

A review of selected species of  
**LYMANTRIA HÜBNER [1819]**

Including three new species (Lepidoptera: Noctuidae: Lymantriinae)

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*from  
subtropical  
and temperate  
regions of Asia,  
some  
potentially  
invasive to  
North America*

**Michael G. Pogue  
Paul W. Schaefer**



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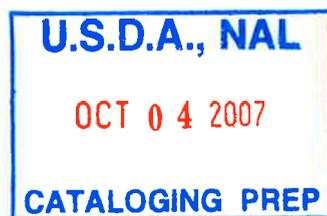


A REVIEW OF SELECTED SPECIES OF *LYMANTRIA* HÜBNER [1819]  
(LEPIDOPTERA: NOCTUIDAE: LYMANTRIINAE)  
FROM SUBTROPICAL AND TEMPERATE REGIONS OF ASIA,  
INCLUDING THE DESCRIPTIONS OF THREE NEW SPECIES,  
SOME POTENTIALLY INVASIVE TO NORTH AMERICA

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*LYMANTRIA (PORTHETRIA) DISPAR ASIATICA* VNUKOVSKIJ, REVISED STATUS

(Figs. 9–12; Pl. 1, Figs. 2, 5; Pl. 8, Figs. 1–7; Pl. 29, Fig. 5; Pl. 32, Fig. 2; Pl. 38, Fig. 1; Pl. 44, Figs. 1–4)

*Lymantria dispar asiatica* Vnukovskij, 1926:79. ST: RUSSIA: Siberia meridionales, Altaj et Sajan occidentales, Prov. Semiplatinsk (Tomsk Polytechnic University, Tomsk, not examined); Gaede, 1932:100; Witt, 1985:187; Schintlmeister, 2004:22. **Revised status**

*Lymantria dispar chosenensis* Goldschmidt 1940:60. ST: KOREA: (unknown type depository, not examined)

*Lymantria dispar koreiba* Bryk 1948:15. HT male: KOREA: Motojondo (NMS, Stockholm, not examined)

*Lymantria dispar kolthoffi* Bryk 1948:16. HT male: CHINA: Kiangsu (NMS, Stockholm, not examined)

## COMMON NAMES

Asian Gypsy Moth (AGM); Maemi-Nabang (in Korean) or Gypsy-Nabam; Ya-zhou-do-er (in Chinese), also translations refer to Persimmon caterpillar or Persimmon tussock moth (in China); Shelkopryad neparnyy (in Russian); Neparniy shovkopryad (in Ukrainian); Uruusgul hur ervechei (in Mongolian).

## DIAGNOSIS

The males of *L. d. asiatica* differ from those of *L. d. dispar* in the ground color of the forewing, which is either a lighter or darker brown in *L. d. asiatica*. In *L. d. dispar*, there is a grayish cast to the light brown ground color. The females of *L. d. asiatica* have a more prominent postmedial band than in *L. d. dispar*. Among late stage larvae, the black form is found to a limited extent in China (Fig. 9) (Schaefer et al. 1984b).



**Figure 9.** Unusual black larval form of *L. d. asiatica* with tachinid eggs (white spots on dorsum) probably of *Parasetigena* sp. (Diptera: Tachinidae). Photo taken in Mengjiagang, Heilongjiang Province, China, July 1983 (photo by Paul W. Schaefer).

## REDESCRIPTION

## MALE

- *Head* Front and vertex light brown; scape and antenna light brown, bipectinate; labial palpus cream-colored basally and ventrally, gray apically.
- *Thorax* Tegula, mesothorax and metathorax slightly darker brown than head and vertex; forefemur cream-colored basally, gray apically, tibia and tarsi cream-colored to

light brown, segments 2–3 dark gray to black; middle and hind legs cream-colored to light brown, tarsi concolorous with legs, segments 2–3 gray to black; underside cream-colored.

- *Forewing* (Pl. 1, Fig. 2): Length 23–28 mm (n=10); ground color light brown to brown; basal area with black dots above and below M vein; antemedial line brown, crenulate from costa to posterior margin, slightly more distinct between costa and R vein; orbicular spot black, in middle of discal cell; reniform spot black, angulate, along vein at end of discal cell; postmedial line a broad brown band, darker at costa, extends to posterior margin; subterminal line brown, crenulate, dark brown spot at costa, line extends to posterior margin; outer margin brown to dark brown and contrasting with ground color; fringe cream-colored to brown, dark brown spots can be present between veins.
- *Hindwing* Ground color brown; discal spot can be absent, but if present, dark brown, crescent-shaped, at end of discal cell; marginal band dark brown; fringe white to light brown.
- *Abdomen* Light brown with median dorsal dark brown patches, light brown ventrally; tymbals absent on third sternite.
- *Genitalia* (Pl. 8): Lateral processes absent from tegumen; uncus elongate, narrow, apex round; valve undivided, not fused ventrally; dorsal process contiguous with costal margin of valve, straight, apex narrowly rounded; juxta a square plate with dorsal margin concave to slightly convex, ventral margin with broad excavation; sacculus apex broadly rounded; saccus variable, V-shaped to narrow U-shaped; aedeagus 0.70–0.84x height of genital capsule, straight, slightly curved proximal to opening of ductus ejaculatorius; vesica an ovate, dorsally produced lobe; cornuti absent.

#### FEMALE

- *Head* Front and vertex white; scape white, antenna dark brown and bipectinate; labial palps dark brown to black.
- *Thorax* White; forefemur fuscous, white basally, long fringe scales white, tibia fuscous, tarsi fuscous; middle femur white, distal apex fuscous, tibia white, proximal apex fuscous, tarsi fuscous; hind femur white, tibia fuscous distally and apically, long white fringe scales and white ventrally, tarsi fuscous; underside white.
- *Forewing* (Pl. 1, Fig. 5) Length 28–41mm (n=10); ground color white; all wing markings fuscous; basal spot; antemedial line a short dash from costa to R vein, becomes a variably distinct sinuate line to posterior margin; orbicular spot small at middle of discal cell; reniform spot V-shaped along veins at end of discal cell; postmedial line a dark spot at costa, becomes a variably distinct broad angular band to posterior margin; subterminal band crenulate, from costa to posterior margin; fringe white with fuscous spots between veins.
- *Hindwing* Ground color white; discal spot faint, V-shaped at end of discal cell; faint fuscous submarginal band; fringe white with fuscous spots between veins.
- *Abdomen* Tergites white, gradually becoming browner dorsally, apex dark brown; sternites white in basal half, brown in distal half.
- *Genitalia* Ovipositor not telescopic; papillae anales quadrate, dorsal margin truncate; anterior and posterior apophyses short; ventral plate of ostium bursae with sclerotized

strap-like process merging to form a circular opening; ductus bursae shorter than in or *L. d. japonica*; corpus bursae ovate.

#### LARVA

PRESERVED SPECIMENS (PL. 29, FIG. 5; PL. 32, FIG. 2; PL. 44, FIGS. 1–4)

- *Length* Full grown larvae 50–55 mm.
- *Head* Cream-colored speckled with light brown, a pair of broad black coronal stripes from above frons paralleling ecdysial line (Pl. 32, Fig. 2); setae twisted (Pl. 44, Fig. 2); stemmata 1, 2, 5, and 6 tripartite; stemmata 3 and 4 with a wrinkled surface and a raised rim margin (Pl. 44, Fig. 3).
- *Thorax* D2 verruca on T1–3 blue; legs yellowish-brown
- *Abdomen* Ground color gray, irrorated with an irregular pattern of white, laterally; dorsal stripe distinct, white; lateral stripe indistinct, white; anterior margin of A1–7 with a pair of irregularly shaped white spots with gray centers; D2 verrucae blue on A1–2, red on A3–8; D1 verrucae small with a large white primary seta and several white secondary setae; SD verrucae reddish-brown and L white, contiguous; SV verruca white; primary setae on D2 verruca black, secondary setae white; primary setae on D2 verruca shorter than those on L; L verruca with long black and white setae; long setae, both black and white on SD and L with microbarbules; eversible glands on A6–7 red; ventral broad black stripe between prolegs faint to absent, remainder of underside a solid pale gray with little or no pattern; prolegs pale with well-developed lateral sclerotized plates; crochets in a homoideous uniordinal mesoseries.

FIRST INSTAR (PL. 38, FIG. 1)

Differences from *L. d. dispar*. SD1 seta on T1 with elongate barbs, SD2 seta with fewer and shorter barbs than SD1 (Pl. 38, Fig. 1).

#### DISTRIBUTION

Throughout temperate Asia, generally east of the Ural Mountains into the Russian Far East, the northern 2/3 of China, and the Korean Peninsula. In Central Asia, it is not found south of the Himalayan range in India (Bhardwaj 1987, Gupta 1992).

#### SPECIMENS EXAMINED

CHINA: Liaoning Prov., Shenyang, 12 Feb. 1999 (3f), Y. Dekang (PWS); Beijing, Tongxian, 1998 (2f), P.W. Schaefer (PWS); Manchuria, Luta (Dairen), 22–31 July (1m), 30 July (1f), 8–14 Aug. (1m), Weymarn (CMP); Djalantun, Gr. Kingan Mts., 22–31 July (2m), 30 July 1, 25 July (1m), 26 July (1m), Weymarn (CMP); Sichuan: junction of Min & Yangtze rivers (1f), Suifu (CMP), K'angting (Taatsienlu), 1906 (1m), (BMNH); Mo Sy Mein, 1894 (2m), genitalia slide USNM 59169 (BMNH); Taekou, Th. Monbeig, 1909 (1m) (BMNH); Tsing Tao, 15–21 July (1m), 1–7 Aug. (1f), Weymarn (CMP). MONGOLIA: Ulaanba-atar, 2004 (3f), P.W. Schaefer (PWS). RUSSIA: Kongaus, 10 Aug. 1923 (1f), Cockerell (CMP).

## OVIPOSITION

Ovipositional behavior is most variable over the wide distribution of this subspecies. Oviposition is similar to that in *L. d. dispar*, but egg mass color is lighter and more consistently yellow, less frequently darkening only to light brown.

In China (Schaefer et al. 1984b) and Korea (Schaefer unpubl. data), egg masses are frequently placed high up on the undersurfaces of branches of large pine trees, *Pinus tabulaeformis* Carriere (Pinaceae). In Russia and Mongolia, females oviposit in cracks or crevices on rock outcrops or occasionally directly on the soil under individual boulders. There, egg masses are so concentrated that they are laid on top of other egg masses or on the remains of previous years' egg masses, and the remains of the expired females remain evident from season to season (Fig. 10). Benkevich (1956) states that in the Altay (or Altai) Mountain region of Siberia and Mongolia the behavior changes from ovipositing on trees in the west to rocks in the east. In the Russian Far East, egg masses are laid on undersides of leaves of deciduous trees (Yurchenko and Turova 1984), which assures the egg masses will fall to the ground and be covered by accumulating snow, and thus be protected from extreme cold temperatures and desiccating winds known to cause significant egg mortality.



**Figure 10.** Egg mass remains of *L. d. asiatica* deposited on the undersurface of a stone (rolled over) and showing partly preserved remains of the expired females. These female remains represent the previous year's individuals as this picture was taken at Hatgal, Hövsgöl, Mongolia, on July 12, 2003, at a time when the current generation was feeding in nearby Siberian larch trees (photo by Paul W. Schaefer).

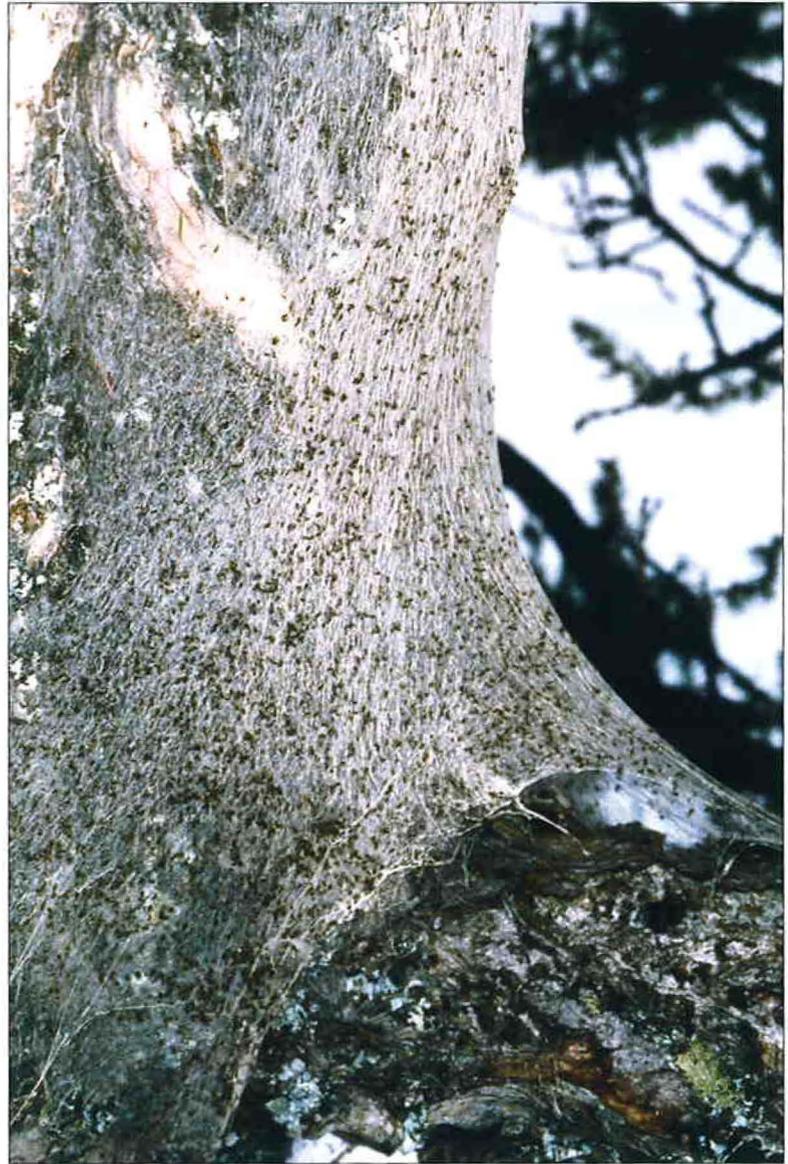
## BIOLOGY AND BEHAVIOR

Populations are univoltine throughout its range, as in *L. d. dispar*, and all overwinter as eggs deposited in a variety of locations. Populations everywhere may reach destructive outbreak levels. In central Asia, where egg masses are concentrated on rocks, ridges or outcrops, upon

hatching larvae must spin copious amounts of silk (Fig. 11) and balloon off the ridges in order to passively encounter acceptable food trees. In the Siberian larch forests and riparian habitats of Mongolia, dispersal by ballooning from either rock faces, pine trees or manmade objects is essential for the larvae to reach their food plants. Often, and depending on the prevailing breezes at the time of the spring egg hatch, the distances involved are appreciable, ranging from several hundred meters to a kilometer or two. In Korea, larvae on pines disperse to suitable tree species such as *Carpinus*, *Quercus* or *Rhododendron* (*Azalia*) (Lee et al. 2002) to feed, but adults fly back to the large pines for oviposition. Much the same occurs in China (Schaefer et al. 1984b). In all these cases, an annual host-utilization cycle exists between the oviposition site (rock outcrop or non-food source pine tree) and the food source (preferred forest trees).

Throughout the range of this subspecies, females are capable of either sustained level or ascending flight and in some areas even show evidence suggesting nocturnal mass migrations of variable, including unknown, distances (Gornostaev 1962, Kondakov 1961, Meyngard 1909, Rozhkov and Vasil'eva 1982, Epova and Pleshanov 1988). We provide one such example of a mass flight, which occurred on 17 August, 2003 at Mörön, Hövsgöl, Mongolia, where many thousands of mostly female moths descended on parking lot lights between 10:30 PM and midnight.

Baranchikov (1989) compared the ovipositional strategy of Eurasian populations of flight-capable females to those of flightless females of gypsy moths. A complicating issue is that Baranchikov's (1989) records and maps of the distribution illustrate a sizable area of overlap, presumably signifying an area of functional polymorphism or of sympatry of two distinct species. According to Baranchikov (1989), this location, centered on Tataria with a



**Figure 11.** Silk deposited from the concentration of hatching *L. d. asiatica* larvae on a Siberian larch tree in close proximity to a rock outcropping where tremendous numbers of egg masses were concentrated. Photo taken at Dalbay Valley, Hövsgöl, Mongolia, on July 13, 2003 (photo by Paul W. Schaefer).

regional city of Kazanj, is a transition zone, wherein females can fly well but flights are short. (Interestingly, this area lies just to the west of the Ural Mountains and might involve both the subspecies *L. d. dispar* and the flighted females, which by our definition are *L. d. asiatica*.) Schaefer and Tuulaikhuu (in Prep.) confirmed that 97% of the AGMs in the mass flight to lights in the city of Mörön, Mongolia, were females, and that all of those females were virgin. In the morning after this flight, all of the males were *in copulo*, while the remaining myriads of other females rested on fence posts, having been inactive during the cool night (Fig. 12). They began to get active as they warmed up and eventually flew upwards, appearing headed for the surrounding higher mountains. Only after their arrival at the higher mountain outcrops, would they chance to call a male. Based on observations at other locations, at which



**Figure 12.** Females of *L. d. asiatica* rest on a fence at a hotel in the center of Mörön, Hövsgöl, Mongolia, August 18, 2003. After warming up in the mid- to late-morning hours, individuals took off and flew upwards and appeared headed for the higher mountains (photo by Paul W. Schaefer).

we found numerous dead males captured in spider webbing, we know that males do frequent such locations. In the final analysis, presence of suitable males for successful mating at these sites of concentrated females seemed to be a limiting factor and in this Mongolian population, many successfully laid egg masses appeared to be infertile.

In other areas of China and Korea, in hours of darkness, females often respond to outdoor lighting, such as street lamps or illuminated store fronts (Belova 1988), and often deposit their egg mass at the site of landings near the lighting (Schaefer et al. 1984b).

### FOOD PLANTS

Polyphagous. Found on many of the same food plants used by both *L. d. dispar* and *L. umbrosa*, as tabulated in Schaefer et al. (1988). Siberian larch, *Larix sibirica* Ledeb. (Pineaceae) is a dominant food tree in much of the northern part of the native range (eastern Siberia and Mongolia). In more southern regions, as in central China, it is often associated with persim-

mon (consequently its alternate local names), *Diospyros kaki* Thunberg (Ebenaceae) (Schaefer et al. 1984). Various species of *Quercus* (Fagaceae) are preferred in all areas within the range of *L. dispar sensu lato*. Otherwise, the following families and genera serve as major food sources: Aceraceae (*Acer*); Betulaceae (*Alnus*, *Betula*, *Carpinus*, *Corylus*); Ebenaceae (*Diospyros*); Fagaceae (*Castanea*, *Castanopsis*, *Fagus*, *Quercus*); Flacourtiaceae (*Xylosma*); Hamamelidaceae (*Hamamelis Liquidambar*); Juglandaceae (*Juglans*); Leguminosae (*Robinia*, *Wisteria*, *Lespedeza*); Moraceae (*Morus*); Oleaceae (*Fraxinus*); Pinaceae (*Larix*, *Pinus*, *Picea*); Rosaceae (*Cydonia*, *Cerasis Eriobotrya*, *Malus*, *Prunus*, *Pyrus*, *Rosa*, *Rubus*); Salicaceae (*Populus*, *Salix*); Theaceae (*Eurya*); Tiliaceae (*Tilia*); and Ulmaceae (*Celtis*, *Ulmus*, *Zelkova*) (Kozhansikov 1950, Kim et al. 1982, Schaefer et al. 1988).

#### PHEROMONAL COMMUNICATIONS

As in *L. dispar sensu lato*, (7R,8S)-*cis*-7,8-epoxy-2-methyloctadecane [(+)-disparlure] has been confirmed as the major pheromone in *L. d. asiatica*.

In China, earlier work revealed that the racemic mixture and the addition of olefin (2-methyl-Z-7-octadecane) generally reduced male captures, (Wallner et al. 1984, O'Dell et al. 1992), but one trapping effort at two test locations produced conflicting results (Wallner et al. 1984).

#### FLIGHT AND PHEROMONE PERIODICITY; SEASONALITY

Males are almost exclusively diurnal and gravid females are fully capable of normal sustained level or ascending flight.

As with both *L. mathura* and *L. monacha*, in the Russia Far East, Wallner et al. (1995) showed the pattern of nocturnal attraction of adult *L. d. asiatica* to ultraviolet lamps, with peak activity from 11:00 PM to 1:00 AM (i.e. Near Midnight), and a male-to-female sex ratio of 11:1. Also in Russia, female flight is described as strong and mention is made that unfertilized females fly better than fertilized females (Benkevich 1966).

#### DISCUSSION

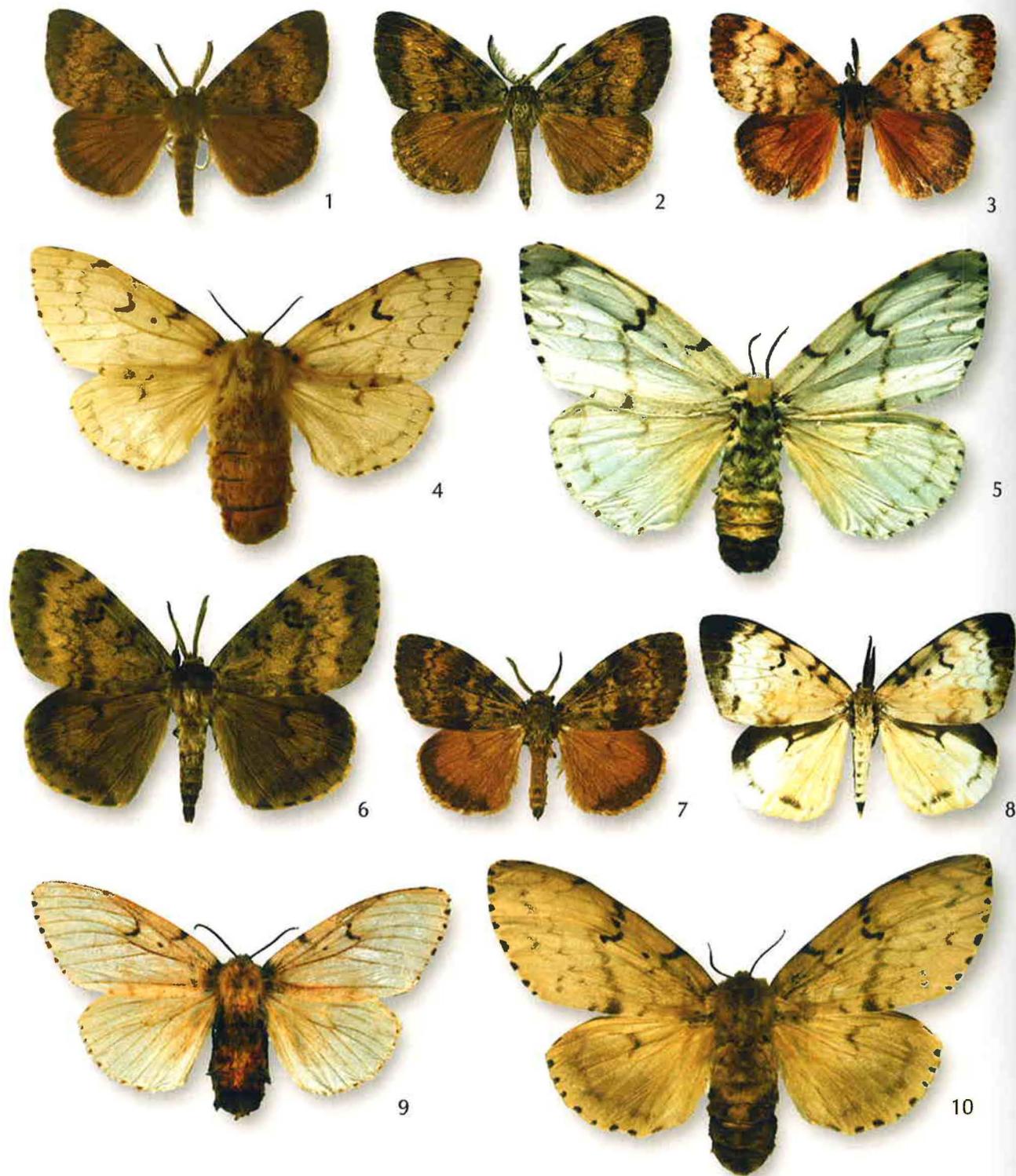
*Lymantria dispar asiatica* was originally described as a subspecies of *L. dispar* by Vnukovskij (1926). Schintlmeister (2004) synonymized *L. d. asiatica* with *L. d. dispar*. Because of the importance in formally recognizing the Asian population of *L. dispar*, we treat *L. d. asiatica* as a valid subspecies. However, based on results from the analysis of the COI mitochondrial gene (Bogdanowicz et al. 2000, Ball and Armstrong 2006), and because some specimens from Korea, Russia, and Japan showed no or little sequence divergence, and even though some recognized coloration differences are evident in certain populations, we are treating both *L. d. asiatica* and *L. d. japonica* as subspecies. Bogdanowicz et al. (2000) analyzed 72 individuals from North America, Europe, Africa, and Asia including Russia, China, Korea, and the Japanese islands of Hokkaido, Honshu, Kyushu, and Okinawa. Bogdanowicz et al. (2000) showed that the percentage sequence divergence between Europe and Asia (including individuals from Kyushu and Honshu, Japan) was 0.67%, with some individuals from Japan (Kyushu and Honshu), Russia, Korea, and China with shared haplotypes. *Lymantria dispar dispar* formed a distinct clade with respect to *L. d. asiatica* and *L. d. japonica* (Bogdanowicz et al. 2000). A similar conclusion was reached by Ball and Armstrong (2006) who analyzed 21 specimens of *L. dispar sensu lato*. Populations from North America shared haplotypes, as did populations from Korea, Russia, and Japan. *Lymantria dispar dispar* was paraphyletic with

respect to *L. d. asiatica* and *L. d. japonica* (Ball and Armstrong 2006). Overall, the mean sequence divergence was only 0.44% for all specimens of *L. dispar sensu lato* analyzed (Ball and Armstrong 2006). Bogdanowicz et al. (2000) also showed a higher percentage of sequence divergence between populations in Hokkaido and populations in Europe and North America (2.0%) and Asia (1.7%). The Hokkaido population represents *Lymantria umbrosa* (Butler). *Lymantria umbrosa* was also supported by Ball and Armstrong (2006) with a sequence divergence of 2.4%. There was also a high percentage of sequence divergence between populations in Okinawa and those in Europe and North America (5.7%) and Asia (5.6%) (Bogdanowicz et al. 2000). The Okinawan population represents *Lymantria albescens* Hori and Umeno.

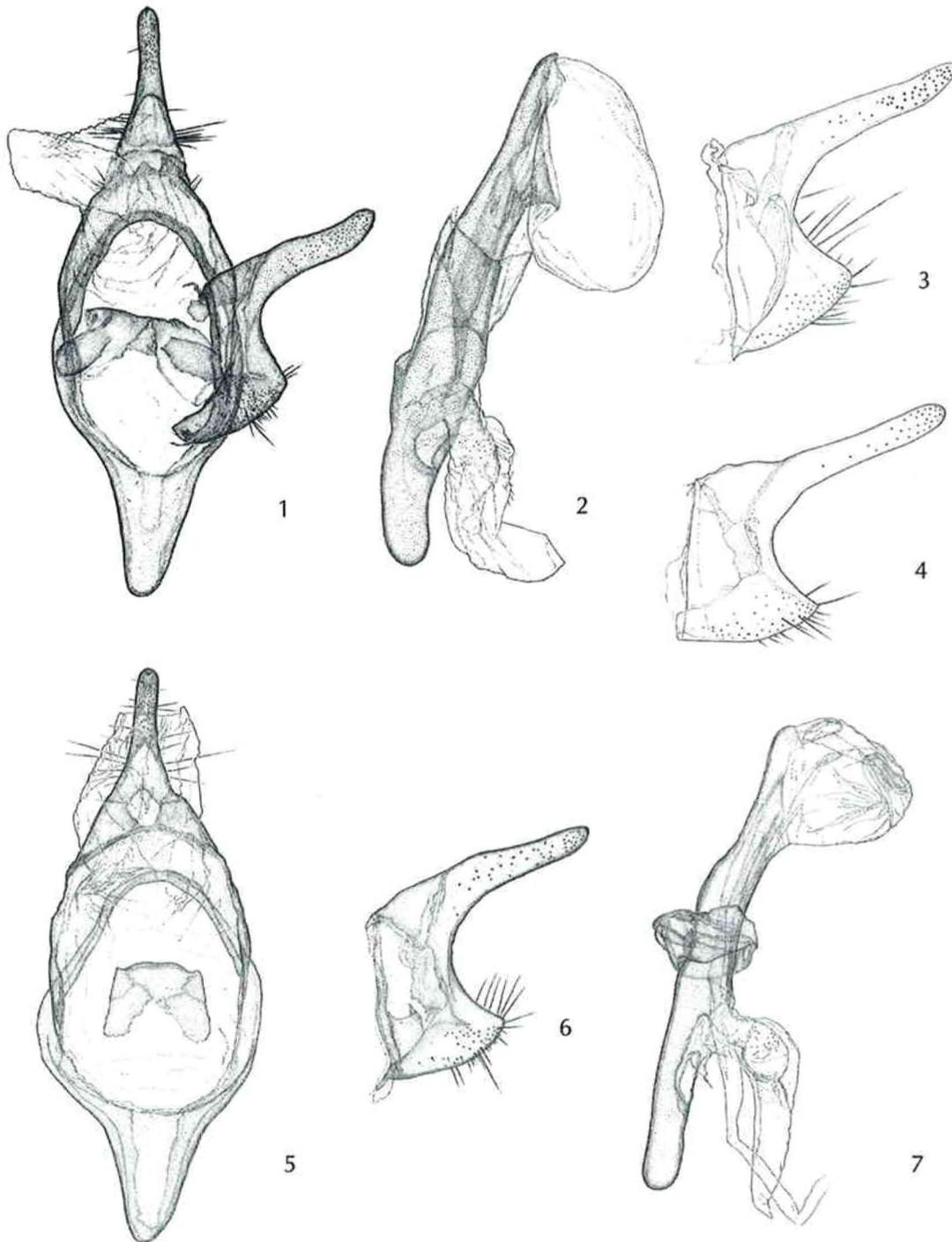
Throughout its range, there is considerable variation in adult forewing color and pattern of *L. d. asiatica*. There are dark brown males from Korea and China and light brown males from Krasnoyarsk in central Russia. Female forewing ground color is white for most, but some specimens from China can have a very slight brownish cast.

Larvae show considerable variation in color and patterning. The black form is more common in *L. d. japonica* (Fig. 9), but occurs rarely in China (Schaefer et al. 1984b) and Korea (Lee and Chung 1997).

As with *L. d. dispar*, *L. d. asiatica* is highly polyphagous. However, whereas *L. d. dispar* females are flightless, *L. d. asiatica* females are fully capable of level or ascending flight, with some showing evidence of migratory flights. Furthermore, the female's ability to fly to lights at night makes for a high potential for female movement to dock areas, shipping containers, or vessels, where they may readily lay their complement of eggs. Hence, the potential for invasion to other countries or continents is very real. Indeed, it accounts for why males and egg masses of Asian-type gypsy moths have been intercepted and collected in western North America. As an endemic species in central Asia, it feeds almost exclusively on Siberian Larch. Although North America does not have extensive larch forests, this moth is highly polyphagous and if introduced will likely find adequate alternative food sources. Maritime commerce with coastal Asian countries, specifically, Korea, China, and Russia, is significant and could result in *L. d. asiatica* invading North America. Clearly, every effort should be made to prevent such an invasion.



**PLATE 1. ADULTS.** **Fig. 1.** *Lymantria (Porthetria) dispar dispar*, male, USA, Maryland, Cecil Co., Pleasant Hill, 14-16 July 1989, W.E. Steiner & J.M. Swearingen (USNM). **Fig. 2.** *Lymantria (Porthetria) dispar asiatica*, male, China, Shantung, Tsingtao (BMNH). **Fig. 3.** *Lymantria (Porthetria) umbrosa*, male, Russia, Partisanskiye Region, Primorye Terr., 26.VI.1978, Y.A. Tshistjakov (BMNH). **Fig. 4.** *Lymantria (Porthetria) dispar dispar*, female, USA, New Hampshire, Portsmouth, July, Schaus & Barnes Coll. (USNM). **Fig. 5.** *Lymantria (Porthetria) dispar asiatica*, female, Russia, South Ussuri, Kedrovaja Pad, 16.VIII.1977, Mati Metsaviir (USNM). **Fig. 6.** *Lymantria (Porthetria) dispar japonica*, male, Japan, Bushi, Iruma City, Saitama-ken (BMNH). **Fig. 7.** *Lymantria (Porthetria) obfuscata*, male, India, Simla (BMNH). **Fig. 8.** *Lymantria (Porthetria) albescens*, male, Japan, Ishigaki Island, Ryukyu, 6.VI.1962, R. Kano (BMNH). **Fig. 9.** *Lymantria (Porthetria) umbrosa*, female, Japan, Nukabira, Hokkaido, 31.VII.1962, H. Ono (BMNH). **Fig. 10.** *Lymantria (Porthetria) dispar japonica*, female, Japan, Bushi, Iruma City, Saitama-ken, 11.VII.1977, H. Inoue (BMNH).



**PLATE 8. MALE GENITALIA.** *Lymantria (Porthetria) dispar asiatica*. **Fig. 1.** Genital capsule, Eastern Asia, genitalia slide USNM 57645. **Fig. 2.** Aedoeagus, genitalia slide USNM 57645. **Fig. 3.** Valve, Korea, genitalia slide USNM 59163. **Fig. 4.** Valve, China, Yachou, genitalia slide USNM 59195. **Fig. 5.** Genital capsule, China, Liaoning Prov., Shenyang, genitalia slide USNM 59160. **Fig. 6.** Valve, genitalia slide USNM 59160. **Fig. 7.** Aedoeagus genitalia slide USNM 59160.

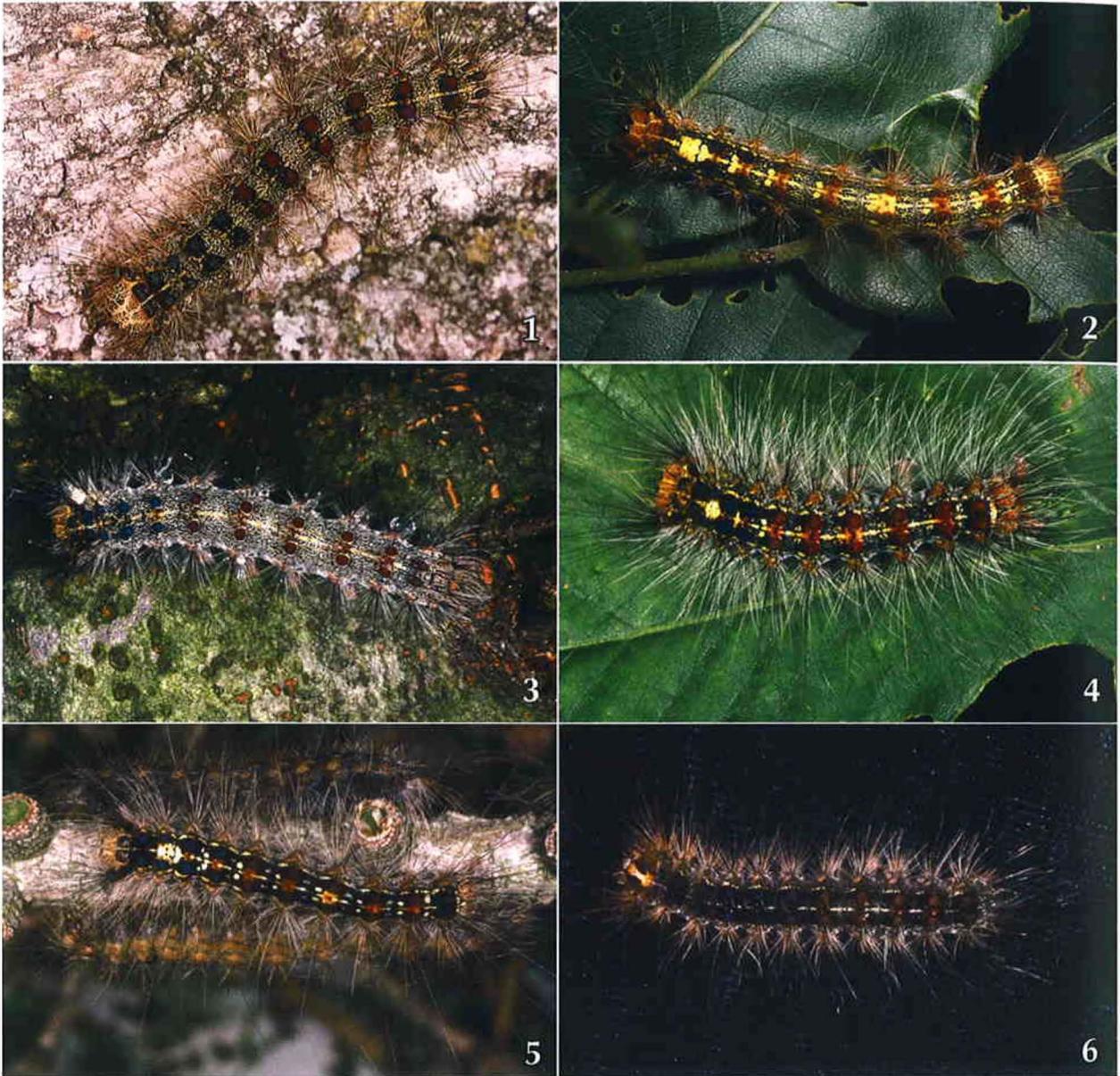


PLATE 29. LARVAE. **Fig. 1.** *Lymantria (Porthetria) dispar dispar*, Spain. **Fig. 2.** *Lymantria (Porthetria) dispar japonica*, Japan, Toyota, on *Castanea* sp. **Fig. 3.** *Lymantria (Porthetria) dispar japonica*, Japan, Honshu, Taiiei. **Fig. 4.** *Lymantria (Porthetria) dispar japonica*, Japan, Morioka. **Fig. 5.** *Lymantria (Porthetria) dispar asiatica*, Mongolia, on *Larix* sp. **Fig. 6.** *Lymantria (Porthetria) obfuscata*, India, Kulu Valley.

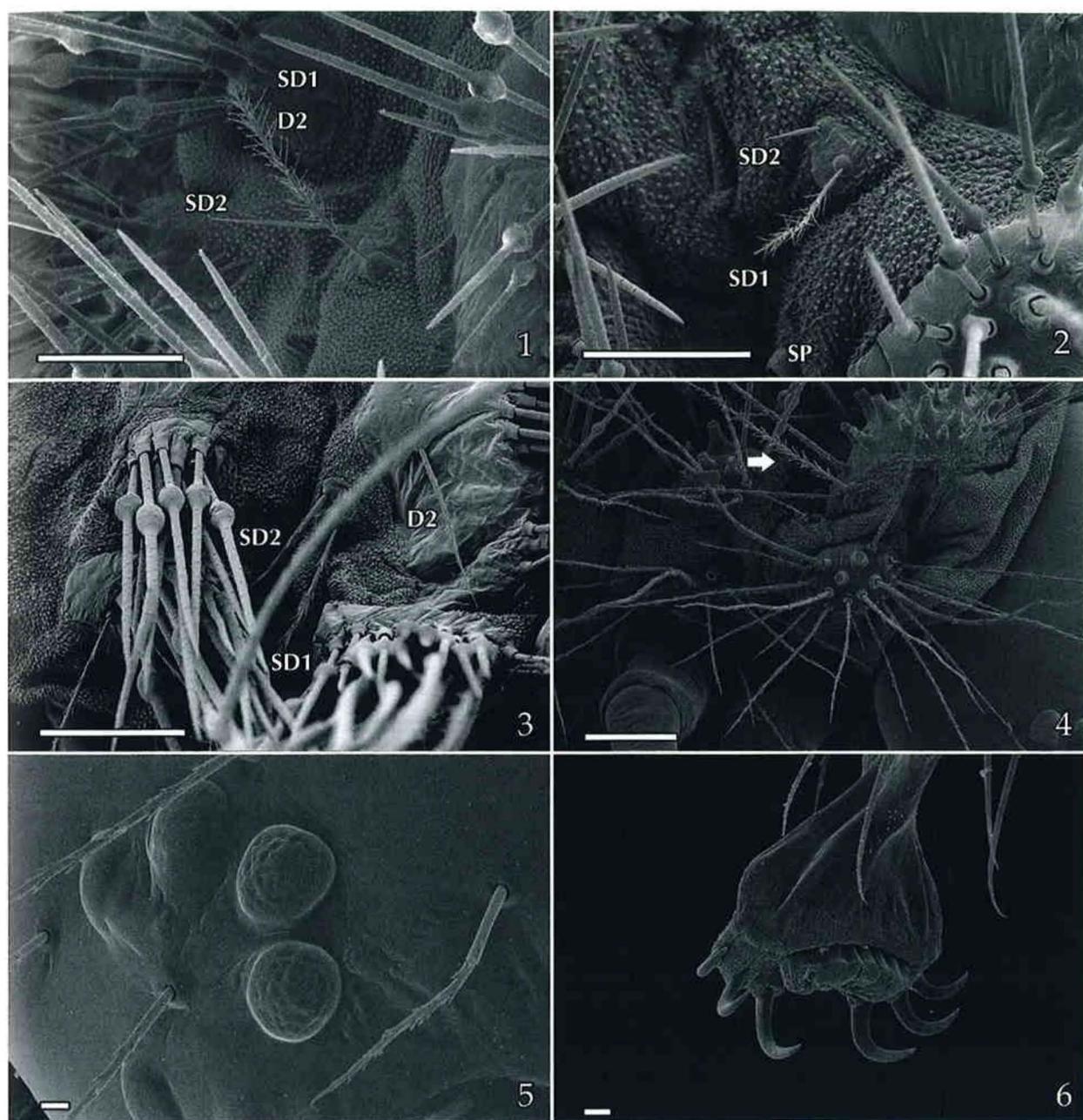


PLATE 38. FIRST INSTAR LARVA. **Fig. 1.** *Lymantria (Porthetria) dispar asiatica*, dorso-lateral view of T1, SD1, SD2, and spiracle; scale=100  $\mu$ . **Fig. 2.** *Lymantria (Nyctria) mathura*, T1 SD1, SD2, and spiracle; scale=100  $\mu$ . **Fig. 3.** *Lymantria (Lymantria) monacha*, T1 SD1 and SD2; scale=100  $\mu$ . **Fig. 4.** *Lymantria (Porthetria) obfusata*, T1 SD1 and SD2; scale=100  $\mu$  (arrow pointing to SD1). **Fig. 5.** *Lymantria (Porthetria) obfusata*, stemma 3 and 4, tripartite; scale=10  $\mu$ . **Fig. 6.** *Lymantria (Porthetria) obfusata*, A3 right proleg; scale=10  $\mu$ .

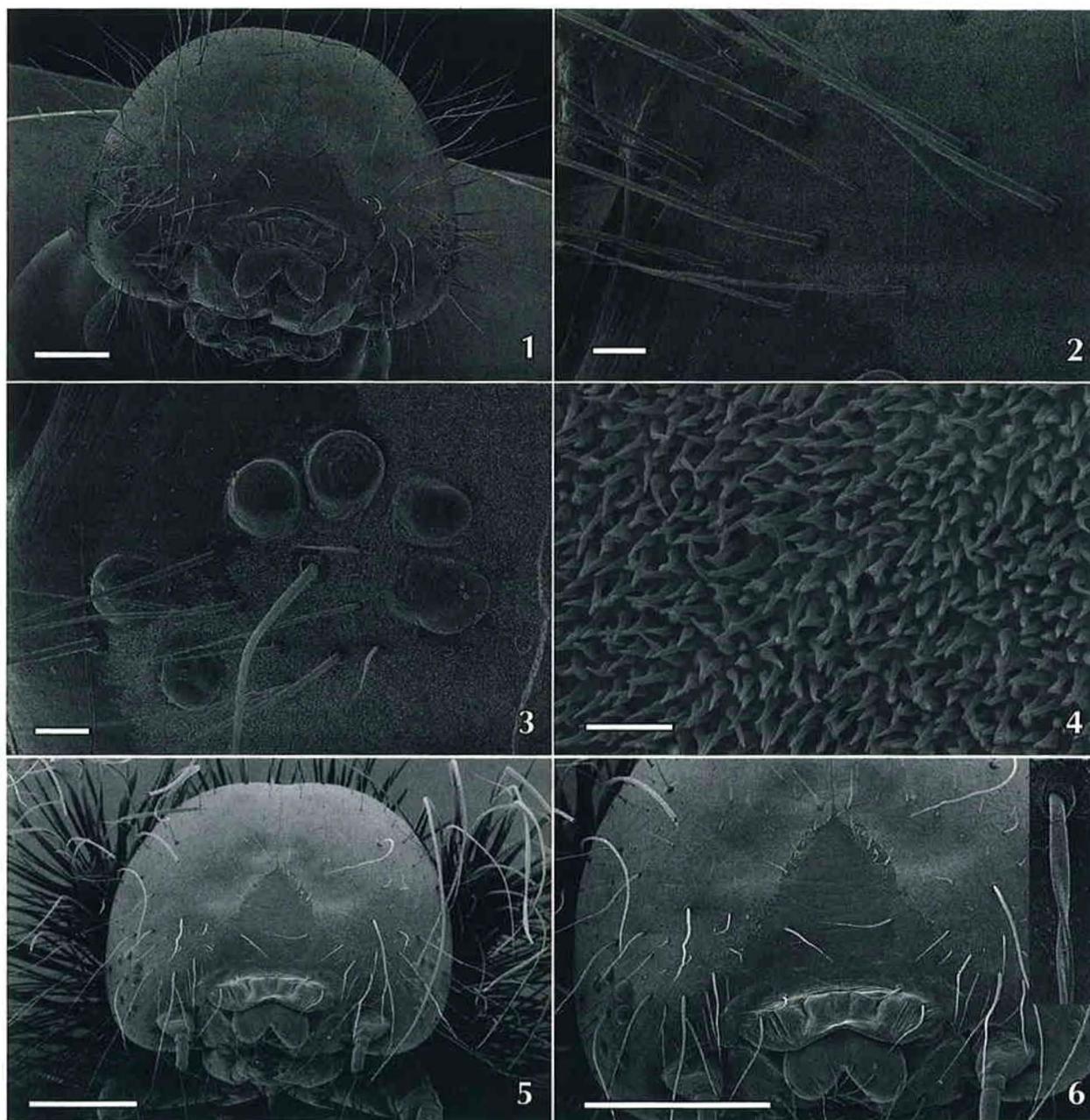


PLATE 44. LAST INSTAR LARVA. Head. **Fig. 1.** *Lymantria (Porthetria) dispar asiatica*, frontal view; scale=1 mm. **Fig. 2.** *Lymantria (Porthetria) dispar asiatica*, twisted and slightly barbed setae dorsal to stemma area; scale=100  $\mu$ . **Fig. 3.** *Lymantria (Porthetria) dispar asiatica* stemma area; scale=100  $\mu$ . **Fig. 4.** *Lymantria (Porthetria) dispar asiatica*, microspinules in black stripe; scale=10  $\mu$ . **Fig. 5.** *Lymantria (Porthetria) umbrosa*, frontal view; scale=1 mm. **Fig. 6.** *Lymantria (Porthetria) umbrosa*, frons, clypeus, and labrum; inset showing twisted seta on head; scale=1 mm.