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Revision of the Palaearctic and Oriental species of *Naarda* Walker (Lepidoptera: Erebidae, Hypeninae). Part 4. Description of nine new species

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ABSTRACT

Description of nine new *Naarda* species, *N. melistigma*, *N. nymphoida*, *N. sonibacsi*, *N. penicula*, *N. variegata*, *N. picata*, *N. lingualis*, *N. costicorna*, and *N. tetramacula* **spp. n.** are given. With 26 figures on 3 plates.

Introduction

The first part of the series of articles dealing with the taxonomy and biogeography of the genus *Naarda* Walker, 1866 (Tóth and Ronkay, 2014a) contains the overview of this large and diverse phyletic group, including the general morphological characterisation of the main lineages and descriptions of 28 new species from eastern and south-eastern Asia, bearing well developed and distinct, large or medium-sized cucullus. The second part of the series (Tóth and Ronkay, in press) deals with newly discovered taxa having partially or entirely fused cucullus. The third part (Tóth and Ronkay, 2014b) encompasses the characterisation of a compact species-group with "flying bird-like" male clasping apparatus, as well as the description of three included species. The present paper gives description of new species with completely fused cucullus and abruptly tapering valva. Before the final, monographic revisionary part, at least one further article will continue the description of new taxa.

Before this series of articles 29 Oriental and Palaearctic species were described by Walker (1858, 1859, 1866), Hampson (1891, 1893, 1902, 1912), Staudinger (1892), Wileman (1915), Strand (1920), Prout (1928), de Joannis (1929), Sugi (1982), Holloway (2008) and Deng and Han (2011). When the revision is complete, the number of known Asian taxa will exceed the 90.

Material and methods

Authors have checked several institutional and private collections (see list of acronyms in next paragraph). Type materials of comparative species (in the Diagnoses) are hosted in the Natural History Museums of Budapest and London.

Permanent genital slides were prepared via the standard method (brief description: Tóth and Ronkay, 2014a,b). Genitalia terminology mainly follows Diakonoff (1954) with some modifications of Tóth and Ronkay (2014a).

Acronyms

BM(NH)	The Natural History Museum, London (formerly British Museum, Natural History)
HNHM	Hungarian Natural History Museum
HSS	Heterocera Sumatrana Society, London
MFN	Berlin Natural History Museum–Museum für Naturkunde, Berlin
KST	The private collection of Sándor Tibor Kovács
MF	The private collection of Michael Fibiger (now hosted at ZMUC).

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OUMNH Oxford University Museum of Natural History
SDEI German Entomological Institute–Senckenberg Deutsches Entomologisches Institut
TFRI Taiwan Forestry Research Institute, Taipei, Taiwan
ZFMK Alexander Koenig Museum, Bonn–Zoologisches Forschungsinstitut und Museum Alexander Koenig
ZMUC Zoological Museum of the University of Copenhagen

Systematic part

Naarda melistigma sp. n.

male: Plate 3, fig. 1; female: Plate 3, fig. 4

Holotype. ♂, Taiwan: Prov. Ilan, 5 km SW of Ilan, 290 m, 25.II.1996. leg. Gy. Fábián & L. Németh; slide No. TB385m (coll. HNHM).

Paratypes. China: 1 ♂, 2 ♀, Kuatun (2300 m) 27,40n. Br. 117,40ö. L. leg. J. Klapperich 19.4.1938. (Fukien); slide Nos RL9752m, TB431f, TB467f (coll. ZFMK); 3 ♀, Fujian, Wuyi Shan, 1400 m 27°41′N, 117°33′E, V–VII.2006. leg. Team of Viktor Siniaev; slide Nos TB463f, TB465f (coll. HNHM).

Taiwan: 1 ♂, Prov. Ping Tung, 5 km W of CHIPEN 470 m 27–28.IV.1997. leg. S. T. Kovács; slide No. TB363m (coll. KST); 1 ♀, Fushan, Ilan, 13.III.1991, leg. Y.B.Fan; slide No. RL230TFRI (coll. TFRI); 1 ♀, Shenkeng, Taipei, 8.III.1992, leg. Y.B.Fan; slide No. RL232TFRI (coll. TFRI); 2 ♀, Fushan, Ilan, 1–2.XI.1994, leg. Y.B.Fan; slide Nos RL153TFRI, RL195TFRI (coll. TFRI); 1 ♂, Fushan, Ilan, 29.VIII.1995, leg. W.T.Jou; slide No. RL197TFRI (coll. TFRI); 1 ♀, Fushan, Ilan, 30.III.1995, leg. J.J.Hsiao; slide No. RL229TFRI (coll. TFRI); 5 ♂, 9 ♀, Kaohsiung County, Shanping FRA, near Liukuei 22°58′16″"N, 120°41′15″E, 700–800 m, 19–21.XI.2002. leg. L. Ronkay & O. Merkl; slide Nos TB374m, TB376f, TB386f, TB636m (coll. HNHM); 4 ♀, County Ilan, 700 m Fu-Shan Botanical Garden, 24°54′N, 121°45′E, 24.VIII & 25.IX.2000. leg. L. Papp, L. Peregovits and L. Ronkay; slide Nos TB379f, TB388f, TB638f (coll. HNHM); 1 ♀, County Taichung, Hui Sun Exp. Forest, Guandashi LTER site, 950 m 24°04′49″N, 121°02′08″E, 12–13.IV.1997. leg. L. Peregovits & A. Kun; slide No. TB383f (coll. HNHM); 1 ♂, Prov. Taitung, Chihpen Hot Springs; 400 m 6.IV., 9.IV.1997; leg. Csorba & Ronkay (coll. HNHM); 1 ♂, Prov. Nantou, Taroko N.P., Kuanyuan, 2256 m, 24°11′15″N, 121°20′45″E, 10.VII.2007, leg. A. Kun; slide No. RL10765m (coll. HNHM).

Taxonomy. This and the next two species are closely related judging by the male scent organs on the legs, shape of labial palps, forewing and by the male genitalia. The deeply bifurcate tip of uncus and the presence of editum are apomorphies of this lineage. The special antennal structure of *N. melistigma* resembles to several *Naarda* species placed on other lineages (e.g. *N. truncata* Tóth & Ronkay or *N. mirabilis* Tóth & Ronkay).

Description. Wingspan 15–21 mm, length of forewing 8–11 mm. Antennae in male with crest-like ventral thickenings of each joint projected slightly towards tip of antenna, base of these plates with two setae on each segment being ca 1.5 times diameter of flagellum. Plates being half as long as the diameter of flagellum and slightly wider than the diameter. Ventral edge of plates with cilia as long as setae. Female antennae filiform with setae and cilia on ventral side of antenna being as long as the diameter of flagellum. Length of labial palps 5.5 times diameter of the eyes in both sexes; 3rd segment unusually long and broad in male, more than half as long as the 2nd segment; moderately long and narrow in female, its tip light in both sexes, 2nd segment quite broad, edge of dorsal scales domed in male, straight in female. Scale-hood of vertex broad-based, short, tapering in male, rounded in female. Femora of fore- and hindlegs densely haired. Characteristic wing pattern features: costa of forewing minutely concave in male, convex in female; wing pattern not showing sexual dimorphism, ground colour brownish grey, costa dark brown, subterminal line fragmented to hardly visible grey dots, postmedial line slightly sinuous, gently bent inwards below cell, antemedial line slightly sinuous, nearly straight, reniform stigma honey-coloured, slightly curved, with a prominent black spot at its lower section, orbicular stigma small, its colour like that of reniform, with dark ring. Hindwing slightly lighter than forewing, with three fasciae, innermost one broadened, making the base of hindwing somewhat darker than other fields of the wing.

Male genitalia (Plate 1, fig. 1): Uncus long, broad, straight, its distal third bifurcate; arms straight with pointed tips. Scaphium as long as uncus, straight, weak. Tegumen as long as vinculum, both being moderately sclerotised. Saccus broad-based, long, evenly tapering to a pointed tip. Juxta longer than broad, pentagonal, but all sides concave, making it somewhat similar to a skinned fur, having a medio-apical, rounded-triangular process. Valva triangular but its dorsal edge highly concave, editum present, narrow, third as long as tegumen, emerging from the dorsal corner of the valval base. Sacculus broad, not tapering, ca half as long as valva. One male from China having a small, setose lobe on the dorsal edge of sacculus. The fused structure of costa, harpe and saccular process relatively narrow, tapering, its tip rounded. Aedeagus elongated, slightly curved, with a long, rounded carinal process having tiny teeth at its apical part. Vesica relatively small, smooth, with one strong, broad-based, curved, rounded cornutus.

Female genitalia (Plate 1, fig. 2): Ovipositor lobes square. Apophyses long; apophyses posteriors as long as apophyses anteriores. Sternum A8 heavily sclerotised, with tiny granules, transverse and longitudinal ribs, sinus very narrow and short. Lamella antevaginalis present: heavily sclerotised, its shape and size like that of sternum A8, but its surface smooth and the lobes directed proximally. Ductus bursae short, relatively broad. Corpus bursae long, moderately broad, its posterior half with dense scobination, becoming denser towards a signum-like rib, the anterior half sparsely scobinate. Granules tiny.

Diagnosis. Specimens of this taxon had been identified as *Naarda ochronota* Wileman, 1915 for several years (see e.g. Tóth and Ronkay, 2014a: fig. 55). After thorough study of the male holotype of *N. ochronota* the authors revealed that the 3rd joint of male labial palp is much longer in *N. melistigma* than in *N. ochronota*, the new species has serrulate antenna while *ochronota* has rami, the apex of forewing is more pointed and the stigmata are smaller and darker in *melistigma* than in *ochronota*.

The closest relative of *N. melistigma* is *N. nymphoida* **sp. n.** Diagnostic features are presented under the Diagnosis of the latter species.

The male genitalia of this new species show some resemblance to those of *N. egrettoides* Tóth and Ronkay, 2014b, however, the base of uncus is simple and the tip is bifurcate in the new species while *N. egrettoides* has a bulb at the base of its uncus and the tip is rounded, the sacculus of *N. melistigma* is longer and narrower, the apical part of valva is more tapering, the saccus is longer, the aedeagus is longer, with a more simple vesica and a smaller cornutus than in *N. egrettoides*. Moreover, this new taxon has editum while *N. egrettoides* lacks it.

Etymology. The species name refers to the deep yellow, honey-coloured reniform and orbicular stigmata.

Distribution. This species has somewhat disjunct area: hitherto known from Taiwan and from a mountain range of the neighbour mainland province Fujian. In Taiwan from the lowlands up to 2250 m a.s.l.

Naarda nymphoida sp. n.

male: Plate 3, fig. 2; female: Plate 3, fig. 5

Holotype. ♂: Vietnam, Prov. Vinh Phu, Tam Dao, 1200 m, 12.X.1986, leg. Mészáros F., Oláh J. & Vásárhelyi T., slide No. TB653m (coll. HNHM).

Paratype. ♀: VIETNAM, No. 129 Vinh Phu Prov.; Tam Dao, 09–05.1987. hotel; MV lamp. 840[m] 21°26′N 105°38′E; leg. Matskási I., Oláh J. & Topál Gy., slide No. TB642f (coll. HNHM).

Plate 1. Genitalia of newly and formerly described species. Figure 1: *Naarda melistigma* sp. n. (clasping apparatus: TB385m; aedeagus: TB363m); figure 2: *Naarda melistigma* sp. n. (TB376f); figure 3: *Naarda nymphoida* sp. n. (TB653m) left valva removed; figure 4: *Naarda nymphoida* sp. n. (TB642f); figure 5: *Naarda sonibacsi* sp. n. (RL7695m); figure 6: *Naarda ochronota* Wileman (TB639m).