

Discover of the American Green-striped Forest Looper, *Melanolophia imitata* (Walker) (Lepidoptera; Geometridae) in Korea

자나방과 (Lepidoptera; Geometridae)의 한국 미기록종 1종 보고

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Abstract - The American species *Melanolophia imitata* (Walker) is recorded for the first time from Korea. The species attacks various coniferous trees in Canada and, in prospect, it can stay a serious pest of forestry in East Asia.

Key Words - Lepidoptera, Geometridae, Systematics, Pest, Korea

초 록 - 해외에서는 산림에 심각한 피해를 주는 *Melanolophia imitata* (Walker)가 우리나라에서 처음으로 보고된다. 이 종은 캐나다에서는 침엽수의 해충으로 알려져 있으며 동아시아 지역에서도 대량 발생할 경우 심각한 산림해충으로 예상되는 종이다.

검색어 - 나비목, 자나방과, 분류, 해충, 한국

Genus *Melanolophia* Hulst, 1896, Trans. Am. ent. Soc. 23: 322, 357 (type-species: *Tephrosia canadaria* Guenée, [1858]) is strict American genus, included about 100 species and distributed from South Alaska and Canada on North to Argentina on South (Rindge, 1964, 1990). During the stay of the first author at the National Institute of Agricultural Science and Technology in 2000, a specimen of *Melanolophia imitata* (Walker) collected in Korea was discovered in the Insects Collection of the Entomology Division of this Institute. In Canada, noticeable defoliation of forests by this species are known (Evans 1962; Silver *et al.* 1962; Prentice 1963). So the species need to be described in detail with available biological information. The description was made on the examined specimen and literature data (Dyar, 1905;

Evans, 1962; Peterson, 1962; Silver *et al.*, 1962; Prentice, 1963; Rindge, 1964; Dawson, 1970; McGuffin, 1981). The detail illustrations of adult and preimaginal stages are given in McGuffin (1981); Dawson (1970) includes photographs of the mature larva.

***Melanolophia imitata* (Walker)** (Figs. 1-3)

Boarmia imitata Walker, 1860, List Specimens Lepid. Insects Colln Br. Mus. 21: 395.

Material examined. 1 ♂ (quite fresh), Korea, GG, Suwon, 8.VII.1998 (J.Y. Choi leg.).

Description. Wing expanse 20~40 mm (in examined specimen 35 mm). Labial palpi short, only some extended before frons. Proboscis well developed. Antenna in

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male pectinate, the pectinations rather short, from near base of segments of flagellum, in female simple, filiform. Haetosema present, small. Head and body grey to grey-brown. Wings above light brown often heavily suffused with brown or brownish black. Transverse lines brown to dark brown, most conspicuous from them post-medial but ante-medial and medial lines often present on forewing, sometimes present on both wings; postmedial line often bordered outwardly by brown band or this band parallel postmedial line but separated from it by a

fine light line; subterminal line a series of brown triangles bordered outwardly by dentate white line; outer band brownish; terminal line a series of small black intervenular spots; fringe concolorous. Discal spots small, punctate, brown, as common scarcely visible. Below wings light grey-brown; transverse lines faint, diffuse, greyish; discal dots indistinct. Forewing with 12 veins, with accessory cell between veins R2 and R3+5. Fore tibia with long spine (epiphyses) some extended before top of tibia; hind tibia with two pairs of long spurs and in male with brush of androconial scales. Male abdomen on A3 with setae comb and on intersegmental membrane between A7 and A8 with prominent comblike paired latero-ventrad structure formed with row of gigantic oar-shaped scales placed on narrow heavy sclerotized plate (double comb referred to by Rindge, 1964 or lateral organs of McGuffin, 1981) (Fig. 2).

Male genitalia (Fig. 3). Uncus tapering from broad base, apical portion not swollen; socius small, represented by 4~7 setae; gnathos strongly developed, enlarged medially, bifurcated to apex; valva large, elongate, symmetrical with small costal tubercle bearing tuft of long setae; medial side of valva with large longitudinal plica densely haired dorsally; process of sacculus well developed, with patch of spines on enlarged apical end; juxta strong, long, strongly narrowed at middle; aedeagus

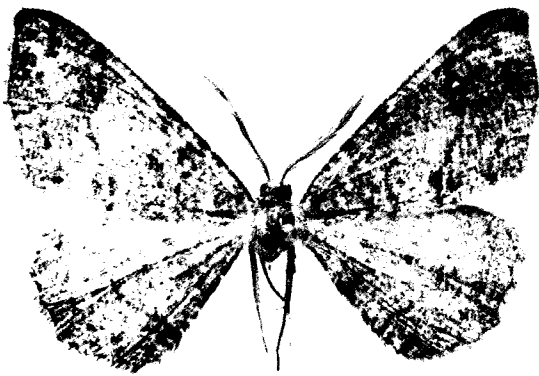
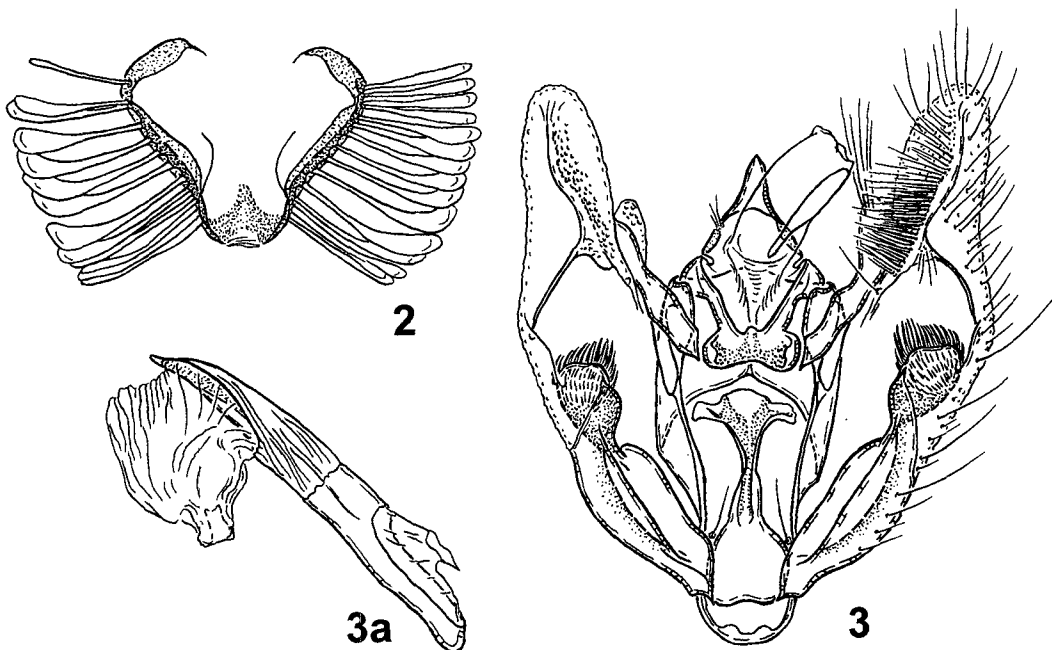


Fig. 1. *Melanolophia imitata* (Walker), male.



Figs. 2-3. 2. *Melanolophia imitata* (Walker), paired latero-ventrad structure between A7 and A8 of male abdomen, ventro-antetal view; 3. *Melanolophia imitata* (Walker), male genitalia; 3a aedeagus.

elongate, tapered at apex, with finger-like projection posteriorly; cornuti lacking.

Female genitalia. Genital plate with slight cleft, with short rod-like projection enlarged apically and indented medianly in some specimens, extending beyond sterigma; ostium surrounded by sterigma; bursa copulatrix, membranous, elongate, with very small signum; ductus seminalis arising from posterior end of bursa copulatrix; posterior apophyses about twice as long as anterior apophyses.

Egg. Length 0.9 mm, width 0.5~0.6 mm, Egg oblong-elliptical, with rows of hexagonal pits separated by low ridges, bluish green, slightly frosted, later shaded and spotted with pink at truncated end (Dyar, 1905; Evans, 1962).

Larva. First instar: slender, length 1.5~3.1 mm, width 0.24 mm. Head: width 0.30~0.31 mm; brown-green, cuticle reticulate. Body dull olive-green with darker lines on dorsum and venter; thoracic plate divided in two parts; anal plate with short middorsal groove. Ventral proleg with 2 setae on side, crochets on ventral and anal prolegs number approximately 18 and 20 respectively.

Mature larva: slender, length 22~37 mm, width 1.9~2.7 mm. Head: width 2.00~2.66 mm (as great as 3.63 mm); green to russet-green, sometimes with yellowish line along lower lobe in line with lateral line on body; antenna brown. Body light green to green; middorsal line geminate green line; addorsal line geminate grey or green line but lighter than middorsal line; white line in upper subdorsal region, then subdorsal line green or with geminate green lines in greenish region; lateral line yellow, yellow-green, or white line; subventral line grey-green stripe; midventral line light, uneven in width. Thoracic plate concolorous; anal plate green, speckled with grey dots. Thoracic legs green or russet, anal legs green, speckled with grey dots. Ventral proleg with 4 setae on side; ventral and anal prolegs with approximately 30 and 32 crochets respectively.

Pupa. Length 9.9~17.1 mm, width 3.7~4.4 mm. Pupa brown, fusiform; sculpture punctate, without grooves, cremaster bifurcate; prothoracic femora covered; prespiracular furrow crescentic, at level of spiracle; callosity elongate, rounded, pubescent.

Distribution. Korea (New record), Canada and USA: from southern Alaska, British Columbia and southwestern Alberta south to southern California (Rindge, 1964; McGuffin, 1981).

Habits. Evans (1962) studies bionomics of the species

in details. Adult nocturnal, in its home area flies from middle of March in southwest to middle of June in northwest, preferring early hours of darkness. Mating usually occurs about 36 hours after emergence; eggs laid about 48 hours later, singly on branches and trunks of host trees; usually over a two-day period up to 80 eggs laid. Adult may live as long as 2 weeks. Incubation period of egg about 9 days.

The hatched larva immediately moves out to foliage and commences feeding on softer tissues of underside of leaves, although some times utilizing any new growth. This early feeding superficially resembles damage by leaf skeletonizers or miners. Second-instar larva also feeds on the underside of leaves. Later instars feed on terminal and subterminal parts of leaves, showing preference for foliage of previous year. Most feeding takes place on crown or lower exposed branches of tree. Each instar lasts approximately 9 days but instar periods are extremely variable, dependent on environmental conditions. In Canada, larva may be collected from late May until early August.

Mature larva drops to ground, burrows down into litter where it spins a loose cocoon and pupates. Hibernation takes place in the pupal stage.

Host plants. According to Evans (1962) the principal host trees in order of preference are *Pseudotsuga menziesii* (Mirb.) Franco, *Tsuga heterophylla* (Raf.) Sarg., *Thuja plicata* Donn., *Abies amabilis* (Dougl.) Forb., *Picea sitchensis* (Bong.) Carr., *Abies grandis* (Dougl.) Lindl., *Picea engelmanni* Parry, *Pinus monticola* Dougl., *Larix occidentalis* Nutt., *Abies lasiocarpa* (Hook.) Nutt., *Ainus rubra* Bong., *Picea glauca* (Moench) Voss, *Salix* spp., *Pinus contorta* Dougl., *Tsuga mertensiana* (Bong.) Carr. The examined specimen was captured on the hill with predominating of *Pinus* trees; it is possible, *Pinus* spp. are hosts of *Melanolophia imitata* (Walker) in Korea.

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