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## A New Hadenine Moth of the Genus *Pseudopanolis* (Lepidoptera, Noctuidae) from Taiwan<sup>1)</sup>

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**Abstract** A new noctuid moth, *Pseudopanolis lala*, is described from Taiwan. It is very similar in wing maculation to *P. flavimacula* (WILEMAN) from Taiwan, but is easily distinguished from the latter by the shape of the male antennae. It is considered more closely related to *P. heterogyna* (BANG-HAAS) from Primorye of the Russian Far East.

Key words: Lepidoptera, Noctuidae, Hadeninae, *Pseudopanolis*, Taiwan.

The hadenine genus *Pseudopanolis* was erected by INABA (1927) for *P. takao* INABA, 1927, on the basis of specimens collected on Mt. Takaosan, Tokyo, and at Nikkô, Central Japan, and was considered to be related to *Panolis* HÜBNER, [1821], the larvae of which were well known conifer-feeders. On the other hand, BANG-HAAS (1927) described a similar moth from "Ussuri", Russian Far East, under the name of *Aplecta* (*Mamestra*) *heterogyna*. KAWADA (1950) illustrated a Japanese moth by the name *Aplecta heterogyna*, though he did not expressly synonymize *P. takao*. SUGI (1958) validated the specific status of *Pseudopanolis takao* and stated as follows: "A quite isolated genus, with type *takao* INABA. Its actual affinity to *Panolis* is doubtful. The genus is at present monotypic, but perhaps includes *heterogyna* O. BANG-HAAS from Ussuri, which appears very similar in pattern of wing. Mr. FLETCHER [BMNH] noticed me of that *Phalera flavimacula* WILEMAN, 1912, described from Mt. Arizan of Formosa as a notodontid may be a senior subspecies to *takao*, then that name takes precedence." INOUE and SUGI (1958) retained the specific status of *P. takao*, and SUGI (1959) suggested the possibility that the three taxa *heterogyna*, *takao* and *flavimacula* are conspecific. In the study on the noctuine moths of China in the HÖNE collection, BOURSIN (1963) pointed out that *Taeniocampa puengeleri* STANDFUSS, 1912, from Algeria and Morocco, was a genuine member of *Pseudopanolis*, synonymized *takao* with *flavimacula*, and regarded *heterogyna* as a different species.

In the early spring of 1968, I had an opportunity to collect a long series of moths of *Pseudopanolis* at the Shimashimadani Valley (900 m in altitude), a tributary of the Azusagawa River, Nagano Prefecture, Central Japan. In this collection, I found a strange male with bipectinate antennae, which are clearly different from

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those of *takao* whose male antennae are slightly dentate. SUGI (1970) described it as a new species, *Pseudopanolis azusa*, and changed the status of *takao* to a subspecies of *flavimacula*. Subsequently, we were able to examine specimens of *flavimacula* collected by Mr. T. TANABE at Tayuling (2,570 m), central Taiwan, in early March, and found that *flavimacula* was definitely different from *takao* and closely related to *azusa*. Based upon this observation, SUGI (1982) raised the status of *takao* to the specific rank.

Pursuing the study of winter moths in Taiwan, I made a short collecting trip to Mt. Anmashan, about 2,300 m in altitude, central Taiwan, in the middle of January, and unexpectedly secured a *Pseudopanolis*-species which was also collected in a natural forest of Mt. Lalashan, about 1,500 m in altitude, northern Taiwan. East Asian species of *Pseudopanolis* are so similar to one another, that it is rather difficult to classify them by the wing maculation. The moths (males) in question have the same wing maculation as in the others, but the antennae are dentate instead of the long bipectinate ones in *flavimacula*. Through the courtesy of Dr. KONONENKO and Mr. HONEY, I was able to examine specimens of *P. heterogyna* and photographs of the holotype of *P. flavimacula*, and have concluded that the Taiwanese moth flying in the depth of winter is an undescribed species beyond all reasonable doubt.

*Pseudopanolis lala* sp. nov.

(Fig. 2)

*Male*. Length of forewing: 19–21 mm. Antenna (Fig. 7) dentate, densely ciliate. Labial palpi short, reddish brown. Frons, vertex and frontal surface of patagia reddish cream yellow, dorsal edges of patagia reddish brown. Thorax grey, hairy. Abdomen darker than thorax, anal portion cream yellow. On the upper-

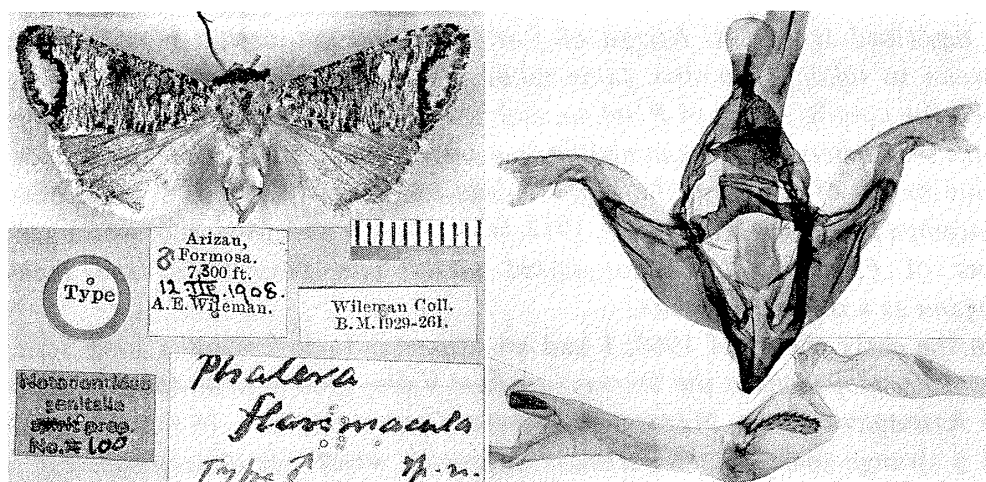
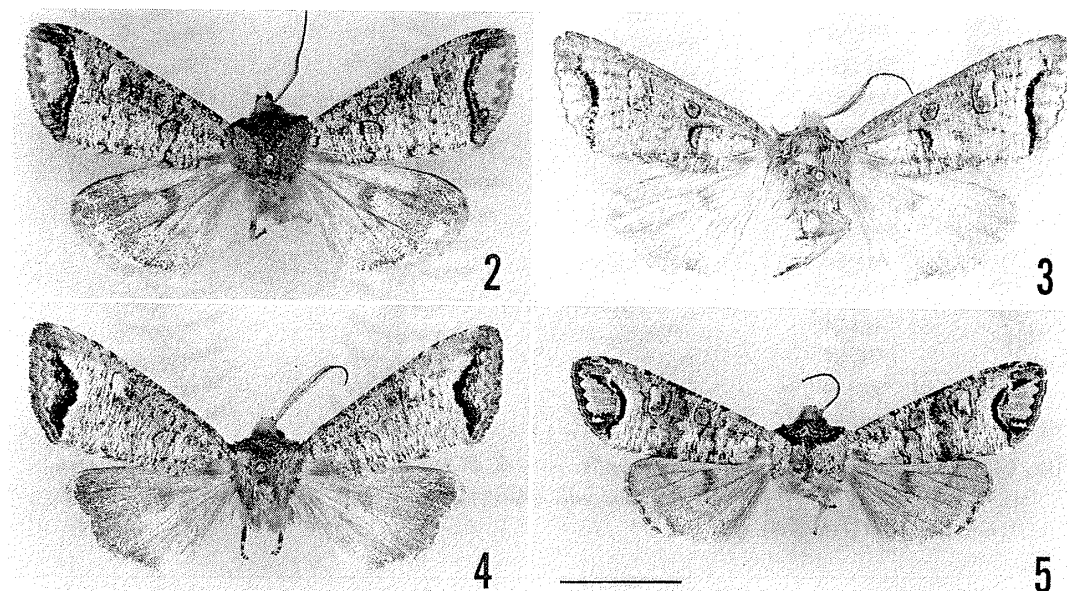


Fig. 1. Holotype, male, of *Pseudopanolis flavimacula* (WILEMAN), labels and genitalia, in Natural History Museum, London.

side of forewing, ground colour grey, tinged slightly with pale green, sprinkled with blackish scales, somewhat lichenous; antemedial line black, slender, dentate; claviform stigma of a black ring; orbicular stigma round, smaller than claviform stigma; median line greyish brown, rather broad and dim, slightly waved; reniform stigma represented by a ring of slender black line, large; postmedial line indistinct, traceable from reniform stigma to dorsum; subterminal line black, arcuate, edged externally with broad reddish brown shade; terminal reddish cream yellow mark very large, broad; cilia pale reddish yellow. Upperside of hindwing dark grey, inner costal and terminal margin whitish; discocellular mark of underside slightly traceable. Underside of forewing dark grey, costa creamy white, dusted with black scales, with a black dot of postmedial line; dorsal area widely cream white; terminal creamy yellow mark corresponding to that on the upperside; hindwing creamy white, with a large black discocellular dot and a black postmedial line, cilia pale reddish brown.

*Male genitalia* (Fig. 11). Uncus rather broad in basal portion, slightly broadened towards rounded apex. Tegumen and vinculum moderate. Valva curved, constricted in basal 2/3, bluntly bifurcate at apex; harpe slender, curved; ampulla broad, rounded. Aedeagus straight, everted vesica angulate at middle, in the basal part with two sclerotized cornuti, viz. a long plate clothed with many short spines and a short robust spine with broad basal portion.

*Type series.* Holotype ♂, Taiwan, Taoyuan, Fuhsing, Mt. Lalashan 1,500 m, 20–22. I. 1992, M. OWADA leg., genit. slide no. NSMT 2199 ♂, preserved in National

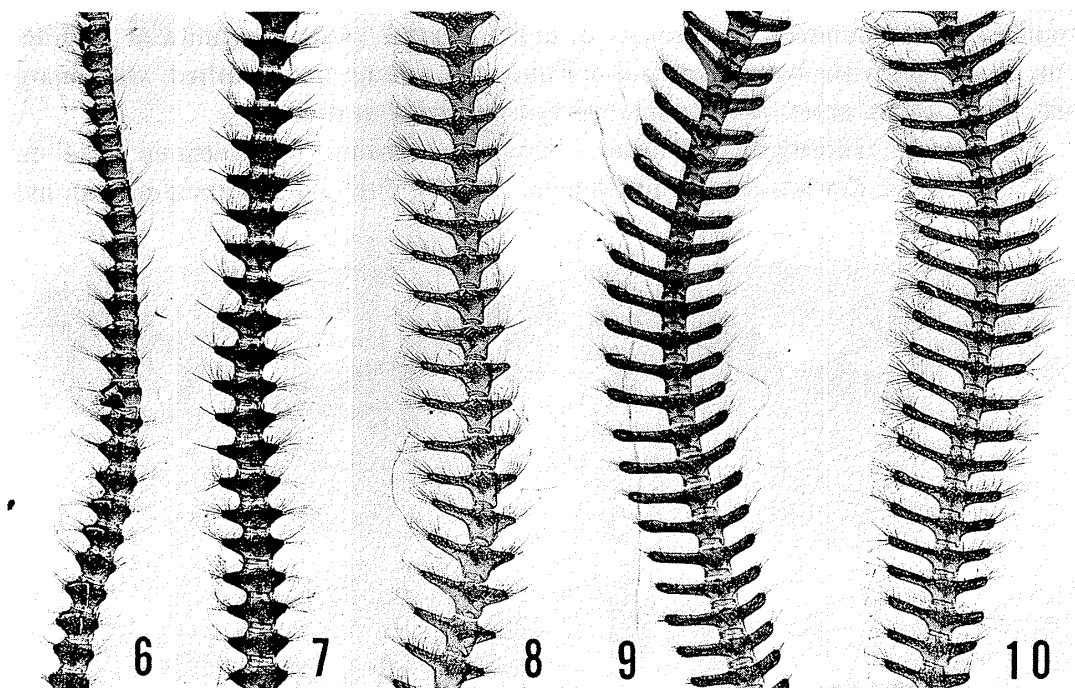


Figs. 2–5. *Pseudopanolis* species, male. — 2. *P. lala* OWADA, sp. nov., holotype. — 3. *P. heterogyna* (BANG-HAAS), Primorye, Russian Far East, in Institute of Biology and Pedology, Vladivostok. — 4. *P. azusa* SUGI, Mt. Ontake, Japan. — 5. *P. takao* INABA, Shimashimadani Valley, Japan. Scale, ca. 10 mm.

Science Museum, Tokyo. Paratypes: Same data as holotype, 13 ♂; Taichung, Hoping, Mt. Anmashan 2,000–2,300 m, 3 ♂, 12–14. I. 1992, K. HORIE, Y. KOBAYASHI & M. OWADA leg.

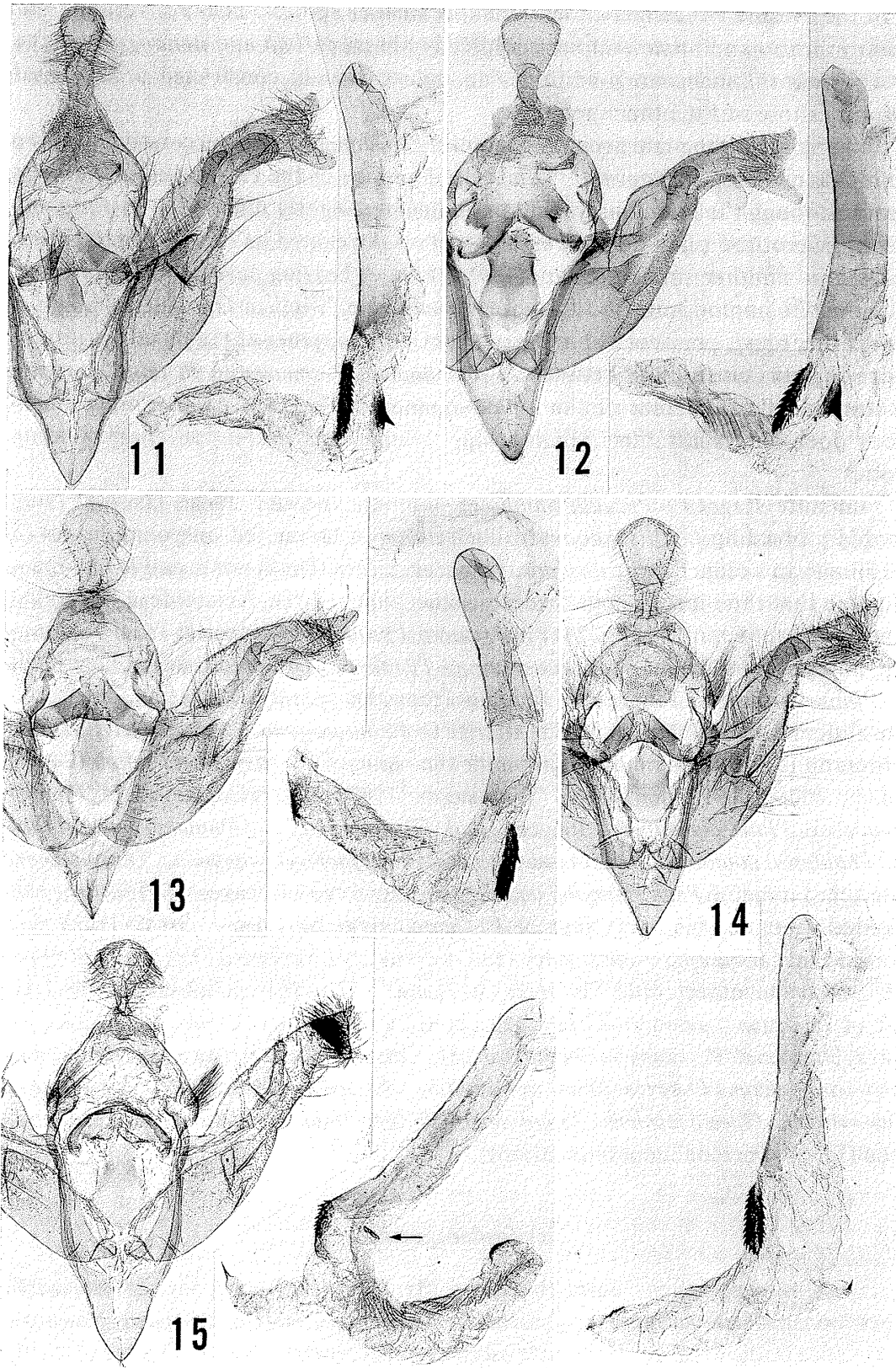
*Remarks.* This species is easily distinguished from *P. flavimacula* from Taiwan by the dentate male antenna (Fig. 7), which is bipectinate in the latter (Fig. 8). In the male antennae of the other species, it is slightly dentate in *takao* (Fig. 6) and long bipectinate in *azusa* (Fig. 9) and *heterogyna* (Fig. 10). In the forewing maculation, *lala* (Fig. 2) is very similar to *takao* (Fig. 5), i.e. the terminal cream yellow mark is broad and extends to the apex, while it is narrow or vestigial and does not extend to the apex in *azusa* (Fig. 4), *flavimacula* (Fig. 1) and *heterogyna* (Fig. 3).

The male genitalia of *lala* (Fig. 11) are very similar to those of *heterogyna* (Fig. 12). The everted vesica has two large cornuti, that is, a long sclerotized plate with many minute spines and a short robust spine which is absent in *flavimacula* (Fig. 13), *azusa* (Fig. 14) and *takao* (Fig. 15). In the latter two species, the vesica has a long membranous projection terminating in a small spine. In *flavimacula*, the distal



Figs. 6–10. Male antennae of *Pseudopanolis*. — 6. *P. takao* INABA. — 7. *P. lala* OWADA, sp. nov., holotype. — 8. *P. flavimacula* (WILEMAN). — 9. *P. azusa* SUGI. — 10. *P. heterogyna* (BANG-HAAS).

Figs. 11–15. Male genitalia of *Pseudopanolis*. — 11. *P. lala* OWADA, sp. nov., holotype. — 12. *P. heterogyna* (BANG-HAAS), Primorye, Russian Far East. — 13. *P. flavimacula* (WILEMAN), Tayuling, Taiwan, genit. slide no. NSMT 2200 ♂. — 14. *P. azusa* SUGI, Mt. Ontake, Gifu, Japan, genit. slide no. NSMT 2198 ♂. — 15. *P. takao* INABA, Shimashimadani Valley, Nagano, Japan, genit. slide no. NSMT 2197 ♂.



end of the everted vesica has a mass of short slender spines which are vestigial but present in *azusa* and *takao* and are completely absent in *lala* and *heterogyna*. The uncus of *lala* is much narrower than and not so heavily constricted in the basal portion as those of the other species.

Judging from the male genitalic features, *Pseudopanolis lala* is considered to be closely related to *P. heterogyna*. The everted vesicae of the two species are almost identical, though the unci, harpes and ampullae are slightly different. In *P. takao*, the long sclerotized plate on the vesica is not so developed as in the other species, and there is another small sclerite (Fig. 15, arrow) bearing several minute spines, which may be homogenous to the short robust spine found in *lala* and *heterogyna*. On the other hand, presence of a mass of short slender spines at the distal portion of vesica suggests close affinity between *P. flavimacula*, *P. azusa* and *P. takao*. It can be surmised that difference of the male antennae in the East Asian *Pseudopanolis*-species does not reflect their relationship, though it is useful for discriminating species.

Immature stages of *Pseudopanolis* are not well known. JIMBO [JINBO] (1962) recorded a breeding of *P. takao* with illustrations of larvae fed on young leaves of the Himalayan cedar, *Cedrus deodara*, Pinaceae, a tree that is not a native to Japan, and noted that the larvae might feed on some pines of the Abietoideae naturally. CHEN (1973, p. 69, pl. 16, fig. 254) illustrated a *Pseudopanolis*-species from Heilongjiang, northeastern China, under the name of *P. takao*, and noted that the host plant was *Pinus koraiensis*, Pinaceae. Judging from the colour illustration, the moth seems different from *P. takao*, and is similar to *P. heterogyna*. He showed a colour photograph of the same moth again under the name of *P. flavimacula takao* (CHEN, 1982, p. 306, pl. 91, fig. 2184). YAMAMOTO (1987) illustrated larvae of *Panolis japonica* on *Pinus densiflora*, Pinaceae, and *Egira saxea* on *Chamaecyparis obtusa* and *Thujopsis dolabrata*, Cupressaceae, and *Cryptomeria japonica*, Taxodiaceae, noted that larvae of *Pseudopanolis azusa* were kept bred on leaves of Pinaceae, and suggested that the true host plant of *P. takao* might be *Tsuga*. SUGI (1987) also reported that larvae of *P. azusa* were fed on pines, and surmised that the host plant of *P. takao* in nature could be *Abies* or *Tsuga*. The information about the host plant of *P. azusa* was derived from the breeding data by H. ENDO, who took ova from a female of *P. azusa* collected on Mt. Ontake in early May, 1982, and fed fresh young leaves of several kinds of conifers. As the result, a few larvae grew on *Abies veitchii*, *Picea jezoensis*, *Tsuga seiboldii* and *Pinus koraiensis*, Pinaceae, into pupae (ENDO, personal communication).

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