

## Description of *Aedes (Aedimorphus) alboscuteUellatus* occurring in Korea

Kwan Woo Lee, Allen N. Hunt and Philip E. Fleicher

Entomology Section, 5th Preventive Medicine Unit, U.S. Army

### INTRODUCTION

The reference collections of mosquito larvae near the 38th parallel which divides North and South Korea were carried out for the first time as a concern of the 5th Preventive Medicine Unit in 1979 and 1980. There are a number of open marshes and ground pools which have provided natural larval breeding sites since the Korean war of 1950. Light trap collections were carried out near Camp Liberty Bell from 1975 to 1980. In 1975 adults of *Aedes lineatopennis* Ludlow were collected. With the intention of collecting larvae of *Aedes lineatopennis*, collections were performed in July 1979 and 1980. Nine larvae of *Aedes alboscuteUellatus* (Theobald), one of unconfirmed species, were collected and reared in laboratory. One female specimen with associated larval and pupal skins and one male with genitalia were furnished to the Smithsonian Institution for verification and permanent deposition. One female with associated larval and pupal skins and one male specimens were deposited in the 5th Preventive Medicine Unit reference collection.

There are two previous records (Reisen *et al.*, 1971 and Hong, 1978) of this species. Their reports are based on female collections only, without any male, larva or pupa which have the main taxonomic characters.

In this paper the authors intend to give detailed descriptions accompanied by illustrations of adult, larva, pupa and male genitalia. The method of presentation, terminology and abbreviations used in the descriptions follow Reinert (1973).

viations used in the descriptions follow Reinert (1973).

### DESCRIPTION

Variations from Reinert (1973) are noted with an asterisk (\*).

*Aedes (Aedimorphus) alboscuteUellatus*  
Theobald, 1905

**FEMALE** (FIG. 1-A, B).

**Head:** Antenna dark brown, approximately 1.13 length of proboscis, pedicel brownish pale, apparently bared but actually with a few short fine brown hairs mesally, flagellomere 1 with basal 0.5 pale and with a few small brown scales; clypeus dark brown, bare; maxillary palpus brown scaled, approximately 0.17 length of proboscis; proboscis brown scaled with a ventral pale area from near base to apical 0.3, approximately 1.15 length of femur I; vertex with dorsum covered with narrow decumbent scales arranged in an anteromedian diamond-shaped brown group and the remainder whitish; lateral surface covered with broad pale scales, an anterodorsal dark patch and a dusky area anterior to antepronotum; numerous dark brown erect forked scales on occiput and vertex extending anteriorly to ocular line. **Thorax:** Scutal integument brown; scutum covered with narrow curved reddish-black scales, not narrow curved white scales forming distinct spots on scutal fossal areas (lateral and posterior) and supra-alar area at base of wing\*, narrow curved yellowish-brown scales on anterior promontory area, anterior scutal fossal area and at scutal angle, a few similar scales scattered on area mesally to acrostichal setae and along lateral margins of prescutellar space; scutellum with a patch of long, broad overlapping silvery scales on each

lobe; median anterior promontory, acrostichal, dorso-central (anterior and posterior), scutal fossal, supralar, several posterior medial scutal and scutellar (lateral and median) bristles reddish-black and well developed; pleural integument brown; antep pronotum with narrow curved yellowish brown scales, several moderately long brown bristles; postpronotum with narrow dark brown scales dorsally and a few yellowish ones posteroventrally, 6 dark posterior bristles; propleuron with a patch of broad silvery-white scales, several light brown bristles; postspiracular area with 7 light brown bristles; subspiracular area with a patch of broad silvery-white scales\*; mesepisternum (sternopleuron) with an upper and a posterior patch of broad silvery-white scales, several upper and posterior brown bristles, lower ones shorter; prealar knob with several light brown bristles; paratergite with a few dusky-white scales; mesepimeron with a patch of broad silvery-white scales and several brown bristles on upper area; other pleural areas bare. *Legs*: Coxae I-III each with several brown bristles, I with anterior surface covered with broad pale brownish scales and a small dorsal patch of silvery-white ones. II with an anterior patch of broad silvery-white scales, III with a small antero-ventral patch of silvery-white scales; trochanters I-III with a few broad white scales; femurs I-III brown, with a few latero-apical white scales, II, III each with a dorsoapical white spot, III with an anteroventral longitudinal pale stripe, wide at base and tapering at apex, I-III each with posterior surface with a longitudinal pale stripe, wide at base and tapering to apex; tibiae I, II brown, each with a dorsoapical white scale patch and a posteroventral longitudinal pale stripe, III brown with an apical white band; tarsi I-III brown; posttarsi I-III each with 2 ungues, I, II equal, each bearing a tooth, III equal, simple. *Wing*: Dorsal veins covered with moderately broad brown scales; costa with a patch of white scales at base; ventral veins brown scaled; alula with narrow brown scales along fringe; 2 remigial bristles. *Halter*: Pedicel pale, capitellum light brown scaled. *Abdomen*: Tergum I brown with a rectangular patch of white scales on laterotergite; terga brown, III-VII each with a few dorsobasal pale scales (pale scales occasionally forming narrow indistinct bands), a few dorsomedian pale scales on VI in some specimens, II-VII each with a large laterobasal white spot; sterna white each with apical brown scaled, brown apical bands broader on post-

erior sterna; terga and sterna with numerous golden bristles, mostly along posterior margins.

*MALE*.— Similar to female in general habitus. *Head*: Maxillary palpus brown, longer than proboscis by length of apical segment; proboscis dark brown scaled with a small ventral pale spot near middle; vertex without anterodorsal dark patch on lateral surface. *Thorax*: Antep pronotum with a few broad pale scales; postpronotum with fewer scales. *Legs*: Posttarsi I-III each with 2 claws, I, II with claws unequal each bearing a tooth, III equal, simple. *Abdomen*: Tergum I with a lateral band of white scales on laterotergite; terga III-VIII each with a broad basal pale band; sternum VIII white scaled. *Genitalia* (FIG. 1-C, D): Tergum IX strongly bilobed with 5 bristles on each lobe, entire surface covered with minute spicules, gonocoxite long and moderately broad, dorsal surface with short fine bristles forming an elongate patch along tergomesal margin from apex to base and extending over basal 0.25, long stout bristles along outer lateral margin from base to apex and on apical 0.35 of ventral surface, scattered short to moderately long bristles mesally on basal 0.95 of ventral surface, scattered scales on lateral and ventral surfaces; gonostylus with pedicel narrow and short, distal 0.8 greatly expanded with a lateroapical horn-like flap bearing a number of moderately long fine hairs, mesal margin of expanded portion with a moderately long flattened, pigmented gonostylar claw near base and 3 small and 3 medium sized accessory claws distally\*, 5 moderately long fine hairs along apical margin and many short fine hairs scattered over tergal surface of expanded area; basal mesal lobe short, with 2 short and 3 moderately long bristles, a long narrow lightly pigmented filament extending from apex to near base of gonostylus and attached to nesal membrane of gonocoxite, entire surface of basal portion covered with short hairlike spicules; proctiger short, paraproct with a subapical thumb-like process, cercal setae absent; phallosome with aedeagus with 2 lateral plates not connected basally, each plate with 6 short, blunt, lateral teeth on distal 0.55 and covered with a dorsal flap, paramere long, approximately 0.5 length of lateral plate; sternum IX large, entire surface covered with minute spicules, 3-5 bristles near center.

*PUPA* (FIG. 2). Chaetotaxy as figured. *Cephalo-*

**thorax:** Hair 5-C with 6 branches, 7-C with 6 branches, 8-C with 7 branches, 9-C with 3 branches. **Respiratory trumpet:** Moderately pigmented; index 5.1. **Metanotum:** Hair 10-C with 5 branches; 11-C single; 12-C with 6 branches. **Abdomen:** Hair 5-I with 4 branches; 1-II with 6 branches; 4-II with 5 branches; 1-III with 7 branches; 6-VI with 5 branches; 1-VII with 7 branches; 6-VII and 9-VII -? (broken); 11-VII double. **Paddle:** Ovoid; with very minute serrations along basal 0.5 of outer margin; tiny spicules along apical 0.5 of outer and apical 0.2 of inner margins; midrib does not reach apex; hair 1-P short, single\*; index 1.17.

**LARVA (FIG. 3).** Chaetotaxy as follow. **Head:** Hairs 1, 3-C single; 4-C with 6 branches; 5-C with 6 branches; 6-C with 5 branches; 7-C with 9 branches; 8-C with 4 branches; 9-C with 5 branches; 10-C triple; 11-C with 4 branches; 12-C with 5-9 branches; 13-C with 6 branches; 14-C single; 15-C with 5 branches; basal maxillary hair single; mental plate with 22 teeth. **Antenna:** Lightly pigmented; numerous spicules on basal 0.3 and a few scattered over remainder of shaft; hair 1-A with 7 branches, inserted at 0.4 from base; 2-A long; 3-A approximately 0.7 length of 2-A. **Thorax:** Hair 0-P bushed; 1, 5, 6, 12-P single; 2-P with 4 branches; 3-P with 5 branches; 4-P with 3 branches; 7-P with 3 branches; 8, 10-P single; 9-P double; 11-P with 3 branches; 14-P triple; 1-M with 6 branches; 2-M with 3 branches; 3-M with 3 branches; 4-M with 7 branches; 5, 7, 10, 12-M single; 6-M with 6 branches; 8-M with 9 branches; 9-M with 10 branches; 11-M single; 13, 14-M bushed; 1-T single; 2-T with 5 branches; 3-T bushed with over 20 branches; 4-T with 4 branches; 5-T single; 6-T with 3 branches; 7-T with 9 branches; 8-T bushed; 10, 11-T single; 12-T double; 13-T bushed. **Abdomen:** Hairs 1, 2-VIII on common basal plate; 0, 14-VIII single; 1-VIII with 11 branches; 2-VIII with 4 branches; 3-VIII with 14 branches; 4-VIII with 3 branches; 5-VIII with 5 branches; 6-VIII not distinct; comb with 18 scales arranged in 3 irregular rows, scales each short and blunt with stout denticles on margins and apex; 1-X triple; 2-X with 12 branches; 3-X single; ventral brush 10 hairs on grid and 4 precratal ones; saddle moderately pigmented with minute ridges, scale-like segment, with a few spicules along posterior margin, acus present; 4 anal papillae, long, each with a broad base and tapering to a pointed apex. **Siphon:** Moderately pig-

mented with minute ridges over entire surface; acus present; index 5.5; Pecten with 14 teeth, apical 1-3 teeth smooth and wider spaced than remainder which have a slender apical attenuated filament with 1-3 basal denticles; hair 1-S with 8 branches, inserted at 0.7 from base.

## TAXONOMIC DISCUSSION

Only the *Aedes alboscuteallatus* (Theobald) and *Aedes vexans nipponii* (Theobald) representing subgenus *Aedimorphus* have been reported to occur in Korea. This subgenus can be separated from others by the first hind tarsal segment being shorter than tibia and no lower mesepimeral bristles. *Aedes alboscuteallatus* is easily separated from *Aedes vexans nipponii* by the abdominal tergites with pure white basal lateral spots, hind tarsi entirely dark and the broad silvery scales on the scutellum. In addition to the above descriptions of *Aedes alboscuteallatus*, the postspiracular area has bristles only without a patch of white scales.

Compared with the Reinert's (1973) and Tanaka's (1979) description of the species, ours has several minor differences. These are as follows: (a) gonostylar claw 7 (6 accessory claws) and (b) basal mesal lobe with 5 setae (2 short and 3 moderately long) in male terminalia, (c) subspiracular area with a patch of white scales in adult instead of short fine hairs. However, since *Aedes alboscuteallatus* is such a widespread species, and is known to be variable, this is considered to be a geographical variation of the same species.

**DISTRIBUTION:** Korea.- Joint Security Area, Northern part of Paju Kyungkido. **World.-** Australia, Bismarck Archipelago, India, Indonesia, Malaysia, Philippines, Solomon Island, South Vietnam, Thailand, Admiralty Island, Burma, Ceylon, Japan, New Britain (Reinert, 1973).

**BIOLOGY:** Larvae are found in small ground pools averaging 25 meter in diameter and 20-25 centimeter deep. A variety of grasses were growing in the pools where our collections were made. The density of the grasses ranged from 50%~80% ground cover. Water in the pools

was relatively clear and dried shortly after the end of the rainy season. Adults can be collected biting cattle and man, preferably in shaded areas (Reinert, 1973). Bait and light trap collections have not been conducted.

## REFERENCES

- Barraud, P. J. (1934) The Fauna of British India including Ceylon, Burma, Diptera 6, Culicidae. Taylor and Francis, London, p. 250-251.
- Belkin, J. N. (1962) The mosquitoes of the South Pacific (Diptera, Culicidae). Volume I, p. 425-426 and II, fig. 296-298.
- 홍한기 (1978) 한국산 *Aedes*속 모기 미기록 1종과 그의 흡혈습성 조사에 관하여. 한국곤충학회지, 8 (1): 42. (초록)
- Knight, K.L. and Stone, A. (1977) A catalog of the mosquitoes of the world (Diptera: Culicidae). The Thomas Say Foundation, Volume VI: 73, Maryland.
- La Casse, W. J. and Yamaguti, S. (1950) Mosquito Fauna of Japan and Korea. p. 130-133, Kyoto.
- Lee, K.W. and Lien, J.C. (1970) Pictorial key to the mosquitoes of Korea, WHO/VBC/70, 196, pp. 7.
- Lee, K.W. *et al.* (1971) Illustrated Encyclopedia of Diptera of Korea. Fauna and Flora of Korea, Vol. 12 Insecta(IV). Samhwa Publishing Co. p. 679-757, Seoul.
- Lee, K.W. and Lee, J.S. (1957) Taxonomic study of Korean mosquitoes. *Korean J. Limnology*, 8 (3/4): 59-61.
- Reinert, J.F. (1973) Contributions to the mosquito fauna of Southeast Asia. XVI. Genus *Aedes* Meigen, Subgenus *Aedimorphus* Theobald. Vol. 9, No. 5: 17-23, Washington.
- Reisen, W.K. *et al.* (1971) The distribution and abundance of mosquitoes on USAF installations in Asia for 1970. 1st Med. Soc. Wing (PACAF). p. 40.
- Tanaka, K., Mizusawa, K. and Saugstad, E.S. (1979) A revision of the adult and larval mosquitoes of Japan (Including the Ryukyu Archipelago and the Ogasawara islands) and Korea (Diptera: Culicidae). *Contributions of Am. Ent. Ins.*, 16: 407-410.
- Theobald, F. V. (1905) A catalogue of Culicidae in The Hungarian National Museum, with descriptions of new genera and species. *Ann. Hist. Nat. Mus. Hung.*, 3:61-120.

＝국문초록＝

## 한국산 숲모기 *Aedes (Aedimorphus) alboscuteallatus*에 대한 분류학적 기술

미육군 예방의무부 곤충연구실

이관우, 알렌 엔 헌트, 필립 이 후레이서

1979~1980年 七月初에 西部 비무장지대(DMZ)에서 모기 幼蟲採集을 실시한 바 *Aedes alboscuteallatus*의 유충을 채집하여 飼育한 결과 成蟲(♀, ♂), 完全幼蟲, 幼蟲 및 蛹의 脫皮殼 등 分類에 必要한 資料를 얻었다. 이 種은 Reisen등(1971)에 依하여 韓國에서 처음 成蟲(♀)채집을 記錄하였으나 이를 確證할 만한 標本이나 分類學的인 記載가 없어 分類상의 誤識으로 看做되어 왔었다. 著者등은 본 채집을 통하여 分類上 必要한 모든 資料를 收集하였기에 成蟲(♀, ♂), 幼蟲, 蛹, 雄蟲生殖器 등의 特徵을 Reinert(1973)의 기재와 詳細히 比較 檢討한 결과 雄蟲에서 gonostylar claw와 basal mesal lobe에 있는 剛毛의 數가 다르고 雌雄蟲에서는 subspiracular area에 흰 비늘들이 모여있는 점을 발견하였다. 그러나 이들 차이점을 여기에서는 단지 地理的 變化로 看做하였으므로 더 많은 수의 채집을 통하여 보다 確實한 究明이 要求된다. 이 標本の 長期保管을 위하여 암수 각 한개씩의 標本과 그에 수반되는 유충 및 蛹의 脫皮殼 標本을 미국 Smithsonian研究所에 보냈으며 나머지는 미 8군 예방의무부 곤충연구실에 보관되어 있다.

FIG.1-A,B: ADULT (F)  
C,D: GENITALIA (M)

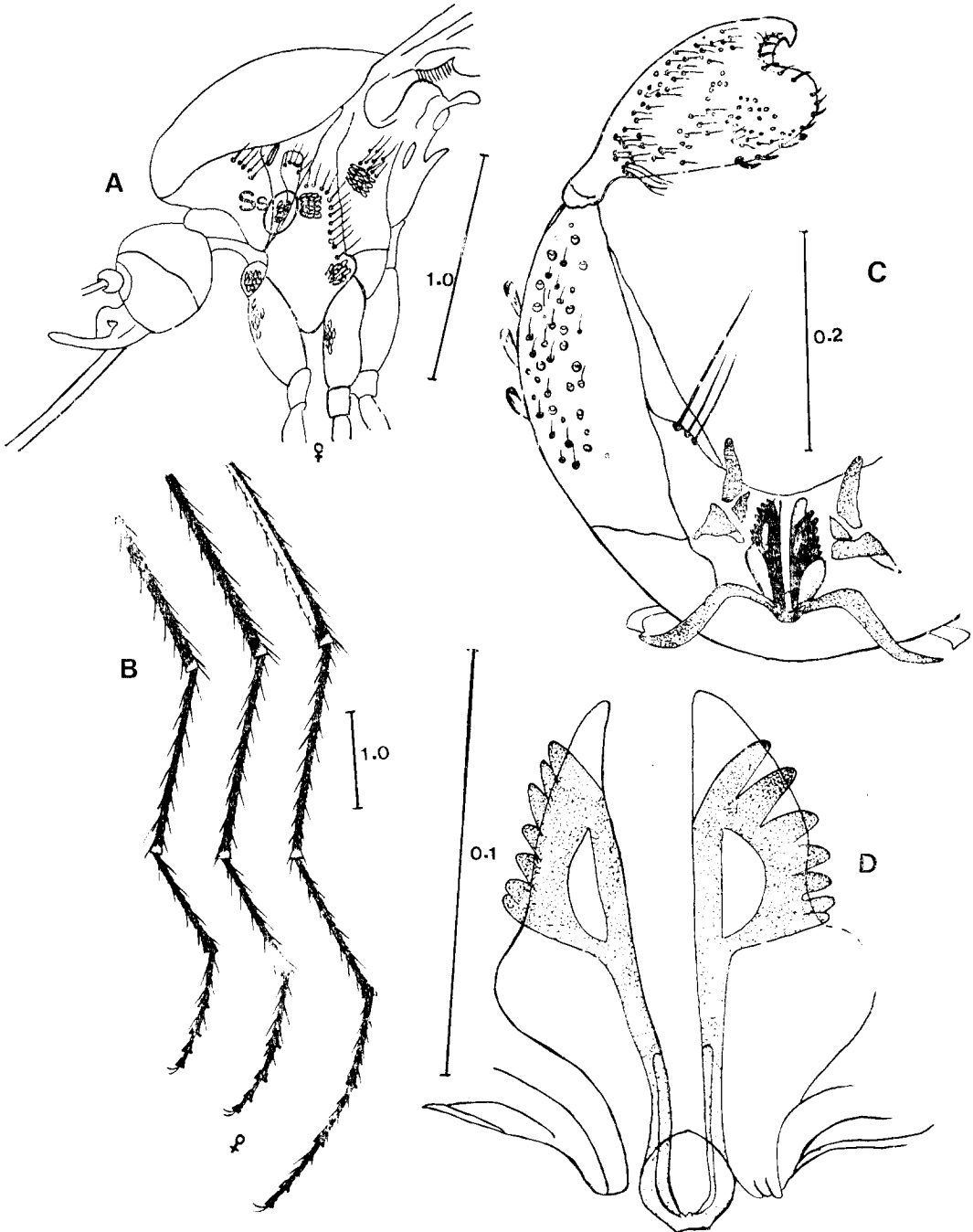


FIG.2: PUPA

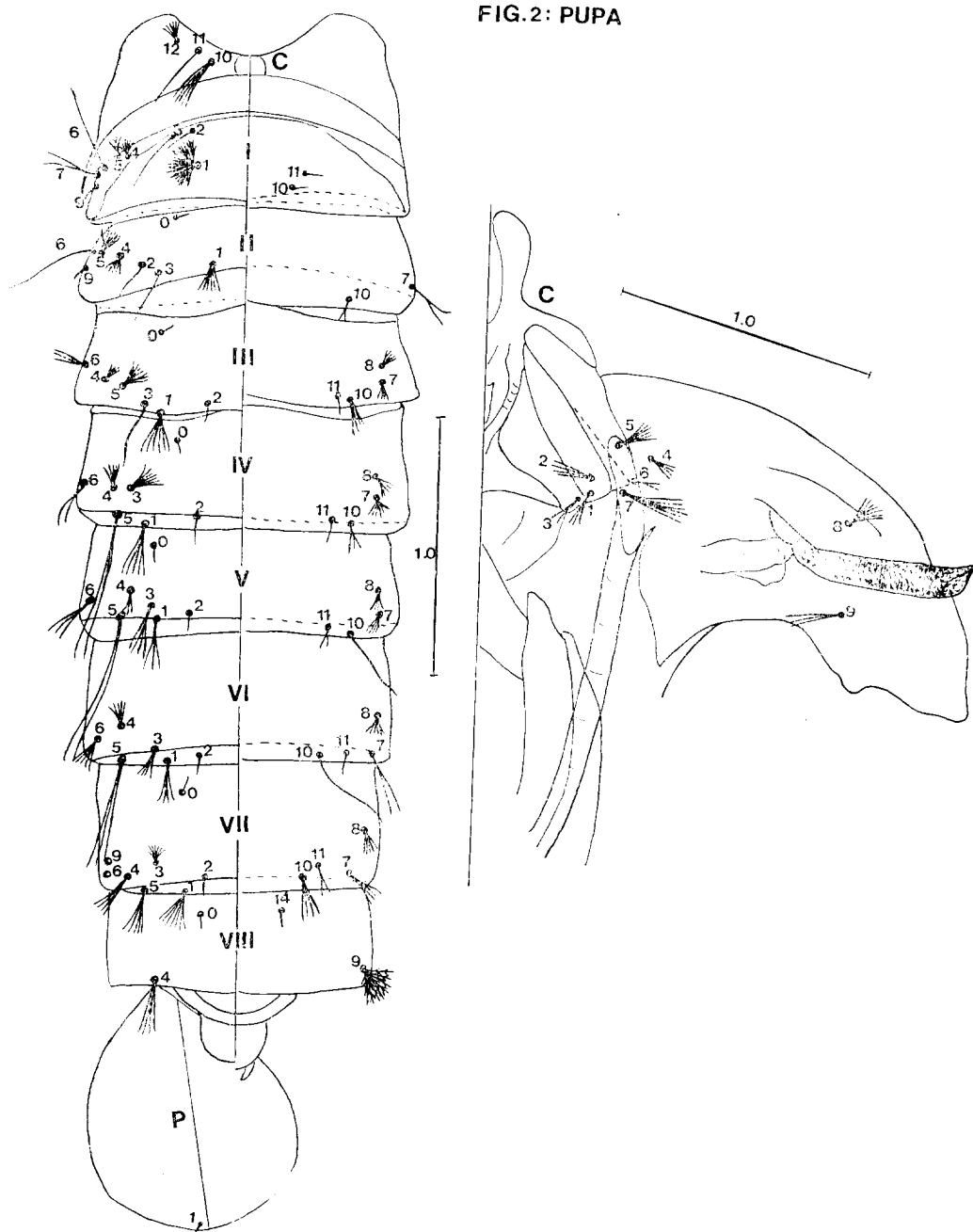


FIG.3: LARVA

