A new species of *Etainia* Beirne (Lepidoptera, Nepticulidae) from Japan

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**Abstract** A new species of the genus *Etainia* Beirne, 1945 of the family Nepticulidae is described from Japan. This species, *Etainia parva* sp. nov., is closely related to *E. peterseni* Puplesis in having yellow forewings with a dark fuscous fascia: however it can be distinguished from the latter by the smaller body size, broader forewing fascia, different shapes of the male valvae and female signa in the genitalia. Morphological characters of *E. peterseni* are redescribed and illustrated.

**Key words** *Acer, Etainia parva* sp. nov., *Etainia peterseni*, genitalia, Hikosan, taxonomy.

**Introduction**

The Nepticulidae are the smallest moths on the planet, phylogenetically representing very primitive heteroneurans (Stonis and Rociené, 2013). Most of the larvae mine leaves, while some species mine the bark, petiole, or buds and fruits of plants. *Etainia* had been treated as a subgenus of *Ectoedemia* (Johansson et al., 1990; Nieukerken and Laštůvka, 2002), though some researchers regarded *Etainia* as a separate genus (Puplesis, 1994; Puplesis and Diškus, 1996) because of the presence in the vinculum of a U-shaped invagination posteriorly, an H-shaped sclerotization in the vesica, and a group of spines in the ductus bursae (Puplesis and Diškus, 1996). Recently, on the basis of molecular phylogeny, *Etainia* has been placed as a distinct genus (Nieukerken et al., 2016). Up to date, three species; *Etainia peterseni* (Puplesis, 1985), *E. capesella* (Puplesis, 1985), and *E. trifasciata* (Matsumura, 1931) have been recorded in Japan (Hirano, 2013, Nieukerken et al., 2016), all belonging to the *E. sericopeza* species-group. The *Etainia sericopeza* species-group comprises 12 species with a well-developed transtilla bar and one large basal apodeme on the valva (Puplesis and Diškus, 1996). Most *Etainia* species are believed to feed on *Acer* spp. (Aceraceae), but one species is known to feed on *Arctostaphylos* (Ericaceae) (Puplesis and Diškus, 1996; Nieukerken and Laštůvka, 2002; Rociené and Stonis, 2013).

*Etainia peterseni*, which is one of the biggest Nepticulidae in Japan, was described on the basis of specimens collected in the Russian Far East, in Primorskiy Kray (Puplesis and Ivinskis, 1985; Puplesis and Diškus, 2003). In 2001, this species was recorded in Japan for the first time (Iwate Pref., 2001), and thereafter there are some additional records (Oku, 2003; Hirano, 2009, 2013). According to Puplesis and Ivinskis (1985), larvae of this species seem to feed on the winged seeds of *Acer* sp. (likely on *Acer pictum* Thunb. subsp. mono (Maxim.)), though its detailed biology is poorly known. In July 2015, the first author (Yagi) collected some individuals of a nepticulid moth which at a glance resembles *E. peterseni* in Hikosan (Mt. Hiko), Fukuoka Prefecture, Japan. However, they looked a little smaller in size and the black fascia of the forewing seemed to be broader than in *E. peterseni*. As a result of examination, we found that these specimens have several morphological differences, especially in the male and female genitalia, and concluded that it represents a new species. Here we describe it with additional material and compare it in detail with *E. peterseni*.

**Materials and methods**

Specimens of the new species and *E. peterseni*, which we collected in Kyushu, Japan, were investigated. Specimens deposited in the collections of Kyushu University, Osaka Prefecture University and the personal collections of Mr. Hirano, Mr. Kogi, and Mr. Mano were also examined. For preparation of the genitalia, the abdomen was boiled in 10% aqueous KOH to macerate and stained with Chlorazol Black E.

**Abbreviations:** ELKU—Entomological Laboratory, Faculty of Agriculture, Kyushu University.

OPU—Entomological laboratory of Osaka Prefecture University.

**Taxonomy**

*Etainia peterseni* (Puplesis, 1985) (Figs 1 AB, 2 AB, 3 A-D, 5A-C, 6A)

[Japanese name: Kiiro-mogurichibiga]


**Diagnosis**

This species is relatively large among the Nepticulidae and the cream yellow forewing has a dark fuscous postmedial fascia. It is easily recognized by the characteristic shapes of the genitalia, especially the subapical process of the valva (Fig. 5B). In the female genitalia, the signa is small, and not elongate (Fig. 6A).

Male (Figs 1A, 2A, 3A-D). Wingspan: 6.9-8.9 mm; forewing length: 3.1-4.1 mm; body length: approximately 2.5 mm; flagellum with 60-67 segments. Head (Fig. 3A): palpi cream. Frontal tuft yellowish orange. Collar yellow; scape cream; pedicel and flagellum tan tinged with gray. Thorax: cream. Tegula cream yellow with dark brown scales; with a cream yellow tuft on underside. Forewing: cream yellow, sometimes tinged with yellowish orange, with a dark fuscous postmedial fascia, apically with dark fuscous scales, base of costal margin with dark fuscous scales. Outer margin of cilia yellowish cream, posterior margin grayish brown. Forewing underside (Fig. 2A) dark brown to dark tan, with yellowish brown glossy androconial scales in basal area (Fig. 3B). Hindwing: grayish brown; basally with big grayish brown scales tinged with yellowish brown (Fig. 3C).

Cilia grayish brown. A pair of frenula dark orange. Costal bristles yellowish brown. Legs: dorsally grayish brown, ventrally dark yellowish brown. Abdomen: grayish brown with a pair of anal tufts (Fig. 3D).

Male genitalia (Fig. 5A-C). Capsule length ca. 570 μm, width ca. 390 μm; phallus length ca. 460 μm. Pseuduncus large. Gnathos with a very large central plate and short (2/5 length of valva) and slender posterior process. Valva basally smooth, subapically with a pointed process, basal apodeme of valva long (Fig. 5B). Transtilla thick, sublateral processes as long as 1/2 of transverse bar. Lateral arm of vinculum with one pair of lobe-like ridges; ventral process of vinculum round. Phallus with a pair of lateral and one median carinae, sclerotization of median carina a little weak and lobe-like (Fig. 5C). Vesica with three long and large cornuti and one small cornutus. Cathrema well developed. A large sclerotization near the cathrema is M-shaped (posteriorly emarginate and anteriorly tridentate).

Female (Figs 1B, 2B). Wingspan: 7.3-8.8 mm, forewing length: 3.4-3.9 mm, body length: approximately 2.5 mm, flagellum with 49-59 segments. Almost entirely similar to male. Sex can be distinguished from the number of segments of the flagellum, the frenulum and the anal tufts (the latter absent in female).

Female genitalia (Fig. 6A). Anal papillae developed posteriorly. T8 projects posteriorly with two lateral lines of setae with ca. 15 setae on each side. Anterior apophyses as long as posterior.

![Fig. 1. Dorsal view of Etainia. A: E. peterseni, male. B: Ditto, female. C: E. parva sp. nov., male (holotype). D: Ditto, female (paratype). Scale bar: 5.0 mm.](image-url)
A new species of *Etainia* in Japan

**Material examined**


**Distribution**

JAPAN: Hokkaido, Honshu, Kyushu; RUSSIA: the Russian Far East.

**Biology**

Adults mainly fly from June to July in Japan. *Etainia peterseni* may have a more northern distribution in Japan than *E. parva* sp. nov., since this species was collected in cool-temperate region, such as Hokkaido and high altitude localities of central and western Japan.

**Remarks**

This species belongs to the *E. sericeopeza* species-group (Puplesis and Diškus, 1996) and is thought to feed on *Acer pictum* (Puplesis and Ivinskis, 1985). In Oshirakawa-Rindo, Nagano Pref., we found mines that seem to be caused by this genus on the winged seeds of *Acer crataegifolium* Siebold et Zucc. but the exact host plant should be confirmed by rearing.
**Etainia parva** Yagi & Hirowatari, sp. nov.

(Figs 1CD, 2CD, 3E-H, 4, 5D-F, 6B)

[Japanese name: Himekiiro-mogurichibiga]

**Diagnosis**

Closely related to *E. peterseni* (Puplesis) and difficult to distinguish from it by external characters. However, the wingspan is a little smaller and the fascia of the forewing tends to be broader. On the other hand, the genitalia are greatly different and it is easy to distinguish the new species from *E. peterseni* in the male by the wide triangular process on the inner margin of the valva (the latter is smooth in *E. peterseni*) and the lack of a subapical process (a pointed subapical process is present in *E. peterseni*) (Fig. 5E), and in the female by the bigger size of the signa and the angular vestibulum (Almost rounded in *E. peterseni*) (Fig. 6B). See Table 1 for morphological discrimination from *E. parva* sp. nov.

Male (Figs 1C, 2C, 3E-H). Wingspan: 5.8-7.8 mm; forewing length: 2.3-3.2 mm; body length: approximately 2.5 mm; flagellum with 57-62 segments. Head (Fig. 3E): palpi brownish cream to cream. Frontal tuft orange to yellowish orange. Collar yellow comprising piliform scales. Scape cream tinged with Thorax: cream yellow, sometimes tinged with orange. Tegula cream yellow with dark brown scales; with a grayish brown piliform tuft on underside. Forewing: cream yellow, sometimes tinged with orange, with a dark fuscous and thick postmedial fascia, apically with few scattered dark fuscous scales, base of costal margin with dark fuscous scales. Outer margin of cilia yellowish cream, posterior margin grayish brown. Forewing underside (Fig. 2C) dark tan, apically dark brown, with dark yellowish brown glossy androconial scales in basal area (Fig. 3F). Hindwing: grayish brown, basally covered with big cream yellow scales (Fig. 3G). Cilia grayish brown. A pair of frenula.

**Fig. 4.** Male genitalia of *Etainia parva* sp. nov., ventral view (holotype). basal forewing. C, G: basal half of hindwing. D, H: terminal segments of abdomen with anal tuft.

dark brown to dark orange. Costal bristles yellowish brown. Legs: dorsally grayish brown, ventrally dark yellowish brown. Abdomen: grayish brown with a pair of anal tufts (Fig. 3H).

Male genitalia (Figs 4, 5 D-F). Capsule length 530-580 μm, width 370-410 μm; Phallus length ca. 450 μm. Pseuduncus small, a little smaller than in *E. peterseni*. Gnathos with a very large central plate and a long (3/5 length of valva) and slender posterior process. Valva basally with a thick and triangular inward process, basal apodeme of valva slightly longer than in *E. peterseni* (Fig. 5E). Transstilla thick, sublateral processes as long as 1/2 of transverse bar. Lateral arm of vinculum with one pair of lobe-like ridges; ventral process of vinculum round. Phallus with a pair of lateral and one median carinae, sclerotization of median carina a little weak and lobe-like (Fig. 5F). Vesica with very large elliptical and reticulate signa ca. 450-490 μm, ca. 1.8 times as long as wide, larger than in *E. peterseni*. Vesicle of ductus spermathecae slightly larger than in *E. peterseni*.

Female genitalia (Fig. 6B). Anal papillae developed sublaterally. T8 projects posteriorly with two lateral lines of setae and ca. 12 setae on each side. Anterior apophyses as long as posterior apophyses. Posterior apophyses thicker than in *E. peterseni*. Vestibulum with paired sclerotized lobes, more angular than in *E. peterseni*; ductus bursae with a group of spines. Corpus bursae with very large elliptical and reticulate signa ca. 450-490 μm, ca. 1.8 times as long as wide, larger than in *E. peterseni*. Vesicle of ductus spermathecae slightly larger than in *E. peterseni*.

**Material examined**

A new species of *Etainia* in Japan

**Distribution**

JAPAN: Honshu, Kyushu.

**Etymology**

The species name “parva” is derived from Latin *parvus* (small) in reference to the smaller body size of this species in relation to *E. peterseni*.

**Biology**

Adults mainly fly from July to August.

**Remarks**

This species also belongs to the *E. sericopeza* species-group. As mentioned above, the host plant of the genus *Etainia* in Japan has been unknown. In Hikosan, Fukuoka Pref., adults were collected near a painted maple *Acer pictum* by light trap (Fig. 7). According to Puplesis and Ivinskis, 1985, *E. peterseni* is assumed to feed on this tree and either one of these two species may utilize this maple. However, *Acer rufinerve* Siebold et Zucc. and *Acer palmatum* Thunb. are also found near this place and the correct host plant should be confirmed by further investigation and rearing.

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**Fig. 6.** Female genitalia of *Etainia* spp., ventral view. A: *E. peterseni*. B: *E. parva* sp. nov. (paratype). Scale bars: 250 μm.


[Kyushu] 2♂ 3♀, Same data as holotype (ELKU); 1♂, Same locality, 5. viii. 1958, H. Kuroko leg. (OPU); 2♂ 1♀, Same locality, 1. vii. 2016, S. Yagi leg. (ELKU).

**Fig. 7.** Habitat (type locality) of *Etainia parva* sp. nov. near Hikosan Biological Laboratory of Kyushu University.
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References


摘 要
日本産 Ettainia 属の 1 新種（鱗翅目，モダリチビダ科）（屋宜 憲央・広渡俊哉）

本州および九州で，キイロモダリチビダ Ettainia peterseni（Puplesis, 1985）に似た 1 新種を発見したので，記載するとともに，キイロモダリチビダの再記載を行った。

Ettainia peterseni (Puplesis, 1985) キイロモダリチビダ

開張 6.9-8.9 mm．頭毛は濃黄～橙色．前翅は黄色みがかかったクリーム色で，前翅中央の横条と基部前線は暗褐色．後翅は灰褐色．♂交尾器のバルバは先端近くの腹面側に細長い突起をもつ．ゲナトスの中央突起は短い．ファルスにはカトレマ付近に M 字型の硬化部をもつ．♂交尾器の T8 後方は尖る．ベステブルムは大きく丸く，シグナは小さい．分布：日本（北海道，本州，九州）；沿海州。

Ettainia parva Yagi & HIrowatari sp. nov. ヒメキイロモダリチビダ（新種，和名新称）

開張 5.8-7.8 mm．頭毛は濃黄～橙色．前翅は黄色みがかかったクリーム色で，前翅中央の横条と基部前線は暗褐色．♂交尾器のバルバは基部近くの腹面側が張り出す．ゲナトスの中央突起は長い．♂交尾器の T8 後方は尖らぬ．ベステブルムは角張り，シグナは大きい．分布：日本（本州，九州）。

本種の外見はキイロモダリチビダ E. peterseni に酷似しているが，小型であり，前翅の横帯も太い．しかし，個体変異が見られる，本種はキイロモダリチビダに比べ南方あるいは低所で採集されるが，ほぼ同所的に得られている地点もあるため交尾器による同定が確実である．本属はカエデの異果に潜孔することが知られているが，日本での生態は不明である。

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