

Taxonomic Study on Pemphigidae (Aphidoidea; Homoptera) from Korea

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한국의 면총과(매미목: 진딧물상과)에 관한 분류학적 연구

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적 요

1989년 5월부터 1993년 4월까지 남한의 16개 지소에서 채집된 면총과 (Pemphigidae) 표본들을 동정 분류한 결과 7속 11종이 얻어졌다. 그 중 *Colophina zelkova* n. sp., *Proiophilus chaenomelis* n. sp., *Tetraneura pumilae* n. sp., *Tetraneura iriensis* n. sp.의 4종은 신종으로서 그들에 관하여 기재하고 그림을 그렸다.

Key words: Aphid, Pemphigidae, Taxonomy, Korea

INTRODUCTION

The Pemphigidae is a group of aphids which are dioecious, making galls or leaf-curling on primary host. The family is consisted of only three subfamilies; Eriosomatinae, Pemphiginae and Fordinae

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(Ilharco & Van Harten, 1987). But the taxonomy of this group is difficult because their life cycles are complex and the various generations of the same species are usually very different. Some species migrate to root of woody secondary hosts, others to roots or aerial parts of herbaceous secondary hosts. Besides it was discovered that several species of Pemphigidae have "altruistic behavior" in first instar nymph, so called "soldier" caste (Aoki, 1976). Thus in some groups, a reliable identification depends on studies of life cycles and host plant affinities (Heie, 1980).

On the other hand present study was accomplished by dealing with characters based on alate viviparous females (emigrants), because this morph is most important to classification.

Until 1985, the taxonomic studies on family Pemphigidae of Korea had been carried out by Okamoto and Takahashi (1927), Paik (1972), Hille Ris Lambers (1970), and Akimoto (1985). Among them, Paik (1972) had made prominent taxonomic works and published the "Illustrated Encyclopedia on Aphididae of Korea", in which he presented 31 species of Pemphigidae. But after that time there are not taxonomic studies except some ecological studies on Korean Pemphigidae.

Recently, we collected 11 species of Pemphigidae including four species new to science. Thus we report them with their ecological data in this paper.

The type specimens of new species and the other specimens reported in this paper are deposited in the Collection of Department of Biology, Chonbuk National University.

SYSTEMATIC ACCOUNT

Subfamily Eriosomatinae, 사과면충 아과(신칭)

1. *Colophina clematis* (Shinji, 1922) 할미질빵어리면충

Pemphigus clematis Shinji, 1922, (p. 531).

Eriosoma clematis Takahashi, 1924, (p. 99); Shinji, 1941, (p. 1,055, fig. 509)

Colophina clematicola: Paik, 1972, (p. 590, fig. 288).

Colophina clematis: Aoki, 1976, (p. 130, fig. 1); Eastop et Hille Ris Lambers, 1976, (p. 191).

Material examined. 1 alate sexuparae, Moonyudo, Chonbuk, 23-IX-89, ex *Clematis mandshurica*, W.K. Lee leg.; 6 apterous viviparous females, Kochang, Chonbuk, 1-VII-90, ex *Clematis apiifolia*, H.Y. Seo leg.

Host plants. *Clematis mandshurica* Rupr.(으아리), *Clematis apiifolia* A.P.(사위질빵).

Remark. This species feeds on stems of host plants but makes globular, loosely closed galls on the margin of leaves of primary host, *Zelkova serrata*.

Distribution. Korea, Japan.

2. *Colophina zelkova* n. sp. 느티어리면충(신칭)(Fig. 1)

Material examined. Holotype: Alate viviparous female (910626-1), Kyungju, Kyungbuk, 24-VI-91, ex *Zelkova serrata*, W.K. Lee leg.; Paratypes- 3 alate viviparous females, Kyungju, Kyungbuk, 24-VI-91, ex *Zelkova serrata*, W.K. Lee leg.; 4 alate viviparous females, Naju, Chonnam, 26-VI-92, ex *Zelkova serrata*, H.Y. Seo leg.; 4 alate viviparous females, Kunsan, Chonbuk, 9-VII-92, ex *Zelkova serrata*, W.K. Lee leg.

Description. Alate viviparous females (emigrant). Body 1.70 (1.52-1.90) mm long.

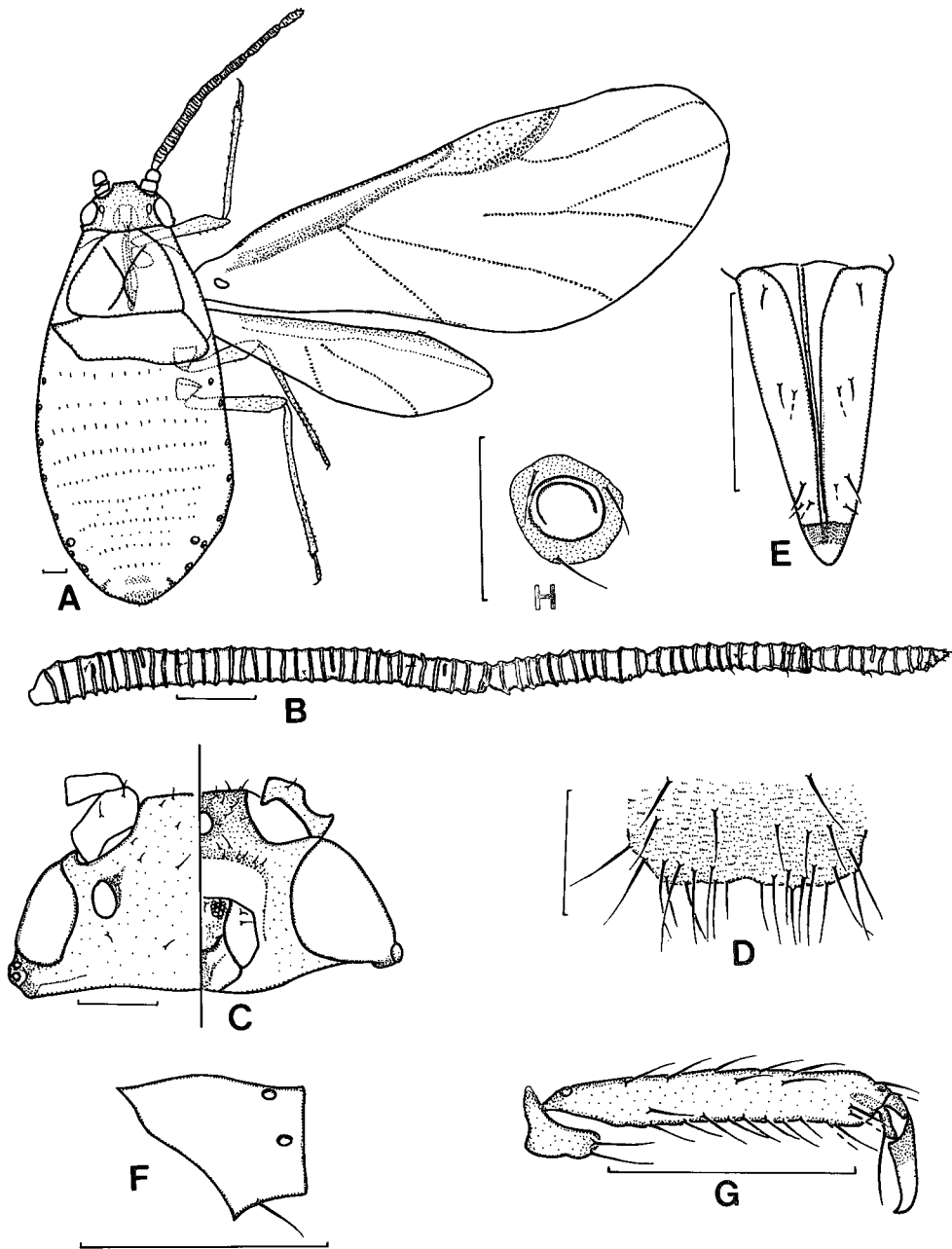


Fig. 1. *Colophina zelkoveae* n. sp. (alate): A, dorsal view (whole body); B, antennal segment III-VI; C, head; D, genital plate; E, ultimate rostral segment; F, hind femorotrochanter; G, hind tarsus; H, cornicle (scales: 100 μ m).

Abdominal tergites membranous except around cornicles. Head, thorax, antennae and legs brown. Abdomen with wax gland plates. Antennae 6-segmented, 1.06 (0.94-1.18) mm long, 0.63 (0.54-0.69) times as long as body, 8.6 (7.5-9.5) times as long as hind tarsus II; processus terminalis short, conical, without spinules on whole segment; antennal segment III relatively long, 3.8 times as long as

segment IV; segment IV a little shorter than segment V; secondary rhinaria on segment III-VI narrow, upheaving and often nearly completely encircling antennal segments; number of secondary rhinaria on antennal segment III 32-44, IV 9-13, V 11-18, VI 8-11. Primary rhinaria irregular in shape, faintly ciliated. Antennal setae very short, mainly present on dorsal side, 0.005-0.010 mm long on segment V; segment I with 2-3 setae, II with 5-7 setae, III with 3-7 setae, IV with 1-4 setae, V with 2-4 setae, and VI with 1-3 setae.

Head with 6 pairs of setae on dorsum, Rostrum reaching between fore and mid coxa. Ultimate rostral segment 0.10 mm long, 0.81 (0.70-0.87) times as long as hind tarsus II, with 4 secondary setae. Femorotrochanter of hind legs 0.062 mm long; middle diameter of hind tibial segment 1.3 (1.1-1.5) times as long as longest setae on that segment. Tarsi 2-segmented; 1st segment with 1 sense peg and 2 setae on fore and mid legs, but 2 setae only on hind legs; 2nd segment of hind tarsus 0.12-0.13 mm long and with 21-23 secondary setae. Empodial setae slender, nearly as long as claws. Abdominal tergites without sclerites. Cornicle semi-ring like, diameter about 0.036 mm, weakly sclerotized around. Cauda broadly rounded shape. Forewings with 1 media once branched.

Host plant. *Zelkova serrata* Makino (느티나무)

Etymology. This species is named after host plant *Zelkova*.

Remarks. This species made a pouch gall on leaf of the host plant. This species is readily distinguished from *Colophina clematis* (Shinji, 1992) by the following characters in alate viviparous female (emigrant); 1) Body 1.70 (1.52-1.90) mm long (about 2.70 mm in *C. clematis*). 2) Antennae with very short setae (without setae in *C. clematis*). 3) Rostrum reaching between fore and hind coxae (beyond hind coxae in *C. clematis*). 4) The number of secondary rhinaria on antennal segment III, 32-44 (40-45 in *C. clematis*).

Distribution. Korea.

3. *Eriosoma yangi* Takahashi, 1939 대만면충

Eriosoma yangi Takahashi, 1939, (p. 142).

Eriosoma yangi: Paik, 1972, (p. 596, fig. 292); Eastop et Hille Ris Lambers, 1976, (p. 191); Akimoto, 1983: (P.43).

Material examined. 4 alate viviparous females, Chollipo, Chungnam, 15-VI-92, ex *Ulmus* sp., H. Y. Seo leg.

Host plant. *Ulmus* sp.(느릅나무속).

Remarks. This aphid species was found in the leaf-rolled galls of *Ulmus* sp. Body was covered with gray wax materials.

Distribution. Korea, Japan, Taiwan.

4. *Paracolopha morrisoni* (Baker, 1919) 외줄면충

Dryopeia morrisoni Baker, 1919, (p. 104).

Tetraneura moriokaensis Monzen, 1923, (p. 1).

Watabura moriokaensis Monzen, 1929a, (p. 29).

Tetraneura nishiyae Takahashi, 1931, (p. 102).

Dryopeia nishiyae Shinji, 1941, (p. 1,070, fig. 519).

Paracolopha morrisoni Hille Ris Lambers, 1966, (p. 600); Akimoto, 1985, (p. 7).

Colopha moriokaensis: Higuchi et Miyazaki, 1969, (p. 55); Paik, 1972, (p. 676); Eastop et Hille Ris Lambers, 1976, (p. 160); Sorin, 1977, (p. 9); Moritsu, 1983, (p. 455).

Tetraneura zelkovisucta Zhang et Zhong, 1983, (p. 86, fig. 9).

Material examined. 4 alate viviparous females, Chonju, Chonbuk, 6-VI-90, ex *Zelkova serrata*, W. K. Lee leg.; 4 alate viviparous females, Namwon, Chonbuk, 6-VI-90, ex *Zelkova serrata*, H.Y. Seo leg.; 3 alate viviparous females, Yesan, Chungnam, 7-V-90, ex *Zelkova serrata*, H.Y. Seo leg.; 4 alate viviparous females, Yesan, Chungnam, 7-VI-90, ex *Pseudosasa japonica*, H.Y. Seo leg.; 4 alate viviparous females, Choochon, Chonbuk, 10-VI-90, ex *Zelkova serrata*, W.K. Lee leg.; 4 alate viviparous females, Ullungdo, Kyungbuk, 6-VI-91, ex *Zelkova serrata*, H.Y. Seo leg.

Host plants. *Zelkova serrata* Makino (느티나무), *Pseudosasa japonica* Makino (이대).

Remarks. The aphid of this species made pouch galls on *Zelkova serrata* and has *Sasa* spp. as the secondary host. This species is one of the most common gall-makers in Korea and was recorded under the name *Colopha moriokaensis* in Korea by Paik (1972). Later, Akimoto (1985) have found that this species is well agreed with *Paracolopha morrisoni* (Baker, 1919), and he united *C. moriokaensis* with *Paracolopha morrisoni* as synonymous ones.

Distribution. Korea, China, Japan.

5. *Tetraneura pumilae* n. sp. 비술네줄면충(신칭) (Fig. 2)

Material examined. Holotype- Alate viviparous female (900607-1), Yesan, Chungnam, 7-VI-90, ex *Ulmus pumila*, H.Y. Seo leg.; Paratype- 3 alate viviparous females, Yesan, Chungnam, 7-VI-90, ex *Ulmus pumila*, H.Y. Seo leg.

Description. Alate viviparous females (emigrant): Body 1.75 (1.60-1.82) mm long, without wax gland plates. Head and thorax dark brown, antennae and legs pale brown. Abdomen wholly membranous. Wings not shaded except pterostigma. Antennae 6-segmented, 0.64 (0.58-0.70) mm long, 0.36 (0.33-0.44) times as long as body and 4.77 (4.36-5.15) times as long as hind tarsus II. Antennal segments I-IV smooth; segment V little imbricated; segment VI showing slight imbrication, coarsely arranged with minute spinules in transverse rows; antennal segment III 1.25 times as long as antennal segment V; Number of secondary rhinaria on segment III-14-23, IV-4-6, V-9-15, segment VI without secondary rhinarium; interrhinarial part not constricted.

Primary rhinarium on segment V with 1 opening, ciliated. Primary rhinarium on segment VI ciliated, irregular shaped, laterally accompanied by a few ciliated accessory rhinaria. Antennal setae short and sparse. Setae on segment V about 0.011 (0.008-0.014) mm long; segment I with 4-5 setae, II with 4-6 setae, III with 4-9 setae, IV with 2-5 setae, V with 8-12 setae, VI with 4 thick and short setae at apex of processus terminalis and 2 or 3 fine, short setae at base.

Head with 5 pairs of setae on dorsum. Rostrum short, slightly exceeding fore coxae; ultimate rostral segment concave laterally, 0.071 (0.064-0.084) mm long, 0.53 (0.46-0.70) times as long as hind tarsus II and with 4 secondary setae. Femerotrochanter of hind leg 0.058 (0.054-0.060) mm long and 0.10 times as long as hind tibial length. Longest setae on hind tibia 0.65 (0.50-0.83) times as long as the middle diameter of that segment. In all legs, first tarsal segment with 1 spine like seta and 2 feeble long setae; second segment of hind tarsus with 2 secondary setae; empodial setae almost as long as claw. Dorsum of abdomen mostly without intersegmental bands of sclerites. Cornicle absent. Cauda broadly triangular and with 2 setae. Forewing with 1 simple unbranched

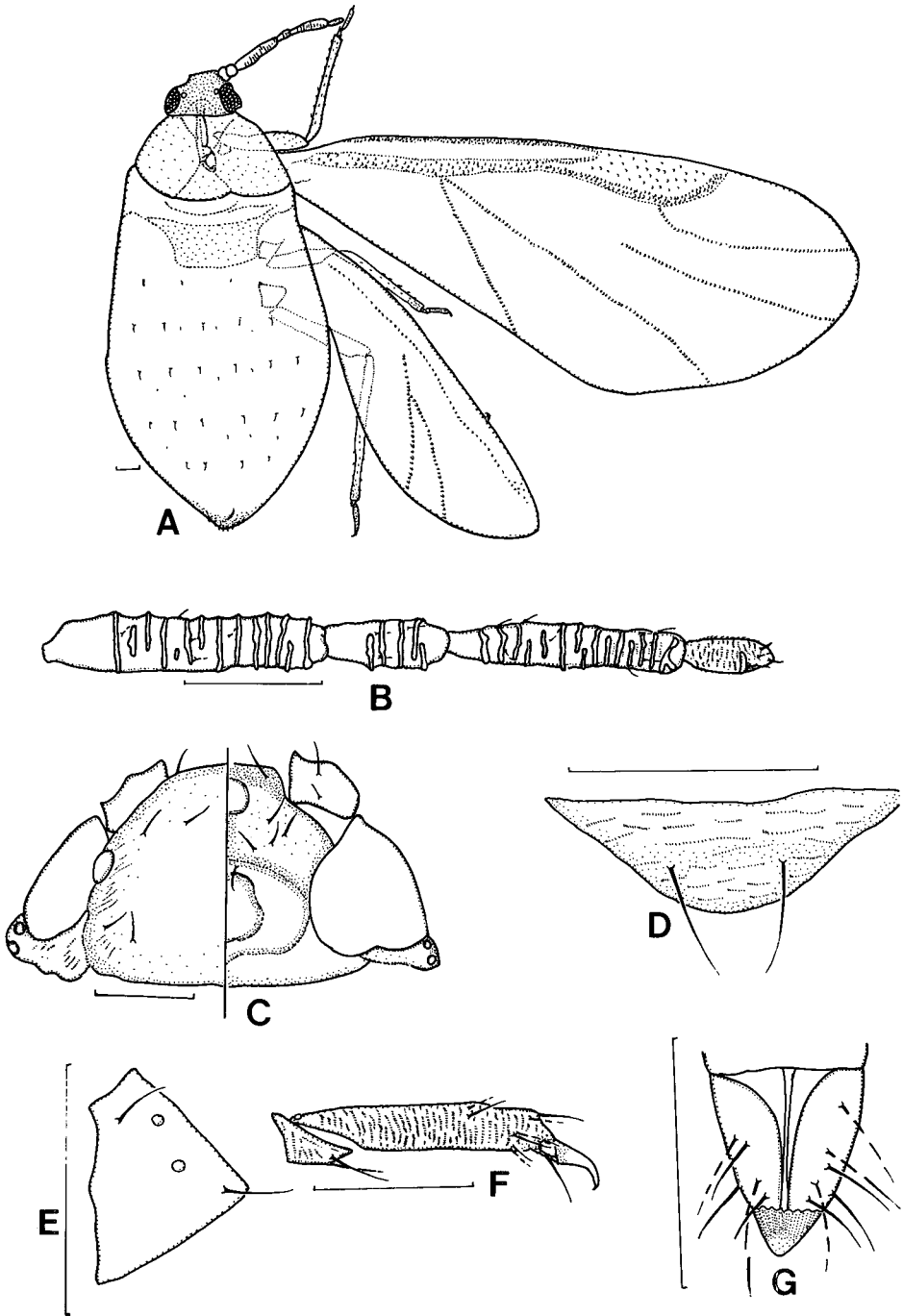


Fig. 2. *Tetraneura pumilae* n. sp. (alate): A, dorsal view (whole body); B, antennal segment III-VI; C, head; I cauda; E, hind femorotrochanter; F, hind tarsus; G, ultimate rostrum (scales: 100 μ m).

media; hind with 2 oblique veins. Hind tarsal claws in embryos inside emigrants (0.05 mm or shorter) not much longer than claws on other tarsi.

Host plant. *Ulmus pumila* L. (비술나무).

Etymology. This species is named after host plant *Ulmus pumila*.

Remarks. This species lived in the gall of host plant, and body colour was gray. This species is different from *Tetraneura radicolica* Strand by the following characters: 1) Head with 10 setae on dorsum (more than 30 setae in *T. raicolica*), 2) Ultimate rostral segment with 4 secondary setae (12-14 in *T. radicolica*).

Distribution. Korea.

6. *Tetraneura (Tetraneura) iriensis* n. sp. 이리네줄면충(신칭) (Fig. 3)

Material examined. Holotype- alate viviparous female (920616-1), Iri, Chonbuk, 16-VI-92, ex *Ulmus* sp., H.Y. Seo leg.; Paratype- 3 alate viviparous females, Iri, Chonbuk, 16-VI-92, ex *Ulmus* sp., H.Y. Seo leg.

Description. Alate viviparous females (emigrant)- Body 1.21 (1.20-1.22) mm long, without wax gland plates. Head, thorax, antennae and legs brown. Abdomen wholly membranous. Wings transparent without pterostigma. Antennae 6-segmented, 0.424 (0.416-0.432) mm long, 0.35 (0.34-0.36) times as long as body and 4.4 (4.2-4.7) times as long as hind tarsus II; spinules present on whole segment VI and in a less degree on segment V, arranged neatly in transverse rows. Antennal segment III relatively long, almost same length to segment V; segment IV short, 2.13 (1.69-2.38) times wider than long except position of secondary rhinaria; segment VI very short, 2.08 (1.91-2.18) times wider than long; processus terminalis stumpy. Secondary rhinaria present on III-V, very narrow, a little upheaving, arranged on IV, V and VI, covering a little more than half of circumference on each segment from ventral side. Number of secondary rhinaria on antennal segments III 10-16, IV 4-5, V 8-10. Primary rhinarium on segment V without opening, not ciliated and jointed with apical secondary rhinarium; primary rhinaria on segment VI without ciliated, irregularly shaped and with a few ciliated circular accessory rhinaria. Antennal setae very short and scarce, mainly present on the dorsal side. Setae on segment V 0.010 mm long. Segment I with 4 setae, segment II with 4-5 setae, segment III with 2-4 setae; segment IV with 1-2 setae; segment V with 10-12 setae; segment VI but processus terminalis with 3 setae; processus terminalis with 4 thick setae. The antennal segment IV 4.67 times as long as longest setae on that segment. Head with 5-6 pairs of setae on dorsum. Rostrum short, a little exceeding fore coxae. Ultimate rostral segment slightly spinulose, more or less concave laterally, 0.060 (0.056-0.062) mm long, 0.62 (0.58-0.68) times as long as second segment of hind tarsus and with 4 secondary setae. Femorotrochanter of hind leg 0.041 mm long, with 4 pseudosensoria. Longest setae on hind tibia 0.87 (0.77-1.00) times as long as half diameter of that segment; tarsus with transverse rows of minute spinules. First segment of tarsus with 1 spine-like setae and 1 pair of feeble long setae in fore and mid legs, but without spine-like setae in hind legs; secondary segment of hind tarsus with 2 secondary setae. Empodial setae feeble, a little longer than claws. Hind tarsal claw of embryo not enlarged.

Abdominal tergites without sclerites. Cornicle absent. Cauda broadly triangular, with 2 long setae. Media of forewing pale, simple and not branched, but cubitus of forewing basally separated. Hind wing with 1 oblique vein.

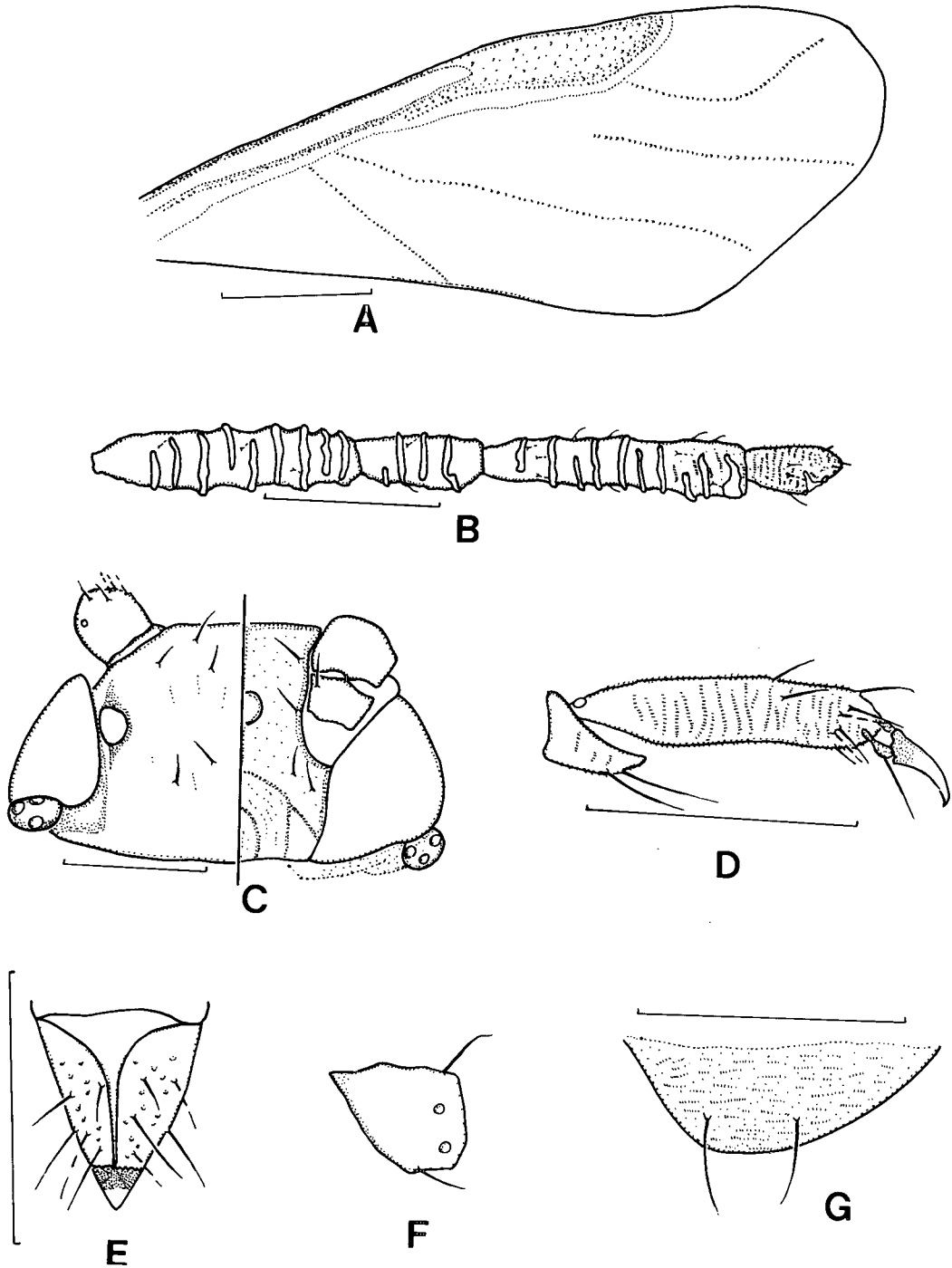


Fig. 3. *Tetraneura iriensis* n. sp. (alate): A, fore wing; B, antennal segment III-VI; C, head; D, hind tarsus; E, ultimate rostrum; F, hind femorotrochanter; G, cauda (scales: 100 μ m).

Host plant. *Ulmus* sp.(느릅나무속).

Etymology. This species is named after the type locality, Iri city.

Remarks. This species made galls on the leaf of host plant. This species is different from *Tetraneura yezoensis* Matsumura by the following characters: 1) Head with 10-12 setae on dorsum (36-40 setae in *T. yezoensis*), 2) Ultimate rostral segment with 4 secondary setae (6-8 in *T. yezoensis*).

On the other hand this species is also similar with *Tetraneura pumilae* n. sp., but readily distinguished from that species by the following characters: 1) The number of secondary rhinaria on antennal segment III 10-16, V 8-10 (III: 14-23, V: 9-15 in *T. pumilae*), 2) Longest setae on hind tibia 0.65 (0.50-0.83) times as long as half diameter of that segment (0.87 (0.77-1.00) times in *T. pumilae*), 3) Body 1.21 (1.20-1.22) mm long 1.75 (1.60-1.82) mm long in *T. pumilae*, 4) Antennal segment III 1.25 times as long as segment V (1.01 times in *T. pumilae*).

Distribution. Korea.

7. *Tetraneura (Tetraneurella) sorini* Hille Ris Lambers, 1970 남방네줄면충

Tetraneura sorini Hille Ris Lambers, 1970, (p. 73).

Tetraneura sorini: Paik, 1972, (P. 22, fig. 315); Moritsu, 1983, (p. 464, fig. 238).

Material examined. 8 alate viviparous females, Ullungdo, Kyungbuk, 6-VI-91, ex *Ulmus laciniata*, H.Y. Seo leg.

Host plants. *Ulmus laciniata* (Trautv.) Mayr (난티나무).

Remarks. This aphid formed leaf-gall on host plant. Body colour was blackish-gray in life.

Distribution. Korea, Japan.

Subfamily Pemphiginae 면충 아과

8. *Pemphigus dorocola* Matsumura, 1917 황철나무혹면충

Pemphigus dorocola Matsumura, 1917, (p. 84).

Pemphigus borealis Takahashi, 1920, (p. 196); 1923, (p. 150).

Pemphigus bursarius Tao, 1970, (p. 139).

Pemphigus dorocola: Monzen, 1929a, (p. 34) & 1929b, (p. 361); Hori, 1938 (p. 124); Shinji, 1941, (p. 1,073, fig. 522); Paik, 1972, (p. 604, fig. 300); Eastop et Hille Ris Lambers, 1976, (p. 341).

Material examined. 4. fundatrix, Dolsando, Chonnam, 16-V-90, ex *Populus euramericana*, W.K. Lee leg; 4 fundatrix and 4 alate viviparous females, Yusung, Chungnam, 17-VI-92, ex *Populus nigra* var. *italica*, H.Y. Seo leg.

Host plants. *Populus euramericana* Guinier (이태리포플러), *Populus nigra* var. *italica* (Muench.) (양버들).

Remarks. Body colour was gray in life. This aphid made petiole gall on poplar tree.

Distribution. Korea, Japan, Taiwan.

9. *Prociphilus chaenomelis* n. sp. 모과면충(신칭) (Fig. 4)

Material examined. Holotype- alate viviparous female (890513-1) Chonju, Chonbuk, 13-V-89, ex

Chaenomeles sinensis, W.K. Lee leg.; Paratype-5 alate viviparous females, Chonju, Chonbuk, 13-V-89, ex *Chaenomeles sinensis*, W.K. Lee leg.

Description. Alate viviparous females (emigrant)- Body 2.08-2.84 mm long, wax gland plates present on head, thorax and abdomen. Wax production considerable. Head, thorax, antennae and legs dark brown. Abdomen wholly membranous. Wings transparent without pterostigma.

Head with 7 pairs of setae on dorsum. Antennae 6-segmented, 1.03 (0.98-1.08) mm long, 0.43 (0.35-0.48) times as long as body and 5.3 (5.0-5.5) times as long as hind tarsus II; segment III 5.8 (5.2-6.3) time as long as segment II; segment IV about equal length to segment V but slightly shorter than segment VI: processus terminalis about 0.22 (0.18-0.25) times as long as the base. Number of secondary rhinaria on segment III 35-44, IV 12-18, V 11-17. Primary rinnarium on segment VI with ciliated, circular opening and with a few ciliated small circular accessory rhinaria; segment VI embriicated. Antennal setae extremely short, mainly present on the dorsal side, the longest seta on segment V 0.011 (0.008-0.014) mm long; segment I with 5 setae, II with 5-8 setae, III with 7-14 setae, IV with 3 setae, V with 3 setae; the base on segment VI with 1 or 2 setae, the processus terminalis with 4-5 thick setae at apex. Rostrum short, a little beyond for coxae; ultimate rostral segment very acute, 0.111 mm long, 0.57 (0.54-0.60) times as long as hind tarsus II and with 4 secondary setae. The longest setae on hind tibia 0.99 (0.82-1.11) times as long as middle diameter of that segment. First tarsal segment with 2 or 3 hairs; second tarsal segment of hind leg with about 8 secondary setae; empodial setae quite fine and much shorter than claws. Wax gland plates present on head, thorax (pro-, meso-, meta-) and abdominal tergites I-VIII. Head with one pair of anterior wax plates and one pair of posterior wax plates composed of many small cells. Abdominal tergites I-V with one pair of spinal and one pair of lateral wax plates respectively. Abdominal tergites VI-VIII with large lateral ones only. All abdominal wax gland plates circular to elongated form, comprising numerous bright cells. Siphuncular pores very small, vestigial. Genital plate with about 30 setae and 3 rudimentary gonapophyses. Hind femerotrochanter 0.109 (0.100-0.114) mm long. Cauda semicircular and with 2 setae. Forewing with a media unbranched and with 2 cubitus basally separated.

Host plant. *Chaenomeles sinensis* Koehne (모과나무).

Etymology. This species is named after host plant *Chaenomeles*.

Remarks. This species made leaf-rolled gall in host plant. This species is distinguished from *Prociphilus kuwanai* by the following characters in alate viviparous female (emigrant): 1) the number of secondary rhinaria on antennal segment III, 35-44, IV 12-18, V 11-17 (III: 18-20, IV: 7-10, V: 8-10 in *P. kuwanai*) 2) Head with two wax gland plates (without wax gland plates in *P. kuwanai*).

Distribution. Korea.

10. *Prociphilus ushikoroshi* Shinji, 1924 윤노리나무면충

Prociphilus ushikoroshi Shinji, 1924, (p. 370).

Prociphilus pourthiacae Monzen, 1929a, (p. 36).

Prociphilus ushikoroshi: Shinji, 1941, (p. 1,091, fig. 536); Paik, 1972. (p. 613, fig. 308); Eastop et Hille Ris Lambers, 1976, (p. 360); Moritsu, 1983, (p. 461, fig. 235).

Marterial examined. 3 apterous viviparous females, Chudong, Chonbuk, 23-IV-92, ex *Sorbus alnifolia*, W.K. Lee leg.

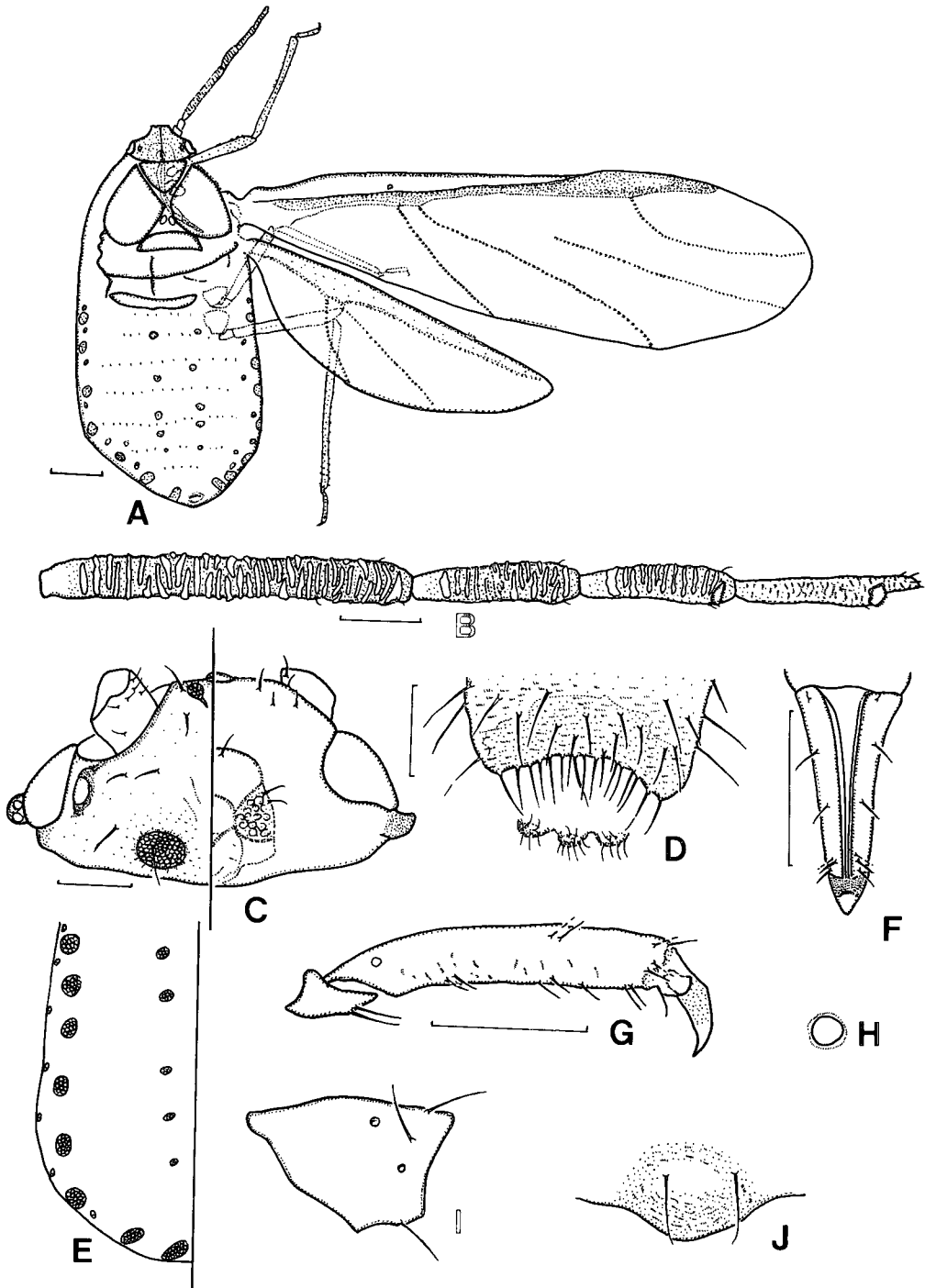


Fig. 4. *Prociphilus chaenomelis* n. sp. (alate): A, dorsal view (whole body); B, antennal segment III-VI; C, head; D, genital plate and gonapophyses; E, wax gland plates of abdomen; F, ultimate rostrum; G, hind tarsus; H, cornicle; I, hind femorotrochanter; J, cauda (scales: 100 μ m).

Host plant. *Sorbus alnifolia* (S. et Z.) K. (팔배나무).

Remarks. This aphid made leaf-rolled galls on host plant. Body colour was deep green and body was covered with white wax filament.

Distribution. Korea, Japan.

11. *Schlechtendalia chinensis* (Bell, 1851) 오배자면충

Aphis chinensis Bell, 1851: 128. (cited from Paik, 1972)

Schlechtendalia chinensis: Paik, 1972, (p. 616, fig. 311); Moritsu, 1983, (p. 462, fig. 236); Zhang et Zhong, 1983, (p. 78, fig. 4).

Material examined. 4 alate viviparous females, Muju, Chonbuk, 26-III-X-92, ex *Rhus chinensis*, W. K. Lee leg.; 6 alate viviparous females, Koduksan, Chonbuk, 3-X-92, ex *Rhus chinensis*, H.Y. Seo leg.

Host plant. *Rhus chinensis* S. et Z. (붉나무).

Remark. This aphid made large galls on host plant.

Distribution. Korea, China, Japan.

ABSTRACT

This study on Pemphigidae was based on the specimens collected from May 1989 to April 1993, at 16 localities of southern part of Korean Peninsula. As a result, 11 species of 7 genera were identified. Of these, four species (*Colophina zelkova*, *Prociphilus chaenomelis*, *Tetraneura pumilae*, *T. iriensis*) are new to science. These four species were described and drawn.

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