

A New Species of *Antoculeora* Ichinose (Lepidoptera, Noctuidae, Plusiinae) from Taiwan

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Abstract A revision of the genus *Antoculeora*, with a description of *A. yoshimotoi* sp. nov. (Taiwan), and notes on the zoogeography and phylogeny of the genus are given.

Key words: Plusiinae, *Antoculeora*, new species, new synonymy, Taiwan.

The species *Plusia ornatissima* was described by Walker in 1858 from the southern Himalayan region (North Hindustan) on the basis of a single female specimen. About two decades later, Oberthür (1880) described *Plusia locuples* for the island of Askold located in the bay of Vladivostok. These two taxa were treated as synonyms first by Staudinger and Rebel (1901), whose opinion was accepted by Hampson (1913) and Warren (1913) and was followed by all subsequent authors till the end of the eighties (e.g. Kostrowicki, 1961; Ichinose, 1962, Dufay, 1973, 1977; Sugi, 1982; Ronkay, 1982; Klyuchko, 1986; Klyuchko & Kononenko, 1986; Kitching, 1987), although a number of studies suggested the possible segregation of this commonly treated taxon, "*Plusia ornatissima*". The most important signs of this doubt are as follows.

A. The species is categorically mentioned by Dufay (1973, 1977) as *Macdunnoughia ornatissima* from the Himalayan region and the name *locuples* is given as a junior synonym of *ornatissima*. On the other hand, some specimens preserved in the collection of The Natural History Museum, London (BMNH), including the holotype male of *locuples*, are identified by him as "*M. locuples* Oberthür".

B. "*Ornatissima*" was described twice by Chou and Lu (1974, 1978) as *Cerviplusia wukongensis* and *C. lushanensis*, the former synonymized with *M. ornatissima* by Dufay (1977). The rather large differences between the genitalia of *ornatissima* (= *wukongensis*) and *lushanensis*, however, forced Poole (1989) to treat *lushanensis* as a distinct species. The second description of *ornatissima* as *wukongensis* is presumably a result of the mistake of Kostrowicki (1961) who illustrated most probably the male genitalia of *Anaplysia pannosa* (Moore, 1882) under the name "*Argyrogramma ornatissima*". Following this misidentification, the Chinese authors have considered their species as distinct from *ornatissima* (see Dufay, 1977; Ronkay, 1987).

C. The description of a third species from China, *Autoculeora* (sic) *minor* Chou & Lu, 1979, based on a single male, has led to even more confusion, especially as the type has been unavailable for further studies.

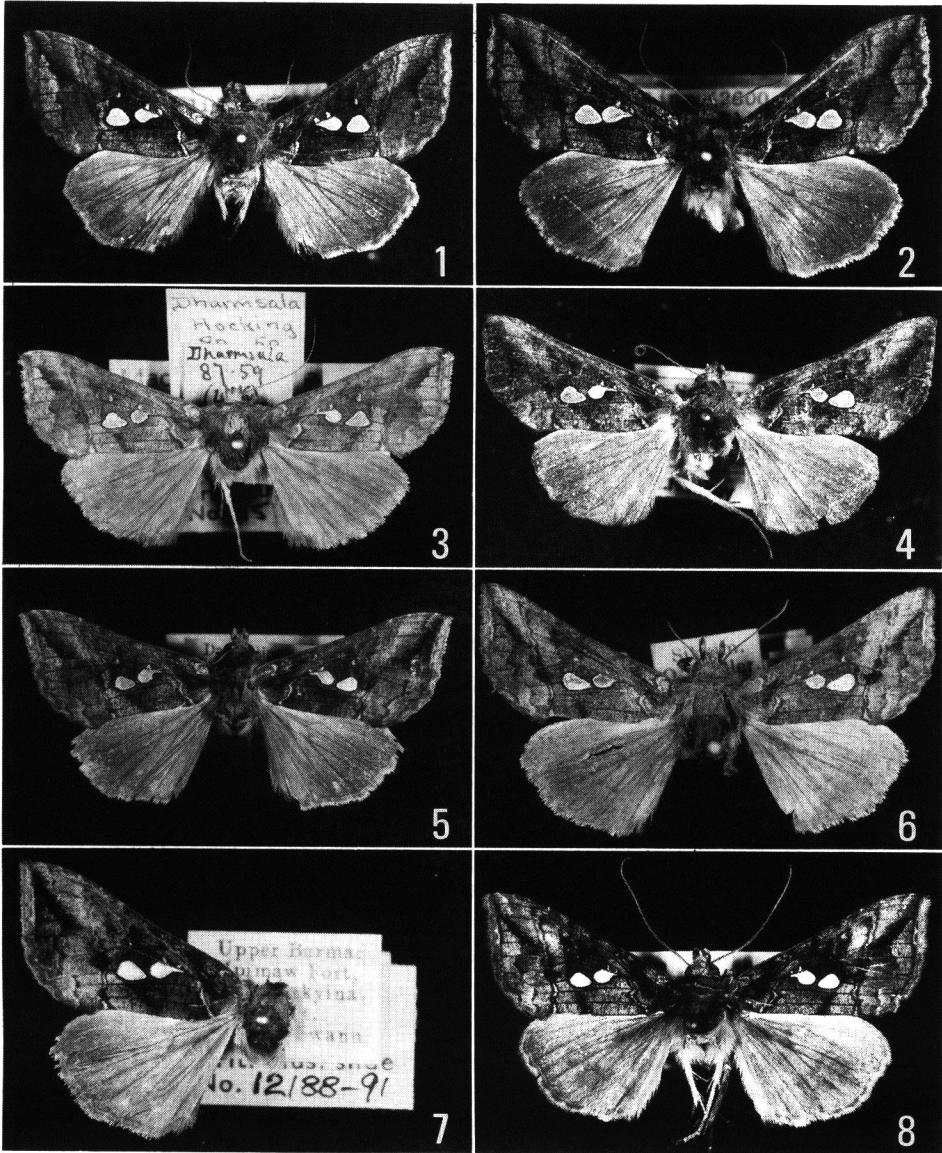
D. Kitching (1987) expressed his opinion that *ornatissima* might be a complex of closely related taxa but may also be a single species: "There are three, perhaps four, very closely related species in *Autoculeora*: *A. ornatissima* (fig. 79), *A. locuples*, *A. lushanensis* Chou & Lu and *A. minor* Chou & Lu, differing only in minor details of wing pattern and valve shape. They may eventually be referable to a single species". In the unpublished checklist of the Plusiinae of the world compiled by Kitching, *A. lushanensis* and *A. minor* are listed as distinct species while *A. locuples* is considered as a synonym of *A. ornatissima* (pers. comm.).

E. In the renewed checklist of the insects of Japan, Sugi (1989) mentioned the Japanese species as *A. locuples*; unfortunately this checklist contains no argumentation on the taxonomic (and nomenclatural) changes.

F. In his checklist of the Noctuidae of the Primorye Territory, Kononenko (1990) gives species rank to *A. locuples* referring to Kitching (1987), although Kitching had neither explicit decisions about the status of the taxa (see above) nor *Autoculeora* species are mentioned by him in the 'Appendix 4' (*op. cit.*, p. 195, "New taxa and synonymy, status changes and revivals"). Also, *A. wukongensis* is given by Kononenko as a synonym of *A. locuples*.

In addition, the genitalia studies on some *ornatissima*-like Taiwanese specimens sent by Mr. H. Yoshimoto for examination in 1987 have surprisingly revealed that the *Autoculeora* populations inhabiting the mountainous regions of Taiwan represent a distinct, most probably endemic species which seems the most ancient known member of the genus in many respects. The discussions with Dr. I. J. Kitching and Mr. S. Sugi led to the statement that this recently discovered species forms an undescribed specific taxon, and, on the other hand, the revision of the genus is needed. This opinion was supported also by Dr. M. Owada (pers. comm.), who sent additional material for studies and locality data of the species from Taiwan, and provided the information that the first recognition of this species was made by Sugi in 1987. This species was published in the checklist of the Lepidoptera of Taiwan as "*Autoculeora* sp. n." (Sugi, 1993).

As a general summary, five named taxa and an unnamed species are mentioned in the adequate literature, the taxonomic status and synonymy of all the named ones being disputed or disputable. The most consistent feature in the opinions of the authors is the synonymy of *A. wukongensis* with *A. ornatissima*, and the most curious is the lack of the proposal for the synonymy of *A. lushanensis* with *A. locuples*, although the identity of the species is, at least, presumable from the illustrations of the genitalia by Ichinose (1962, as *ornatissima*) and by Chou and Lu (1978, *lushanensis*, holotype). Moreover, there is a single (and the same) species known from the Russian Far East, Korea and



Figs. 1-8. *Antoculeora* spp. — 1-2. *A. yoshimotoi* sp. nov., (1) holotype male, Taiwan, Tayuling, (2) paratype female, Taiwan, Tayuling. — 3-7. *A. ornatissima* (Walker), (3) Dharmasala, (4) Sikkim, (5) Darjeeling, (6) Sikkim, (7) Upper Burma. — 8. *A. locuples* (Oberthür), North Korea.

Japan, and the type locality of *A. locuples* is Askold, near Vladivostok.

The history of the generic classification of "*Plusia*" *ornatissima* and its relatives is sufficiently outlined by Kitching (1987). It is worth to mention that

Antoculeora was erected originally (Ichinose, 1973) as a subgenus of *Erythroplusia* Ichinose, 1962 and its raise to a full genus was made by Chou and Lu (1979) without any argumentation. *Antoculeora* was used as a genus by Sugi (1982), too, but the detailed diagnosis and the real taxonomic interpretation were given firstly by Kitching (*op. cit.*). The problems discussed above and the existence of the undescribed species from Taiwan gave the impetus to revise the taxa of *Antoculeora*. The main results of this revision are as follows: 1) There are three different species belonging to *Antoculeora* (see the synopsis section), and two of them (*ornatissima* and *locuples*) are partly sympatric in the eastern-northeastern Himalayan region. 2) Several morphological features of the members of the genus have a slight or large overlap, principally in case of the *ornatissima-locuples* species-pair. The external morphological characteristics are insufficient for the correct identification, especially in case of the specimens originated from the eastern part of Tibet and from southern China. 3) The specific features of the male genitalia lie in the configuration of the carina of aedeagus and coiling of vesica, and there are good but not always distinctive ones can be found in the shape and size of the distal parts of valvae, the shape of the apical third of the fultura inferior (juxta) and the size of the clavi; those of the female genitalia are the shape and size of the sclerotized parts of the ostium and the ductus bursae, the shape of cervix bursae and the shape and the surface covering of corpus bursae, respectively. 4) The status of *A. minor* remains dubitable a bit, as I had no opportunity to study the specimen itself. But, according to the great individual variability of the genitalia of the two species occurring in continental Asia including China and the published genitalia figure, most features given (*e.g.* additional process at ventral edge of sacculus on right valva, dentated saccular extensions, relatively short clavi and long vinculum, supposedly entirely dentated plate of carina of aedeagus—a long row of teeth on the drawing at distal end of aedeagus) fit well with those of *A. locuples*. Consequently, the holotype of *A. minor* is considered here as a small (but not extremely small!) specimen of *A. locuples*; therefore it is interpreted as synonymous with *A. locuples*. 5) The Taiwanese species is rather remote from the two other relatives by its genital characteristics, some of them (*e.g.* almost symmetrical genital capsula with short apical processi of valva, very long, sword-like saccular extensions having no teeth distally, very high fultura inferior, long, slender clavi, tip of carina with a single, large tooth, distal tube of vesica with a spinulose field consisting of rather strong spiculi in males, less differentiated, sclerotized complex of ostium) displaying closer relationship with the hypothetical ancestor species of the genus. 6) There is a nomenclatural problem with the designation of the type species of the genus. Some details of the diagnosis of the genus given by Ichinose (“...Right sacculus, in addition, with another short projection in the proximity of its end... Vulva gigantic, strongly sclerotized, squarish, with a large triangular funnel at the right corner of bottom.”)

clearly show the fact (which is supported also by the historical data) that the species representing the basis of the genus is "*Plusia*" *locuples*; consequently the type species of *Antoculeora* in biological sense is *locuples*. But, according to ICZN, 70b, the Commission has the only competence to decide whether *ornatissima* or *locuples* should be used as the type species of *Antoculeora*. It is really curious that the last paragraph of the diagnosis of *Antoculeora* deals with the same problem, namely the misinterpretation of *Diachrysia* "*orichalcea*" sensu Hübner (= *chryson* Esper, 1789); this discovery (Dufay, 1970) led Ichinose to propose a new generic name (*Thysanoplusia*) for the *intermixta-orichalcea* group.

Zoogeography. The genus *Antoculeora* has a rather wide distribution from the central parts of the southern Himalayas through south-eastern and eastern China to Korea, rather far north in the Russian Far East along the Pacific zone in the continent and from Taiwan through Japan to the Kurile Isles. The core area of *Antoculeora* covers the higher montane monsoon forest regions in the Himalayan range eastwards to Taiwan. The western border of *A. ornatissima* is yet unclear, no confirmed data are known from the Pakistani Himalayas. The data from Indonesia are most probably based on the misidentification of Kostrowicki (1961); on the other hand, *A. ornatissima* was recently found at Sa Pa, Lao Cai Prov, northern Vietnam, by Dr. M. Owada. Two of the species have larger, partly overlapping distribution areas: *A. ornatissima* occurs in the Himalayas and the south-eastern edges of the Tibetan plateau, extending south-eastwards to northern Vietnam, and *A. locuples* lives mostly in the Palaearctic part of the Asian Pacific, its known range extending from the Kurile Isles (Klyuchko & Kononenko, 1986) to the central part of the southern Himalayas. The third species, *A. yoshimotoi* described in this paper, is apparently known only from Taiwan. *A. ornatissima* and *A. yoshimotoi* are characteristic of montane and upper montane, humid but warm, sometimes subtropical forests up to 3,500 m. *A. locuples* occurs in significantly lower elevations and under much more temperate climate, inhabiting deciduous forests, stream valleys, etc. All species of *Antoculeora* have two, more or less distinct generations in the early summer and the mid-autumn.

Synopsis

Antoculeora Ichinose, 1973

(= *Cerviplusia* Chou & Lu, 1974)

(= *Autoculeora* Chou & Lu, 1979; misspelling)

Type species: *Plusia ornatissima* Walker, 1858, by original designation, see also the last note of the revision section.

- Antoculeora yoshimotoi* sp. nov. (Taiwan)
Antoculeora ornatissima (Walker, 1858) ([India], Northern Hindustan)
 (= *wukongensis* Chou & Lu, 1974; [China], Shensi)
 (= *locuples* sensu auctorum, nec Oberthür, 1880)
 (= *chalsytis* sensu Kollar, 1844, nec Hübner, [1803])
Antoculeora locuples (Oberthür, 1880) ([Russia], Askold, near Vladivostok),
stat. rev.
 (= *lushanensis* Chou & Lu, 1978; [China], Kiangsi; **syn. nov.**)
 (= *minor* Chou & Lu, 1979; [China]; **syn. nov.**)

Identification tables for the genital features

As it is mentioned in the revision section, the features of the genital capsula are usually very variable and often partly overlapping between *A. ornatissima* and *A. locuples*. The best diagnostic features can be found in the sclerotization of the carina of aedeagus, the vesica and the structure of the ostium bursae; the configuration of the distal part of the saccular extension is also a key feature.

Male genitalia

Antoculeora yoshimotoi (Fig. 9): 1) vinculum rather short, V-shaped, saccus large, membranous; 2) fultura inferior very high, apical part strongly rostrum-like; 3) valvae almost entirely symmetrical; 4) apical processi relatively short; 5) subapical processi laminated, partly folded; 6) right valva without additional process at distal end of sacculus; 7) saccular extension very long, sward-like, acute, without teeth; 8) clavus very long; 9) aedeagus with carina terminated in a large, pointed tooth; 10) basal part of vesica with two shorter diverticula bearing bundles of short, spiniform cornuti; 11) distal part of vesica a broad, reclinate sac with scobinate walls and a spinulose field consisting of short but relatively strong spiculi.

Antoculeora ornatissima (Figs. 10–11): 1) vinculum variably long; 2) fultura inferior rather low, apical part more or less broadly triangular, not rostrum-like; 3) valvae strongly asymmetrical; 4) apical processi strongly different, costal one much shorter, ventral one very long, its terminal part projected always ventrally on right valva; 5) subapical processi digitiform, regularly asymmetric on left and right valvae; 6) right valva without additional process at distal end of sacculus; 7) saccular extension not as long as in *yoshimotoi*, acute, without teeth; 8) clavus not very long but regularly longer than in *locuples*; 9) aedeagus with carina terminated in a broadly half-moon-shaped plate covered with short but strong teeth at base (and sometimes in medial third); 10) basal part of vesica with two diverticula bearing bundles of short, spiniform cornuti, one of them usually long, tubular, second much smaller, often without spinules; 11) distal part of vesica

with scobinate walls but without spinulose field.

Antoculeora locuples (Fig. 12): 1) vinculum variably long; 2) fultura inferior moderately high, apical part triangular, more or less rostrum-like; 3) valvae strongly asymmetrical; 4) apical processi strongly different, costal one much shorter, regularly short but flattened, broad, ventral one much longer, terminal parts curved inwards on both valvae; 5) subapical processi digitiform, regularly asymmetric; 6) right valva with an additional, finger-like process at distal end of sacculus; 7) saccular extension long, distally often dilated, terminal part always armed with strong teeth; 8) clavus most often shorter than that of *ornatissima*; 9) aedeagus with carina terminated in a rather narrow, half-moon-shaped plate, covered entirely with strong teeth; 10) basal part of vesica with two short(er), broad diverticula bearing short, spiniform cornuti; 11) distal part of vesica a broad, reclinate sac with scobinate walls but without spinulose field.

Female genitalia

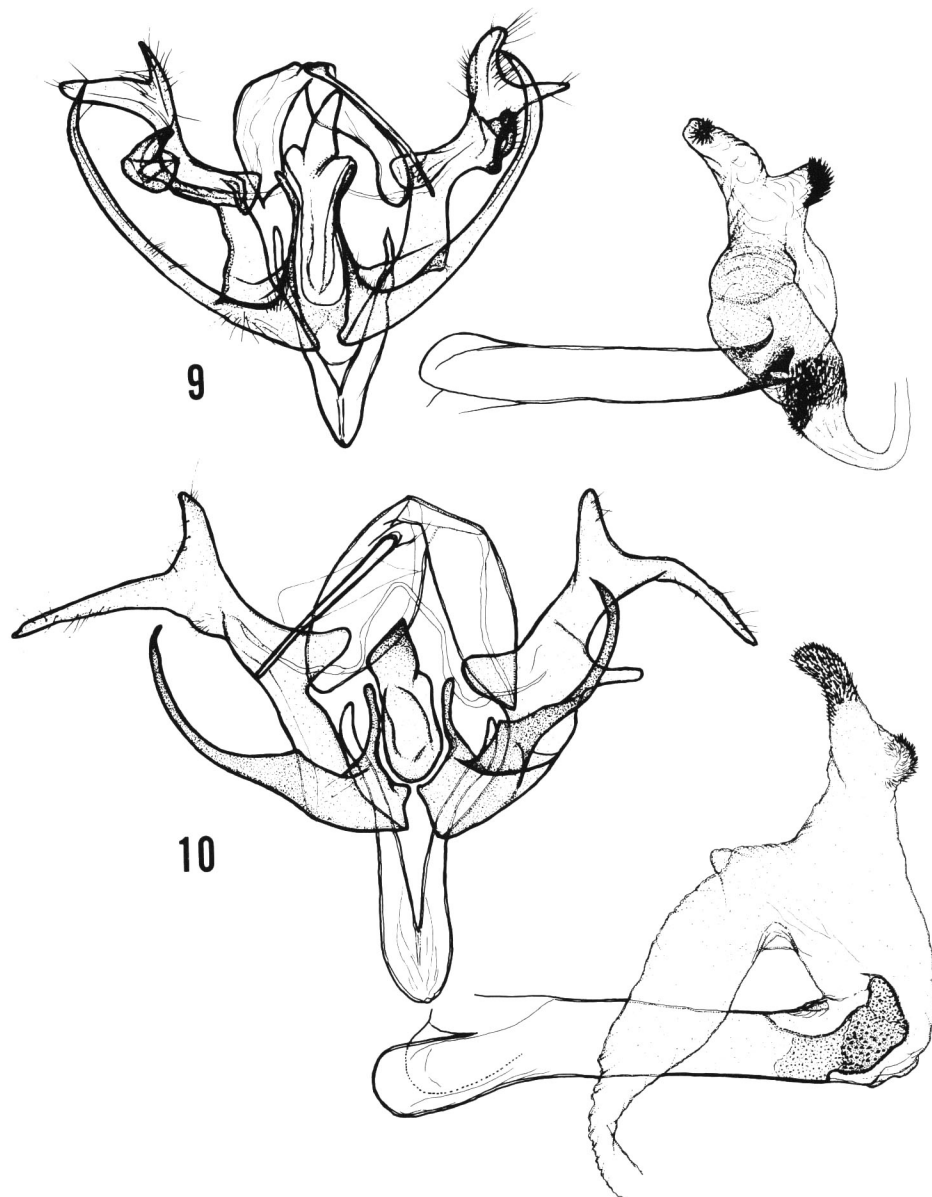
Antoculeora yoshimotoi (Fig. 13): 1) proximal papillae anales symmetrical; 2) ostium bursae large but almost simple, anterior section of ostial complex represented by a sclerotized, more or less cylindrical, dorso-lateral protuberance; 3) cervix bursae rounded; 4) medial third of corpus bursae with long, rather strong wrinkles; 5) proximal third of corpus bursae a large, spacious sac, covered partly with fine, short, hair-like spiculi; 6) sclerotization of sternite VIII almost homogeneous.

Antoculeora ornatissima (Fig. 14): 1) proximal papillae anales asymmetrical; 2) ostium bursae forms a heavily sclerotized, double complex, posterior part smaller, flattened, more or less rectangular with deeply incised proximal margin, anterior part huge, axe-head-shaped with pointed postero-lateral tip; 3) cervix bursae elongated, folded; 4) medial third of corpus bursae only slightly wrinkled; 5) proximal third of corpus bursae a large, spacious sac, covered partly with fine, short, hair-like spiculi; 6) sternite VIII sclerotized, with a weaker medial triangle.

Antoculeora locuples (Fig. 15): 1) proximal papillae anales asymmetrical; 2) ostium bursae forms a heavily sclerotized, double complex, posterior part huge, broadly calyculate, anterior part huge, more distinct, a broad, flattened tube continued proximally in an acute, triangular extension; 3) cervix bursae elongated, narrow, non-folded; 4) medial third of corpus bursae only slightly wrinkled; 5) proximal third of corpus bursae a large, spacious sac, covered partly with fine, short, hair-like spiculi; 6) sclerotization of sternite VIII more or less homogeneous.

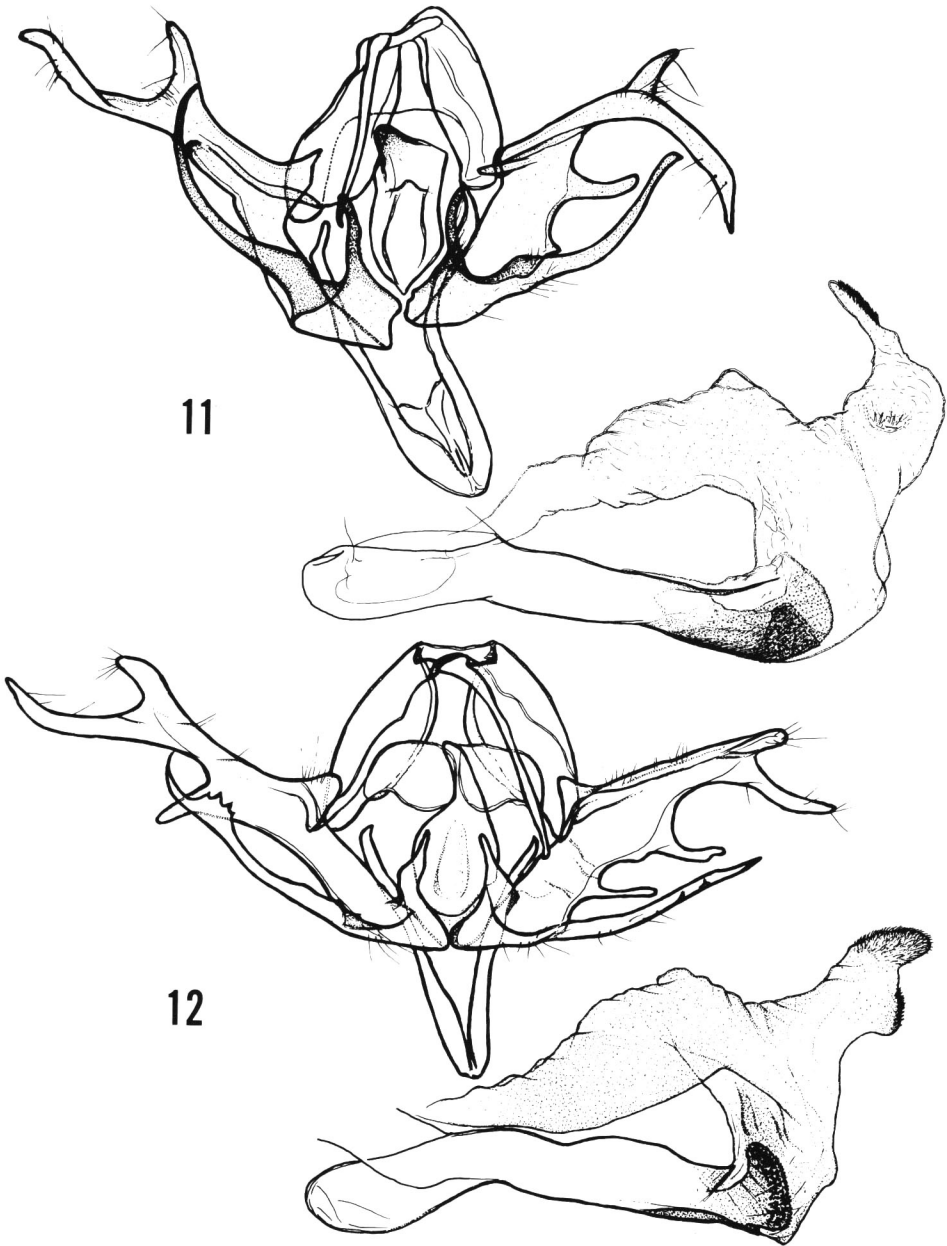
Systematic part

The diagnosis of the genus is given in detail by Ichinose (1973) and by



Figs. 9–10. Male genitalia of *Antoculeora* spp. — 9. *A. yoshimotoi* sp. nov., holotype, Taiwan, Tayuling. — 10. *A. ornatissima* (Walker), Darjeeling.

Kitching (1987). Some additional characteristics of the everted vesica and those features present only in the Taiwanese species can be found in the diagnoses of the taxa and/or the identification tables.



Figs. 11-12. Male genitalia of *Antoculeora* spp. — 11. *A. ornatissima* (Walker), Masuri.
— 12. *A. locuples* (Oberthür), North Korea.

Antoculeora yoshimotoi sp. nov.

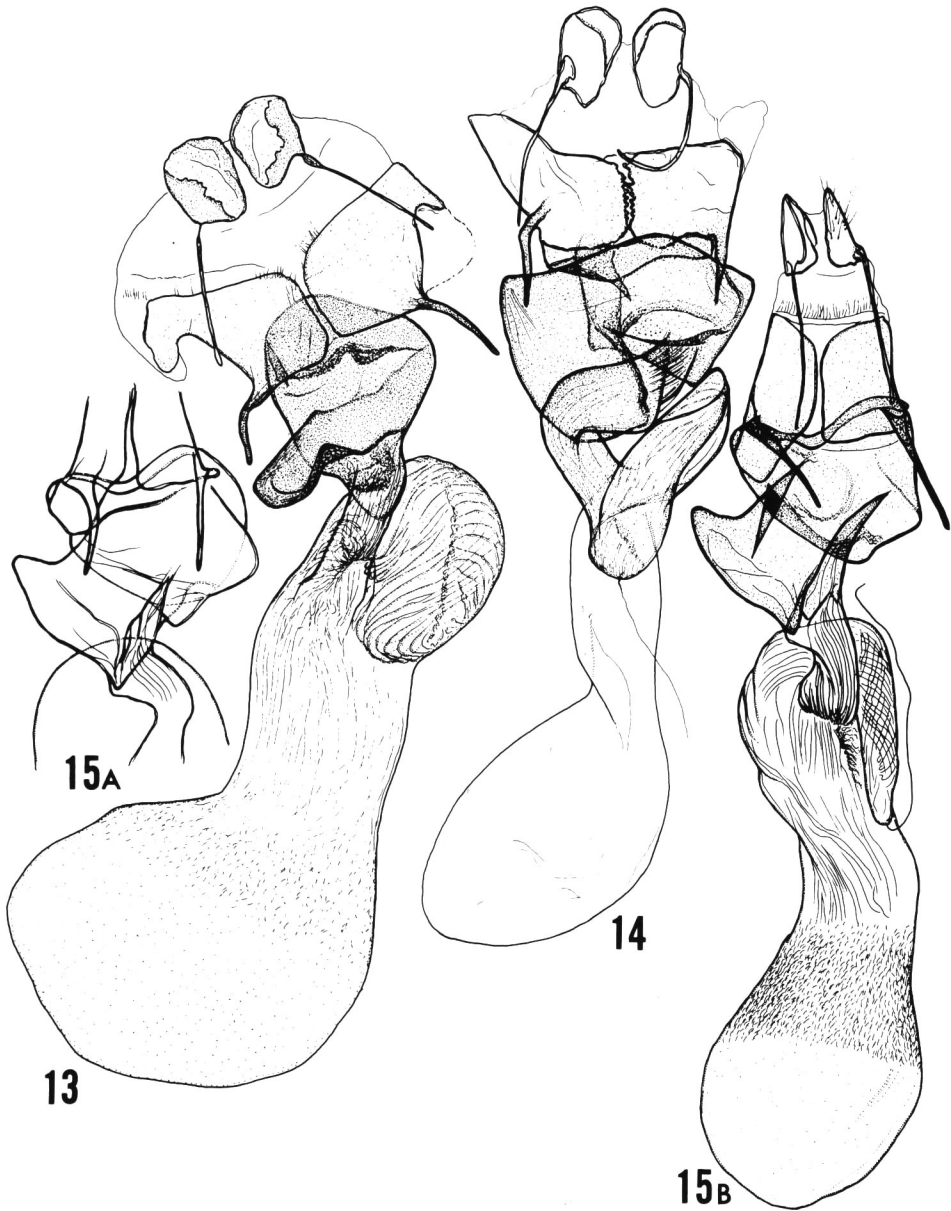
(Figs 1–2)

Description. Wingspan 34–37 mm, length of forewing 16, 5–17 mm. Head red-brown, frons and third joint of palpi fiery red, collar reddish-brown variegated by fiery red hair-scales. Thorax dark violaceous brown, tegulae marked with reddish. Forewing broad triangular with apex acute, outer margin apically concave, tornal lobe large. Ground colour violaceous brown irrorated slightly with light grey, medial and marginal fields suffused with brilliant bronze-red and metallic golden. Transverse lines brownish, double, slightly sinuous, filled partly by golden scales. Orbicular and reniform stigmata encircled with violaceous grey and defined with some gold spots at lower edge of cell; medial line a diffuse, dark brownish shadow. Stigma large, silvery, consisting of two more or less rounded spots, outlined with blackish brown and a few golden scales. Hindwing cupreous brown, inner area slightly lighter, veins covered by brown. Discal spot represented by a darker shadow, transverse line obsolescent. Underside of forewing grey-brown, costal margin and apex suffused with orange-brown, cross lines diffuse, dark brown. Hindwing lighter, ochreous grey, irrorated by brown, cross lines and discal spot well-marked, dark brownish.

Male genitalia (Fig. 9). Uncus very long, slender with apex hooked, vinculum relatively short, V-shaped, saccus large, membranous. Fultura inferior (juxta) elongated, narrow and high, apical part rostrum-like. Valvae almost entirely symmetrical, apical arms forming an antler with furcate apical third, subapical processi broadly laminated, apically recurved and partly folded. Sacculus extension very long, sward-like, acute, without teeth; clavus very long. Aedeagus cylindrical, distal end with a large, pointed tooth. Vesica everted ventrally, consisting of two shorter diverticula bearing bundles of short, spiniform cornuti and a longer, broader, reclinate sac with scobinate walls, distal part broadly covered with small spinules.

Female genitalia (Fig. 13). Ovipositor short, narrow, gonapophyses relatively short. Ostium bursae very large, more or less rounded, sclerotized, flattened, bearing a sclerotized, cylindrical, dorso-lateral protuberance. Ductus bursae relatively short, membranous, with stronger wrinkles. Cervix bursae rounded, rugose, medial third of corpus bursae elongated, with long, rather strong wrinkles, proximal third a large, spacious sac, covered partly with fine, short, hair-like spiculi. Sternite VIII without stronger incision.

Type series. Holotype: male, "Tayuling (2,600 m) (Hualien Hsien) (TAIWAN) Aug. 28–29, 1983, H. Yoshimoto leg.", Slide No. 2784 Ronkay, in the National Science Museum, Tokyo. Paratypes: 22 males, 26 females; Taiwan, from the following localities: Prov. Hualien–Tayuling, 2600 m, 28–29 August, 1983 and 2–4 May, 1984 (Yoshimoto), Tayuling, 30 km SE of Lishan, 2,650 m,



Figs. 13–15. Female genitalia of *Antoculeora* spp. — 13. *A. yoshimotoi* sp. nov., paratype, Taiwan, Tayuling. — 14. *A. ornatissima* (Walker), Sikkim. — 15. *A. locuples* (Oberthür), (A) Japan, (B) North Korea.

25 September, 1992 (Aulombard & Plante), same loc., 3,000 m, 31 June, 1993 (Aulombard & Plante), 5 km SW of Tayuling, 2,900 m, 21 May, 1995, 121°17'E, 24°09'N (M. Hreblay & P. Stéger), 7 km SW of Tayuling, 3,000 m, 19 August, 1996, 121°16'E, 24°08'N (Csövári & Mikus), Mts. Hohuanshan, Sunhsuehlou, 3,100 m, 23–24 June, 1989 (Owada), 3,300 m, 19–21 June, 1993 (Aulombard & Plante), 10 km NE of Tienchih, 2,100 m, 23 May, 1995, 121°20'E, 24°04'N (Hreblay & Stéger); Prov. Taichung–Mt. Hsuehshan, Sanliuchiu-shanchuang, 3,100 m, 30 June, 1989 (Owada), Chika-shanchuang, 2,460 m, 29 June, 1989 (Owada), Mts. Tahsuehshan, Anmashan, 2,230 m, 14–16 June, 1989 (Owada), Wuling Farm, 35 km NE of Lishan, 1750 m, 26 September, 1992 (Aulombard & Plante); Prov. Nantou–Mt. Nienkaoshan, Tienchi, 2,860 m, 21 June, 1989 (Owada), 3 km SW of Tsuifeng, 2,100 m, 22 May, 1 June, 11 and 26–27 October 1995, 121°10'E, 24°06'N (Csövári, Hreblay & Stéger); Prov. Taitung–Kuangshan–Yakou, 2,600 m, 11–12 June, 1989 (Owada); Prov. Miaoli, 20 km E of Tungshih, 1335 m, 10 October, 1995, 121°03'E, 24°19'N (Csövári & Stéger); Slide Nos. HY 1272; 4869, 4870 (males); 2820 Ronkay (female); in the collections of NSMT, Hungarian Natural History Museum, T. Csövári (Budapest), M. Hreblay (Érd), J. Plante (Martigny), G. Ronkay (Budapest), H. Yoshimoto (Tokyo).

Distribution. The species is known only from Taiwan, where it seems rather widespread in the medium-high and high altitudes. It has two generations in May–June and in August–September.

Early stages and foodplant. Unknown.

Antoculeora ornatissima (Walker, 1858)

(Figs. 3–7)

Plusia ornatissima Walker, 1858, List Specimens lepid. Insects Colln. Br. Mus., 15: 1786.

The genitalia of both sexes are illustrated in Figs. 10, 11, 14, and the diagnostic features of the genitalia are given in the identification tables.

Type material examined. Holotype female, India, Northern Hindustan, slide No. 14158 Noctuidae BMNH (coll. BMNH).

Additional material examined. India: 1 female, Dharmasala, Hocking, 87–59 (459), October, slide 11529 BM Noct., *Macdunnoughia ornatissima* (Walker), det. Dufay, 1977; 3 females, Sikkim, Möller, coll. H. J. Elwes, Rothschild Bequest, slide Nos 2799, 2801, 2811 Ronkay; 1 female, Sikkim, Lachin Lachoong, 8,000 a 16,000', Éte 1894, Chasseurs Bretendean, slide No. 2808 Ronkay; 1 male, Darjeeling, 25.05.1935, D. G. Sevastopulo, B.M. 1975–385, slide No. 2798 Ronkay; 1 female, Bengal, Russell, Moore coll., 94–106, *Macdunnoughia ornatissima* (Walker), det. Dufay, 1977, slide No. 2812 Ronkay; 1 male, Mussorree (“Masuri”), 3–4,000 ft, Oct. 95, Rothschild Bequest, slide No. 2800 Ronkay.

China: 1 female, [Tibet], "Ta-Tsien-lou, Chasseurs indigènes, P. Déjean, 1903", slide No. 4866 Ronkay; 1 male, "Frontière orientale du Tibet, Chasseurs indigènes du P. Déjean, 1906", slide No. 4868 Ronkay. Nepal: A large series from central and eastern Nepal (Annapurna Himal, Ganesh Himal, Langtang, Solu Khumbu Himal), slide Nos. 4856, 5394 Ronkay (males). Burma: 2 females, Upper Burma, Hpimaw Fort, near Myitkina, 8,000 ft, Capt. A. E. Swann, slide Nos 12188-91 B. M. Noct., 2807 Ronkay. Vietnam: 1 female, Prov. Lao Cai, Pass north of Mt. Phang Si Pang, 1,800 m, 9 October, 1994, leg. M. Owada, slide No. 5348 Ronkay.

Distribution. The species appears rather widespread in the southern Himalayan region from north-western India through Burma to northern Vietnam, in the eastern part of Tibet and SE. China, occurring in the medium high and high elevations; rather local, in some places of the southern Himalaya may be frequent.

Antoculeora locuples (Oberthür, 1880)

(Fig. 8)

Plusia locuples Oberthür, 1880, Études d'Ent., 5: 85, pl. 9, fig. 3.

Diagnosis. *A. locuples* is in average larger than the other relatives; the wingspan of the large specimens is often around 40 mm, and such large specimens of *A. ornatissima* are exceptional. The genitalia of *A. locuples* are also larger, stronger in sclerotization; the specific features are given in the identification tables and are illustrated in Figs. 12, 15.

Type material examined. Holotype male, Askold, slide No. 4427 B.M. Noct. (coll. BMNH).

Additional material examined. A large series of specimens from Japan, Korea, the Russian Far East, central Nepal (Ganesh Himal, Annapurna Himal) and from China (Yunnan, Doyonlumba near Salween, 2,700–2,900 m, 1.08.1916, Handel-Mazzotti, coll. NHM, Vienna); Slide Nos 1029, 2214, 4631, 4633, 4867, 5365, 5392, 5393 Ronkay (males) 115, 2809, 4632 Ronkay (females).

Distribution. The species has an eastern Asian distribution with Pacific centre, its range extending from central Nepal throughout central and north-eastern China northwards to Sakhalin and the Kurile Isles, widely distributed and locally frequent in the Primorye Territory, Korea and Japan. It is very local and rare in the Himalayan region, having only a single brood which is on the wing in July–September, occurring in the higher altitudes (2,800–4,200 m). The species is much more widespread in the Pacific region where it has two regular generations in June–August and in September–October, occurring principally in the lower parts of the mountains where it might be relatively frequent; it is found in higher ranges only occasionally.

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