

REVISION OF THE PALAEARCTIC AND
ORIENTAL SPECIES OF THE GENUS *NAARDA*
(LEPIDOPTERA: EREBIDAE, HYPENINAE)
PART 2. DESCRIPTION OF TEN NEW SPECIES FROM ASIA

BALÁZS TÓTH and LÁSZLÓ RONKAY

*Department of Zoology, Hungarian Natural History Museum
H-1088 Budapest, Baross u. 13, Hungary; E-mail: balazs0toth@gmail.com, ronkay@nhmus.hu*

Descriptions of ten new *Naarda* species, *N. octogesima* sp. n. (Thailand), *N. laoana* sp. n. (Laos), *N. mirabilis* sp. n. (Vietnam), *N. vicina* sp. n. (Philippines), *N. atrata* sp. n. (Thailand), *N. plumbea* sp. n. (Nepal), *N. furcatella* sp. n. (Thailand, Indonesia, Cambodia), *N. secreta* sp. n. (Taiwan), *N. huettleri* sp. n. (Sri Lanka), *N. palawana* (Philippines, Indonesia) sp. n. are given. With 39 figures.

Key words. *Naarda*, Asia, new species, revision, Oriental Region.

INTRODUCTION

The first part of the series of articles dealing with the taxonomy and biogeography of the genus *Naarda* Walker, 1866 (TÓTH & RONKAY 2014) contains the overview of this large and diverse phyletic group, including the general morphological characterisation of the main lineages and the descriptions of 28 new species from eastern and South-Eastern Asia. The second part of the series continues the description of the newly discovered taxa. Present paper (and the forthcoming third item of the series) contains the description of those new species, which have tiny or absent (fused) cucullus, in contrast to the first part, which encompassed the taxa with well developed and distinct, large or medium-sized cucullus.

MATERIAL AND METHODS

The genital terminology, methodology, affiliation of the material examined and their abbreviations are used in the same way as in Part 1 (TÓTH & RONKAY 2014).

Acronyms: BM(NH) – The Natural History Museum, London (formerly British Museum, Natural History); HNHM – Hungarian Natural History Museum, Budapest; MFN – Museum für Naturkunde, Berlin; LP – the private collection of László Peregovits; MF – the private collection of Michael Fibiger (hosted at ZMUC); SDEI – Senckenberg Deutsches Entomologisches Institut, Müncheberg; TFRI – Taiwan Forestry Research Institute, Taipei; ZMUC – Zoological Museum of the University of Copenhagen.

SYSTEMATIC PART

***Naarda octogesima* sp. n.**

(Figs 1, 13, 25, 28)

Holotype. ♂, Thailand: Prov. Nan, Doi Phu Kha NP, between Pua and Bo Luang, 1350 m, 101°05'E, 19°12'N, 3.XI.2002, leg. B. Herczig & G. Ronkay; slide No. RL7903m (coll. HNHM).

Paratype. Thailand: 1 ♀, Prov. Chiang Mai, 1600m, between Fang and Nor Lae, 99°09'E, 20°02'N, 28.10.2002, leg. B. Herczig & G. Ronkay; slide No. TB399f (coll. HNHM).

Taxonomy. According to the male genitalia, *N. octogesima* and *N. laoana* spp. n. represent a distinct lineage.

Description. Wingspan 21–24 mm, length of forewing 11–12 mm. Antennae filiform, ciliate, in male cilia arranged into four transverse arrays, length of cilia twice diameter of flagellum; in female one cilium per segment, shorter than diameter of flagellum. Length of labial palps 2.5 times the diameter of eye in male, three times in female, in both sexes tip not light, dorsal scales long, dorsal edge strongly convex. Scale-hood of vertex broad-based, relatively long, its tip bifurcate. Profemora and – tibiae in male slightly thickened, hairy. Characteristic wing pattern features: costa not concave in male; ground colour greyish brown in male, darker in female; subterminal line greyish with two projections inwards in male, more sinuous in female; postmedial line parallel to the subterminal but slightly more sinuous with an angulation inwards nearly touching reniform spot in male; medial line broad, dark; antemedial line present; reniform stigma big, pale yellow, 8-shaped, with greyish dots in the top and bottom halves, orbicular stigma relatively big, pale yellow. Hindwing slightly paler than forewing, with three transverse lines, basal one broader and more prominent in male.

Male genitalia (Fig. 1). Uncus relatively long, curved, bulged ventrally at basal half, its tip pointed. Scaphium as long as uncus; tegumen longer than vinculum, the latter being very strong. Saccus broad-based, long, wide, its tip rounded. Base of transtilla very broad. Shape of juxta like a shield or coat-of-arms, with a small notch at its ventro-medial edge. Valva broad-based, abruptly tapering. Cucullus free only at its tip, very narrow. Sacculus very well-developed, basally narrow, distally dilated, its distal end twice broader than base. Harpe a relatively broad-based process, its tip rounded, its base fused with the ventro-lateral corner of the sacculus. Costa heavily developed, ending in long, bifurcate process, ventral extension curved ventrally beyond the harpe, dorsal extension tongue-shaped. Aedeagus straight, very thick and short; vesica globular, twice longer than aedeagus, its distal third ample and scobinate, with an ultimately long, strong cornutus emerging close to carina, being 2.5 times longer than aedeagus.

Female genitalia (Fig. 13). Ovipositor lobes rectangular. Apophyses quite broad; apophyses posteriores ca 1.4 times longer than apophyses anteriores. Lobes of sternum A7 rounded. Basal half of sinus very narrow, its posterior part broad. Sternum A7 with large, rounded, broad-based, sclerotised plate. Ductus bursae broad and very short, strongly sclerotised, connected to corpus bursae rather proximally at dorsal side; with rather tubular, heavily sclerotised, terminally slightly curved anterior pocket. Corpus bursae globular, densely scobinate; appendix bursae shortly conical.

Diagnosis. The closest relative of this new species is *N. laoana* sp. n. The differential external morphological features of *N. octogesima* are as follows: the ground-colour of wings is darker in *N. octogesima* than in *N. laoana*, the basal area of wings is less ochreous suffused, the 8-shaped reniform stigma is more prominent, more distinctly pale yellow, and the orbicular stigma is also more conspicuous. In the male genitalia, the ventral process of vinculum is stronger, thicker in *N. octogesima*, the dorsal edge of costa is slightly curved, the sub-apical neck is considerably thinner, and the bifurcate process is smaller with shorter extensions. The huge cornutus in the aedeagus is slightly longer than in *N. laoana*, its distal half sinuous and tapering into acute tip (not bifurcate as in *N. laoana*); and the vesica has large distal scobinate area in contrast to *N. laoana*. In the female genitalia the ductus bursae is much broader, the corpus bursae is more spherical, its surface is more scobinate, and the appendix of ductus bursae is longer than those of *N. laoana*.

The male genitalia of *N. octogesima* are somewhat similar to those of *N. abnormalis* (Hampson, 1912), but the uncus and the scaphium are narrower, longer and more curved in the new species, the notch of the juxta is smaller, the saccus is much more elongate, the costa is much more developed, the distal part of sacculus is much broader, but the harpe is smaller than in *N. abnormalis*. The two species are rather dissimilar externally as *N. octogesima* is considerably larger in size, having convex costa of the male forewing, much stronger crosslines on both wings, conspicuous large and yellow reniform stigma, and the hindwing is much darker than in *N. abnormalis*.

Etymology. The specific name refers to the unique 8-shaped reniform stigma.

Distribution. Northern Thailand.

***Naarda laoana* sp. n.**

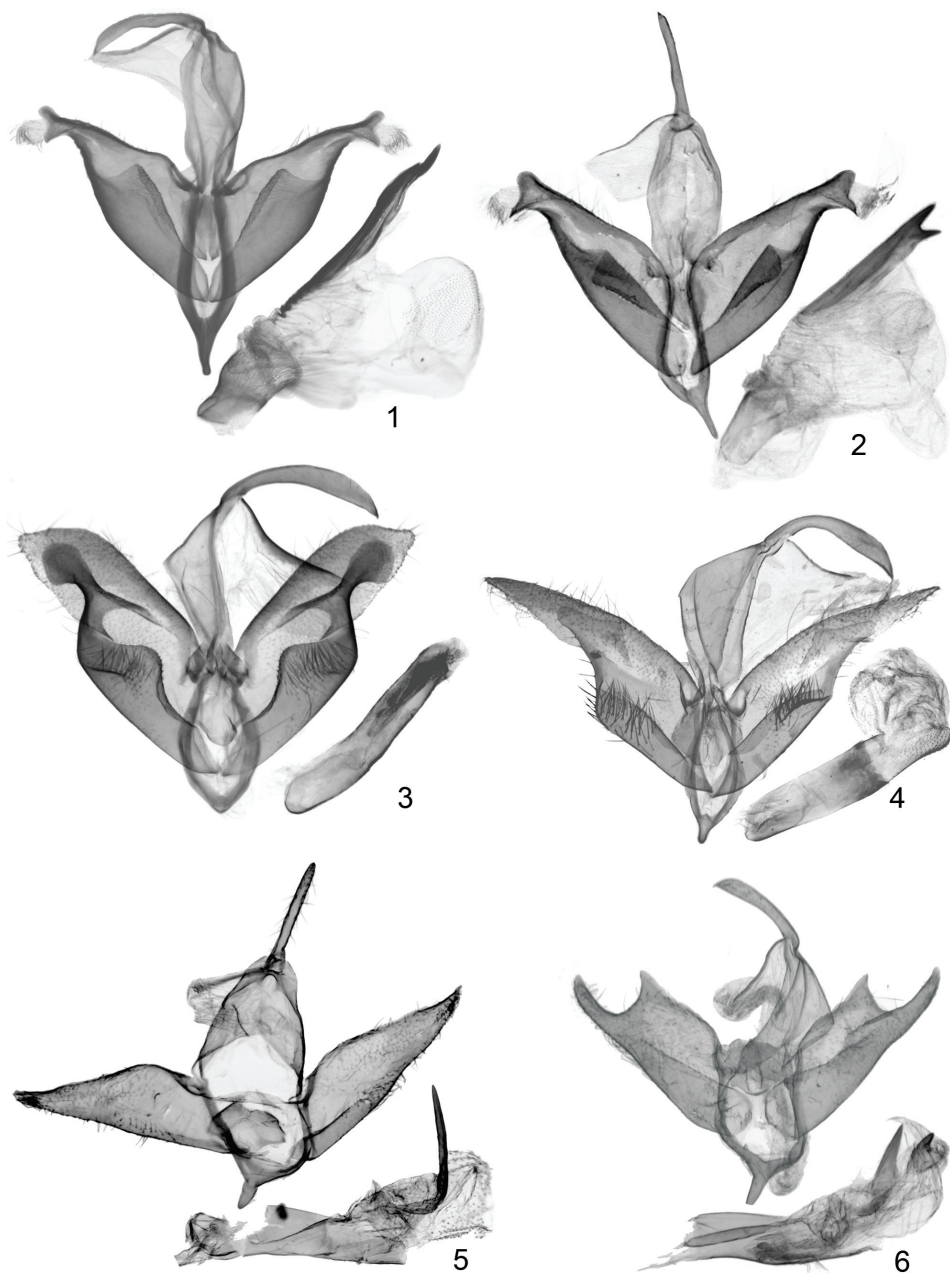
(Figs 2, 14, 26, 29)

Holotype. ♂, Laos: Prov. Xiang Khouang, Phou Samson, 10 km E Ban Peun, 19°8.717'N, 103°46.811'E, 15.II.2012, Lao2012PL_20, leg. L. Peregovits & A. Szapannos; slide No. TB555m (coll. HNHM).

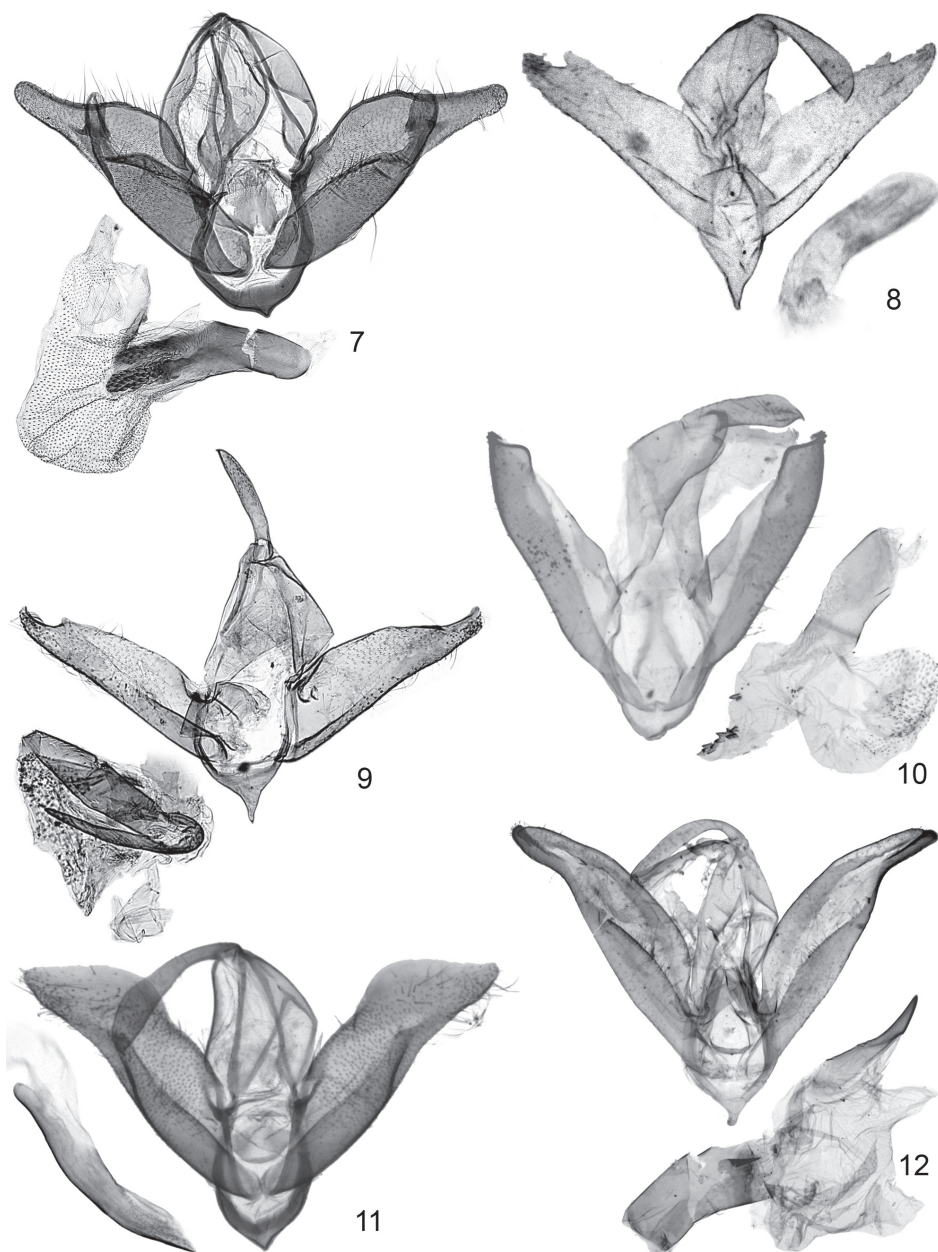
Paratypes. 4 ♂, 1 ♀, data as holotype but slide No. TB554m, TB556f (coll. LP).

Taxonomy. This species is the closest relative of *N. octogesima*.

Description. Wingspan 22–25.5 mm, length of forewing 11–12.5 mm. One of the largest *Naarda* species. Antennae filiform, ciliate, setose with one seta per segment. Length of setae 1.5–2 times diameter of flagellum in male, nearly or just as long as diameter of flagellum in female. Cilia of males as long as or somewhat (ca 1.5 times) longer than diameter of flagellum, arranged to four transverse arrays; cilia of females half as long as diameter of flagellum, in three transverse arrays. Male antenna with long scales forming a small



Figs 1–6. Male genitalia of newly described *Naarda* species: 1 = *N. octogesima* sp. n. (RL7903m), 2 = *N. laoana* sp. n. (TB554m), 3 = *N. mirabilis* sp. n. (RL7920m), 4 = *N. vicina* sp. n. (clasper app.: RL7988m; aedeagus: RL7989m), 5 = *N. atrata* sp. n. (TB392m), 6 = *N. furcatella* sp. n. (clasper app.: TB447m; aedeagus: TB419m).



Figs 7–12. Male genitalia of newly and formerly described *Naarda* species: 7 = *N. blepharota* Strand (RL10745m), 8 = *N. secreta* sp. n. (RL155TFRIm), 9 = *N. huettleri* sp. n. (TB571m), 10 = *N. palawana* sp. n. (RL7992m), 11 = *N. glauculalis* Hampson (RL7681m), 12 = *N. melinau* Holloway (RL7977m).

node on the central segments. Labial palps relatively short, their length 2.5 times diameter of eye in male, 3.5 times in female. Palps broadest at apical part in male, at central part in female; dorsal edge of the latter being strongly convex. Scale-hood of vertex wide, its tip rounded, long in male, short in female (half as long as in male). Protibiae in male slightly broader, hairy. Characteristic wing pattern features: forewing costa not concave in male; ground colour ochreous brown in male, dark chestnut-brown in female, basal area suffused with yellowish in both sexes; subterminal line greyish with two projections inwards in both sexes, its colour lighter in female, postmedial line strictly parallel with subterminal in both sexes, angled inwards and almost touching reniform stigma in male; medial line dark, wide, slightly sinuous in male, straight in female; antemedial line present. Reniform stigma big, angular and oblong, dark ochreous yellow, usually obsolescent, less prominent despite its size; with two darker, brown-shaded dots in upper and lower thirds, bottom one sometimes darker than top one; orbicular stigma quite big, as yellow as reniform, with broad, dark outline. Hindwing ground colour slightly more grey than that of forewing, discal spot absent, subterminal line much lighter than ground colour.

Male genitalia (Fig. 2). Uncus relatively long, curved, with a bulge at the ventral edge of the basal half, its tip pointed. Scaphium as long as uncus, but curved against it. Tegumen longer than vinculum; the latter strongly sclerotised, with slender ventral process. Saccus broad-based, abruptly tapering, long, its distal half quite narrow, its tip rounded. Base of transtilla very broad. Juxta triangular or heart-shaped (tapering ventrally), with small ventro-medial notch. Valva broad-based, abruptly tapering towards subapical neck. Cucullus very narrow, free only at tip. Sacculus well developed, distally dilated, its distal end twice broader than base. Harpe a relatively broad-based process, its tip rounded, its base fused with the ventro-lateral corner of the sacculus. Costa heavily sclerotised, its dorsal edge straight, distal end bifurcate, more or less bird-head-like, with long, acute ventral extension ("bill") which does not surpassing ventral edge of cucullus; dorsal extension rounded, tongue-shaped. Aedeagus straight, very thick; vesica spherical with two small diverticula, its surface smooth, nearly twice broader and longer than aedeagus, with an extremely large, broad and straight, apically bifurcate cornutus.

Female genitalia (Fig. 14). Ovipositor lobes angular. Apophyses posteriores slightly (ca 1.3 times) longer than apophyses anteriores. Lobes of sternum A7 rounded. Sinus very broad. Ductus bursae very short and surprisingly narrow, hardly sclerotised. Corpus bursae oval, its anterior quarter densely scobinate by very small granules. A strongly sclerotised, broad, longitudinal band present from the mouth of ductus bursae to anterior tip of corpus bursae, ending in a small appendix.

Diagnosis. The comparison of this new species with its closest relative, *N. octogesima*, is given under the Diagnosis of that species. The best distinctive external features of *N. laoana* are the less prominent reniform stigma, the more yellowish suffused basal part of both wings, and the more distinctly marked yellow subterminal lines. The key features of the male genitalia are the straight and apically bifurcate cornutus, the lack of scobination of vesica, the larger and more bird-head-like sclerotised end of costa with longer and more acute ventral extension and the finer, thinner vinculum. The female genitalia of *N. laoana* are easily separable from those of *N. octogesima* by the

shorter and thinner, membranous ductus bursae with shorter anterior pocket-like extension, and the less scobinate corpus bursae.

The male genitalia of *N. laoana* resemble those of *N. abnormalis* but have narrower, longer uncus and scaphium, much longer saccus, much more developed costa, much broader distal part of sacculus and smaller harpe. The two species are more dissimilar externally, the new species is much larger in size, and the costa of male is not concave in contrast to the latter species. The ground colour of *N. laoana* is lighter (in male) or more reddish (in female), the reniform stigma is larger but less conspicuous than in *N. abnormalis*.

Etymology. This is the most interesting species among the few *Naarda* taxa described from Laos.

Distribution. Laos, southern part of the Xiangkhoang Plateau.

***Naarda mirabilis* sp. n.**
(Figs 3, 27)

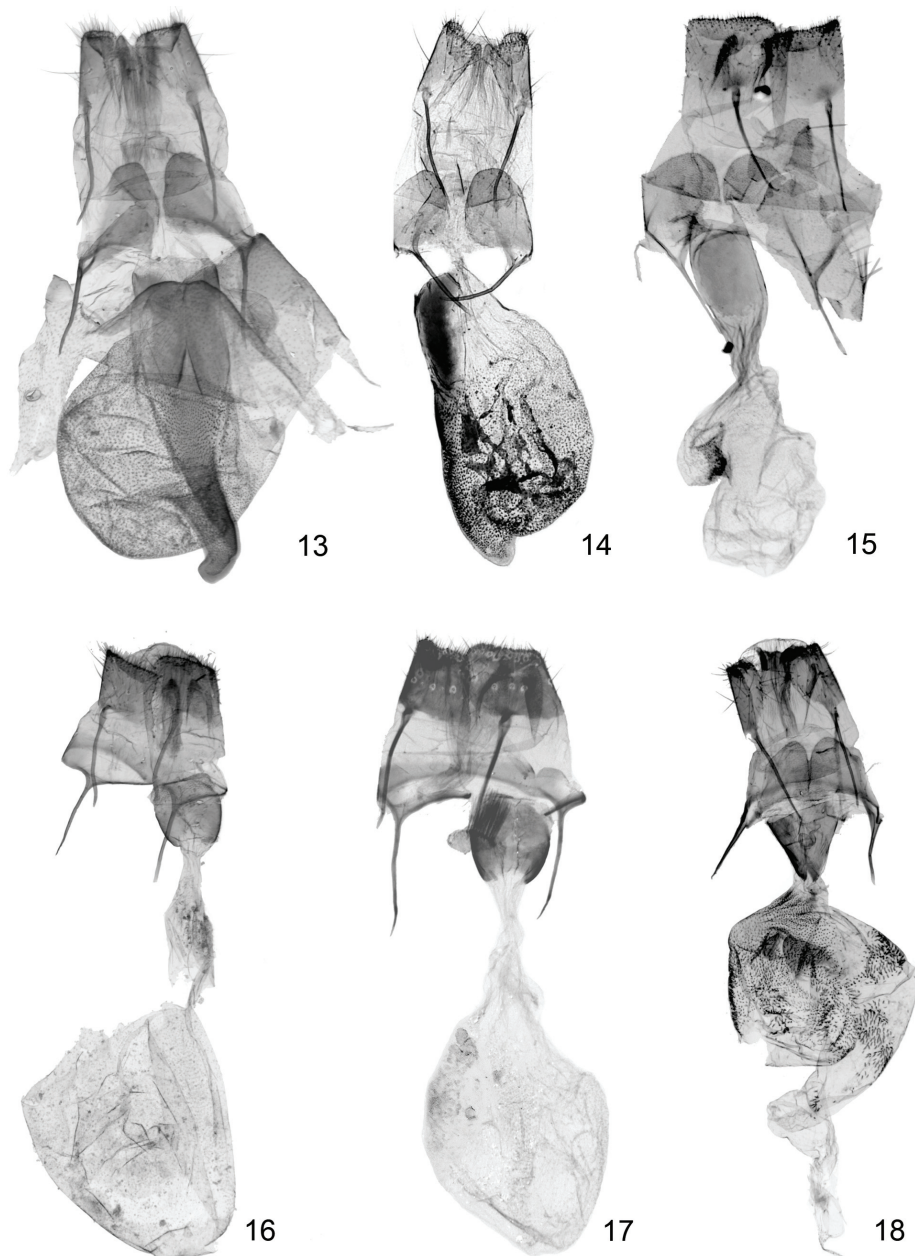
Holotype. ♂, Vietnam, Lao Cai province, Sa Pa district, Frontier Satellite Camp, 22° 19' 17,7"N, 103° 47' 30,9"E, 2240 m, 18–22 VIII.1998, leg. A. Kun; slide No. RL7920m (coll. HNHM).

Paratypes. 2 ♂, with the same data as the holotype; slide Nos RL7921m, RL7942m (coll. HNHM).

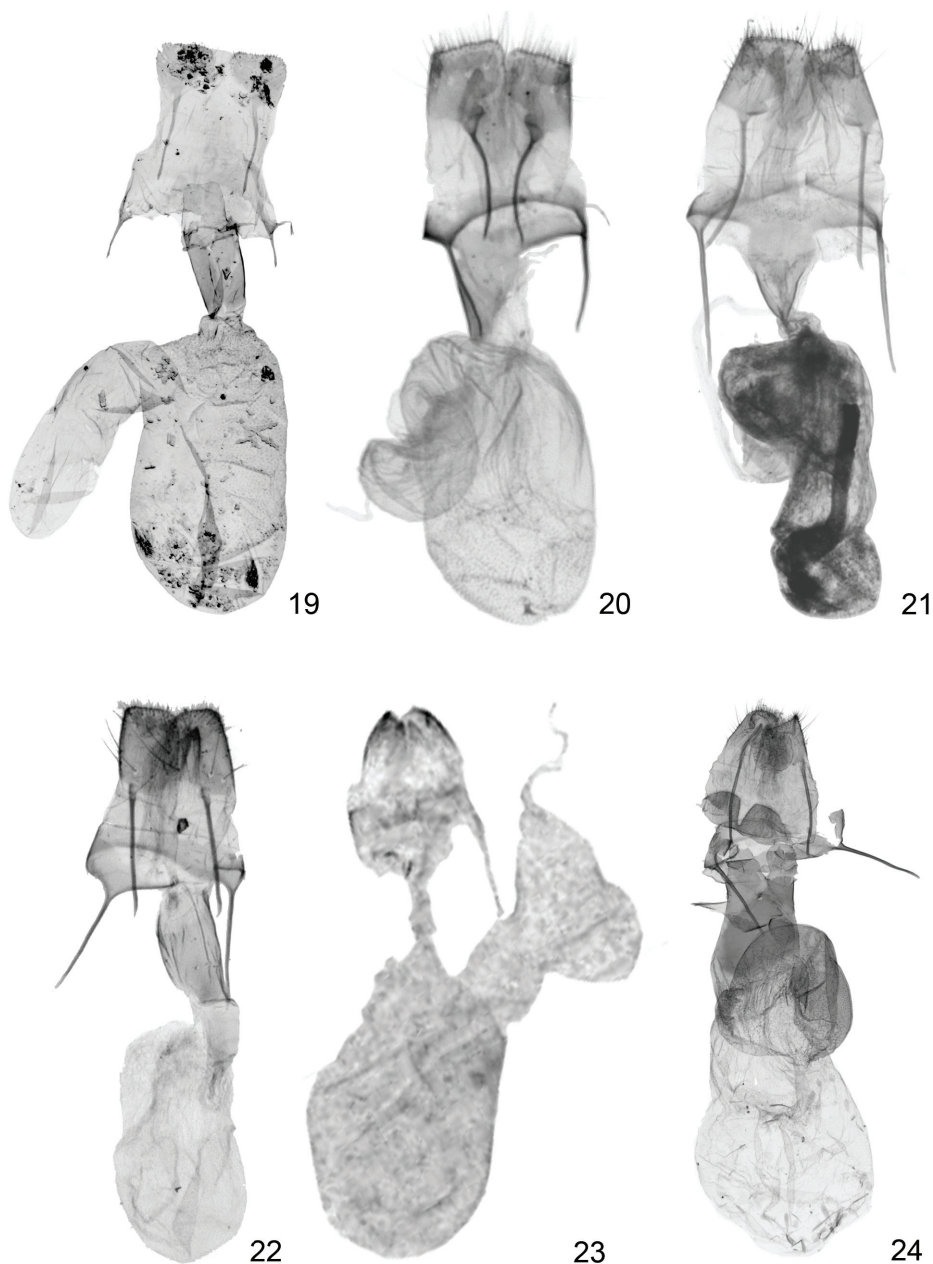
Taxonomy. The closest relative of the new species is *N. glauculalis* (Hampson, 1893), the detailed comparison is given in the Diagnosis. The structure of antennae of *N. mirabilis* is similar to that of certain taxa occurring in the Philippines, while the shape and pattern of the wings are rather similar to those of *N. blepharota* (Strand, 1920).

Description. Wingspan 20 mm, length of forewing 10 mm. Antennae filiform, with fine crest-like ventral thickenings of each joint projected slightly towards tip of antenna, base of these plates with two setae on each segment being twice longer than diameter of flagellum; cilia emerge from the ventral edge of plates being 1.5 times diameter of flagellum. Length of labial palps nearly three times diameter of eyes; third segment short, its tip light; second segment quite broad, dorsal scales relatively short, basal third without dorsal scales. Scale-hood of vertex long, triangular, broad-based, its tip pointed. Protibiae with dense hairs. Characteristic wing pattern features: forewing broad with costa not concave; ground colour of forewing brown; subterminal line creamy white, strongly sinuous; postmedial line strongly marked, very dark brown, slightly sinuous; field between the two transverse lines with darker area close to dorsum; antemedial line present; reniform stigma bright yellow, without darker markings inside, oval-shaped, relatively small and close to costa; orbicular stigma hardly visible. Hindwing slightly paler than forewing, transverse lines visible near inner edge only; discal spot clearly visible, long, narrow and curved.

Male genitalia (Fig. 3). Uncus long, banana-shaped, its tip hooked. Scaphium as long as uncus, curved against it. Tegumen as long as vinculum. Juxta deltoid-shaped, nearly as wide as long. Valva broad, with parallel edges in both sections, basal two-thirds (saccular



Figs 13–18. Female genitalia of newly described species: 13 = *N. octogesima* sp. n. (TB399f), 14 = *N. laoana* sp. n. (TB556f), 15 = *N. vicina* sp. n. (RL8000f), 16 = *N. atrata* sp. n. (TB448f), 17 = *N. plumbea* sp. n. (RL7917f), 18 = *N. furcatella* sp. n. (TB422f).



Figs 19–24. Female genitalia of newly and formerly described species: 19 = *N. palawana* sp. n. (RL8003f), 20 = *N. ineffectalis* sensu Holloway (RL10784f), 21 = *N. ineffectalis* sensu Holloway (RL7689f), 22 = *N. notata* Hampson (RL7690f), 23 = *N. bisignata* Walker (OUMNH 433-1964), 24 = *N. barlowi* Holloway (TB437f).

section) ca twice as broad as apical third; cucullus obliquely truncate. Dorsal half of cucullus fused with the strongly developed costa. Sacculus long, narrow at base, medial third twice broader than basal part and minutely dentate along dorsal edge, distal third as wide as basal part; distal half of sacculus characteristically setose. Harpe strongly developed, broad-based, fused with sacculus at a narrow section; erect part forming large, mushroom-shaped process directed towards the tip of valva. Aedeagus long, slightly curved, its edges parallel, carinal process absent; vesica (uneverted) scobinate.

Diagnosis. The external features and the genitalia of *N. mirabilis* are similar to those of *N. glauculalis*. However, a dark area is present in *N. mirabilis* close to the subterminal line, which is absent in *N. glauculalis*. In the male genitalia of the new species the juxta is more angular, the valva is broader, and the harpe is much bigger, mushroom-shaped, being very different from that of *N. glauculalis*; in addition, the aedeagus of *N. mirabilis* is less curved.

The genital structures of *N. mirabilis* and *N. vicina* are strikingly different for the first sight (Figs 3 & 4) but the homologous parts are recognisable, displaying a closer relationship between the two new species.

Etymology. The beautiful male genitalia inspired us to give the specific name.

Distribution. Northern Vietnam (Sa Pa, Lao Cai province).

***Naarda vicina* sp. n.**

(Figs 4, 15, 30, 33)

Holotype. ♂, Philippines, Palawan, Mantalingajan, Tagabung, 1150 m, 18.IX.1961, Noona Dan Exp., „caught by Mercury-light, 18.30-06.00”, slide No. RL7989m (coll. ZMUC)

Paratypes. 6 ♂, 1 ♀, Philippines, Palawan, Mantalingajan, Tagabung, 1150 m, 17.IX. and 18.IX.1961, Noona Dan Exp.; slide Nos RL7988m, RL8000f (coll. ZMUC: 5 ♂, 1 ♀; and NHM: 1 ♂).

Taxonomy. The shape and colouration of the forewing are very similar to those of *N. fuscicosta* (Hampson, 1891) and also similar to those of *N. acoluta* Holloway, 2008 and *N. lancanga* Deng et Han, 2011 but, according to the male genitalia, *N. vicina* is a member of a distinct lineage rather closer to *N. glauculalis*.

Description. Wingspan 19–21 mm, length of forewing 9–10 mm. The male antenna less specialised, more or less filiform with short fasciculate cilia and flat dorsal scales; female antenna filiform, very sparsely ciliate. Dorsal scale-hood ochreous-brown, more or less rounded triangular, covering most parts of vertex. Ocelli very small, black. Palpi of both sexes similar, long and porrect, with rather long ventral hair-scales and more or less lanceolate second joint; third joint relatively long and pointed. Labial palps more than three times longer than diameter of eye. Characteristic wing pattern features: pale ochreous-brown (buff) forewing ground colour with dense tobacco-brown suffusion at costal area, along outer margin and at postmedial line; crosslines present but diffuse, subterminal

fuscous, diffuse, sinuous; terminal line a row of fine black(ish) dots. Orbicular hardly visible, reniform marked with ochreous scales and two fine, sometimes obsolescent brown dots. Hindwing pattern variably distinct, usually obsolescent, tobacco-brown suffusion usually intense, discal spots and sinuous, ochreous-brown lines in marginal area regularly well-visible; terminal line a row of dark dots, cilia as ground colour, finely spotted with darker brown.

Male genitalia (Fig. 4). Uncus long, curved at its base. Scaphium much shorter than uncus, curved against it. Tegumen longer than vinculum. Saccus narrow, relatively short, its tip rounded. Juxta large, rounded, isodiametric. Valva long, tapering. Costa convex, well developed, strong, its tip acutely pointed, extending into cucullus and fused with its dorsal part. Sacculus relatively broad, short; its distal half densely setose. Harpe present distally from sacculus, its base nearly as broad as valva, erect process large, abruptly tapering but terminally rounded. Aedeagus straight, thick, carina with relatively short, broad process scobinate sparsely by small teeth. Vesica globular, sparsely scobinate by tiny grains.

Female genitalia (Fig. 15). Ovipositor lobes rectangular. Apophyses narrow; length of apophyses posteriores ca 1.3 times that of apophyses anteriores. Sternum A7 with two rounded lobes. Sinus very narrow. Ductus bursae long, divided to broad, sclerotised posterior part with colliculum and narrow, membranous proximal part. Corpus bursae quite small, ovoid, with broad but short cervix bursae attached next to the mouth of ductus bursae. Surface of corpus bursae smooth, that of cervix scobinate by tiny granules.

Diagnosis. The wing pattern of *N. vicina* is confusingly similar to that of *N. fuscicosta*, although the filiform antenna of *N. vicina* and the conspicuously pectinate antenna of *N. fuscicosta* can easily distinguish the males. *Naarda lancanga* has also very similar pattern, but lacks the dark area close to dorsum, which is present in *N. vicina*. Moreover, the innermost fascia on the hindwing of *N. vicina* is sinuous, while in *N. lancanga* it is rather straight. The new species differs externally from *N. acolutha* by the absence of the dark field at posterior section of termen, and by the conspicuously lighter terminal field of the hindwing.

The male genitalia are rather similar to those of *N. glauculalis* (Fig. 11) but the new species has the scaphium shorter, the juxta bigger, the saccus longer, the valva longer with much more acute tip, the distal part of costa slightly less developed, the sacculus broader and shorter, with prominent distal setose field, and the aedeagus is thicker and straighter than in *N. glauculalis*.

The female genitalia of *N. vicina*, in comparison with those of *N. barlowi* Holloway, 2008 (Fig. 24) have shorter apophyses, shorter and much narrower ductus bursae, and much smaller corpus bursae.

Etymology. The specific name refers to the high external similarity of the new species to otherwise not closely related congeners (*vicina* = neighbour).

Distribution. All known specimens were caught at the southern part of Palawan Island, Philippines.

***Naarda atrata* sp. n.**

(Figs 5, 16, 31, 34)

Holotype. ♂, Thailand: Prov. Chiang Mai, 500 m, Mae Suai, Charin Garden Resort, 99°35'E, 19°47'N, 2.XI.2002, leg. B. Herczig & G. Ronkay; slide No. TB392m (coll. HNHM).

Paratypes. Thailand: 1 ♂, 1 ♀, data as holotype, slide No TB666m (coll. HNHM); 1 ♀, Prov. Chiang Mai, 450 m, Mok Fa Garden Resort, 98°48'E, 19°06'N, 1.XI.2002, leg. B. Herczig et G. Ronkay; slide No. TB448f (coll. HNHM); 1 ♀, Prov. Chiang Mai, between Chiang Dao and Kariang, 900 m, 99°48'E, 19°25'N, 26.X.2002, leg. B. Herczig & G. Ronkay; slide No. TB665f (coll. HNHM).

Taxonomy. The very dark ground colour of wings is an unusual character in the genus.

Description. Wingspan 11–13 mm, length of forewing 5–7 mm; one of the smaller species of the genus. Antennae filiform, ciliate with setae in both sexes, in male with dense ciliation, length of cilia 1.5 times diameter of flagellum, length of setae twice longer than that of flagellum. In female setae as long as diameter of flagellum, cilia half times as long as diameter, ciliation sparse. Labial palps similar in both sexes, with length three times diameter of eye, tiny 3rd segment, relatively broad 2nd segment and convex dorsal edge of scales. Scale-hood of vertex narrow-based, relatively long, its tip rounded. Profemora of male wide. Characteristic wing pattern features: costa in males minutely concave; ground colour dark grey; subterminal line mouse-grey, quite narrow, strongly sinuous; postmedial line blackish, parallel with subterminal line, in male angled strongly inwards below cell; reniform stigma ochreous, elongate, oval – or flask-shaped, with pale grey line in its axis and with black dot at bottom third; orbicular stigma small but clearly visible, ochreous with blackish edge. Hindwing differently coloured in the two sexes: in female paler than forewing, with broad innermost fascia and without discal spot; in male ground colour like forewing, discal spot present, hardly visible, area between discal spot and postmedial line slightly paler than ground colour.

Male genitalia (Fig. 5). Uncus relatively long, straight, its tip rounded. Scaphium shorter than uncus, straight. Tegumen longer than vinculum. Saccus narrow-based, long, its tip rounded. Juxta mushroom-shaped, nearly twice wider than long. Valva narrow-based, edges of basal third parallel, distal part strongly tapering; costa, cucullus and harpe fused producing into sclerotised and acutely pointed structure; costal process absent. Sacculus short and narrow, its tip rounded, ending in the basal half of valva. Aedeagus straight, long, evenly narrow, carinal process absent; vesica (semi-everted) densely scobinate, armed by very long and slender, subbasally curved cornutus having somewhat ribbon-like basal section and straight, pointed spine.

Female genitalia (Fig. 16). Ovipositor lobes wide, angular. Apophyses short; rate of apophyses anteriores : apophyses posteriores = 2,5 : 3. Sternum A7 very short, sinus absent. Ductus bursae relatively long, narrow, membranous, with large, globular colliculum close to ostium. Corpus bursae divided into two parts, posterior part smooth, as long as but slightly broader than ductus bursae, anterior part large, oval, three times longer than posterior part, densely scobinate by tiny grains.

Diagnosis. *Naarda atrata* is very similar in external appearance to *N. furcattella* sp. n., but the labial palps of the former species are conspicuously shorter.

The male genitalia of this new species differ from those of *N. glauculalis* by the shorter uncus and scaphium, much longer saccus, narrower sacculus, broader and less abruptly tapering valva, less curved and thicker aedeagus and the presence of a narrow cornutus.

The female genitalia of *N. atrata* are reminiscent of *N. notata* (Hampson, 1891) (Fig. 22), but the ductus bursae is narrower and the colliculum is much shorter, but broader.

Etymology. The specific name refers to the dark ground colour of wings.

Distribution. Thailand, the mountainous areas of Chiang Mai in the northwestern part of the country.

***Naarda plumbea* sp. n.** (Figs 17, 36)

Holotype. ♀, Nepal: Koshi, Taplejung area, near Dhoban, 820 m, 28.III.1996, leg. G. Csorba & L. Ronkay; slide No. RL7917f (coll. HNHM).

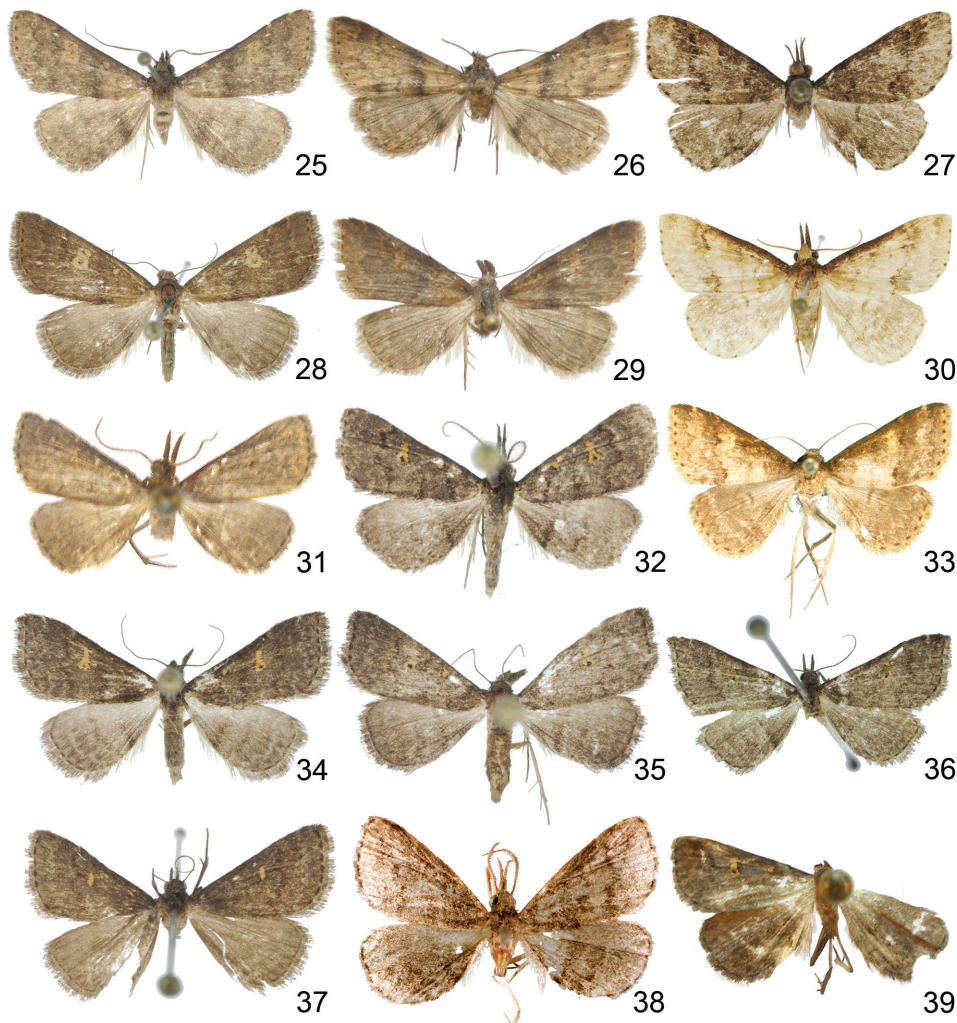
Taxonomy. The configuration of the female genitalia indicates a close relationship with *N. atrata*.

Description. Wingspan 16 mm, length of forewing 8 mm. Antennae filiform and ciliate, ciliation sparse, length of cilia half the width of flagellum. Length of labial palps slightly more than three times diameter of eyes; 3rd segment tiny, the very tip creamy white; 2nd segment broad, its dorsal scales long, their dorsal edge convex. Scale-hood of vertex narrow-based, relatively long, its tip pointed. Forewing ground colour dark plumbeous grey, costa and outer margin darker; subterminal line lighter grey, hardly visible; postmedial line dark grey, slightly sinuous, slightly angled inwards below cell; antemedial line indistinct. Reniform stigma narrow with wider bottom section, less conspicuous, greyish suffused deep ochreous with indistinct dark outline and dark comma-shaped spot in bottom third; orbicular stigma very small, ochreous with blackish edge. Pattern of hindwing similar to that of forewing, but discal spot absent from upperside.

Female genitalia (Fig. 17). Ovipositor lobes wide, angular. Apophyses long, apophyses anteriores as long as apophyses posteriores. Sternum A7 short, sinus a tiny triangular area. Ductus bursae quite long, its distal part with large, globular colliculum, other parts narrow, membranous, ostium four times broader than anterior mouth. Corpus bursae pear-shaped with narrow neck; surface of the whole corpus bursae smooth; signum absent.

Diagnosis. The wing pattern and shape of *N. plumbea* are somewhat similar to those of *N. leptovalva*, but the reniform stigma is darker than in the latter species.

The female genitalia of *N. plumbea* differ from its closest relative, *N. atrata* by the smaller size and the more elongate, entirely smoothly membraneous corpus bursae. The genitalia of *N. plumbea* are somewhat similar to those of *N. notata*, but the ductus bursae is narrower, the colliculum is shorter and much broader and the corpus bursae is more elongate.



Figs 25–39. Adults of newly described species: 25 = *N. octogesima* sp. n. male, 26 = *N. laoana* sp. n. male, 27 = *N. mirabilis* sp. n. male, 28 = *N. octogesima* sp. n. female, 29 = *N. laoana* sp. n. female, 30 = *N. vicina* sp. n. male, 31 = *N. atrata* sp. n. male, 32 = *N. furcatella* sp. n. male, 33 = *N. vicina* sp. n. male (photo: ZMUC), 34 = *N. atrata* sp. n. female, 35 = *N. furcatella* sp. n. female, 36 = *N. plumbea* sp. n. female, 37 = *N. palawana* sp. n. male, 38 = *N. secreta* sp. n. male, 39 = *N. huettleri* sp. n. male.

Etymology. The species name reflects to the lead grey ground colour of the wings.

Distribution. The specimen was collected at the southwestern foot of the Kanchenjunga massif.

***Naarda furcatella* sp. n.**
(Figs 6, 18, 32, 35)

Holotype. ♂, Thailand: Kanchannaburi by River Kwai Resotel, 19–22.VII.2003, leg. M. Fibiger; slide No. TB447m (coll. MF, ZMUC).

Paratypes. Thailand: 3 ♂, 2 ♀, with the same data as the holotype; slide Nos TB419m, TB422f, TB659f, TB675f (coll. MF, ZMUC and HNHN); 1 ♀, Prov. Chiang Mai, 500 m, Mae Suai, Charin Garden Resort, 99°35'E, 19°47'N, 2.XI.2002, leg. B. Herczig & G. Ronkay; slide No. TB682f (coll. HNHN).

Indonesia: 4 ♀, West-Sumatra, Bukittinggi, 980 m 00°15'30S / 100°21'13E 19.-23. II.2002. leg. M. Fibiger & K. Larsen; slide Nos TB415f, TB650f, TB680f (coll. MF, ZMUC); 1 ♀, West-Sumatra, Batang Palupuh, 880 m, 7 km. N. Bukittinggi, 00°14'34S / 100°09'13E; 21.II.2002; leg. M. Fibiger & K. Larsen (coll. MF, ZMUC); 1 ♀, North-Sumatra, Hutu Padang (Asahan), River Silau, 48 km SE P. Siantar, Near Sialangoman, 220 m, 13.II.2002. leg. M. Fibiger & K. Larsen; slide No. TB417f (coll. MF, ZMUC).

Cambodia: 1 ♀, Mondolkiri prov.; Seima Biodiversity Conservation Area, road Seima–O'Rang; 12°15'44"N 107°03'49"E, 360 m; No. 88, 27-29.I.2006, at light; leg. G. Csorba & G. Ronkay; slide No. TB798f (coll. HNHN).

Taxonomy. This species is very similar externally to *N. atrata*, but the male genitalia show conspicuous similarities to certain undescribed African species.

Description. Wingspan 10.5–12 mm, length of forewing 5–6 mm. This is one of the smallest *Naarda* species. Antennae filiform, ciliate with setae. Ciliation uniquely (slightly) more dense in female than in male. Length of cilia 1.5 times the diameter of flagellum in male, half the diameter in female. Setae also longer in male; 2.5 times longer than diameter of flagellum, in female only 1.5 times longer. Labial palps four times diameter of eyes in male, nearly 2.5 times in female; 3rd segment small, its tip light; 2nd segment broad, dorsal scales long, their dorsal edge convex, in male nearly domed. Scale-hood of vertex narrow-based and relatively long in male, broad-based and short in female. Characteristic wing pattern features: pattern and ground colour similar in both sexes (but the female specimens are worn); forewing costa not concave in male; ground colour dark grey; subterminal line hardly visible, sinuous with small, equal streaks directed inwards; postmedial line darker than ground colour, more sinuous than subterminal line, strongly angled inwards below cell; antemedial and medial lines also present. Reniform stigma flask- or pear-shaped, bright yellow, bottom third with big, blackish dot, dark edge of reniform fragmented into short sections; orbicular stigma well-marked, as yellow as reniform stigma and fully encircled with dark line. Ground colour of hindwing like that of forewing in female, paler in male; traces of fasciae present at inner margin only.

Male genitalia (Fig. 6). Uncus relatively long, slightly dilated towards apex, its tip abruptly pointed to a hook-like structure. Scaphium as long as uncus, slightly sinuous. Vinculum as long as tegumen. Saccus narrow-based but long, slightly tapering, its tip

rounded. Juxta rounded. Valva relatively short, edges of medial half parallel, basal part relatively broad; costal process large, biggest in this lineage, broadly triangular with pointed and slightly distally curved tip. Apical fused structure as wide as costal process, very long (1/3rd of the whole valval length), slightly tapering, its tip slightly curved upwards. Sacculus very broad at base, apically tapering. Aedeagus thick, straight, with well-developed carinal process. Vesica (partially everted) with two, strong and curved cornuti, but without scobination.

Female genitalia (Fig. 18). Ovipositor lobes rounded. Apophyses thick, especially apophyses anteriores. Apophyses posteriores 1.6 times longer than apophyses anteriores. Lobes of sternum A7 long, rounded. Sinus long, its base extremely narrow, slightly dilated distally. Posterior end of ductus bursae broad, but gradually tapering towards corpus bursae. Colliculum well developed, sclerotised, funnel-shaped, covering posterior two-thirds of ductus bursae. Corpus bursae globular, with several wide, curved, densely scobinate bands; anteriorly with broad, very long, slightly curved cervix bursae being twice as long as rest of the corpus bursae.

Diagnosis. The male genitalia of this new species are somewhat similar to those of *N. glauculalis*, but the uncus is narrower in *N. furcatella* than in *N. glauculalis*, the saccus is much longer, the distal fused structure of the valva is longer and process-like, the aedeagus is less curved, the vesica is armed by two strong cornuti, and a strikingly long costal process is present in the valva.

The female genitalia of *N. furcatella* are reminiscent to those of *N. ineffectalis* sensu Holloway (Figs 20–21), but in the new species the sternum A7 is longer, the corpus bursae is less elongate, globular, and more scobinate than in *N. ineffectalis*.

Etymology. The species name was inspired by the bifurcate valva of the male genitalia.

Distribution. This species is found in the central part of Thailand, in Cambodia and on Sumatra Island.

***Naarda secreta* sp. n.** (Figs 8, 38)

Holotype. ♂, Taiwan: Chaofeng, Hualien, 13.XII.1993, leg. Y.B. Fan; slide No. 155TFRI (coll. TFRI).

Taxonomy. The size, the dark ground colour, the strong postmedial line and the structure of the male genitalia imply close relationship with *N. atrata* and *N. furcatella*.

Description. Wingspan 13 mm, length of forewing 6.5 mm. Antennae filiform, ciliate with setae. Two setae on each segment; longest ones twice longer the diameter of flagellum. Ciliation dense; cilia as long as the diameter of flagellum. Labial palps long, five times longer the diameter of eye; 3rd segment relatively long, its tip light; dorsal scales of 2nd segment relatively short, dorsal edge convex. Scale-hood of vertex broad-based, medium

long, rounded. Characteristic wing pattern features: costa of forewing not concave; shape of forewing unusually broad; ground colour dark grey with slight brownish shade (the specimen is worn); terminal line very strong, blackish; transverse lines hardly visible except for the broad, blackish postmedial line being slightly sinuous and bent inwards below cell; reniform stigma light yellow, narrow, angular, with narrow dark edge and some blackish scales at bottom section; orbicular stigma tiny, hardly visible, composed by only a few light yellow scales. Colouration and pattern of hindwing similar to those of forewing.

Male genitalia (Fig. 8). Uncus relatively long, straight, with convex dorsal edge and hooked tip. Tegumen as long as vinculum. Saccus broad-based, long, gradually tapering, its tip rounded. Juxta large, rhomboidal, broader than long. Valva long, medium wide, slightly tapering; a small costal lobe present in the apical quarter of valva. Sacculus narrow, elongate, half as long as valva. Distal third of valva composed by the strongly sclerotised fusion of costa, harpe and cucullus; this section being tapering, very slightly curved dorsally, its tip rounded. Aedeagus elongate, evenly wide, slightly curved; vesica (uneverted) with large, straight cornutus.

Diagnosis. The unusually broad forewing of this new species is shared by *N. blepharota* (Strand, 1920). *Naarda secreta* is slightly smaller in size than *N. blepharota*, the ground colour is darker, the reniform stigma is lighter and smaller, and the streaks of the terminal line are much more elongate. The male genitalia show more conspicuous differences between these two species: the ventral edge of uncus in *N. secreta* is straight, while that of *N. blepharota* (Fig. 7) has an emergence, the juxta is broader, the valva has no harpe, but the costa has small lobe, which is absent in *N. blepharota*.

The male genitalia of this new species are similar to those of *N. atrata*. However, the costal lobe of the valva of *N. secreta* is absent from *N. atrata*, moreover, the valva is less tapering, its tip rounded instead of being pointed as in *N. atrata*, the saccus is broader and the cornutus in the vesica is also broader.

Etymology. The species has remained long been hidden due to the external similarity to *N. blepharota*. The specific name is remembering to this fact.

Distribution. Taiwan.

***Naarda huettleri* sp. n.** (Figs 9, 39)

Holotype. ♂, „Ceylon, 1975.X-XI, leg. Hüttler B.“; slide No. TB571m (coll. HNHM).

Taxonomy. The male genitalia imply close relationship with *N. secreta* and *N. atrata*.

Description. Wingspan ca. 11 mm, length of forewing 5.5 mm (right forewing of holotype missing). Head missing. Characteristic wing pattern features: costa of forewing straight; ground colour dark brownish grey (the specimen is worn); transverse lines indis-

tinct; reniform stigma medium-sized, light yellow, semilunar, with large black spot at bottom half, very wide dark edge in cell; orbicular stigma large, ca. half as large as reniform, its ground colour like that of reniform. Colouration and pattern of hindwing similar to those of forewing.

Male genitalia (Fig. 9). Uncus relatively short, slightly curved, medium wide, hooked. Scaphium straight, as long as uncus. Tegumen slightly longer than vinculum. Saccus broad-based, long, gradually tapering, its tip pointed. Juxta large, rounded triangular, broader than long. Valva long, narrow, slightly tapering. A small costal lobe present in the apical quarter of valva. Sacculus medium wide, elongate, nearly half as long as valva. Distal quarter of valva composed by the sclerotised fusion of costa, harpe and cucullus; this section being tapering, apically slightly curved to dorsal direction, its tip pointed. Aedeagus medium thick, evenly wide, straight; proximal quarter of vesica scobinate by relatively big grains and with large, narrow cornutus being strongly curved at base, straight at remaining section.

Diagnosis. The shape and size of forewing of this new species are similar to *N. ineffectalis* sensu Holloway, 2008. But *N. huettleri* lacks the male basal scent organ of forewing, which is present in *N. ineffectalis* sensu Holloway, moreover, the orbicular spot is larger. The male genitalia show more conspicuous differences between these two species: the uncus in *N. huettleri* is not bifurcate, while that of *N. ineffectalis* is branched, the juxta lacks the huge process present in *N. ineffectalis*, the valva is much narrower and longer, and the cornutus of aedeagus is much narrower.

The supposed closest relative of *N. huettleri* is *N. secreta*. However, *N. huettleri* differs from the latter by the somewhat narrower uncus, narrower valva and the more curved apical fused structure of valva.

Etymology. The new species is dedicated to the collector of the type specimen, Mr Béla Hüttler (1937–2002), former taxidermist of the HNHN.

Distribution. Sri Lanka.

***Naarda palawana* sp. n.** (Figs 10, 19, 37)

Holotype. ♂, Philippines, Palawan, Brookes Point, Uring Uring, 23.VIII.1961, Noona Dan Exp., „caught by light of Petromax“, slide No. RL7992m (coll. ZMUC).

Paratypes. 1 ♂, 5 ♀, Philippines, Palawan, Brookes Point, Uring Uring, 16., 17. and 18.VIII.1961, Noona Dan Exp.; slide No. RL8003f (coll. ZMUC, HNHN). Three specimens lack their abdomen.

Indonesia: 1 ♂, 1 ♀, S.W.Celebes: Pangean near Maros. 2,000 ft. March 1938; J.P.A.Kalis. B.M.1938-397, slide Nos BM Noct. 21816♂, 21817♀ (coll. BMNH)

Taxonomy. The shape and the pattern of the wings are closest to those of *N. maculifera*, but conspicuous differences can be observed (see the Diagnosis).

Description. Wingspan 11–12 mm, length of forewing 5–5.5 mm. One of the smallest species of the genus. Male antenna consisting of somewhat thickened joints, with long fasciculate cilia arising from ventral crest-like ridge; female antenna with considerably less thickened joints, without prominent ridge and cilia but with sparsely scales. Frontal scale-hood small, rounded triangular, consisting of broad, large scales. Male palps short, twice longer than diameter of eye, gracile, slightly upturned distally, greyish-brown with some whitish hair-scales; third joint rather long and acute. Female palps somewhat longer, thicker, more porrect. Characteristic wing pattern features: ground colour dark blackish-grey; all crosslines dissolved in dark ground colour or hardly visible; subterminal line dark mouse grey, other transverse lines dark, blackish, subterminal and postmedial lines parallel, very slightly sinuous. Reniform stigma conspicuous, narrow, yellow, relatively small, with indistinct dark edge, without darker inner scales; orbicular stigma missing; hindwing lighter than forewing, mouse-grey, without traces of transverse lines and discal spot.

Male genitalia (Fig. 10). Uncus very broad, short, with hook-like tip. Scaphium straight, as long as uncus. Tegumen slightly longer than vinculum. Saccus indistinct. Juxta Y-shaped, bifurcate; its branches very narrow and directed ventro-laterally. Valval shape unique within the genus, its dorsal and ventral edges nearly parallel, gradually tapering, sacculus distally gradually dilated, as long as valva; cucullus not differentiated. Dorsolateral corner of sacculus extending beyond dorsal edge of valva. Costa present only at the basal 1/3 of valva, but broad. Harpe absent or entirely fused with sacculus. Aedeagus very thick, slightly curved, carina with short, straight, slightly sclerotised process. Vesica globular, its apical half densely scobinate by elongate grains, basal part with broad and long diverticulum, apical part of this diverticulum is armed by ca. 10 small, rose-spine-like cornuti.

Female genitalia (Fig. 19). Ovipositor lobes short, angular. Apophyses anteriores only half as long as apophyses posteriores. Sternum A7 short, sinus absent. Ductus bursae relatively broad, moderately long, colliculum large, entirely covering ductus bursae. Corpus bursae ellipsoidal, its whole surface scobinate by tiny grains; posterior quarter with broad and very long cervix bursae being as long as the 2/3 of corpus bursae. Cervix smooth, except for its very basal part having similar scobinate as in corpus bursae.

Diagnosis. The external appearance of this new species is similar to *N. maculifera* (Staudinger, 1892), but *N. palawana* is smaller in size, the labial palps are shorter, the forewing is broader, the reniform stigma is smaller and the orbicular stigma is missing while it is present in *N. maculifera*.

The male genitalia of *N. palawana* are somewhat reminiscent to those of *N. melinau* Holloway, 2008 (Fig. 12) but in the former taxon the uncus is much broader and shorter, the costal process of *N. melinau* is absent, the distal part of the sacculus is much broader, and the vesica of aedeagus has much more, smaller cornuti than in the latter species.

The female genitalia of this new species are very similar to those of *N. alternata* Tóth et Ronkay, 2014, but the apophyses anteriores are considerably longer in *N. palawana*, the ductus bursae is broader and entirely covered by the large colliculum which is absent in *N. alternata*. The female genitalia are also somewhat similar to those of *N. bisignata* Walker, 1866 (Fig. 23), but the

ductus bursae is broader, the corpus bursae is slightly narrower and scobinate in contrast to the smooth corpus bursae of *N. bisignata*.

Etymology. This species is the most easy to distinguish among those which were collected at the island of Palawan.

Distribution. The southern part of Palawan and southwestern Sulawesi.

*

Acknowledgements – We are grateful to Christian Kutzscher (SDEI, Müncheberg), Wolfram Mey (MFN, Berlin), Martin Honey (BMNH, London), Jung-Tai Chao (TFRI, Taipei), Niels Peder Kristensen † and Ole Karsholt (ZMUC, Copenhagen), for the access of the type material of their institutes and the loan of several *Naarda* specimens, which were essential in our work.

The authors express their thanks to Béla Herczig, András Kun, László Peregovits, Gábor Ronkay, Albert Szappanos and the late Michael Fibiger for lending *Naarda* specimens for examination.

The first author would like to express his thanks to the leaders of the Hungarian Natural History Museum for obtaining research authorisation to HNHM. He is indebted also to the staff members of the Collection Lepidoptera for their generous help during his research.

This research was supported by the Synthesys Project (Grant Nos GB-TAF-2656 and FR-TAF-562), the National Research Council, Taipei (NSC) and the COBICE project.

REFERENCES

- DENG, G. & HAN, H. L. (2011) A new species of *Naarda* from Southwest China (Lepidoptera, Noctuidae, Hypeninae). *Tinea* **21** (5): 256–258.
- HAMPSON, G. F. (1891) *Illustrations of typical specimens of Lepidoptera Heterocera in the Collection of the British Museum VIII. The Lepidoptera Heterocera of the Nilgiri District*. Taylor & Francis, London, 144 + 4 pp., 8 pls.
- HAMPSON, G. F. (1893) *Illustrations of typical specimens of Lepidoptera Heterocera in the Collection of the British Museum IX. The Lepidoptera Heterocera of the Nilgiri District*. Taylor & Francis, London, 182 + 5 pp., 20 pls.
- HOLLOWAY, J. D. (2008) The moths of Borneo: family Noctuidae, subfamilies Rivulinae, Phytometrinae, Herminiinae, Hypeninae, Hypenodinae. *Malayan Nature Journal* **60** (1–4): 1–268.
- POOLE, R. W. (1989) Noctuidae. Pp. 501–1013. In: HEPPNER, J. B. (ed.): *Lepidopterorum Catalogus (New Series) 118*. E. J. Brill / Flora & Fauna Publications, Leiden, New York, København & Köln.
- STAUDINGER, O. (1892) Die Macrolepidopteren des Amurgebiets I. Theil. Rhopalocera, Sphinges, Bombyces, Noctuae. Pp. 83–658, pls 1–10. In: ROMANOFF, N. M. *Mémoires sur les Lépidoptères* 6. St. Petersburg,
- STRAND, E. (1920) H. Sauter's Formosa-Ausbeute: Noctuidae II., nebst Nachtrage zu den Familien Arctiidae, Lymantriidae, Notodontidae, Geometridae, Thyrididae, Pyrali-

- dae, Tortricidae, Gelechiidae und Oecophoridae. *Archiv für Naturgeschichte* **84 A** **12**: 102–197.
- SUGI, SH. (1982a) Noctuidae. In: INOUE, H., SUGI, SH., KUROKO, H., MORIUTI, SH. & KAWABE, A. *Moths of Japan I*. Kodansha Co., Tokyo, 1–966.
- SUGI, SH. (1982b) Noctuidae. In: INOUE, H., SUGI, SH., KUROKO, H., MORIUTI, SH. & KAWABE, A. *Moths of Japan II*. Kodansha Co., Tokyo, 1–402.
- TÓTH, B. & RONKAY, L. (2014) Revision of the Palearctic and Oriental species of the genus *Naarda* Walker, 1866 (Lepidoptera: Erebidae, Hypeninae). Part 1. Taxonomic notes and description of 28 new species from Asia. *Oriental Insects* **48**(1–2): 1–49. doi: 10.1080/00305316.2014.959790
- WALKER, F. (1859) *List of specimens of the lepidopterous insects of the Collection of the British Museum* 19. Edward Newman, London, 238 pp.
- WALKER, F. (1866) *List of specimens of the lepidopterous insects of the Collection of the British Museum* 35. Edward Newman, London, 506 pp.

Revised version received April 19, 2013, accepted January 25, 2015, published April 30, 2015