

**Immature Stages of *Tipula (Yamatotipula) latemarginata*  
(Diptera, Tipulidae) from Korea**

**Dong Sang Kim\* and Jong Eun Lee**

(Department of Biological Science, College of Natural Sciences,  
Andong National University, Andong 760-749, Korea)

**ABSTRACT**

The present paper is a part of the study on the immature stages of genus *Tipula* in Korea. It describes and illustrates each immature stage of *Tipula (Yamatotipula) latemarginata* from egg to pupa.

Key words: Immature stages, crane-fly, Tipulidae, Korea

**INTRODUCTION**

*Tipula* is the largest genus of Tipulidae, but only a small number of species were studied about the immature stages and relationships between larvae, pupae and adults. The early taxonomic work on *Tipula* larvae had been carried out by Alexander (1920), and about 10 species of *Tipula* larvae and pupae were described in his classic monograph. Foote (1963) observed each immature stage of *T. footeana* Alexander and reported that the larval characters of the first instar differ considerably from the other three instars. Hofsvang (1979) described the larvae of *T. salicetorum* Siebke, and he showed that there were no differences in position of setae and numbers of protuberances among larvae of instars 2-4. Gelhaus (1986) studied the relationships between *Tipula* larvae and adults in North America, and classified to subgenera based on the characters of larvae. Kim (1971) reviewed nine previously described species of *Tipula* adults from Korea. Yoon and Kim (1992) described 16 species of *Tipula* larvae in Korea, but they tentatively classified these species and didn't inve-

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\* To whom correspondence should be addressed.

Tel: 054-673-2781, Fax: 054-823-1627, E-mail: sang0229@yahoo.co.kr

stigate any relationships with previously known adults. Up to now a study on relationships between larvae, pupae and adults of genus *Tipula* has not been yet carried out in Korea.

*T. (Yamatotipula) latemarginata* investigated in the present paper is an abundant and widely distributed, common crane-fly in Korea. The adults can be seen easily in grass field of the streams, rivers, ponds, lakes and so on. We describe each immature stage of the species.

## MATERIALS AND METHODS

The egg, larval and pupal specimens examined were collected in the field and reared in the laboratory from November 2000 to May 2002. Larvae used in this study were killed by dropping them into water near boiling. After 5 minutes, specimens were transferred to 10% formalin and left for several weeks. Then they were preserved in 70% ethanol for permanent storage. Pupae were immersed in Kahle's fluid for two days, then they were transferred to 70% ethanol for permanent storage. For fine morphological studies on the minute structure, the parts were mounted on slides and observed through a compound microscope. The abbreviations used in this paper are as follows: V, ventral; L, lateral; D, dorsal region. Materials used in this paper are deposited in the Insect Collection of Andong National University (ADU), Andong, Korea.

## DESCRIPTION

### ***Tipula (Yamatotipula) latemarginata* Alexander, 1921** 애아이노각다귀 (Fig. 1A-O)

**Egg.** Length 0.66-0.73 mm; width 0.21-0.25 mm (N = 30). Elongated-ovoid, with two sides equally wide, one end of egg a little more pointed than the other. Chorion shiny dark, without sculpturing. Micropyle subapical on pointed side. A coiled, thread-like filament at the end opposite the micropyle.

**Material examined.** 40 indiv., Gyeongbuk Prov., Bonghwa-gun, Naeseong Stream, 12 April 2001, D. S. Kim.

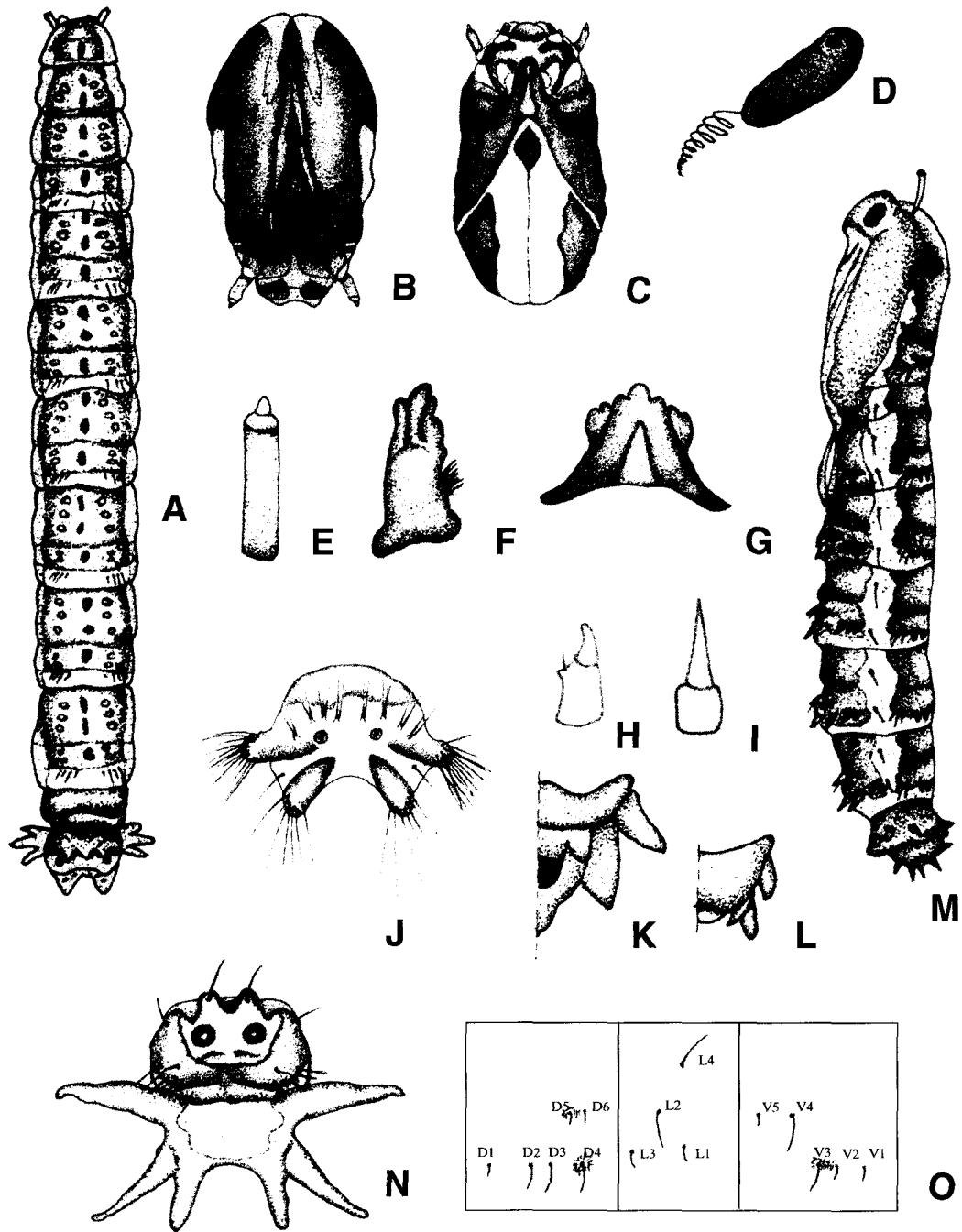
**First instar larva.** Length 2.8-4.7 mm; width (2nd abdominal segment) 0.3-0.5 mm (N = 30). Coloration pale yellow; body slender, moderately elongated. Anal gills, two pairs developed, one pair rudimentary. Spiracular lobes with two lateral lobes and two ventral lobes, dorsal lobes rudimentary; brush-type setae on apex of lateral and ventral lobes, apex of ventral lobes with 7 setae, one short, six long, 13 setae on apex of lateral lobes. Spiracles with one ring, pale yellow.

**Material examined.** 45 indiv., Gyeongbuk Prov., Bonghwa-gun, Naeseong Stream, 10 September 2001, D. S. Kim.

**Second instar larva.** Length 7.0-12.5 mm; width 0.8-1.3 mm (N = 30). Coloration pale grayish yellow. Spiracles two rings, inner ring very small and black, outer ring pale yellow. Other characters very similar to fourth instar larva.

**Material examined.** 34 indiv., Gyeongbuk Prov., Bonghwa-gun, Naeseong Stream, 10 October 2001, D. S. Kim.

**Third instar larva.** Length 13.0-19.0 mm; width 1.4-2.1 mm (N = 28). Coloration pale yellow;



**Fig. 1.** Immature stages of *Tipula (Yamatotipula) latemarginata*. Fourth instar larva: A, larva (dorsal view); B, head capsule (dorsal view); C, head capsule (ventral view); E, antenna; F, mandible; G, mentum; N, spiracular disc; O, chaetotaxy of abdominal segments 2-7. Pupa: H, spine of sternite on abdominal segments 5-7 (fore row); I, spine of sternite (hind row); K, cauda (♀); L, cauda (♂); M, male pupa (lateral view). Egg: D. First instar larva: J, spiracular disc.

abdominal segments I-V yellowish brown. Spiracles two rings, inner ring black, outer ring yellowish brown. Other characters very similar to fourth instar larva.

**Material examined.** 28 indiv., Gyeongbuk Prov., Bonghwa-gun, Naeseong Stream, 10 November 2001, D. S. Kim.

**Fourth instar larva.** Length 20.8-38.0 mm; width 2.4-4.4 mm (N = 30). Coloration yellowish brown to grayish brown; dorsum with button hole-like markings and a median longitudinal brown stripe. Body moderately elongated, terete, pubescent. Head capsule rather small, black; thinner part of lateral plates pale yellow. Mentum of head capsule with seven distinct teeth anteriorly, median tooth the largest; mandible with four teeth. Antenna elongate, cylindrical; apex with very small apical disk, button-like. First abdominal segment shorter than remaining segments; abdominal segments II-VII each divided into two rings, long anterior and short posterior.

Chaetotaxy of abdominal segments II-VII as follows: Dorsum with six setae arranged in anterior row of two (D5 and D6) and posterior row of four (D1-D4); D2-D4 long, D5 short, many macroscopic hairs around D4-D5. Lateral region with four setae, L1-L3 fairly close together on posterior ring, L4 on anterior ring; L2 and L4 long, L1 and L3 short. Venter with five setae; V1-V3 close together, V4 and V5 slightly anterior to V1-V3, V3-V4 very long, V5 short, V1 especially slender and short, many macroscopic hairs between V2 and V3.

Spiracular disc with three pairs of lobes; each lobe with numerous marginal hairs and marginal brown stripes. Ventral lobes with markings; black, short, transverse and rod-like marking at base, very small black disc on apex, indistinct and longitudinal brown stripe from apex to base. Each dorsal lobe with a short seta on apex; each lateral lobe with four setae; each ventral lobe with eight setae. Spiracle with two rings; inner ring black, outer ring dark brown. Anal gills with three pairs developed, large.

**Material examined.** 51 indiv., Gyeongbuk Prov., Bonghwa-gun, Naeseong Stream, 10 March 2002, D. S. Kim.

**Pupa.** Length 15.0-20.0 mm; width (at the wing base) 2.5-3.2 mm (N = 25). Coloration yellowish brown to dark brown; wing sheaths light brown; pleural region of abdomen light yellow. Antenna slender, moderately elongated, extending some distance beyond wing root. Pronotal breathing horns short, with tips slightly enlarged, flattened, smooth. Labrum broad, apex pointed. Labial lobes oval. Maxillary palpi strongly recurved at tips. Wing sheaths extending just beyond end of second abdominal segment. Leg sheaths extending beyond base of fourth abdominal segment. Abdominal tergites with weak spines; spines with a transverse row at base of posterior ring; no spines on anterior ring. Sternites with strong armature of posterior ring; two transverse row of spines on abdominal segments V-VII, with two spines on fore row and no fixed number on hind row. Pleurites with a single strong spine on each ring. Male cauda on dorsum with six lobes spinous-tipped, sharply pointed. Eighth segment with eight spines; on ventral and lateral region with six strongly sclerotized spines, on dorsal region with two small hook-like spines. Female cauda on dorsum with six spinous lobes; female ovipositor elongate, tergal valves long and straight, sternal valves a little shorter. Eighth segment on ventral and lateral region with six very strong spines.

**Material examined.** 18 ♂♂, 9 ♀♀, Gyeongbuk Prov., Bonghwa-gun, Naeseong Stream. 5 April 2002, D. S. Kim.

**Remarks.** *Tipula (Yamatotipula) latemarginata* is characterized by dorsal part of the body with

button hole-like markings and a median longitudinal brown stripe. The spiracular disc of the species has three pairs of lobes and the ventral lobes have rod-like markings at base. Sixteen species of *Tipula* larvae have been described in Korea (Yoon and Kim, 1992), but they were tentatively classified, so the relationships with adults are unknown. The larva *T. KUb* described corresponds to this species as *T. KUb* has the button hole-like markings and median longitudinal brown stripe on dorsum and the rod-like markings at the base of ventral lobes. Other characters of *T. KUb* also are very similar to this species. So it is concluded that the larva *T. KUb* is that of *T. (Y.) latemarginata*.

**Distribution.** Korea, Japan, Sakhalin.

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한국산 애아이노각다귀 (파리목, 각다귀과)의 미성숙기의 형태

김 동 상 · 이 종 은  
(안동대학교 자연과학대학 생명과학과)

요 약

*Tipula*속에 속하는 한국산 애아이노각다귀 (*Tipula latemarginata*)의 알, 유충, 번데기 시기에 대한 분류학적 연구를 수행하였으며, 이 종의 미성숙 단계는 한국에서 처음 기재된다.