

Studies on a Korean Unrecorded Phamphilid-sawfly
(Hymenoptera, Symphyta) Feeding on Korean Pine.

Taxonomical and Morphological Studies

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잣나무를 食害하는 韓國未記錄種 넓적잎벌(膜翅目, 廣腰亞目)에 關한 研究 (I)

形態 및 分類學的 研究

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摘 要

本論文는 京畿道光陵試驗林에서 잣나무를 食害하는 韓國未記錄種 잣나무넓적잎벌(新稱)을 材料로 하여 1958~1961년에 研究한 것을 記錄한 것이다.

(1) 本虫은 膜翅目 廣腰亞目 扁葉蜂科의 *Acantholyda nemoralis*에 該當하는 것으로서, 이 것의 學名으로는 R. B. Benson氏의 說에 따라 *Acantholyda posticalis posticalis* MATSUMURA를 採用하기로 하였다.

(2) 分布地로는 既知의 日本, 蒙古, 시베리아外에 韓國을 追加한다. 歐羅巴에는 別個의 亞種이 있다. 本種의 棲息地로는 現在까지 京畿道の 光陵, 加平, 楊州와 江原道の 春城郡이 알려져 있을 뿐이다.

(3) 成虫의 體色은 大體로 黑色이나, 頭部와 胸部에 黃色의 무늬가 많다. 觸角은 黃褐色 絲狀으로 雌虫은 33節, 雄虫은 32節로 되어 있다.

(4) 卵은 보트形으로 그兩端이 上外方으로 突出, 產卵直後의 色은 光澤있는 淡黃綠色을 呈 하나 3日이 經過하면 帶紫黃綠色으로 變한다. 길이 約 3mm, 幅 約 0.7mm이다.

(5) 孵化幼虫의 體色은 帶赤黃色이나, 머리와 胸脚은 黑色이다. 머리가 크고 몸통은 가늘다. 體長 約 3.5mm, 體幅 約 0.7mm. 成熟幼虫의 體色은 淡黃褐色이나, 背線 및 氣門上線은 鮮명한 赤色이다. 3雙의 胸脚과 한雙의 尾脚이 있고, 腹脚은 없다. 頭部는 키틴質化하였고 褐色이며, 觸角은 7節로 되어 있고 大腮가 發達하였다. 體長 約 27.4mm, 體幅 約 4.5mm. 前蛹은 赤色の 背線 및 氣門上線이 없고, 全身이 橙黃色이며, 觸角의 背脚에 漆黑色의 커다란 複眼을 가지고 있는 點等이 成熟幼虫과 다른 點이다. 암컷이 될 것은 크고(體長 約 20~26mm), 수컷이 될 것은 작다(體長 約 13~17mm).

(6) 蛹은 裸蛹으로 蛹化直前의 것은 단지 複眼과 單眼만이 黑色을 呈하고, 他部分은 全部 黃色이지만 時間이 經過함에 따라 色이 變한다. 體長 約 17mm, 體幅 約 5mm.

INTRODUCTION

Phamphilid-sawflies cause a serious damage to the forest plant by eating leaves, though the mode of attack varies in different species. Unexpectedly a great deal of injury caused by Phamphilid-sawflies was found in some afforested places in Kwang-nung forest in Kyung-gi Province recently. In spite of the urgent importance from an economical viewpoint, very little has been hitherto known concerning the biology and the identification of these

pests.

This insect belongs to Suborder Symphyta (Order Hymenoptera) because the abdomen is joined to the thorax by its entire width; to Family Phamphilidae because antennae are inserted distinctly above the clypeus, fore-tibiae have two apical spurs and intercostal veins are present; to Genus *Acantholyda* because tarsal claws have a small tooth at some distance below the apex (Pl. 1-9) and foretibiae have a preapical spur (Pl. 1-9); and to species *posticalis* (*nemoralis*) since the head has a fine postgenal carina, the abdomen is yellow in color at least on both sides, stigma is entirely yellow in color, and the abdomen of female is mostly yellow (Takeuchi, 1938).

There have been various species names given to this insect, such as; *Tenthredo stellata* CHRIST, *Tenthredo pratensis* FABRICIUS, *Lyda nemoralis* THOMSON, *Lyda posticalis* MATSUMURA, and *Acantholyda pinivora* ENSLIN (Takeuchi, 1938). Benson (1951) adopts the *Acantholyda posticalis* as the species name of this insect and treats *stellata* CHRIST, *nemoralis* THOMSON, and *pinivora* ENSLIN as synonyms of this species. As Benson has pointed out, there is no doubt that this insect belongs to the same Subspecies as the Japanese form of this species, and it may be realized that the East Asian and the European forms of this species are distinct enough to be treated as Subspecies, but it is, of course, the East Asian one which is the typical Subspecies. It differs from the European *A. posticalis pinivora* ENSLIN in that the wings are slightly yellowish (instead of hyaline), the abdomen in the female above is almost entirely flavous (instead of mainly black), and the subcosta of the forewing is the same color as the rest of the venation (instead of brown like the base of the stigma). Therefore, it should be called *A. posticalis posticalis*. Paik (1960) has described that *Acantholyda sasakii* parasites on Korean pine only in Kang-won and Kyung-gi Provinces, but it seems not to be *A. sasakii* YANO; it is *A. posticalis* MATSUMURA. *A. sasakii* differs from *A. posticalis* in that the head has no postgenal carina and the abdomen of female is red in color only on both sides (instead of mostly yellow).

Previously the author and Cho (1959) described a preannouncement of a destructive leaf-rolling sawfly of the Korean pine. Present paper deals with the results of the observations on the above species, *A. posticalis posticalis*.

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DESCRIPTIONS

1. Adult.

Female (Plate I-1).....Body black; 2 spots just behind the ocelli, a triangular spot at the anterior margin of the eye, a narrow line behind the fore-going spot, 2 spots of the occiput, the cheeks, the anterior margin of the labrum of the same, the mandibles, the palpi, the hind margin of the pronotum, the tegulae, 3 spots of the mesonotum, the scutellum and 2 spots on each side, 3 spots of the metanotum, the gula and the middle and posterior pleurae are yellow. Mandibles at the apices are fulvous, each of which has a tooth.

Head with large punctures. Thorax sparsely largely punctured. Antenna (Plate I-4) with 33 joints, about 9 mm in length; the scape almost black; both ends of the same and the rest joints yellowish brown but distally dark; the scape is longest of the whole joints; pedicel short; the 1st joint of the flagella a little shorter than the scape; each flagellum in turn becomes short and slender distally; each joint of the antenna with microhairs (Table 1).

Table 1. Length of Antennae (mm)

| Segment | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| ♀ | 1.130 | 0.348 | 0.913 | 0.435 | 0.435 | 0.391 | 0.391 | 0.326 | 0.326 | 0.304 | 0.304 | 0.282 | 0.282 | 0.282 | 0.282 | 0.263 | 0.263 |
| ♂ | 0.739 | 0.348 | 0.826 | 0.435 | 0.435 | 0.391 | 0.391 | 0.326 | 0.326 | 0.304 | 0.304 | 0.304 | 0.304 | 0.282 | 0.282 | 0.263 | 0.263 |

| 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | Total |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.239 | 0.239 | 0.239 | 0.217 | 0.217 | 0.195 | 0.195 | 0.174 | 0.174 | 0.174 | 0.130 | 0.130 | 0.130 | 0.108 | 0.108 | 0.130 | 9.757 |
| 0.239 | 0.217 | 0.217 | 0.217 | 0.217 | 0.217 | 0.174 | 0.174 | 0.174 | 0.130 | 0.130 | 0.130 | 0.068 | 0.068 | 0.086 | — | 8.983 |

Wings (Plates I-5, 6,) hyaline with a fulvous tinge; the veins and stigma yellowish brown; intercostal vein of the fore-wing with both branches, forked. Legs (Plate I-7) fulvous, but the cex, trochanter and femora above black; the legs with setae on the surface, the fore-tibia with 1 preapical spur and 2 apical spurs, and the middle and posterior tibiae with 1 central spur, 2 preapical spurs and 2 apical spurs; each leg with 2 tarsal claws (dark brown); each claws with a small tooth at some distance below apex. Dorsal side of the abdomen fulvous, but the first half part of the 1st segment black, in some individual this black part extends a little longer caudad, ventral side of the abdomen yellow, the last segment dark brown. Body length about 15.5mm; extension of the fore-wings about 30mm (Table 2).

Table 2. Size of Females (mm)

| | Length of Bodies | Width of Bodies | Length of Fore-wings | Length of Post-wings | Extension of Wings | Length of Antennae |
|---------|------------------|-----------------|----------------------|----------------------|--------------------|--------------------|
| Average | 15.5 | 4.3 | 13.5 | 9.1 | 29.9 | 8.9 |
| Maximum | 17.0 | 5.0 | 15.0 | 10.0 | 33.0 | 2.3 |
| Minimum | 14.0 | 3.5 | 12.0 | 8.0 | 28.0 | 8.5 |

Male.....Differences from the female are as follows:

- 1) The yellow spots of the face are more vivid.
- 2) Antenna with 32 joints, about 8.3mm in length. Shorter than in female, the scape without black part.
- 3) The dorsal black part of the abdomen extends as long as 3rd or 4th segment, narrowly caudad.
- 4) Body length about 13mm, a little smaller than female. Extension of the fore-wings about 21mm (Table 3).

Table 3. Size of Males (mm)

| | Length of Bodies | Width of Bodies | Length of Fore-wings | Length of Post-wings | Extension of Wings | Length of Antennae |
|---------|------------------|-----------------|----------------------|----------------------|--------------------|--------------------|
| Average | 12.9 | 3.25 | 9.3 | 6.3 | 21.5 | 8.3 |
| Maximum | 15.0 | 4.0 | 11.0 | 7.5 | 25.0 | 9.5 |
| Minimum | 11.0 | 3.0 | 8.5 | 5.5 | 20.0 | 7.5 |

2. Egg (Plates I-8, 9)

Cymbiform, both ends of it process, light yellowish green in color at first, but three days after becomes purple-yellowish green, about 3×0.7mm in size (Table 4).

Table 4. Size of Eggs (mm)

| | Length of Bodies | Width of Bodies |
|---------|------------------|-----------------|
| Average | 3.17 | 0.87 |
| Maximum | 3.96 | 1.00 |
| Minimum | 3.04 | 0.70 |

Table 5. Size of Hatching Larvae (mm)

| | Length of Bodies | Width of Bodies |
|---------|------------------|-----------------|
| Average | 3.539 | 0.687 |
| Maximum | 4.348 | 0.739 |
| Minimum | 0.870 | 0.609 |

3. Larva.

Hatching larva.....Cylindrical in form, with large head and slender trunk; reddish yellow in color; head, thoracic legs and ocelli under antennae black; all over the trunk with cetae sparsely. Body length about 3.5mm width about 0.7mm (Table 5).

Mature larvae (Plate II-1).....Cylindrical in form, light yellowish brown in color; dorsal line and supra

spiracular lines red; head and dorsal side of central annulus of 1st thoracic segment cutinized brown; ocelli, mandible, tibiae and apical segment of subanal appendage black. Vertical furrow short, width of head width of thorax, mandible strong with one tooth, antenna with 7 joints, thoracic leg with 5 joints, subanal appendage with 3 joints, thorax and abdomen with microhairs sparsely, each joints of thoracic legs with 2-3 setae. Body length about 24mm, width about 4.7mm (Table 6).

Table 6. Size of Mature Larvae (mm)

| | Length of Bodies | Width of Bodies |
|---------|------------------|-----------------|
| Average | 27.46 | 4.51 |
| Maximum | 29.2 | 4.9 |
| Minimum | 23.0 | 3.5 |

Table 7. Size of Prepupae before Burrow (mm)

| | Length of Bodies | Width of Bodies |
|---------|------------------|-----------------|
| Average | 16.7 | 4.8 |
| Maximum | 19.5 | 5.5 |
| Minimum | 13.0 | 4.0 |

Prepupa (Plate II-5).....Orange yellow compound eyes black. Body length about 21mm, width about 5mm (Table 7).
Pupa (Plate II-8).....Liberal, yellow, but compound eyes and ocelli black. Body length of average 16.7mm (range, 19.5-13.0mm), width of average 4.8mm (range, 5.5-4.0mm).

Distribution and Habitat.

1. Distribution.

East Asian Subspecies (*A. posticalis posticalis* MATSUMURA).....Korea (unrecorded), Japan, Mongolia, and Siberia.

European Subspecies (*A. posticalis pinivora* ENSLIN).....Europe.

2. Habitat.

Kwang-nung, Ka-pyung, and Yang-ju in Kyung-gi Province, and Chun-song in Kang-won Province, Korea.

SUMMARY

The present paper describes on a Korean unrecorded Phamphiliid-sawfly (*Hymenoptera, Symphyta*). The sawfly is known to be *Acantholyda posticalis posticalis* MATSUMURA. Morphological descriptions on the adult, egg, larva, and pupa of the species are given in the present paper.

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Plate I

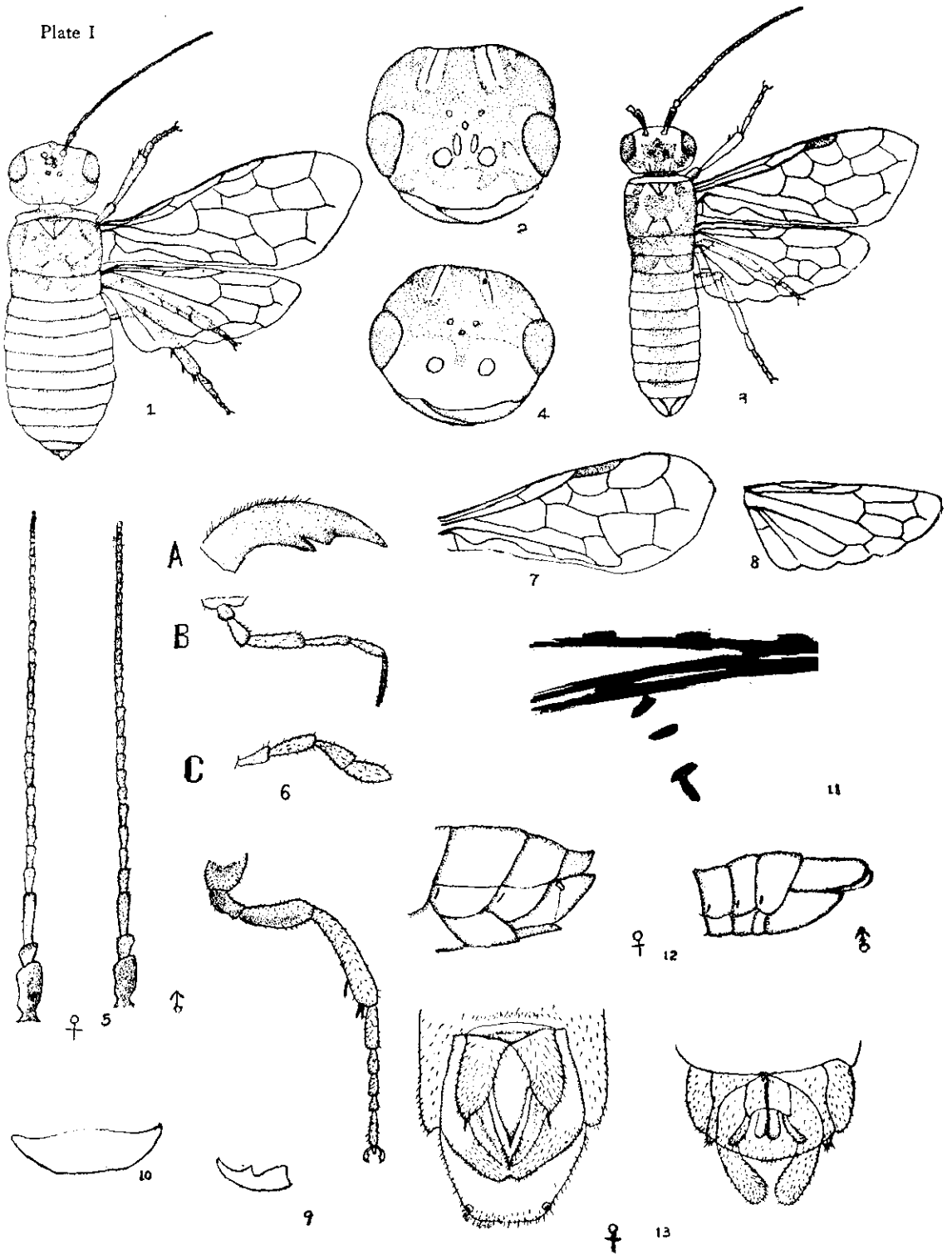
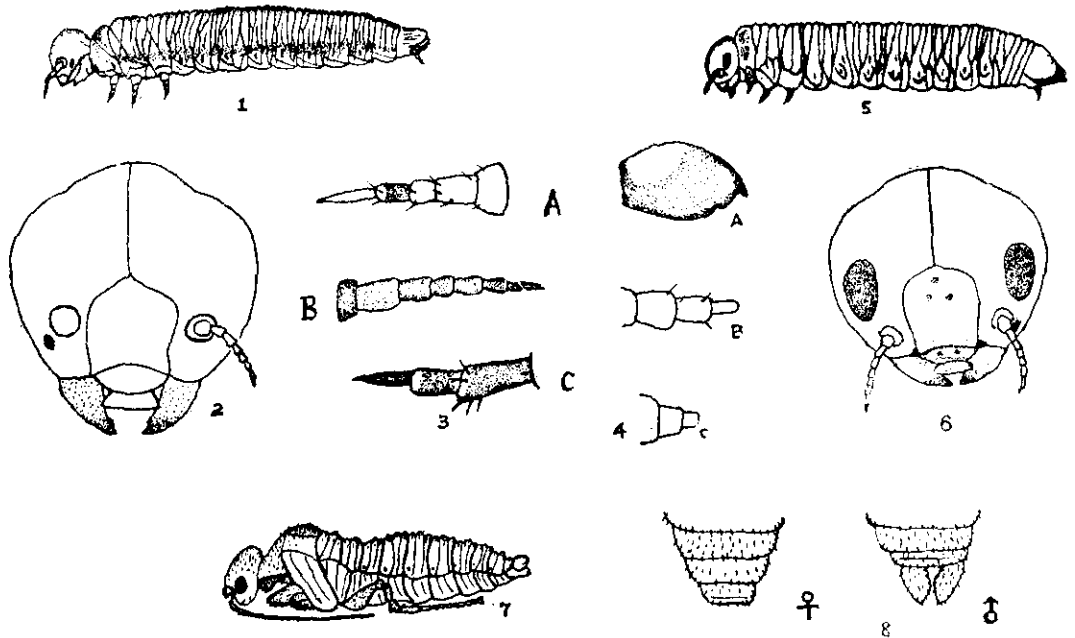


Plate II.



Explanation of the plates

Plate I

- 1 Adult (Female)
 2 Head of female adult (Front view) 3 Adult (Male)
 4 Head of male adult (Front view)
 5 Antennae (Female, Male)
 6 (A) Mandible of adult
 (B) Maxillary palpus of adult
 (C) Labial palpus of adult. (all female)
 7 Fore-wing of female 8 Post-wing of female
 9 Fore-leg of female 10 Egg
 11 Deposited eggs on the leaves 12 Telsons
 13 Genitalia

Plate II

- 1 Larva 2 Head of larva
 3 (A) Fore-leg of larva
 (B) Antenna of larva
 (C) Subanal appendage of larva
 4 (A) Mandible of larva
 (B) Maxillary palpus of larva
 (C) Labial palpus of larva
 5 Prepupa 6 Head of prepupa
 7 Pupa
 8 Telsons of pupae

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