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Two new species of *Chandata* MOORE, 1882 (Lepidoptera, Noctuidae) from China

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Abstract

The description of two new species (*Chandata bidentata* nov.sp. and *Chandata rothei* nov.sp.) are given from Sichuan, China. New taxa and closely related species are illustrated with imagines in colour and male and female genitalia.

Key words: Lepidoptera, Noctuidae, *Chandata*, nov.sp., new species, Asia.

Zusammenfassung

Die Beschreibung zweier neuer Arten (*Chandata bidentata* nov.sp. und *Chandata rothei* nov.sp.) stammt aus Sichuan, China. Männliche und weibliche Genitalien werden dargestellt, sowie neue Taxa und nahe verwandte Arten in Farbe.

Introduction

The genus *Chandata* MOORE, 1882 (type species: *Chandata partita* MOORE, 1882) is a southern-eastern Palearctic Apameinae genus (however the range of a few species extend to northern India, Thailand and Vietnam), of which the species are often slightly different externally and in the genitalia of both sexes, as well. Nine species are described, the majority of them (*Chandata partita* MOORE, 1882, *Chandata c-nigrum* YOSHIMOTO, 1982, *Chandata tridentata* YOSHIMOTO, 1982, *Chandata elegantula* HREBLAY & PLANTE, 1995, *Chandata pseudopartita* HREBLAY & RONKAY, 1998) are Himalayan; two species (*Chandata aglaja* (KISHIDA & YOSHIMOTO, 1978), *Chandata taiwana* YOSHIMOTO, 1982) are endemic to Taiwan; one (*Chandata maminti* HREBLAY, PEREGOVITS & RONKAY, 1999) in Vietnam and Thailand, while the northernmost one (*Chandata bella* (BUTLER, 1881) = *Lamprostricta bella* BUTLER, 1881 = *Euplexia graeseri* STAUDINGER, 1892) have a wide range in the Far East and Japan.

For a long period, a large disjunction has been observed in the range of the genus, since no *Chandata* species was found in the continental China. In 2006, a single female of an unknown *Chandata* was collected by V. Siniaev, furthermore in 2014 and 2017 a series of males and females of a smaller, but distinct species by the A. Floriani and second author; both of the species in the high mountains of Sichuan, China, are described as new species here. Both of them resemble *Chandata bella* (BUTLER, 1881), *Chandata tridentata* YOSHIMOTO, 1982, *Chandata taiwana* YOSHIMOTO, 1982 and *Chandata aglaja* (KISHIDA & YOSHIMOTO, 1978) in the external and genitalia features, as well. The most characteristic external feature in these species is the extended, white, typical forewing pattern in the forewing's middle field. Both of the male and female genitalia are hardly distinctive of each species; the shared features are the long and thin uncus, large cucullus with more or less developed corona, finger like digitus, small harpe and ventrad vesica with a single spiniform cornutus in the males; while those are in the females the long, terminally evenly waisted papillae anales, broadly V-shaped antevaginal plate, funnel-like, sclerotized, folded ductus bursae, slightly prominent and detached appendix bursae and more or less elongate corpus bursae. Although, *Chandata taiwana* YOSHIMOTO, 1982 is very similar to the two new species in the external features, it is indicated in the female genitalia (hardly sclerotized ductus bursae and not elongate corpus bursae), that this species is not so close relative of the two new ones as the *Chandata bella* (BUTLER, 1881) and *Chandata tridentata* YOSHIMOTO, 1982.

Material and methods

The article is based on the private collection of the authors, some further collections and of the Taiwan Forestry Research Institute (Taiwan); however type material documentation was preserved in the National Science Museum Tsukuba (Japan).

Standard methods and chemicals were used for dissection of the abdomen and preparation of the genitalia (coloured with chlorazol blue, covered in Canada balm) of most specimens, which were photographed using a Nikon D 90 with Nikon 1:4– 5,6 D objective; genitalia slides were photographed by Super Cool–scan 5000 (the name of the scanning programme is VueScan32) and Nikon D 90 with Nikon ED AF Micro Nikkor 200 mm 1:4 D objective and further processed and combined to plates by Adobe Photoshop software. For acquiring images of species deposited in TFRI and NSMT, Nikon D 300 with Nikon 60 mm F2.8D AFS for specimen images and Nikon D600 with Laowa 25mm f/2.8 2.5-5X Ultra Macro and a pair of Nikon SB-R200 Remote Speedlights for genitalia were used.

Abbreviations

AFM.....	Alessandro Floriani (Milan, Italy)
ASV.....	Aidas Saldaitis (Vilnius, Lithuania)
HNHM	Hungarian Natural History Museum (Budapest, Hungary)
NSMT.....	National Science Museum Tsukuba (Japan)
PGM.....	collection of Péter Gyulai (Miskolc, Hungary)
SW.....	genitalia slide of Shipher Wu
TFRI.....	Taiwan Forestry Research Institute (Taipei, Taiwan)
GYP.....	genitalia slide of Péter Gyulai

Systematic part

Chandata bidentata nov.sp. (Figs. 1, 20)

Type material: Holotype. ♀ (Fig. 1), China, Sichuan, Qing - Cheng Shan, 1500-1800 m, 31° 12' N, 102° 47' E, 01-30.09.2006, leg. V. Siniaev & Team, slide no. GYP4928f (coll. PGM, Miskolc, Hungary, later to be deposited in the HNHM).

Diagnosis: *Chandata bidentata* (Fig.1) is a medium sized species, the most similar is the *Chandata taiwana* (Figs. 2, 3, 4), from which it is distinguished by the careful study of some of the external features, however identification is much easier by the comparison of the female genitalia. The distinguishing external features are as follows: in the new species, the forewing apex is more elongate; the white colouration of the vertex, thorax and wing pattern in the forewings is somewhat more extended and snow-white, without dirty white shade and scattered fine brown scales; the antemedial streak is broader and the outer edge almost straight, versus slightly arcuate in the *Chandata taiwana*. In comparison *Chandata tridentata* (Figs. 5, 6, 7) and *Chandata rothei* nov.sp. (Figs. 8, 9, 10) (see below) separation is very easy, since the white colouration of the vertex, thorax and wing pattern in the forewings is conspicuously more extended and pure; in addition, the anvil-like white pattern in the lower medial area is two-protruding, "bident" in the new species, while three-protruding, "trident" in the *Chandata tridentata*; it is asymmetric in the significantly smaller (31 mm, versus 23-30 mm) *Chandata rothei* nov.sp., since the lower - outer small tongue is very slight, controversy the strong inner one conspicuous of the anvil-like white patch in the lower medial area; whereas it is more irregular, extended in the *Chandata bella* (Figs.13 , 14).

Less similar, and not so related species is *Chandata aglaja* (Figs. 11, 12), from which the new species can be well separated by the snow-white forewing pattern, without dirty white shade and scattered brown scales; the red-brown coloured antemedial streak and red-brown shade in the subterminal field (this colouration is declined in *Chandata aglaja*) and the very slight lower - outer tongue process of the anvil-like white pattern in the lower medial area.

Female genitalia: The differences between *Chandata bidentata* (Fig. 20) and close relative species are found in the shape and size of the papillae anales, the sclerotization and configuration of ductus bursae and the shape of corpus bursae. Surprisingly, *Chandata bidentata* is the most distinctive from the externally most resembling *Chandata taiwana* (Fig. 21) by the funnel-like, sclerotized, somewhat folded ductus bursae and more or less elongate corpus bursae; versus those are the hardly sclerotized ductus bursae and rather globular corpus bursae in *Chandata taiwana*. From *Chandata tridentata* (Fig. 22) the new species differs by the weaker papillae anales and ductus bursae, the slight tongue extension of the ductus bursae toward the corpus bursae (which is very conspicuous, large in the *Chandata tridentata*) and the presence of a sclerotized bar in the wall of corpus bursae. From the *Chandata bella* (Fig. 26) and *Chandata rothei* (Figs. 23, 24) nov.sp. it is more distinctive, since have differently shaped and sclerotized antevaginal plate and folded ductus bursae, broader but significantly shorter corpus bursae, having a sclerotized bar in the wall. In comparison *Chandata aglaja* (Fig. 25), the most conspicuous differences are the sclerotized, folded, funnel like ductus bursae, broadly V-shaped antevaginal plate and the shorter corpus bursae in the new species.

Description (Figs. 1, 20): It is a medium sized species; wingspan 31 mm, length of forewing 15 mm. Female. Antennae filiform, tip of papillae, frons and vertex white; vesture of body and forewing ground colour variegate snow-white and black, with red-brown and more or less pinkish-whitish suffusion in the subterminal and terminal fields. The most remarkable external features of the new species are the less elongate forewing apex, the white basal dash, broad red-brown definition of the streak of the antemedial line, white orbicular and reniform stigmata, from which the previous one joined with the unusual claviform stigmata, forming a large, white anvil-like patch, of which the outer side two-protruding ("bident"). Hindwing unicolorous brown, with hardly discernible brown discal spot and diffuse trace of the medial and subterminal lines. Female genitalia (Fig. 20): can be characterized by the long, terminally evenly tapering, apically pointed papillae anales, long apophyses anteriores and shorter apophyses posteriores, broadly V-shaped antevaginal plate, sclerotized, somewhat folded funnel-like ductus bursae and saccular corpus bursae, having a sclerotized bar in the wall. Male is not known.

Biology and distribution: The single specimen was found in the high mountain region of Sichuan, China, in moderate altitude, in the autumnal period.

Etymology: The specific name indicates the two equal outer process of the anvil-like white pattern in the lower medial area.

***Chandata rothei* nov.sp. (Figs.8, 9, 10, 17, 23, 24)**

Type material: Holotype: ♀ (Fig. 8), China, W. Sichuan, road Yaan/Kangding, Erlang Shan Mt., H-2161 m, N29°87'340", E102°30'970", 11-12.IX.2017, Saldaitis leg, slide no. GYP4568f (coll. PGM, Miskolc, Hungary, later to be deposited in the HHNM).

Paratypes: 10 ♂♂, 3 ♀♀, with the same data (colls AFM, ASV, M. Dvorak, S. Rothe, H. Seibald, J. Stumpf and PGM), 3 ♂♂, the same locality, only: 20.VIII. 2014, Floriani & Saldaitis leg (coll. AFM), slide nos GYP4059m, GYP4891m, GYP4912f.

Diagnosis: *Chandata rothei* nov.sp. (Figs. 8, 9, 10) is one of the two smallest species of the genus; only the very dissimilar Himalayan *Chandata c-nigrum* specimens

are the same sized. The externally resembling relative species are the *Chandata bella* (Figs.13, 14), *Chandata taiwana* (Figs. 2, 3, 4), *Chandata bidentata* nov.sp. (Fig.1) and *Chandata tridentata* (Figs. 5, 6, 7); the latter one is the most resembling. From all can be well separated by the relatively smaller size (23-30 mm, versus 25-33 mm) and the asymmetry of the anvil-like white patch in the lower medial area, of which the lower - outer tongue is very slight (one-protruding, "unident") controversy the strong inner one conspicuous; additionally, in comparison *Chandata bella* and *Chandata bidentata*, the white colouration of the forewing pattern is conspicuously less extended.

Male genitalia: *Chandata rothei* nov.sp. (Fig. 17) can be separated from *Chandata bella* (Fig. 19) by the stronger uncus, longer, straight digitus and conspicuously larger cornutus in the vesica; from *Chandata taiwana* (Fig. 15) the less developed corona in the cucullus, much stronger and longer uncus, significantly longer but weaker, straight digitus and larger cornutus in the vesica; from *Chandata tridentata* (Fig. 16) distinct in the much stronger and longer uncus, conspicuously longer aedeagus and larger cornutus in the vesica and finally it differs from *Chandata aglaja* (Fig. 18) by the shorter uncus, more elongate fultura inferior with longer ventral processes; smaller, less extended cucullus, curved aedeagus and stronger, longer, straight cornutus in the vesica, sitting on a conspicuously smaller base.

Female genitalia: The new species (Figs. 23, 24) differs from all by the more folded ductus bursae and the somewhat more ample appendix bursae. Furthermore, *Chandata rothei* nov.sp. is distinctive from *Chandata bella* (Fig. 26) by the somewhat cup-shaped antevaginal plate, larger, differently sclerotized and folded ductus bursae and slightly longer corpus bursae; from *Chandata tridentata* (Fig. 22) by the weaker papillae anales, the absence the large tongue-like sclerotized extended lamina of the ductus bursae and the conspicuously longer corpus bursae; from *Chandata taiwana* (Fig. 21) the longer, sclerotized-folded ductus bursae and the significantly longer, saccate corpus bursae; from *Chandata bidentata* (Fig. 20) by the differently sclerotized and folded ductus bursae and the much elongate but less ample corpus bursae, without the sclerotized bar in the wall of corpus bursae; finally from *Chandata aglaja* (Fig. 25) the most conspicuous differences are the sclerotized, folded, funnel like ductus bursae and the broadly V-shaped antevaginal plate.

Description (Figs. 8, 9, 10): It is a medium sized species, wingspan 23-30 mm, length of forewing 12-14 mm. Antennae of males finely bipectinated, those of the females filiform, tip of papillae, frons and vertex white; vesture of body and forewing ground colour variegate white and black, with dark red-brown suffusion in the subterminal field (the lightest in the apex), and two whitish patches in the terminal field. The most remarkable external features of the new species are the less elongate forewing apex, the white basal patch, broad red-brown definition of the streak of the antemedial line, white orbicular and reniform stigmata, from which the previous one joined with the unusual claviform stigmata, forming a large, white patch in the middle field, which is C-shaped in the inner side, however anvil-like in the lower section, of which the outer side almost one-protruding, "unident". Hindwing unicolorous brown, with the absence of the discal spot and presence the diffuse trace of the medial and subterminal lines. **Male genitalia** (Fig. 17): Uncus is long, strong, curved, apically slightly hooked; fultura inferior high, elongate subpentagonal, with bilateral small extensions ventrad and two equally long

processes dorsad; vinculum U-shape; valvae somewhat curved, cucullus detached, large, with slight corona; harpe small, straight, finger-like, digitus strong, straight, wedge-like. Vesica ample, curved ventrad, with a small sclerotized bar subbasally and a single, straight, strong, spine-like cornutus (sitting on an elongate sclerotized base) subterminally. **F e m a l e g e n i t a l i a** (Figs. 23, 24): It can be characterized by the long, apically pointed, posteriorly evenly tapering papillae anales, long apophyses anteriores and shorter apophyses posteriores, broadly V-shaped antevaginal plate, sclerotized, folded funnel-like ductus bursae, ample but less prominent appendix bursae and long corpus bursae.

B i o l o g y a n d d i s t r i b u t i o n: The new species is known from the Erlang Shan at the eastern edge of the Tibetan plateau in China's Sichuan province. Series of males and females were collected at ultraviolet light at the end of August and September at altitude ranging 2200 m. *Chandata rothei* nov.sp. were collected in virgin mixed forest habitat dominated by various broad-leaved trees such as oaks (*Quercus dentata* THUNBERG, *Quercus glauca* THUNBERG), poplars (*Populus cathayana* REHDER, *Populus simonii* CARRIÈRE), elm (*Ulmus parvifolia* JACQUIN), rhododendrons (*Rhododendron brachycarpum* G. DON, *Rhododendron dauricum* LINNAEUS), and bamboos (*Phyllostachys* ssp., *Borinda* ssp., *Fargesia* spp.).

E t y m o l o g y: The new species is named after a prominent German lepidopterist, Stefen Rothe (Taucha, Germany), for his contributions to entomology.

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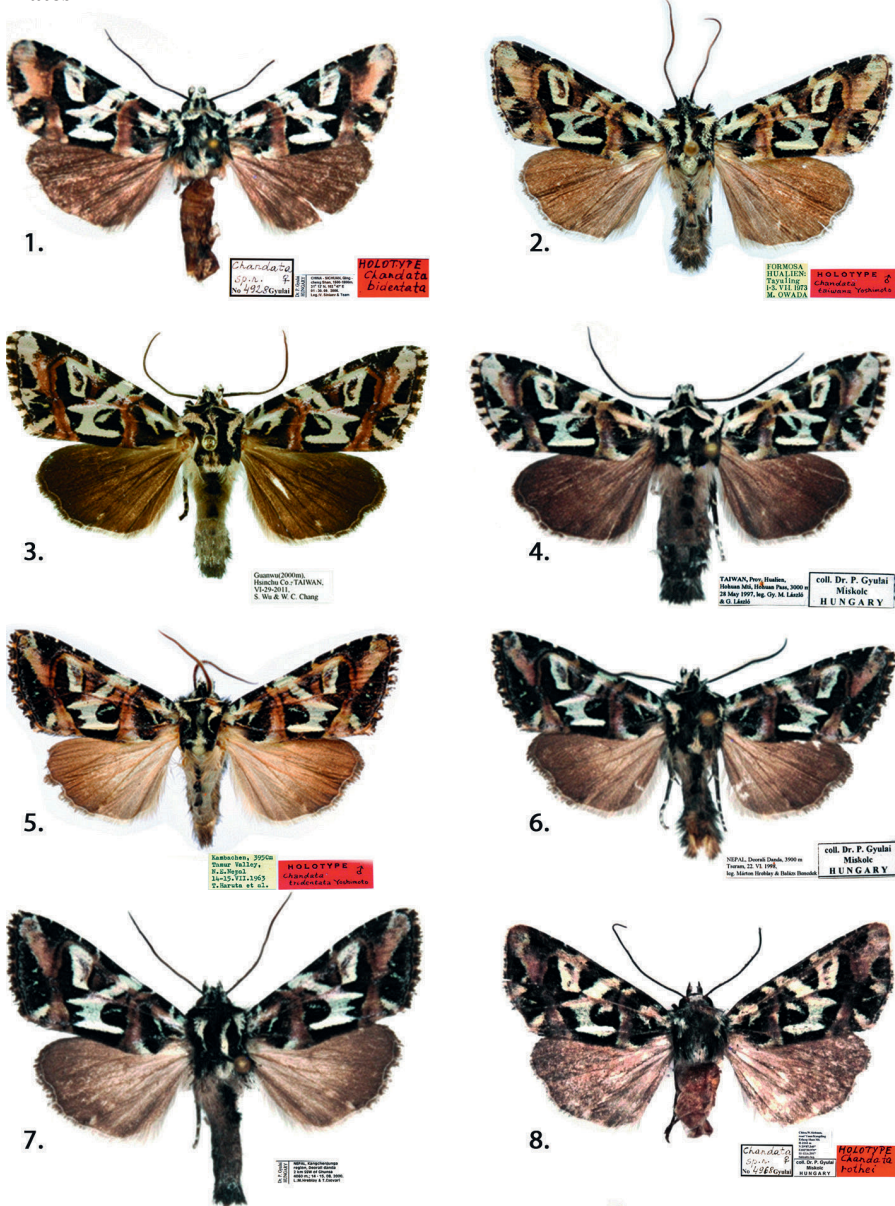
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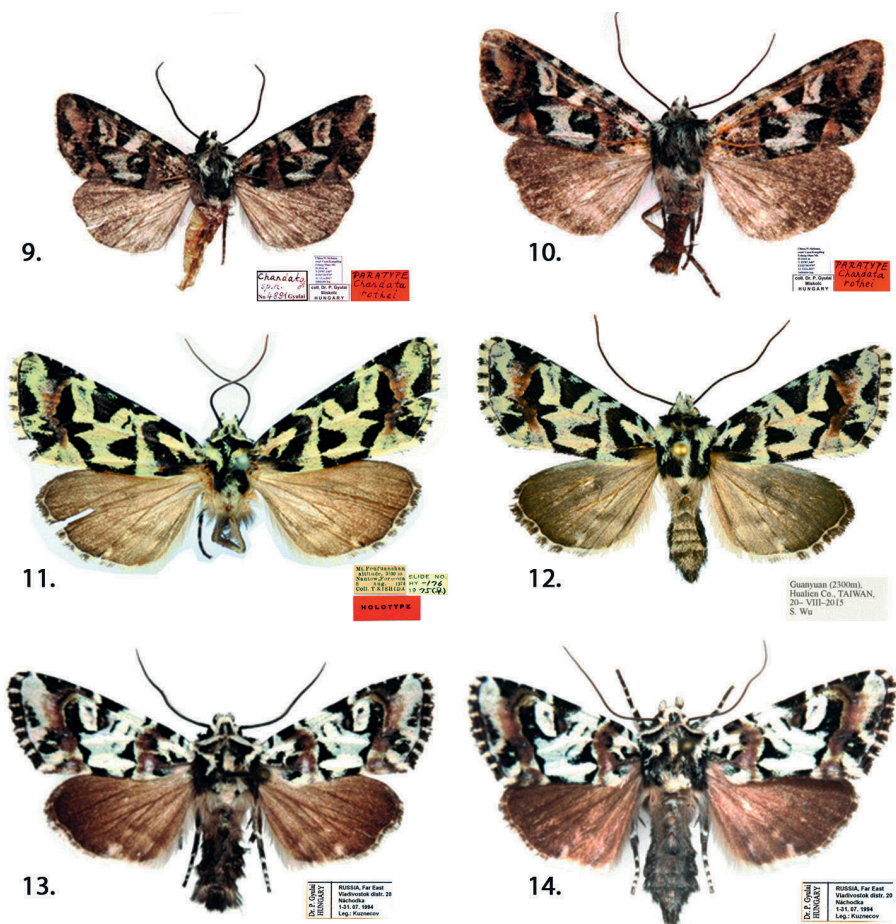
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Plates



Figs. 1-8: Adults. (1) *Chandata bidentata* n.spec., Holotype, ♀, China, Sichuan, GYP 4928 (PGM); (2) *Chandata taiwana* YOSHIMOTO, 1982, Holotype, ♂, Taiwan, (NSMT); (3) *Chandata taiwana* YOSHIMOTO, 1982, ♀, Taiwan (TFRI128526_2400); (4) *Chandata taiwana* YOSHIMOTO, 1982, ♀, Taiwan, (PGM); (5) *Chandata tridentata* YOSHIMOTO, 1982, Holotype, Nepal, ♂, (NSMT); (6) *Chandata tridentata* YOSHIMOTO, 1982, Nepal, ♀, (PGM); (7) *Chandata tridentata* YOSHIMOTO, 1982, Nepal, ♂, (PGM); (8) *Chandata rothei* n.spec., Holotype, ♀, China, Sichuan, GYP 4968 (PGM).



Figs. 9-14: (9) *Chandata rothei* n.spec., Paratype, ♂, China, Sichuan, GYP 4891 (PGM); (10) *Chandata rothei* n.spec., Paratype, ♀, China, Sichuan, (PGM); (11) *Chandata aglaja* (KISHIDA & YOSHIMOTO, 1978) Holotype, Taiwan (NSMT); (12) *Chandata aglaja* (KISHIDA & YOSHIMOTO, ♀, Taiwan, (TFRI); (13) *Chandata bella* (BUTLER, 1881) ♂, Russia, Far East (PGM); (14) *Chandata bella* (BUTLER, 1881) ♀, Russia, Far East (PGM).

Genitalia

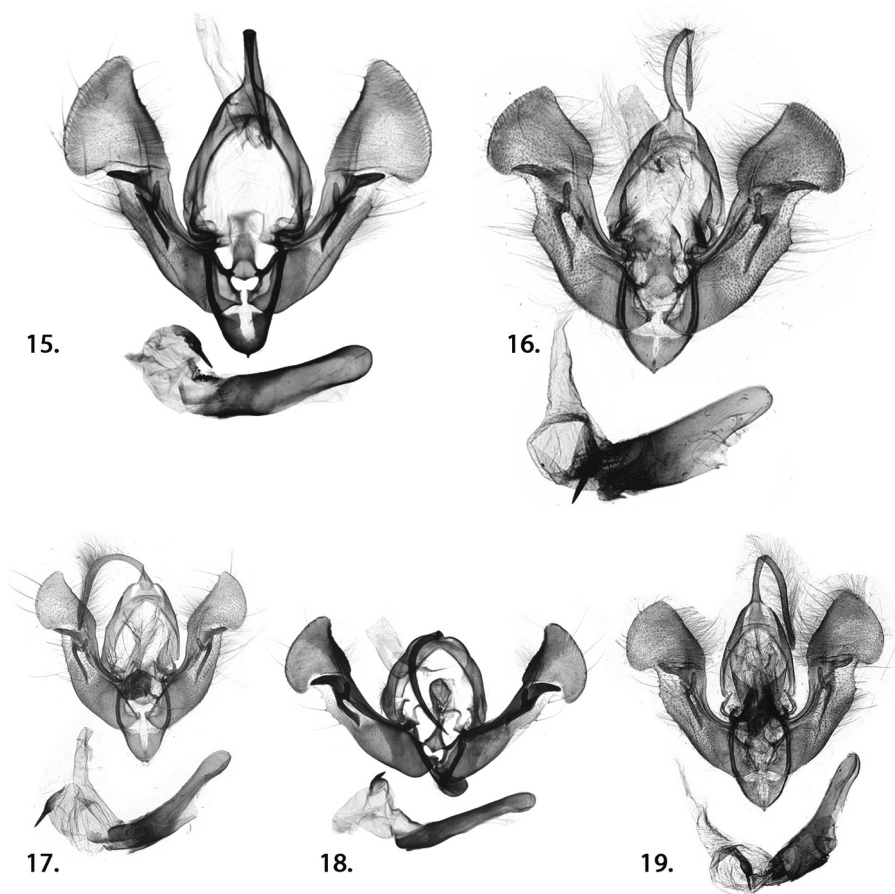


Fig. 15-19: Male genitalia: (15) *Chandata taiwana* YOSHIMOTO, 1982, Taiwan, ♂, TFR1155879 (TFRI); (16) *Chandata tridentata* YOSHIMOTO, 1982, Nepal, GYP 4909 (PGM); (17) *Chandata rothei* n.spec., Paratype, China, Sichuan, GYP 4891 (PGM); (18) *Chandata aglaja* (KISHIDA & YOSHIMOTO, 1978), Taiwan, TFR1149100 (TFRI); (19) *Chandata bella* (BUTLER, 1881) Russia, Sachalin GYP 4907 (PGM).

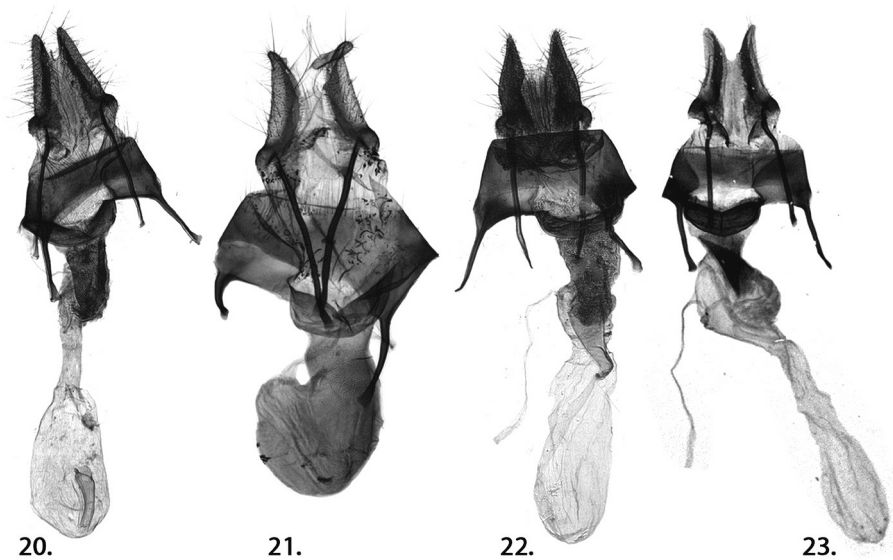


Fig. 20-23: Female genitalia: (20) *Chandata bidentata* n.spec., Holotype, ♀, China, Sichuan, GYP 4928 (PGM); (21) *Chandata taiwana* YOSHIMOTO, 1982, Taiwan, Guanwu, TFRI128526 (TFRI); (22) *Chandata tridentata* YOSHIMOTO, 1982, Nepal, GYP 4914 (PGM); (23) *Chandata rothei* n.spec., Holotype, China, Sichuan, GYP 4968 (PGM).

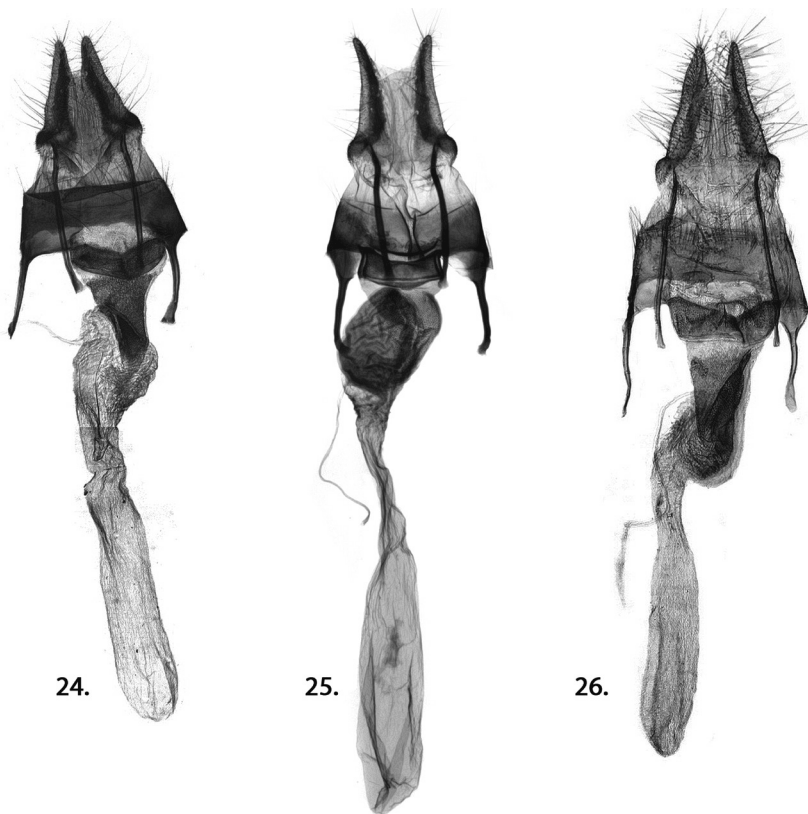


Fig. 24-26: (24) *Chandata rothei* n.spec., Paratype, China, Sichuan, GYP 4912 (PGM); (25) *Chandata aglaja* (KISHIDA & YOSHIMOTO, 1978), Taiwan, TFR1155939 (TFRI); (26) *Chandata bella* (BUTLER, 1881) Russia, Far East GYP 4916 (PGM).

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