



## ***Theorica valuliae* Pinkaew, new species (Lepidoptera: Tortricidae: Olethreutinae), the first record of the genus in Thailand**

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### **Abstract**

The genus *Theorica* Diakonoff, 1966 includes two previously described species that occur in Vietnam (i.e., *T. secunda* Kuznetsov, 1997) and New Guinea (i.e., *T. lamyra* (Meyrick, 1911)). We report the first occurrence of this genus in Thailand, represented by a new species: *Theorica valuliae* Pinkaew, n. sp. In addition to illustrations of the adult and genitalia, we also present photographs of living specimens in their natural resting posture.

**Key words:** new species, taxonomy, Olethreutini, Thailand

### **Introduction**

The genus *Theorica* was proposed by Diakonoff (1966) to include a single species, *Argyroproce lamyra* Meyrick, 1911 from New Guinea. Kuznetsov (1997) subsequently described *T. secunda* from Vietnam, the holotype of which was figured by Nedoshivina (2010: fig. 55). The genus is distinguished by pronounced sexual dimorphism in the hindwing (Diakonoff 1973). Males of *Theorica* are characterized by a forewing that is narrow at the base and strongly broadened apically, and a hindwing that is very narrow, with the anal margin forming a roll separated from the remainder of the anal area, the latter forming a protruding lobe basal to the cubital area. In the male genitalia the phallus is long and narrow. Field work in Thailand has revealed the presence of a third species that is described herein.

### **Materials and methods**

Specimens of the new species were collected in natural forests of Khao Yai National Park, Pang Sida National Park, Khao Khitchakut National Park, and Hala-Bala Wildlife Sanctuary, and a reforested area of the Ang-Et Community forest, all in Thailand.

Methods of genitalia preparation were adapted from Common (1990). An Olympus SZ51 stereomicroscope was used for examinations and measurements of specimens. An Olympus CH2 compound microscope was used to examine selected structures of the genitalia. Forewing length was measured from the outer edge of the tegula at the wing base to the outermost edge of the fringe scales at the apex. Adults were photographed with a Canon DSLR 5D Mark II camera and a 100-mm macro lens. Labial palpi were photographed with a Leica S8 APO stereomicroscope equipped with a Leica MC170 HD camera module. Genitalia were photographed with a Leica DM750 connected with an ICC50 HD camera module. Terminology for forewing pattern and genitalic structures follow Horak (2006). Specimens are deposited in the Kasetsart Kamphaengsaen Insect Collection (KKIC), Nakhon Pathom, Thailand.

***Theorica valuliae* Pinkaew, n. sp.**

(Figs. 1–13)

**Diagnosis.** The male of this species is most similar to that of *Theorica secunda* Kuznetsov in having a modified hindwing with a tube-like anal lobe separated from the anal margin at the base of the wing. The two species differ in the ground color of the forewing: grayish brown in *T. secunda* and pinkish red in *T. valuliae*. The male genitalia of *T. valuliae* are most similar to those of *T. lamyra* (Meyrick, 1911), but the socii are covered with twisted setae in *T. valuliae* and straight setae in *T. lamyra*. The female genitalia of the new species is distinct from other species by having a very short ductus bursae with the corpus bursae reaching only slightly beyond the anterior margin of sternum VII. Moreover, the moth in resting posture has a distinct heart-shape and a dark brown V-shaped mark crossing both wings (Fig. 2).



**FIGURES 1–2.** Living specimens of *Theorica valuliae*, adult on substrate. 1. Lateral view 2. Dorsal view.



**FIGURES 3–4.** *Theorica valuliae*, adult (scale bars = 2 mm). 3. Male (Holotype) 4. Female (Paratype).

**Description. Head** (Fig. 5): Lower frons white to yellowish white; upper frons light brown mixed with brown; vertex brown; labial palpus sinuate and porrect, with short basal segment, white mixed with yellowish white, second segment narrow at base and widened apically, light brown with dark brown spot basally, transverse brown stripe medially extending from dorsal margin to ventroapical brown patch, with grayish brown patch dorsoapically, third segment short, light brown. Antenna brown.

**Thorax:** Smooth scaled, brown mixed with dark brown, with blackish raised scale tufts posteriorly; hind tibia in male with hair pencil originating from base, yellowish brown. Forewing broadly triangular, length 6.0–6.1 mm in male ( $n = 6$ ) (Fig. 3), 5.2–5.3 mm in female ( $n = 3$ ) (Fig. 4); costa slightly sinuate, with strong curve before apex; strigulae well developed, pinkish red broken by blackish spots; termen round with brown, mixed with dark brown fringe scales; ground color pinkish red, brighter in female, basal patch large, gray, with large subtriangular, blackish patch, extending from dorsum to discal cell, with blackish longitudinal stripe below and parallel to costa; median fascia broken into blackish, irregular stripes and spots separated by gray scales, extending from costa to tornus; apically with narrow, irregular line extending obliquely from costa to  $R_4$  then divided, one branch extending obliquely to termen between  $M_1$  and  $M_2$ , the other extending downward to tornus; underside light gray with yellowish white marks along costa and termen, with light brown fringe scales. Hindwing in male rather small compared with forewing, subtriangular, brown, slightly paler basally, fringe scales grayish white with brown color at base, slightly paler from apex to rounded lobe in anal area, anal lobe separated from tube-like roll of anal margin by deep excavation (Figs. 7–8); underside light gray with white fringe scales; female hindwing broader than male, termen strongly sinuate, without anal lobe and tube-like roll at base.





**FIGURE 5.** *Theorica valuliae*, head (male holotype).

**Abdomen:** Male genitalia (Fig. 9) with tegumen moderately sclerotized, dorsal one-third slightly narrowed, shoulders rounded, with moderately dense scale sockets laterally, apodeme of muscle m4 forming moderately wide lobe; uncus subtriangular, membranous, apical one-third constricted laterally, rounded apically, with moderately dense scale sockets; socius large, membranous, fused to tegumen, with patch of dense twisted setae (Fig. 10); gnathos a wide transverse band arising from mid-length of tegumen, weakly sclerotized basally, moderately sclerotized medially, dorsomedially with sclerotized process projecting upward; vinculum moderately sclerotized; juxta subtriangular, caulis rather short, anellus wide, cup-shaped at base of phallus; valva long and sinuate; sacculus with group of setal sockets basally, beyond basal opening with large, reticulated oval patch, with a dense setal cluster forming thorn-like projection from setose area on ventral margin adjacent to excavation of sacculus (Fig. 11), ventral margin with long, narrow spiniform setae truncate apically; cucullus club-shaped, rounded apically, densely setose, with dense spines basoventrally; phallus long, narrow, parallel-sided, apical one-half slightly curved, apex strongly curved, without cornuti.

Female genitalia (Figs. 12) with papillae anales densely setose; tergum VIII forming a narrow, sclerotized band; sternum VII weakly sclerotized, posterior margin deeply concave, with dense scale sockets along posterior margin; ostium distant from hind margin of sternum VII and close to lateral extensions of tergum VIII; sterigma weakly sclerotized medially, moderately sclerotized laterally, forming medial lobes with dense scale sockets, separated from rugose, lateral lobes by narrow, deep excavation (Fig. 13); ductus bursae as long as corpus bursae; colliculum with two lateral sclerites; origin of ductus seminalis indistinct; corpus bursae weakly sclerotized, without signum.

**Holotype.** ♂, Thailand, Sa Kaeo Province, Pang Sida N. P. (Pangsida Waterfall), 13°05'36"N 102°12'21"E, ca. 165 m, 27 Apr 2017, N. Pinkaew, np10072 (genitalia slide NP3311). Deposited in KKIC.

**Paratypes.** Thailand: Prachinburi Province, Khao Yai N. P., 14°11'02"N 101°36'19"E, ca. 94 m, 15 Feb 2010, N. Pinkaew, np3437 (♂, genitalia slide NP1377). Nakhon Nayok Province, Khao Yai N. P., 14°23'56"N 101°22'16"E, ca. 780 m, 9–12 Sep 2010, N. Pinkaew, np6747 (♀, genitalia slide NP3702). Chanthaburi Province, Ang-et Com. For., 12°36'04"N 102°19'50"E, ca. 33 m, 22–23 Dec 2011, N. Pinkaew, np8737 (♂), np8738 (♂). Khao Khitchakut N. P., 12°51'04"N 102°12'10"E, ca. 98 m, 9–10 Apr 2013, N. Pinkaew, np5786 (♀, genitalia slide NP1958). Trat Province, Trat Agroforestry Res. St., 12°23'43"N 102°40'32"E, ca. 30 m, 17–18 Feb 2012, N. Pinkaew, np5235 (♂). Sa Kaeo Province, Pang Sida N. P., 14°07'37"N 102°15'30"E, ca. 610 m, 20 Jun 2017, N. Pinkaew, np10431 (♀, genitalia slide NP3312, lost bursa). Narathiwat Province, Hala-Bala W.S., 05°47'49"N

101°50'03"E, ca. 60 m, 23–29 Jan 2012, N. Pinkaew, np6621 (♂, genitalia slide NP2869). All specimens deposited in KKIC.



**FIGURE 6.** *Theorica valuliae*, hind tibia pencil (arrow) (male paratype).



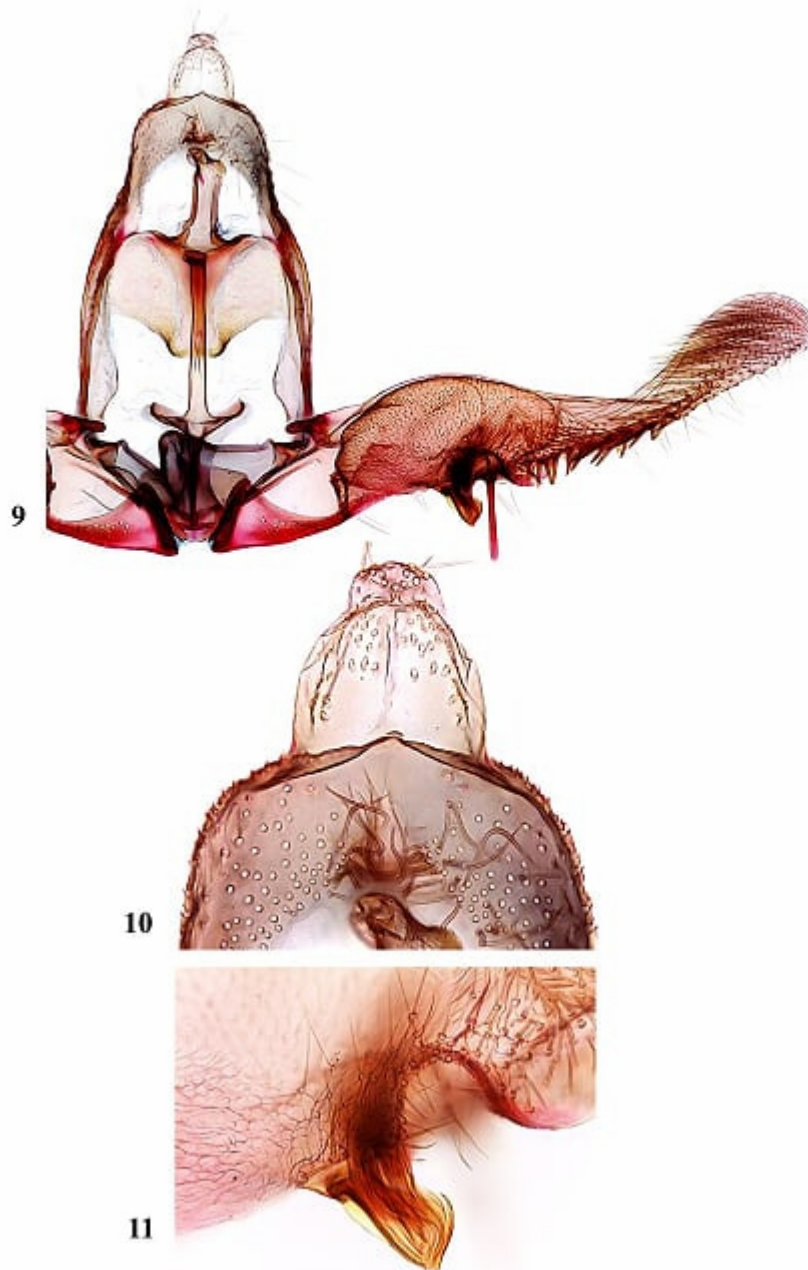
**FIGURES 7–8.** *Theorica valuliae*, male hind wing. 7. Hind wing with scales (male holotype) 8. Hind wing without scales (paratype).

**Etymology.** The specific epithet is a patronym dedicated to the late Associate Professor Valuli Rojanavongse, who served as the Master's degree advisor for the first author.

**Distribution.** Thailand. Specimens were collected in both natural forest (evergreen and dry evergreen forest) and reforest areas.

**Remarks.** Diakonoff (1966, 1973) included *Theorica* in his subtribe Lobesiae and mentioned that it was closely related to *Podognatha* Diakonoff, 1966 on the basis of the shape of the valva and the spines on the ventral margin of the valva in the male genitalia, both of which are somewhat similar to those of *Lobesia* Guenée, 1845. Horak (2006) also mentioned that *Theorica* is related to *Podognatha* based on the shared peculiar modification of the male hindwing with a lobe between CuP and 1A+2A and the deep excavation and complex narrow anal lobe beyond 3A. However, Horak (2006) included *Podognatha* in the *Zomaria*-group because several derived characters of *Theorica* and *Podognatha* are shared with members of that group. Hence, the position of *Theorica* within Olethreutini is not entirely resolved.

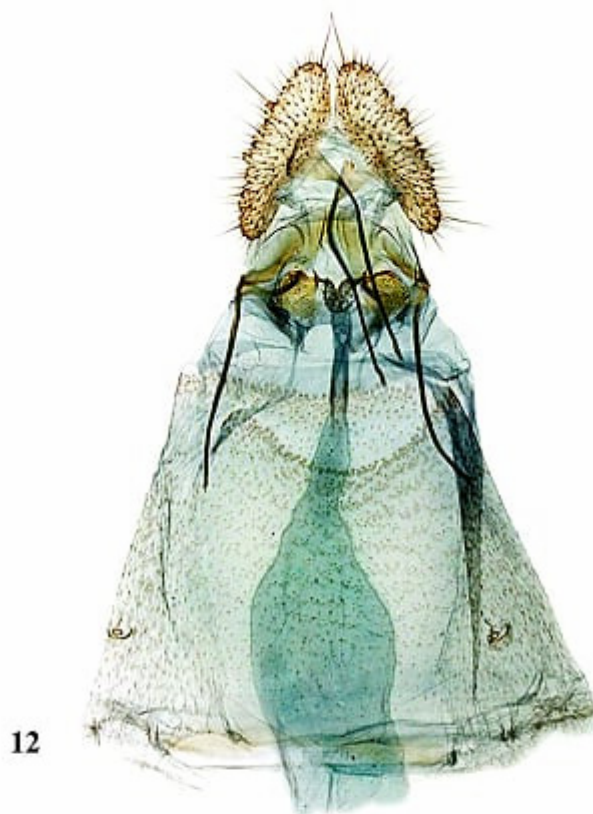




**FIGURES 9–11.** Morphological features of male genitalia of *Theorica valuliae* (holotype). 9. Genital capsule 10. Uncus and socii 11. Ventral process on ventral margin of valva.

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**FIGURES 12–13.** Morphological features of female genitalia of *Theorica valuliae* (NP3702). 12. Genital capsule. 13. Sterigma and ostium bursae.

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