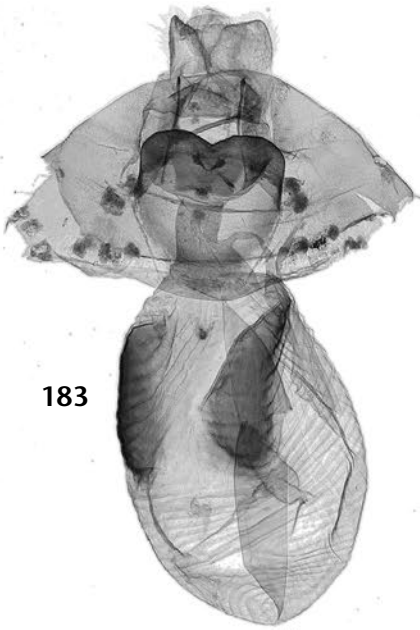
**Material examined:** The HT, 81 PT and 27 additional specimens have been studied in CMWM, CCGT and RMNH. — HT: ♂, Philippines, Mindanao, Bukidnon, Mt. Kitanglad Süd, Intavas, 2200 m, 15. VIII.–15. IX. 1993, Primär-Urwald, leg. V. SINIAEV [CMWM].

**Diagnosis:** Fwl. 28–29 mm. A conspicuous species with chocolate brown pattern, the white pattern being much reduced. Fw. with a straight white bar below the cubital vein which is not connected with the narrow lunular shaped fascia. The fascia is not reaching costa nor tornus. Hw. with a very broad brown margin, leaving a small white subhyaline center which is crossed by the dark veins.

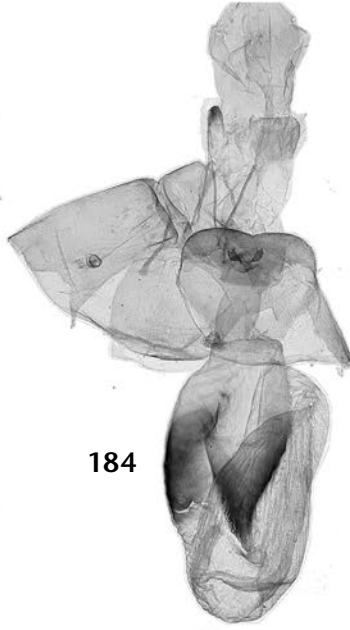
♂ genitalia with a narrow hooked beak-shaped uncus. Valva broad and short with a robust rather broad apical process covered with frizzled setae. Costal process on cucullus narrow but well developed. Phallus compared to allied species rather short but similarly curved, vesica broad without cornutus.

**Figs. 183–191:** ♀ genitalia. — **Fig. 183:** *N. (A.) scalarium scalarium*, prep. RV1378. **Fig. 184:** *N. (A.) scalarium balinensis*, prep. RV1381. **Fig. 185:** *N. (A.) scalarium tenuifascia*, prep. RV1362. **Fig. 186:** *N. (A.) scalarium regalis*, prep. RV1376. **Fig. 187:** *N. (A.) scalarium timorana*, prep. RV1405. **Fig. 188:** *N. (A.) montana*, prep. BM2103. **Fig. 189:** *N. (A.) hyalina stresemanni*, prep. RV1395. **Fig. 190:** *N. (A.) hyalina diaphana*, prep. RV1371. **Fig. 191:** *N. (A.) kinabaluensis*, prep. BM4025. — Genitalia and details to individually different scales.

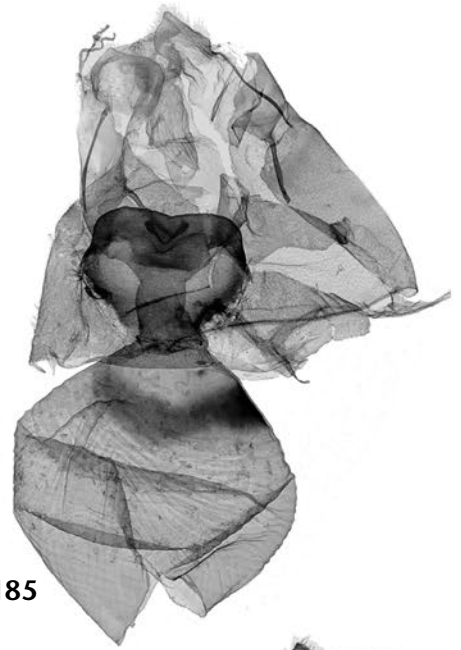




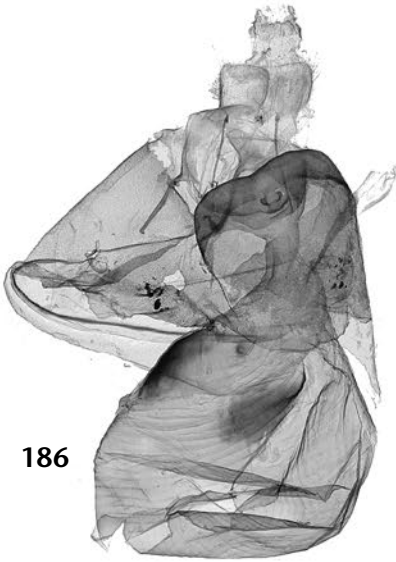
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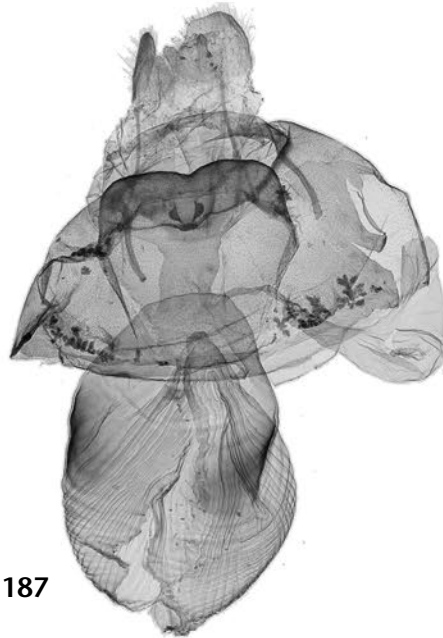
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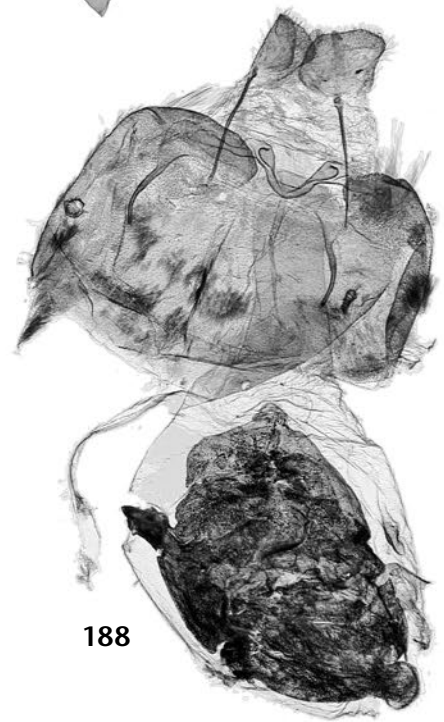
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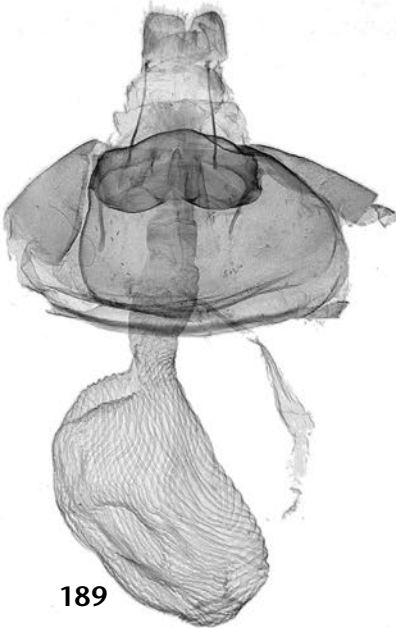
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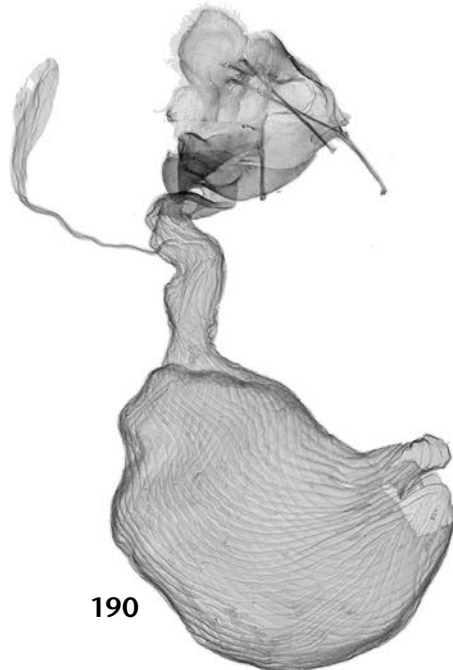
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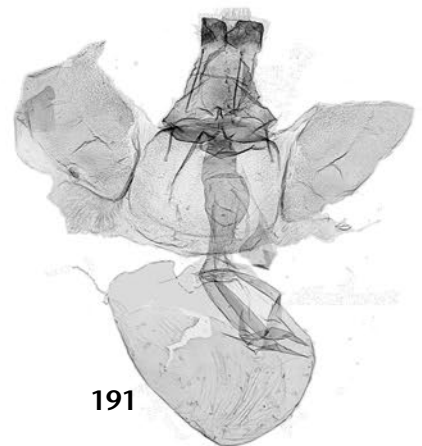
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191

♀ genitalia with long ductus bursae and with cervix bursae somewhat swollen, with vein-like ridges. Globular bursa copulatrix with one small oval and boat-shaped scobinated signum.

**Distribution:** It seems to be endemic on Mindanao, in the provinces of Bukidnon and Davao del Sur (Mt. Apo), Philippines.

### *Nyctemera (Arctata) owadai* KISHIDA, 1994

(Figs. 59–60, 94, 122, 149, 175, 202, 225.)

*Nyctemera owadai*: KISHIDA (1994: 16); DE VOS & ČERNÝ (1999: 174).

**Material examined:** 11 specimens have been studied in CKC, CCGT, CMWM and RMNH, excluding the HT which is in NSMT. – HT: ♂, Philippines, Luzon, Mountain Province, Sagada, 1550 m, 21.–23. VII. 1985, leg. M. OWADA [NSMT].

**Diagnosis:** Fwl. 20–25 mm. A rather small species. A straight white bar running from base to fw. fascia below the cubital vein, usually crossed by a narrow oblique line near the fascia. Fascia running from costa to tornus or just not reaching it. Hw. white with a narrow regular margin without distinct convex undulation.

♂ genitalia resemble those of *toxopei* but the triangular costal process on the cucullus is larger and the apical process more robust. The beak-shaped uncus is broader than in *toxopei*. Phallus long and slender, strongly curved, with a narrow vesica without cornutus.

♀ genitalia with strongly folded lamella vaginalis. A long and narrow ductus bursae. Globular bursa copulatrix with one small more or less circular scobinated signum. Signum smaller than in *luzonensis*.

**Distribution:** This mountain species is endemic to North Luzon, Philippines.

### *Nyctemera (Arctata) toxopei* VAN EECKE, 1926

#### *Nyctemera (Arctata) toxopei toxopei* VAN EECKE, 1926

(Figs. 61–62, 95, 123, 176, 203, 226.)

*Nyctemera toxopei*: VAN EECKE (1926: 349); BRYK (1937: 86).

**Material examined:** The LT and PLT and 13 additional specimens have been studied in BMNH and RMNH. – LT: ♂, designated herewith from the syntype series (1 ♂, 1 ♀): Boeroe [Buru], Ehu, 600–1100 m, 25. IX. 1921, leg. L. J. TOXOPEUS [RMNH]; PLT: ♀, Boeroe [Buru], Fakal, 17. IX. 1921, leg. L. J. TOXOPEUS [RMNH].

**Diagnosis:** Fwl. 26–29 mm. The wing pattern very much resembles that of *owadai*, but *toxopei* is distinctly larger. The white fascia is wider and the oblique crossing between fascia and basal streak is better developed. The dark marginal band in the hindwing is very narrow.

The ♂ genitalia of *toxopei* are more delicate than in *owadai*. The beak-shaped uncus is narrower, the apical process of the valva is less robust and the costal process on the cucullus is smaller and more shallow. Phallus almost identical to that of *owadai*.

♀ genitalia almost identical to that of *owadai* but with a smaller signum.

**Distribution:** The subspecies *toxopei* is endemic to the Moluccan island of Buru.

### *Nyctemera (Arctata) toxopei ceramensis* ssp. n.

(Figs. 63–64, 96, 124, 150, 177, 204, 227.)

**Holotype** ♂: 29.20., Central Ceram, 3000 ft., Dec. [19]19, C. F. & J. PRATT; JOICEY Bequest., Brit. Mus. 1934-120. [BMNH].

**Paratypes** (in total 2 ♂♂, 7 ♀♀): 1 ♂, 3 ♀♀, 29.20., Central Ceram, Manusela, 6000 ft., x.-xii. 1919, C. F. & J. PRATT. JOICEY Bequest., Brit. Mus. 1934-120 [BMNH]. 1 ♂, Seram, Gunung Binaia, north slopes, 2000 m, viii.-ix. 1987, upper montane forest, site 12:2, J. D. HOLLOWAY, D. T. JONES et al. (Operation Raleigh) [BMNH]. 1 ♀, Seram, Gunung Binaia, north slopes, 1000 m, viii.-ix. 1987, secondary forest, site 9:2, J. D. HOLLOWAY, D. T. JONES et al. (Operation Raleigh) [BMNH]. 2 ♀♀, Seram, Gunung Binaia, north slopes, 1200 m, viii.-ix. 1987, lower montane forest, site 10:2, J. D. HOLLOWAY, D. T. JONES et al. (Operation Raleigh) [BMNH]. 1 ♀, Seram, Gunung Kobipoto, north slopes, 900 m, viii.-ix. 1987, lowland forest, site 6:1, J. D. HOLLOWAY, D. T. JONES et al. (Operation Raleigh) [BMNH].

**Etymology:** The name *ceramensis* is derived from its origin, the island Seram, Indonesia.

**Diagnosis:** Fwl. 27–28 mm. The dark pattern of subspecies *ceramensis* is more extended than in subspecies *toxopei*. The white fascia and basal streak are narrower and the separation of basal streak and fascia is wider. In the hw. the marginal band is much broader than in *toxopei*, in the ♀ even the dorsum is brown.

The genitalia of both sexes identical to those of *toxopei*.

**Distribution:** The subspecies *ceramensis* is endemic to the Moluccan island of Seram.

### *Nyctemera (Arctata) robusta* DE VOS & ČERNÝ, 1999

#### *Nyctemera (Arctata) robusta robusta* DE VOS & ČERNÝ, 1999

(Figs. 65–66, 97, 125, 151, 178, 205, 228.)

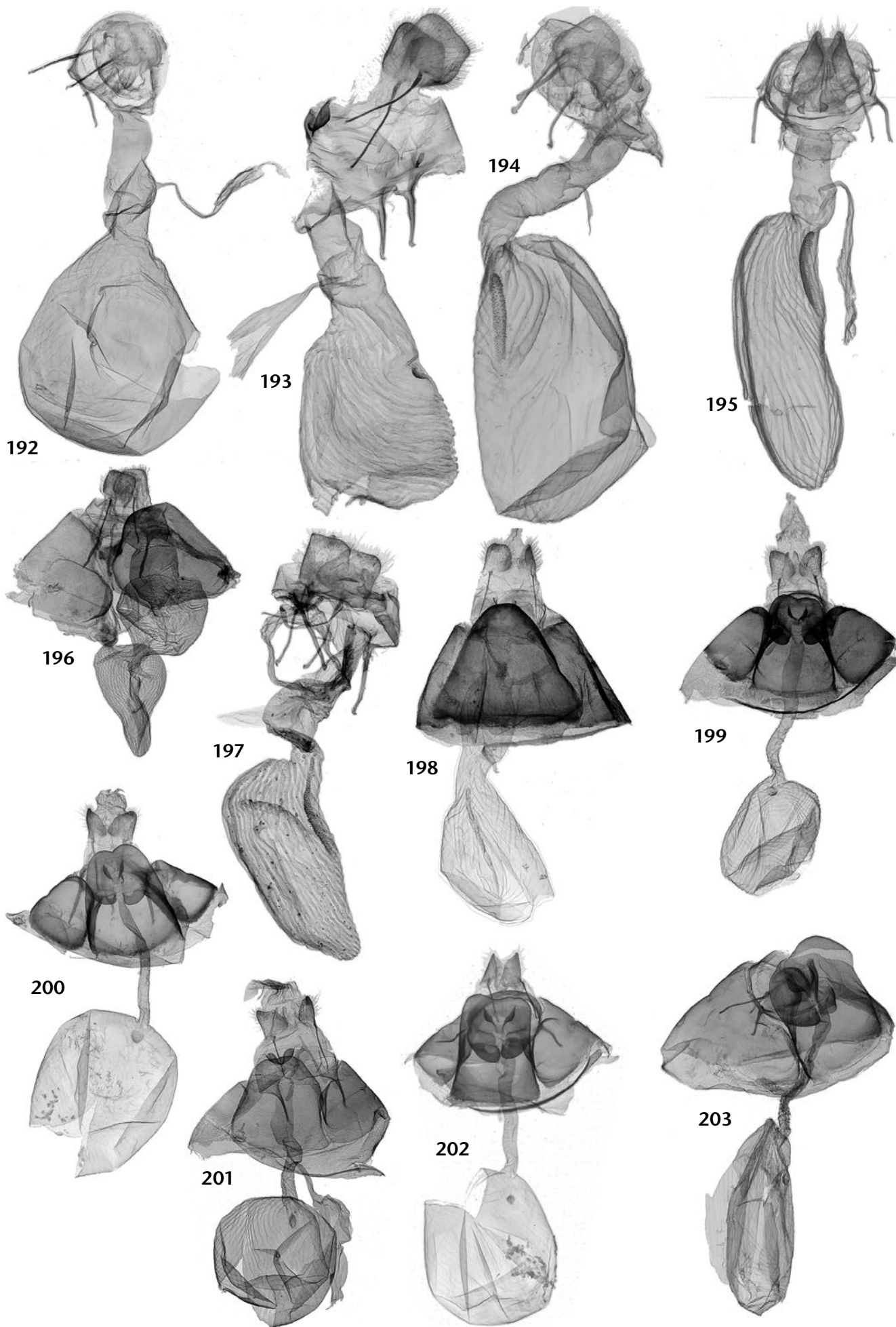
*Nyctemera robusta*: DE VOS & ČERNÝ (1999: 167).

**Material examined:** HT, 152 PTs and 97 additional specimens were studied in BPBM, CKC, CCGT, CMWM and RMNH. – **Holotype**: ♂, Philippines, Mindanao, Bukidnon, Mt. Kitanglad, 1700 m, 15. viii.–15. ix. 1993, leg. V. SINIAEV [CMWM].

**Diagnosis:** Fwl. 25–29 mm. This robust species is easily recognised. The greyish brown pattern on the semihyaline dirty white wings give it a peculiar appearance. The white fw. fascia is broad, running from costa to tornus and there gradually tapering. The dark pattern on the outer margin of the fascia is convex. Forewing with anal vein and dorsum white. Hw. with broad irregular dark margin, venation on hw. pale brown.

**Figs. 192–203:** ♀ genitalia. – **Fig. 192:** *N. (A.) toradjana*, prep. RV1373. **Fig. 193:** *N. (A.) undulata*, prep. RV362. **Fig. 194:** *N. (A.) palawanica*, prep. RV397. **Fig. 195:** *N. (A.) browni*, prep. RV1390. **Fig. 196:** *N. (A.) angustipennis*, prep. WT19.923. **Fig. 197:** *N. (A.) consobriniformis*, prep. RV346. **Fig. 198:** *N. (A.) gratia*, prep. RV1399. **Fig. 199:** *N. (A.) luzonensis luzonensis*, prep. RV1401. **Fig. 200:** *N. (A.) luzonensis apoensis*, prep. RV1403. **Fig. 201:** *N. (A.) lunulata*, prep. WT19.925. **Fig. 202:** *N. (A.) owadai*, prep. RV1397. **Fig. 203:** *N. (A.) toxopei toxopei*, prep. RV287. – Genitalia to individually different scales.





♂ genitalia with a conspicuous broad beak-shaped uncus with dorsally pointy “ears” which is not seen in any of the other species in the subgenus. Valva large with a narrow apical process and a more or less rectangular costal process on the cucullus. Phallus not so strongly curved as in the other allied species in the *luzonensis* group, vesica without cornutus.

♀ genitalia with an almost circular sternite. Ductus bursae rather broad with the cervix bursae slightly swollen. A large globular bursa copulatrix with in the connection of ductus and bursa one rather small boat-shaped scobinated signum.

**Distribution:** Subspecies *robusta* is confined to the Central and Northeastern part of Mindanao in the provinces Bukidnon, Davao del Sur and Misamis Oriental, Philippines.

***Nyctemera (Arctata) robusta busanica* ssp. n.**

(Figs. 67–69, 98, 126.)

**Holotype** ♀: Philippinen, Mindanao, Prov. Sumangani [sic], Cotabato, Mt. Busa, near Kainba, 700 m, vi. 1998, leg. BAL [CMWM].

**Paratypes** (in total 15 ♂♂, 1 ♀): same data as HT, 1 ♂ RMNH; 14 ♂♂, 1 ♀ CMWM. — No other material available.

**Etymology:** The name *busanica* refers to the locality where all specimens were found so far: Mount Busa, South Cotabato, South Mindanao, Philippines.

**Diagnosis:** Fwl. 26–27 mm. The dark pattern is much reduced in this subspecies, leaving only traces of it in some specimens. The ground colour is subhyaline smutty white. In some specimens there is a remnant of pale greyish brown in the basal half and apex of the fw. and a faint visible pale hw. margin. The yellow of the abdomen also is paler than in ssp. *robusta*, but the black bands are identical.

♂ and ♀ genitalia are identical to those of *robusta*.

**Distribution:** The subspecies *busanica* has only been found on Mount Busa in the Province South Cotabato in southern Mindanao. The name “Sumangani” as province of Mindanao mentioned on the labels is an error, it must be a reference to “Sarangani” which is a province in the South of Mount Busa.

***Nyctemera (Arctata) goliath* sp. n.**

(Figs. 70–71, 99, 127, 152, 179, 206, 229.)

*Nyctemera tenuifascia*: SNELLEN (1907: 115) nec SNELLEN (1898).

*Nyctemera tenuifascia tenuifascia*: ROEPKE (1949: 60) nec SNELLEN (1898).

**Holotype** ♂: Tosari, ix. 1917, W. ROEPKE. Museum Leiden, verzameling WKJ ROEPKE [RMNH].

**Paratypes** (in total 2 ♂♂, 4 ♀♀): 1 ♀, O. Java, Tosari, [before 1907], 5800 vts, KOHLBRUGGE. 9. *Nyctemera tenuifascia* SNELL. sec. SNELLEN [RMNH]; 1 ♀, Tosari, Tinggo Crater, 5. vii. 1910, E. A. COCKAYNE [BMNH]; 1 ♀, Tenger, iv. 1914 [RMNH]; 1 ♂, 1 ♀, Kletak Tengger, E. Java, 5400 ft, v. 1934 [♂], vi. 1934 [♀], J. P. A. KALIS [BMNH]; 1 ♂, Lawoe, J. P. ROSIER. FELDR. vii. 1936. Museum Leiden, verzameling WKJ ROEPKE [RMNH].

**Etymology:** The species is probably the largest *Nyctemera* species and therefore the name *goliath* seems appropriate, referring to the giant GOLIATH, the large champion fighter of the Philistines mentioned in the Bible.

**Diagnosis and description:** Probably the largest *Nyctemera* species. Robust, pale brown with a contrasting white fascia and fine white veins on the fw. The white thorax is conspicuous.

Fwl. 29–32 mm. Head pale yellow, in some specimens with white just behind the antennae. Frons with black spot and a black triangular dot on the vertex. Labial palpi rather long, black with narrow white rings at segmental connections and basal segment white ventrally. Antennae with flagellum white, pectinations dark grey brown, in ♂ relatively short bipectinate in comparison with the other species, in ♀ even shorter.

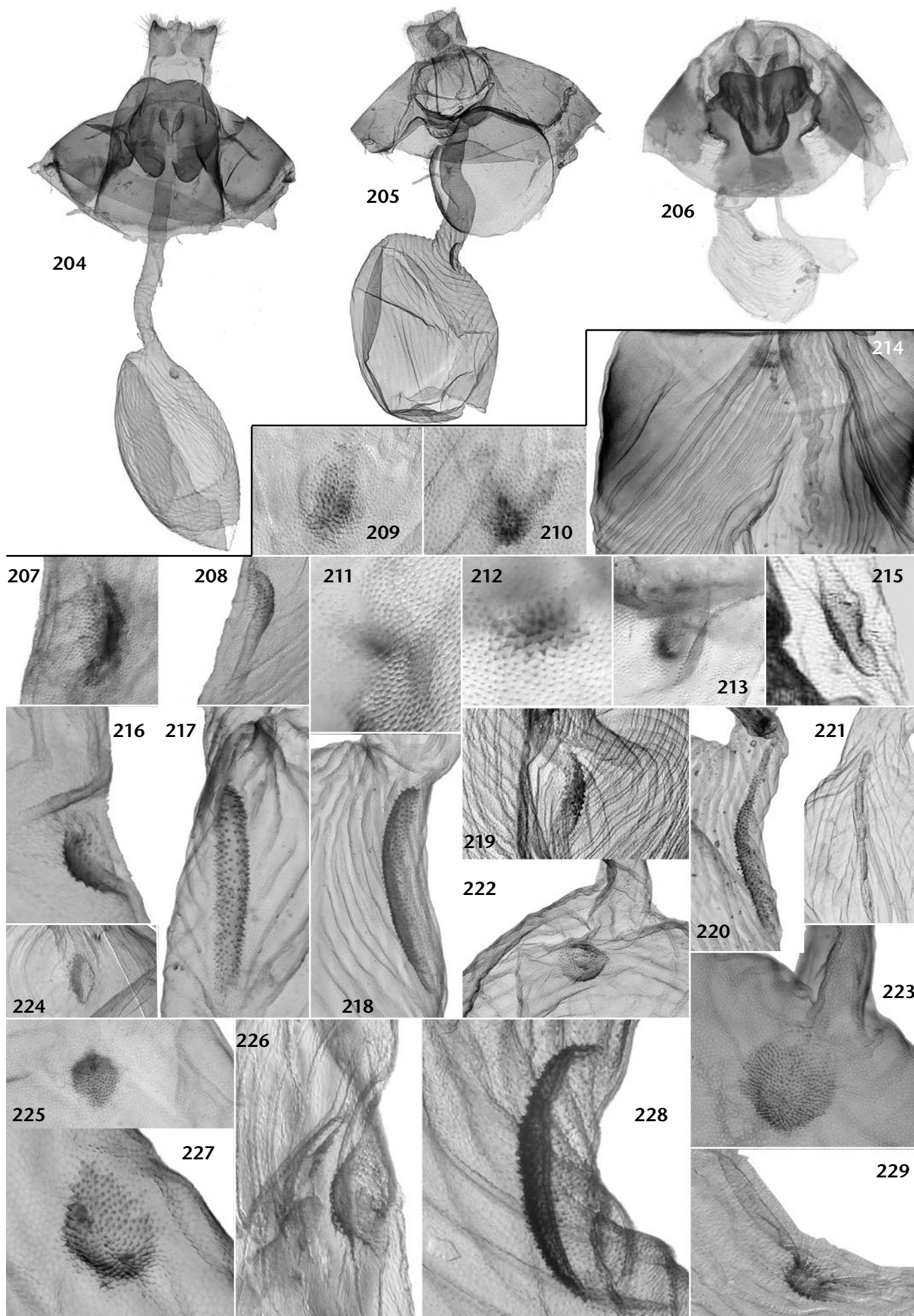
Patagia white with posterior rim yellow and each patagium with one black dot. Tegulae usually white, in some specimens with a streak of yellow in the middle, with a large black basal spot and a smaller black central spot. Rest of visible thorax dorsally white with centrally some yellow, and with two black anterior spots, one black central spot and one black posterior spot. Thorax ventrally white, mixed with yellow, in some specimens entirely yellow, with some black spots. Legs with coxa and femur white and with anterior side dark grey brown, tibia and tarsi pale grey brown.

Abdomen dorsally white with a dark grey brown band on each segment, the last segments yellow and in some specimens almost all segments with yellow ground colour. Lateral with black patch around the stigmata. Abdomen ventrally white with a row of black dots laterally. In specimens with reduced white pattern the yellow coloration on the thorax and abdomen is usually extended.

Fw. and hw. semihyaline. Upperside fw. pale brown with straight white fascia running from costa to wing fold, fascia with irregular sides and more narrow at costa, in some specimens with reduced white pattern fascia is

**Figs. 204–206:** ♀ genitalia. — **Fig. 204:** *N. (A.) toxopei ceramensis*, prep. RV1393. **Fig. 205:** *N. (A.) robusta robusta*, prep. WT19.924. **Fig. 206:** *N. (A.) goliath*, prep. RV1382. — **Figs. 207–229:** Signa of ♀ genitalia. **Fig. 207:** *N. (A.) arctata*, prep. RV1374. **Fig. 208:** *N. (A.) albofasciata*, prep. RV1375. **Fig. 209:** *N. (A.) zerenoides*, prep. RV1380. **Fig. 210:** *N. (A.) scalarium scalarium*, prep. RV1378. **Fig. 211:** *N. (A.) scalarium balinensis*, prep. RV1381. **Fig. 212:** *N. (A.) scalarium tenuifascia*, prep. RV1362. **Fig. 213:** *N. (A.) scalarium regalis*, prep. RV1376. **Fig. 214:** *N. (A.) scalarium timorana*, prep. RV1405. **Fig. 215:** *N. (A.) montana*, prep. BM2103. **Fig. 216:** *N. (A.) undulata*, prep. RV362. **Fig. 217:** *N. (A.) palawanica*, prep. RV397. **Fig. 218:** *N. (A.) browni*, prep. RV1390. **Fig. 219:** *N. (A.) angustipennis*, prep. WT19.923. **Fig. 220:** *N. (A.) consobriniformis*, prep. RV346. **Fig. 221:** *N. (A.) gratia*, prep. RV1399. **Fig. 222:** *N. (A.) luzonensis luzonensis*, prep. RV1401. **Fig. 223:** *N. (A.) luzonensis apoensis*, prep. RV1403. **Fig. 224:** *N. (A.) lunulata*, prep. WT19.925. **Fig. 225:** *N. (A.) owadai*, prep. RV1397. **Fig. 226:** *N. (A.) toxopei toxopei*, prep. RV287. **Fig. 227:** *N. (A.) toxopei ceramensis*, prep. RV1393. **Fig. 228:** *N. (A.) robusta robusta*, prep. WT19.924. **Fig. 229:** *N. (A.) goliath*, prep. RV1382. — Genitalia and details to individually different scales.





reduced to a narrow white irregular stripe and running from costa to vein CuA2. All veins finely coloured with white. Dorsum white, wing fold finely white. Underside almost identical to upperside but with less white on the veins.

Upper- and underside hw. scarcely scaled with white (semihyaline) and with a broad pale brown margin which is crossed by the thin white veins.

♂ genitalia (prep. BM4055, RV1360) with uncus long and slender, slightly sinuous with a sharp bend down apex. Saccus rounded and rather deep. Valvae broad, more or less triangular. Cucullus with at the outside of the valve a short rounded costal lobe before the apex with at the innerside a small finger-shaped process and a larger straight finger-shaped apical process. Both finger-shaped processes covered with setae. The apical process is much shorter than any of the other allied species in the *luzonensis* group.

Phallus long and S-shaped, vesica sock-shaped with two short lobes and a pointed apex, no cornutus.

♀ genitalia (prep. RV1382) with a large and peculiar shaped sternite which is strongly sclerotised in a “T” form. Ductus bursae short and broad, running into a swollen and folded cervix bursae. Bursa copulatrix relatively small, globular with ridges and folds and with a small bowl-shaped scobinated signum with some sclerotised extensions distally and caudally.

**Distribution:** The species is found in the Tengger Mountains on the slopes of Mount Bromo in the eastern part of Java, Indonesia, at an altitude of 1700–1800 m. There are no recent records of this species so the existence of a still living population could therefore be feared. However, the localities of the species are not often entomologically investigated and it would be interesting to do this for this species in future more thoroughly.

**Taxonomical note:** SNELLEN (1907) confused this species with his own *Nyctemera tenuifascia* SNELLEN, 1898 from Lombok which he described from a specimen from the PAGENSTECHE collection in Wiesbaden (said to be now in München; present deposition of this HT by monotypy unknown). Because he had the original type specimen of *tenuifascia* not to his disposal at the moment he received his first specimen of *Nyctemera goliath* from Dr. I. H. F. KOHLBRUGGE, he could not estimate the size and real appearance of *tenuifascia* anymore, despite of his excellent coloured drawing which he made of the type (SNELLEN 1898: fig. 19). SNELLEN (1907), although having noticed the differences in pattern and appearance of the two, made the mistake of assuming that the two were conspecific and only concern variation. This was followed by all authors up to now. ROEPKE (1949) added to the confusion by even depicting a true *Nyctemera goliath* and naming it *Nyctemera tenuifascia tenuifascia*.

### Key to the species groups of subgenus *Arctata*

1. Forewing pattern consisting of more or less confluent dots and patches, leaving a white oblique fascia open, hindwing margin usual with isolated dots . . . . . *arctata* group
  - Forewing pattern with no or hardly any isolated dots, margin of hindwing complete . . . . . 2
2. Males . . . . . 3
  - Females . . . . . 5
3. Male genitalia with elongate saddle-shaped uncus with a hammer-head apex . . . . . *hyalina* group
  - Male genitalia with beak-shaped uncus . . . . . 4
4. Phallus short, bend and diverging distally. Vesica not very long, in some species with a distal cornutus . . . *browni* group
  - Phallus long, distally strongly curved with a broad part at origin of ductus ejaculatorius. Vesica narrow, trunk-shaped without cornutus . . . . . *luzonensis* group
5. Female genitalia with bursa copulatrix without signum . . . . . *hyalina* group
  - Bursa with a signum . . . . . 6
6. Signum oval or longitudinal, ductus bursae short and wide . . . . . *browni* group
  - Signum circular, ductus bursae long and narrow . . . . . *luzonensis* group

### Key to the adults of subgenus *Arctata*

1. fore- and hindwing both pure white with only the veins suffused . . . . . *gratia*
  - at least the forewing with pattern or not pure white . . . . 2
2. forewing with very pale pattern, bone-white, veins darker . . . . . *robusta busanica*
  - forewing darker patterned, not bone-white or veins not darker. . . . . 3
3. forewing with rows of pale grey-brown dots, hindwing without pattern . . . . . *zerenoides*
  - forewing with darker pattern, hindwing with margin of dots or complete . . . . . 4
4. hindwing with margin pattern of isolated dots . . . . . 5
  - hindwing with margin complete or at most deeply indented . . . . . 9
5. hindwing dots very small, forewing fascia narrowing at costa . . . . . *montana*
  - hindwing dots confluent or not very small, fascia not or hardly narrowing . . . . . 6
6. forewing fascia diverging from tornus to costa, sometimes with a central dot . . . . . *albofasciata*
  - fascia not diverging or not clearly defined . . . . . 7
7. forewing fascia wide, more or less oval, narrowly connected with basal streak . . . . . *arctata*
  - fascia not clearly defined, with rows of dark dots . . . . . 8
8. medial row of dots on forewing complete and sinuous, termen rounded . . . . . *zerenoides*
  - medial row of dots interrupted, termen straight . . . . . *scalarium scalarium*

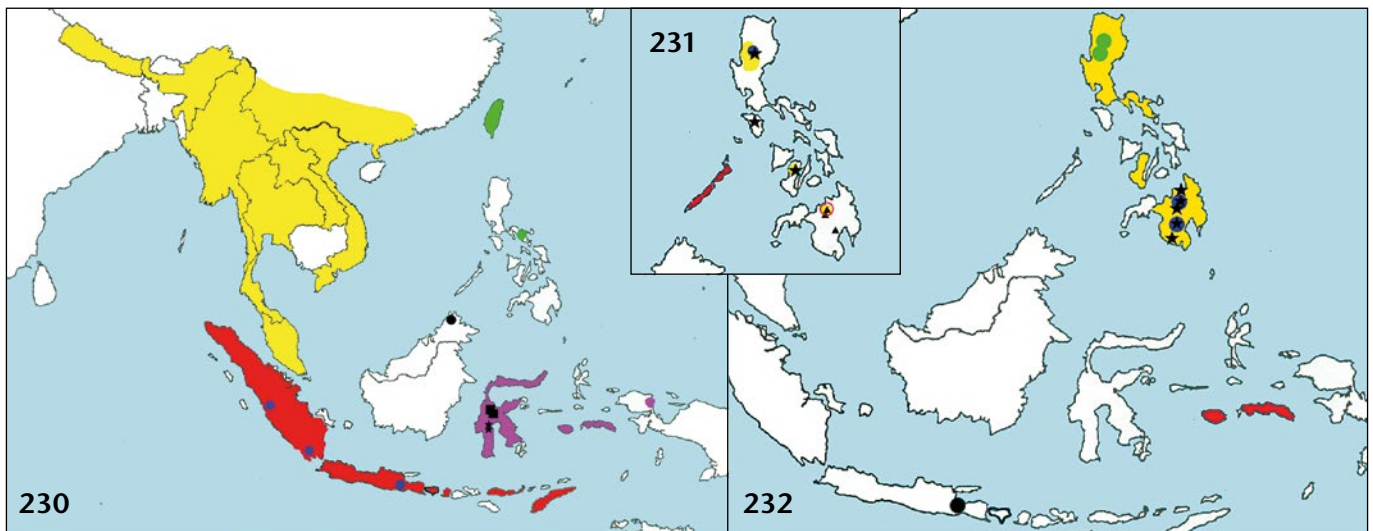


9. hindwing margin convexly patterned, sometimes deeply indented along veins . . . . . 10  
 – hindwing margin smooth, at least not deeply indented along veins . . . . . 23
10. forewing without distinct basal streak . . . . . 11  
 – forewing with distinct basal streak . . . . . 16
11. forewing dark without any white pattern . . . . . *scalarium balinensis*  
 – forewing with at least traces of or complete white fascia . . . . . 12
12. fascia reaching costa and tornus . . . . . 13  
 – fascia not reaching both, costa either tornus or none . . . . . 14
13. forewing with white subapical patch or dot, fascia irregular . . . . . *scalarium regalis*  
 – forewing without such spot, fascia straight . . . . . *hyalina hyalina*
14. fascia reaching costa, not tornus, a large species . . . . . *goliath*  
 – fascia not reaching costa . . . . . 15
15. fascia reaching tornus, no subapical spot . . . . . *scalarium balinensis*  
 – fascia not reaching tornus nor costa, with or without subapical spot . . . . . *scalarium tenuifascia*
16. forewing with basal streak irregular, not straight . . . . . 17  
 – basal streak regular, rather straight . . . . . 18
17. subapical spot present, abdomen with black bands . . . . . *scalarium timorana*  
 – no subapical spot present, abdomen with black dorsal dots or incomplete bands . . . . . *undulata*
18. basal streak small or narrow, not connected with fascia . . . . . 19  
 – forewing with basal streak large, connected with fascia . . . . . 20
19. basal streak reaching to middle of the forewing . . . . . *hyalina stresemanni*  
 – basal streak short, not reaching middle of forewing . . . . . *hyalina diaphana*
20. a dark isolated dot between basal streak and fascia . . . . . *kinabaluensis*  
 – no isolated dot between basal streak and fascia . . . . . 21
21. hindwing margin gradually narrowing towards white tornus . . . . . *angustipennis*  
 – hindwing margin not narrowing, tornus with dot or patch . . . . . 22
22. hindwing tornus with elongated patch . . . . . *palawanica*  
 – hindwing tornus with small dot . . . . . *browni*
23. hindwing margin very broad, reaching center of the wing . . . . . 24  
 – hindwing margin not reaching center of the wing . . . . . 26
24. forewing fascia lunular shaped, curved . . . . . *lunulata*  
 – forewing fascia narrow and irregular in a straight line . . . . . 25
25. forewing fascia reaching costa, termen straight . . . . . *toradjana*  
 – forewing fascia just not reaching costa, termen slightly rounded . . . . . *celebensis*
26. white areas on fore- and hindwing entirely crossed by dark veins . . . . . *luzonensis luzonensis*  
 – white areas partly or not crossed by dark veins . . . . . 27
27. white areas on fore- and hindwing partly crossed by dark veins . . . . . *luzonensis apoensis*  
 – white areas on both wings not crossed by dark veins . . . . . 28
28. forewing with distinct basal streak . . . . . 29  
 – forewing without basal streak, dorsum and anal vein white . . . . . *robusta robusta*
29. fascia more or less oval shaped, distinctly separated from basal streak . . . . . 30  
 – fascia straight, distinctly connected with basal streak or only separated by vein . . . . . *owadai*
30. dark subcostal vein crossing the fascia . . . . . *consobriniformis*  
 – no dark subcostal vein crossing the fascia . . . . . 31
31. hindwing margin very narrow, forewing fascia very broad . . . . . *toxopei toxopei*  
 – hindwing margin broader, fascia narrower . . . . . *toxopei ceramensis*

## Conclusion

Considering the 21 treated species to belong to the subgenus *Arctata* ROEPKE, 1949 of *Nyctemera* is supported by the similar general construction of the genitalia of the ♂♂. All species have in common that in the ♂ the valvae have a conspicuous apical process which is curved dorsally. In most species the dark wing pattern is convex but there are some exceptions. The construction of the wings, ♂ uncus and phallus subdivide the species into 4 species-groups. It would be premature to consider these species-groups to be of subgeneric level without having studied the molecular relationships. Most external characters point in the direction of a monophyletic alliance and at least for the time being it would be wise not to split this subgenus further.

For some species the position is still uncertain. *Nyctemera (Arctata) montana* HOLLOWAY, 1976 has a different construction of the ♀ genitalia, especially in the ductus bursae, which could even justify to place it in a group of its own. It is, however, for the time being placed here in the *arctata* species-group because the wing pattern very much resembles the general concept of this species-group. It has strong convex dark pattern on the fw. and on the hw. it has similar marginal dots. When ♂ specimens of *montana* become available the genitalia might reveal the correct position in the subgenus. *Nyctemera (Arctata) gratia* (SCHULTZE, 1910), *N. (A.) undulata* DE VOS & ČERNÝ, 1999 and *N. (A.) celebensis* sp. n. have a construction of the ♂ genitalia or wing pattern that is confusing and seem to form intermediates between two species-groups. *Nyctemera (A.) goliath* sp. n. has a peculiar distribution to belong to the *luzonensis* species-group. The structure of its genitalia are more or less resembling those of the *luzonensis* group and that is why it is preliminary placed in this group but still the struc-



**Figs. 230–232: Distribution maps of the species groups.** **Fig. 230:** The *arctata* species group: *Nyctemera (Arctata) arctata* (yellow); *N. (A.) scalarium* (red); *N. (A.) zerenoides* (blue dots); *N. (A.) albofasciata* (green); *N. (A.) montana* (black dot). The *hyalina* species group: *N. (A.) hyalina* (purple); *N. (A.) kinabaluensis* (black dot); *N. (A.) toradjana* (black stars); *N. (A.) celebensis* (black squares). **Fig. 231:** The *browni* species group (The Philippines): *N. (A.) browni* (yellow); *N. (A.) palawanica* (red); *N. (A.) angustipennis* (blue dot); *N. (A.) undulata* (red ring); *N. (A.) consobriniformis* (black triangles); *N. (A.) gratia* (black stars). **Fig. 232:** The *luzonensis* species group: *N. (A.) luzonensis* (yellow); *N. (A.) toxopei* (red); *N. (A.) lunulata* (blue dots); *N. (A.) owadai* (green dots); *N. (A.) robusta* (black stars); *N. (A.) goliath* (black dot).

tures do differ so much that, like in *montana*, it might even belong into a species-group of its own. Molecular research is necessary to establish the correct positions of all species, particularly of *montana* and *goliath*.

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