

## **Taxonomic Study on Three Families (Peltoperlidae, Perlodidae, Perlidae) of Stoneflies (Plecoptera) in Korea**

**Chul Ho Ra, Jong Sur Kim, Yang Won Kang, and Soon Ah Ham**

(Dept. of Biology, Chonnam National University, Kwangju 500-757, Korea)

### **ABSTRACT**

A taxonomic study on three families of Plecoptera in Korea was performed with adults, nymphs and eggs. As a result, the identified species were eight species, eight genera. Among them, three species, *Perlodes stigmata* n. sp., *Kamimuria coreana* n. sp. and *Neoperla coreensis* n. sp., are described as new in this paper.

Key words: Taxonomy, Plecoptera, Peltoperlidae, Perlodidae, Perlidae, new species, Korea.

### **INTRODUCTION**

The Plecoptera is one of the small group of aquatic insects with a little more than 2,000 species in the world. They are primarily associated with clean and cool running waters, and superficially similar to Orthoptera and Embioptera which share some of the primitive characters.

The study of Plecoptera was begun by Klapalek and Enderin in the early 19th century and performed by Tillyard (1921), Claassen (1931, 1940), Frison (1935a, b, 1942a, b), Ricker (1943, 1952), Kawai (1954, 1969, 1976) and Illis (1965, 1966). The taxonomic position of most of species had been rearranged in the last two decades by Zwick (1973a, d, 1982a, b, 1983), Stark & Stewart (1981), Stark (1989), Sivec *et al.* (1988), Kondratieff *et al.* (1988) and so on.

Meanwhile, the taxonomic study of Korean Plecoptera was done by Wu (1935), Kasai (1938), Doi (1938), Ueno (1941), Illies (1966), Komatsu (1971), Baumann (1975), Zwick (1973b, c) since Okamoto (1921) described *Perla (Oyamia) coreana* as species which was the first record on

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stoneflies from Korea. Recently, Yoon & Aw (1985), and Ra (1987) have studied for nymphs and Cho (1991), Ra *et al.* (1991a, b) for nymphs and adults.

## MATERIALS AND METHODS

The specimens examined in this study were collected in Korea from 1982 to 1993. Terminal segments of male and female bodies were figured after KOH treatment. Aedeagus were everted by gently squeezing live males between fingers just prior to fixing, and figured without KOH treatment. Nymphs could be identified by rearing. Mature eggs were removed from gravid female or egg laid on petridish contained water in a spawning box, and placed in 70% ethanol. The eggs were sonicated in an ultrasonic cleaner for a minute and dehydrate in ethanol series, acetone and isoamylacetate. Then they were dried, mounted with double stick tape, coated with gold for two minutes at 5 mA using an ion coater, and observed with a SEM (JOLE, TSM-T330A). Specimens examined in this study are deposited in the Entomological Laboratory, Department of Biology, Chonnam National University, Kwangju, Korea.

## RESULTS

Order Plecoptera Burmeister, 1839

Family Peltoperlidae Claassen, 1931

One of the smallest families of Plecoptera which was established by Claassen (1931), consist of 14 genera and approximately 40 species (Stark and Stewart, 1981). The roach-like nymphs armed with shield-like notum; short abdomen, head and cerci. Head width much narrower than prothorax.

Genus *Yoraperla* Ricker, 1952

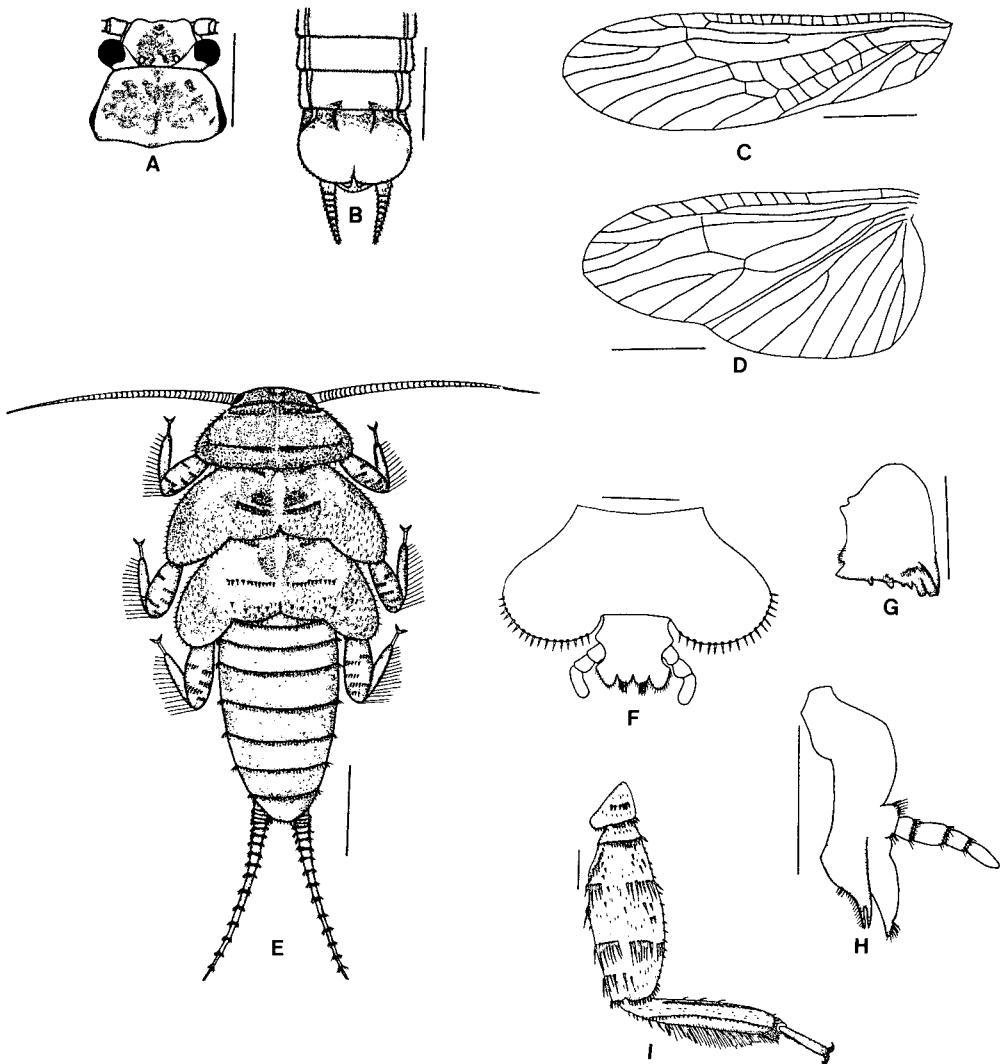
### 1. *Yoraperla* sp. (Fig. 1)

**Material examined.** 2 ♀ ♀, Taesuondong valley, Mt. Chiri, Hadong, 8 May 1990, Y.G. Cho & Y. W. Kang; 1 ♀ Songbalsa valley, Mt. Packun, Kwangyang, May 1990, Y.G. Cho. Nymph: Okch'onsa, Yönhwasan, 19 Jun. 1992, H.J. Lee & J.S. Kim; Ch'onghwansa valley, Milyanggun, 28 Jun. 1992, H.J. Lee & J.S. Kim; Ojönri, Mulyamyön, Ponghwagun, 27 Feb. 1993, H.J. Lee & J.S. Kim; Mt. Samdong, Mulyamyön, Ponghwagun, 27 Feb. 1993, H.J. Lee & J.S. Kim; Mt. Oksök, Mulyamyön, Ponghwagun, 27 Feb. 1993, H.J. Lee & J.S. Kim; Mt. Ch'öngok, Ponghwagun, 28 Mar. 1993, H.J. Lee & J.S. Kim; Taehyönsamri, Sökp'omyön, Ponghwagun, 28 Mar. 1993, H.J. Lee & J.S. Kim; Ssangjönri, Kunsömyön, Ulchingun, 28 Mar. 1993, H.J. Lee & J.S. Kim.

**Description.** Body length 9.7-11.7 mm. General body color light brown. Head with dark brown marker between ocelli and clypeus (Fig. 1A). Prothoracic notum brown, meso-metathoracic notum and tergum of abdomen with dark brown parts. Antennae dark brown, but first-fifth segment from basal part light brown. Cercus with long hairs at basal parts, composed of 11 segments, its tip dark brown. Leg light brown, with dense setae. Base of tibia each leg with transverse setae. Forewing with 16 costal crossveins, 6 cu1-cu2 crossveins, length 15 mm (Fig. 1C). Hindwing with anal lobe (Fig

1D). Subgenital plate width similar to body width, large and round with a U-marker and dense setae on hind margin. Dark brownish color pattern on anterior margin (Fig. 1B).

**Mature nymph.** Body length 8-11 mm, head capsule width 2.1-2.3 mm. General body color dark brown with distinctly brown strips, covered with white and golden, short, fine setae; lateral and posterior margins on thoracic notum with long stout setae (Fig. 1E). Antennae composed of 45-50 segments, length 4.5 mm. Cercus having 15-17 segments with stout setae on hind margins of all cercal segments. Mandible bearing 5 teeth, its ventral base with dense bands of fine hairs, dorsal base with fine hairs (Fig. 1G). Lacinia chisel-like with two teeth; its ventral part with branched sensilia, galea with large and hair turft in apical region (Fig. 1H). Tip of glossae and paraglossae with dense



**Fig. 1.** *Yoraperia* sp. A, adult head and thorax, dorsal view; B, female adult abdomen, ventral view; C, forewing; D, hindwing; E, nymphal habitus (dorsal view); F, labium; G, mandible; H, maxilla; I, hindleg (scales. A-D: 2 mm, F-I: 0.5 mm).

sensillia (Fig. 1F). Prothoracic notum hat-shape, mesothoracic notum with groove-like median transverse rows of stout setae. Coxal base of midleg separated; base of legs with branched coxal gills and 4 bands of transverse setae on femur (Fig. 1I).

**Distribution.** Korea.

#### Family Perlodidae

A large family of medium- or large-sized stoneflies. The nymphs generally very colorful, and if gills present they are unbranched. The adults without nymphal gill remnant on the thorax, with greatly reduced glossae and paraglossae. Nearly 100 species divided into about two dozen genera.

Genus *Megarcys* Klapalek, 1912

#### 2. *Megarcys ochracea* Klapalek, 1912

*Megarcys ochracea*; Okamoto, 1912, p. 16; Kasai, 1938, p. 49; Yoon & Aw, 1986, p. 16.

**Material examined.** Nymphs: Taesongdong valley, Mt. Chiri, Hadong, 12 Mar. - 20 Aug. 1990, Y. W. Kang & Y.G. Cho; P'iagol valley, Mt. Chiri, Kurye, 8 Mar. 1987, J.S. Kim.

**Distribution.** Korea and Japan.

Genus *Perlodes* Banks, 1903

#### 3. *Perlodes stigmata* n. sp. (Figs. 2-3, Pl. 1)

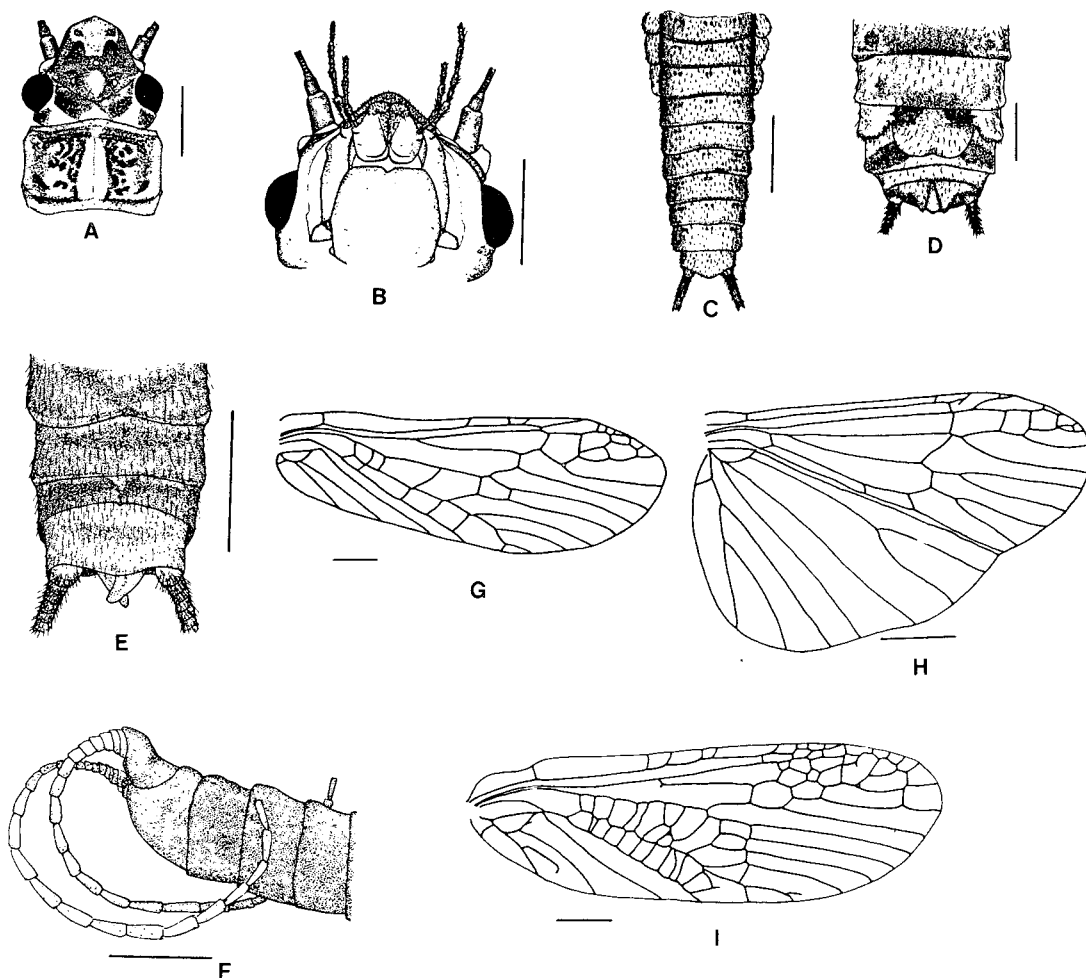
**Material examined.** Holotype: ♂, Paemsagol valley, Mt. Chiri, Namwon, 22 Apr. 1987, J.S. Kim. Paratype: 2 ♂♂, 3 ♀♀, Paemsagol valley, Mt. Chiri, Namwon, 22 Apr. 1987, J.S. Kim. Nymphs: Poknae, Posong, 23 Feb. 1989, Y.W. Kang, Yongri, Hwasun, 22 Feb. 1989, S.Y.W. Kang & Y.G. Cho; Mt. Packun, Kwangyang, 24 Jan. 1985, Y.G. Cho.

**Description. Male.** Body length 12.5-13.4 mm. General body color black. Clypeus broad; shape pentagon with light brown marker. M-line distinct. Triocellate, light brown marker between postocelli and behind compound eye (Fig. 2A). Gill remnants remain on submentum (Fig. 2B). Prothoracic notum quadrilateral with transverse line on hind region (Fig. 2A). 1st-3rd segments of abdomen divided in notum and sternum (Fig. 2C). Wing lucid brown; forewing with 3 anal veins and anal cell, length 13.4-14.2 mm. Veins being variation each individual (Fig. 2G, H, I). Long cerci bent to sternum. 9th abdominal segment very slender, 10th segment curved upper in middle point. Each paraproot crossed forming X-shape (Fig. 2E). Cercus bent below abdomen and crossed forming X-shape. Its tip reached to 8th abdominal segment (Fig. 2F).

**Female.** Body length 19.5-20.7 mm, forewing length 16.9-18.2 mm. General body color blackish brown. T1-T7 unmodified. Subgenital plate produced into semicircle-shape and bifurcate in mid point (Fig. 2D).

**Egg.** Rhombus; transection triangular. Egg length 400 μm, egg width 230 μm. 3 transverse keels and 1 keel in posterior pole. Aeropyles distributed mainly on the surface of keels and anchor (Plate 1. A, B, C).

**Mature nymph.** Body length 17.4-18.5 mm, head capsule width 4.0-4.6 mm, antennae 12-13 mm. General body color brownish yellow with blackish brown marker. Head triangular with light area behind clypeus, with round marker between postocelli, M-line indistinct (Fig. 3A). Mandible bearing 5 teeth (Fig. 3B). The third joint of maxillary palpus longest (Fig. 3C). Paraglossae of labrum much

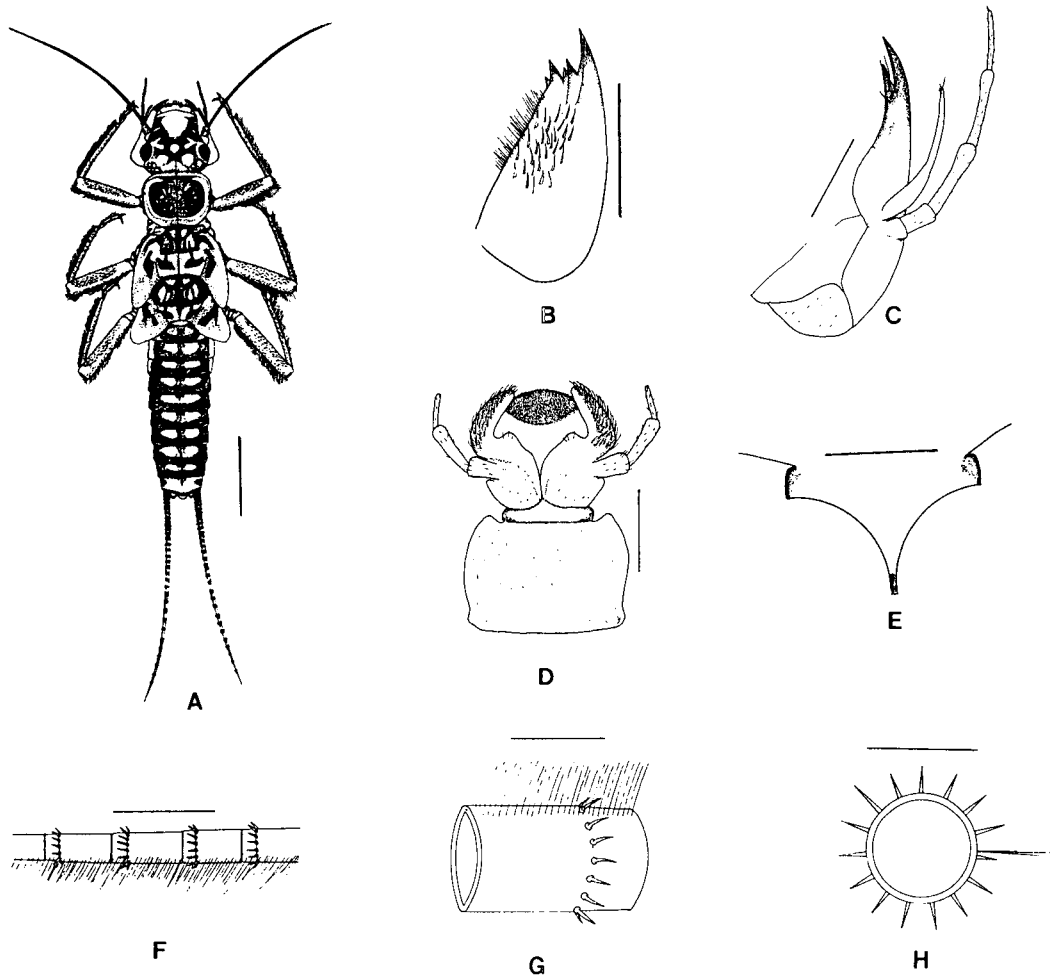


**Fig. 2.** *Perlodes stigmata* n. sp. A, head and thorax, dorsal view; B, head, ventral view; C, female abdomen, dorsal view; D, female abdomen, ventral view; E, male abdomen, dorsal view; F, male abdomen, lateral view; G, male forewing; H, male hindwing; I, female forewing (scales. A-D: 2 mm, E-F: 1.5 mm, G-H: 2 mm).

smaller than glossae (Fig. 3D). Prothoracic notum quadrilateral with irregular marker. Wing pad of mesothoracic notum paralleled to vertical line and that of metathoracic notum opened. Y-arm in mesothoracic sternum continued to furcal pits, transverse line indistinct (Fig. 3E). Abdomen cylindrical; 1st-3rd segment divided in appearance. Each segment of cerci with setae and swimming hair, length 16-17 mm (Fig. 3F, G, H).

**Remarks.** *Perlodes yarizawana* (Ueno) and *P. frisoana* (Kohno) are similar to this species in general features, *P. yarizawana* have suasage-shape vastigal gill filament in coxa of leg in female but this species have not. And also paraprocts of *P. yarizawana* paralld but those of this species exchange crossed.

1st-4th abdominal segment of *P. frisoana* devided in notum and tergum but 1st-3rd segment in this species.



**Fig. 3.** *Perlodes stigmata* n. sp. A, nymphal habitus, dorsal view; B, mandible; C, maxilla; D, labrum; E, Y-arm; F-G, cercus (scales: A: 2 mm, B: 0.5 mm, C-F: 1 mm, G-H: 0.25 mm).

#### Family Perlidae Latreille, 1802

Medium or large size stoneflies with wide varieties of habitat. They widely distributed throughout Africa, Eurasia, America, consisting of 2 subfamilies (Acroneuriinae, Perlinae), 4 tribes (Acroneurini, Anacroneurini, Neoperlini, Perlini) and 48 genera. Among them, 4 genera distributed in Korea (Yoon & Aw, 1985; Ra, 1987; Cho, 1991). This family characterized by having branched thoracic and abdominal gills. Head relatively large with 2 or 3 ocelli, with rounded glossae and paraglossae.

#### Genus *Paragnetina* Klapalek, 1907

#### 4. *Paragnetina flavotincta* (McLachlan, 1872)

*Perla flavotincta* McLachlan, 1872, p. 54.

*Paragnetina flavotincta*: Zwick, 1973, p. 153; Yoon & Aw, 1985, p. 127.

**Material examined.** Nymphs: Pulyöngkyekok, Kunsömyön, Ulchingun, 28 Mar. 1993, H.J. Lee & J.S. Kim; Ssanggyesa, Hadonggun, 20 Mar. 1990, Y.W. Kang; Taesongdong valley, Mt. Chiri,

Hadong, 18 Mar. 1990, Y.W. Kang.

**Distribution.** Korea, Siberia.

Genus *Oyamia* Klapalek, 1907

### 5. *Oyamia nigribasis* Banks, 1921

*Perla* (*Oyamia*) *coreana* Okamoto, 1921, p. 48.

*Oyamia coreana*: Okamoto, 1924, p. 53; Yoon & Aw, 1985, p. 126.

*Oyamia nigribasis*: Zwick, 1973, p. 153; Sivec *et al.*, 1988, p. 26.

**Material examined.** 30 ♂♂, 65 ♀♀, Mt. Chuwal, Tamyang, 18 May 1993, J.S. Kim; 5 ♂♂, 7 ♀♀, Sanjang valley, Mt. Mudung, Kwangju, 24 Apr. 1991, J.S. Kim; 2 ♀♀, Mt. Worak, 30 May 1991, M.C. Lee & J.S. Kim; 5 ♂♂, 20 ♀♀, Sungpalsa valley, Mt. Paekun, 5 Jan. 1990, Y.G. Cho & S.K. Baik; 3 ♂♂, 20 ♀♀, Mt. Paekun, 25 Jan. 1990, Y.G. Cho & S.K. Baik; 4 ♂♂, 15 ♀♀, Chungsimsa, Mt. Mudung, Kwangju, 8 Jan. 1990, J.S. Kim, Y.G. Cho & S.K. Baik; 1 ♂, 5 ♀♀, Sanjang valley, Mt. Mudung, Kwangju, 5 Jan. 1989, Y.K. Cho & S.K. Baik; 2 ♂♂, 7 ♀♀, Mt. Bungpung, 15 Jan. 1988, Cho Y.K. & S.K. Baik. Nymphs: Ssanggyesa, Hadonggun, 5 May 1992, H.J. Lee & J.S. Kim; Mt. Kajisan, Milyanggun, 28 Jun. 1992, H.J. Lee & J.S. Kim; Mt. Pisul, Talsonggun, 3 May 1992, H.J. Lee & J.S. Kim; Paegun bridge, Songjugun, 15 Mar. 1992, H.J. Lee & J.S. Kim; Mt. Kaya, Songjugun, 15 Mar. 1992, H.J. Lee & J.S. Kim; Mt. Kumo, Kumnuggun, 3 Mar. 1993, H.J. Lee & J.S. Kim; Hyöndongri, Sokpomyön, Ponghwagun, 29 Mar. 1993, H.J. Lee & J.S. Kim; Pulyöng valley, Kunsömyön, Ulchingun, 28 Mar. 1993, H.J. Lee & J.S. Kim.

Genus *Kamimuria* Klapalek, 1907

### 6. *Kamimuria coreana* n. sp. (Figs. 4-5, Pl. 1)

**Material examined.** Holotype: ♂, Sanjang valley, Mt. Mudung, Kwangju, 26 Jun. 1993, J.S. Kim. Paratypes: 3 ♂♂, 3 ♀♀, Sanjang valley, Mt. Mudung, Kwangju, 26 Jun. 1993, J.S. Kim & S.A. Ham; 5 ♂♂, 5 ♀♀, Sanjang valley, Mt. Mudung, Kwangju, 15 May 1993, J.S. Kim & S.A. Ham; 1 ♂, Sanjang valley, Mt. Mudung, Kwangju, 6 Jul. 1993, J.S. Kim; 7 ♂♂, 8 ♀♀, Taesongdong valley, Mt. Chiri, Hadong, 18 Jul. 1992, Y.W. Kang; 1 ♂, 11 ♀♀, Taesongdong valley, Mt. Chiri, Hadong, 19 Jul. 1992, Y.W. Kang; 5 ♂♂, 9 ♀♀, Taesongdong valley, Mt. Chiri, Hadong, 3 Jul. 1990, Y.W. Kang. Nymphs: Sanjang valley, Mt. Mudung, Kwangju, 15 May 1993, J.S. Kim & S.A. Ham; Taesongdong valley, Mt. Chiri, Hadong, 19 Jul. 1992, Y.W. Kang; Jangsutae valley, Mt. Solaksan, 27 Oct. 1990, M.C. Lee; Baemsagol valley, Mt. Chiri, Namwon, 12 Sep. 1987, J.S. Kim; Mt. Bungpung, Tamyang, 22 Oct. 1985, S.K. Back & Y.G. Cho.

**Description. Male.** Body length 14.7-20.5 mm. General body color yellowish brown. Prothoracic notum blackish brown, thoracic and abdominal sternum light brown, antennae blackish brown, cerci light brown. Triocellate. Clypeus distinctly sclerotized suture with many setae (Fig. 4A). Antenna each segment with many setae, length 15.0-17 mm. Pronotum with symmetrical brown marker (Fig. 4A). Coxa of leg with remnant nymphal gill. Wing lucid brown, forewing with 10 costa-subcosta crossveins (occasionally additional 5-6 crossveins), 7m-cu1 crossveins, 10-12 cu1-cu2 crossveins, and branched cu1, length 16.2-20.5 mm (Fig. 4E-F). T1-8 unmodified, T7-8 with many sensilla basiconica (Fig. 4B). Hemitergites finger-like with many setae and teeth (Fig. 4C).

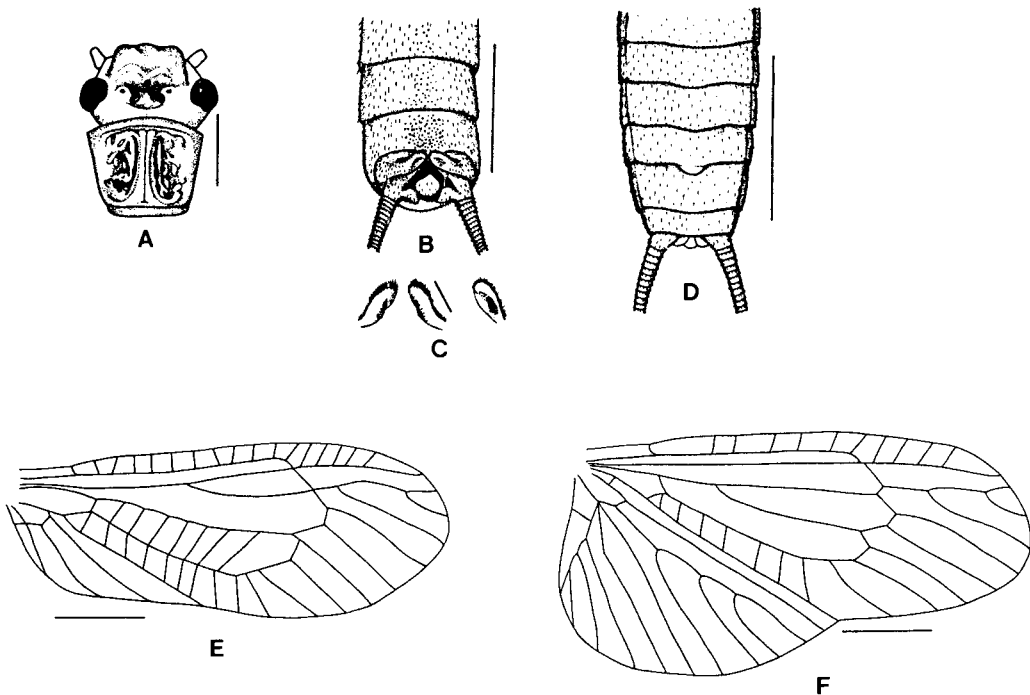
**Female.** Body length 19.3-23.9 mm, Forewing length 25.2-33.0 mm. T1-8 unmodified. Subgenital

plate weakly modified in semicircle shape (Fig. 4D).

**Egg.** Egg length 310  $\mu\text{m}$ . Typically oval (Plate 2A). Collar stalked anchor, rim shaped calyx of flower (Plate 2B). Micropyles located in two-thirds position from anterior pole (Plate 2C). Micropylar orifices without lips.

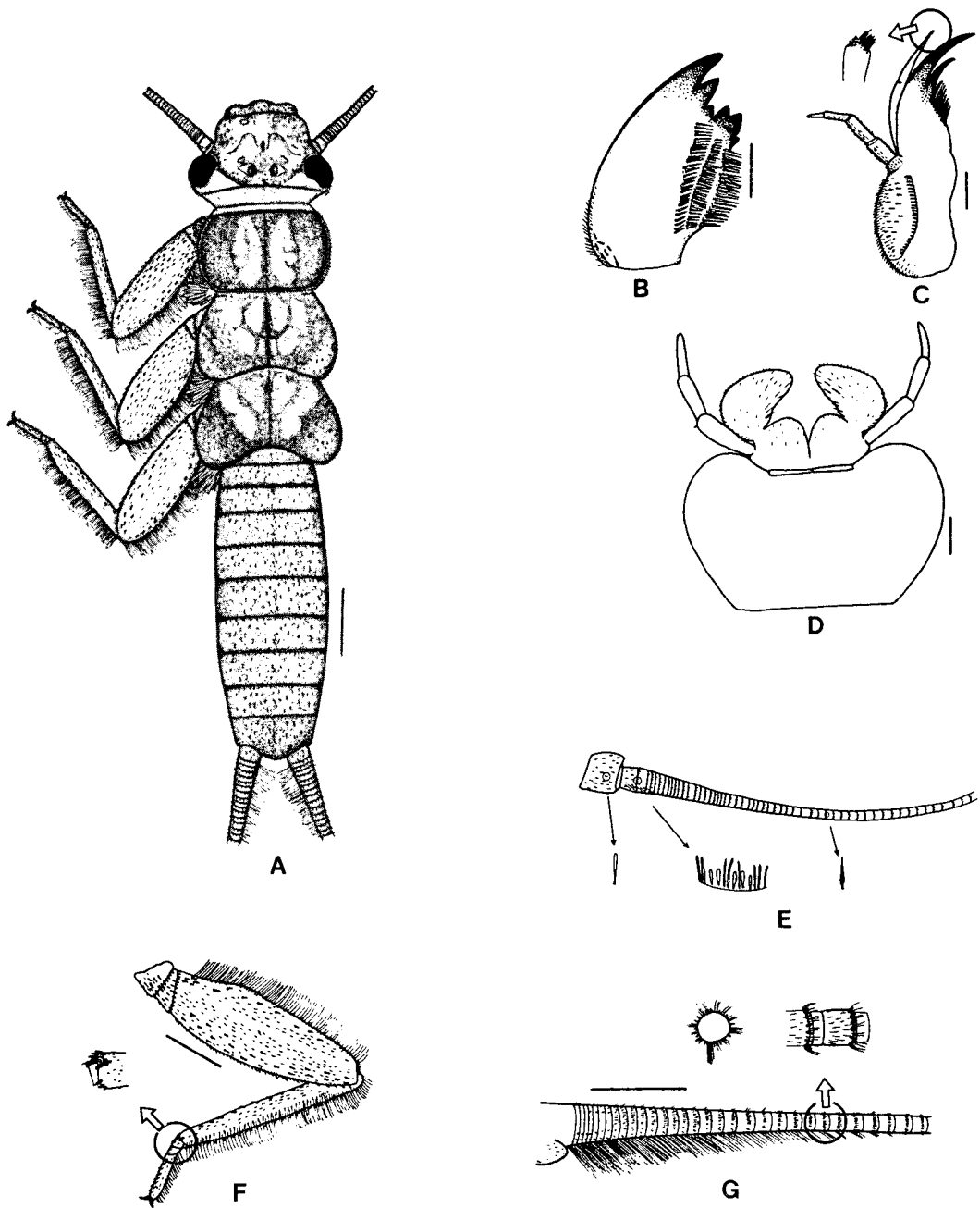
**Mature nymph.** Body length 20.3-25.5 mm, head capsule width 4.7-5.9 mm. General body color brown or blackish brown, with light brown marker. Head triangular; each with rounded light spots behind clypeus and in front of postocelli, M-line distinct (Fig. 5A). Mandible with 6 teeth and 3 rows of setae (Fig. 5B). Lacinia of maxilla armed with large teeth (Fig. 5C). Paraglossae of labrum much smaller than glossae (Fig. 5D). Antennae with differently shaped setae in scape, pedicel and flagellum, length 10.4-13.0 mm (Fig. 5E). Thorax and abdomen covered with golden setae, prothoracic tergum with symmetrical brown marker, meso- and metathoracic tergum also having similar to regular marker. Tibia of hind leg with short setae and spurs (Fig. 5F). Each segment of cerci with whirls of setae on the hind margin and strong swimming hairs, length 16.9-19.5 mm (Fig. 5G).

**Remarks.** Fifteen *Kamimuria* species are recognized (Sivec *et al.*, 1988; Uchida & Isobe, 1991). Among them, *K. tibialis* (Pictet, 1841) and *K. uenoi* Kohno, 1947 are very similar to this species. But the lower part of hemitergite without teeth in the species (*K. uenoi* and *K. tibialis*). Meanwhile, this species has teeth lower part of hemitergite. *K. tibialis* and *K. uenoi* armed with a similar to female's subgenital plate in T8 but *K. coreana* has not.



**Fig. 4.** *Kamimuria coreana* n. sp. A, head and thorax, dorsal view; B, male abdomen, dorsal view; C, hemitergite; D, female abdomen, ventral view; E, forewing; F, hindwing (scale. 2 mm).



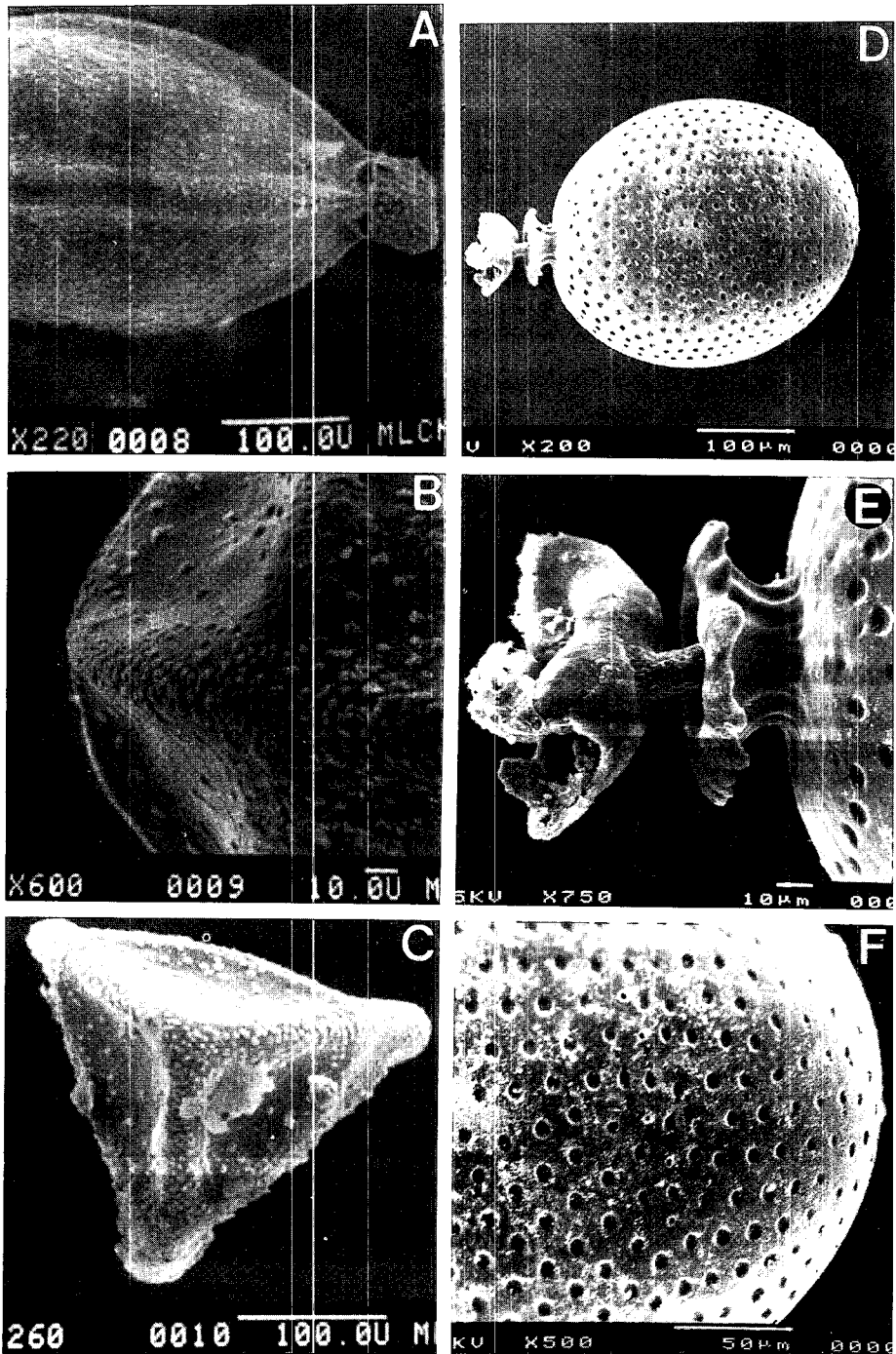


**Fig. 5.** *Kamimuria coreana* n. sp. A, nymphal habitus, dorsal view; B, mandible; C, maxilla; D, labrum; E, antennae; F, hindeleg; G, cercus (scale: 0.5 mm).

Genus *Neoperla* Needham, 1905

**7. *Neoperla coreensis* n. sp.** (Figs. 6-7)

**Material examined.** Holotype: 1 ♂, Sanjang valley, Mt. Mudung, Kwangju, 6 Jul. 1993, J.S. Kim. Paratypes: 24 ♂♂, 10 ♀♀, Sanjang valley, Mt. Mudung, Kwangju, 6 Jul. 1993, J.S. Kim; 2 ♂♂, 2



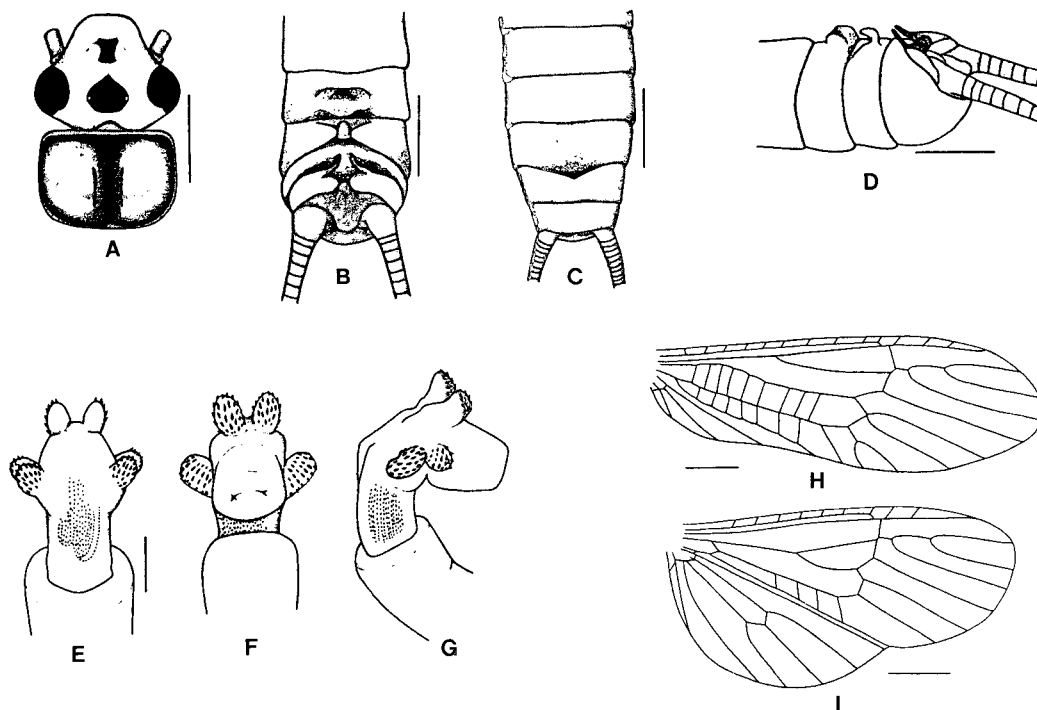
**Plate 1.** Eggs of *Perlodes stigmata* n. sp. and *Kamimuria coreana* n. sp. A, Anchor and anterior part of *Perlodes stigmata* n. sp., lateral aspect; B, *Perlodes stigmata* n. sp., posterior aspect; C, *Perlodes stigmata* n. sp., posterior upside aspect; D, entire egg of *Kamimuria coreana* n. sp., lateral aspect; E, anchor and collar of *Kamimuria coreana* n. sp., lateral aspect; F, micropyle row of *Kamimuria coreana* n. sp., lateral aspect.

♀ ♀, Sanjang valley, Mt. Mudung, Kwangju, 26 Jun. 1993, J.S. Kim & S.A. Ham; 1 ♂, 1 ♀, Sanjang valley, Mt. Mudung, Kwangju, 17 Jun. 1991, J.S. Kim. Nymphs: Sanjang valley, Mt. Mudung, Kwangju, 26 Jun. 1993, J.S. Kim & S.A. Ham; Sanjang valley, Mt. Mudung, Kwangju, 6 Jul. 1993, J.S. Kim.

**Description.** Body length 10.6-11.8 mm. General body color brownish yellow with blackish yellow or brown marker. Biocellate. Head brown with dark circular area over ocelli and small dark area behind clypeus (Fig. 6A). Basal antennae segment brown, other segments blackish brown. Prothoracic notum with blackish brown area inner side margin and medial stripe (Fig. 6A). Thoracic and abdominal sternum light brown, abdominal tip blackish brown. Wing lucid, with brown veins. Media of forewing branched two, 9m-cu crossveins, length 11.4-12.8 mm. (Fig. 6H-I). T7 produced notched lobe; apex of lobe covered with sensilla basiconicas (Fig. 6B). T8 relatively slender, tongue shape, extrude to T7. Hemitergite finger-like (Fig. 6B, D). Base of aedeagus membranous, median tube with 6 humps armed with many spines; a pair of humps located on each lateral and upper side, apex tube membranous and cut bluntly (Fig. 6E-G).

**Female.** Body length 11.9-15.4 mm, forewing length 13.8-15.1 mm. T1-6 unmodified. Subgenital plate produced into triangular-shape, slightly upper trude (Fig. 6C).

**Mature nymph.** Body length 11.0-11.8 mm, head capsule width 2.9-3.9 mm, antennae 6.5-8.0 mm. General body color brown with light brown marker. Body covered with golden setae. Biocelli nearly contacted with transoccipital ridge. Head rhombus; blackish marker on ocelli and on central



**Fig. 6.** *Neoperla corensis* n. sp. A, head and thorax, dorsal view; B, male abdomen, dorsal view; C, female abdomen, dorsal view; D, male abdomen, lateral view; E, aedeagus (dorsal view); F, aedeagus (ventral view); G, aedeagus (lateral view); H, forewing; I, hindwing (scales. A-D: 1 mm, E-G: 0.05 mm, H-I: 2 mm).

area (Fig. 7A). Mandible bearing 5 teeth, its ventral base with 3 rows of setae (Fig. 7B). Lacinia with 2 teeth; galea with apical hair turft (Fig. 7C). Pronotum nearly as wide as head with round light marker. Meso-metathoracic notum with light brown marker shaped flower. Last abdominal segment with branched anal gill (Fig. 7A). Each segment of cerci with whirls of setae on the hind margin but swimming hair weak, length 5.9-7.5 mm (Fig. 7E).

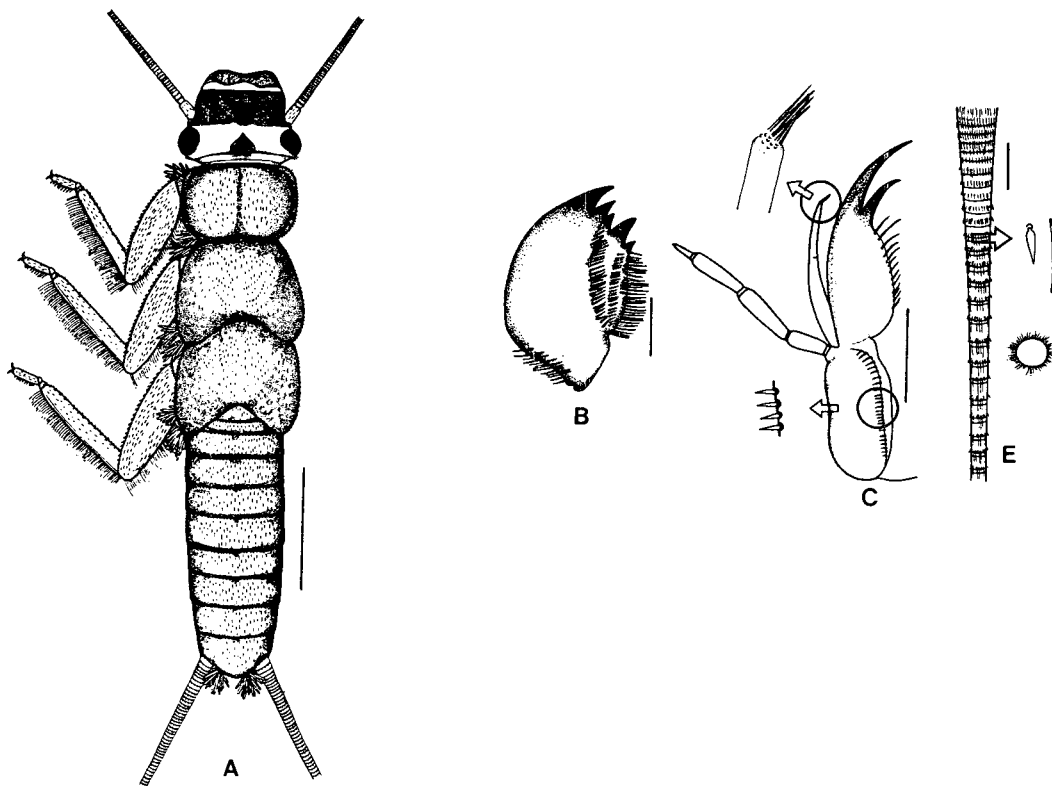
**Remarks.** This species was very similar to the structure of hemitergite in *Neoperla quadrata* Wu et Claassen, 1934 and S6-7 of female was closely similar to the species. But *N. quadrata* has two humps on lateral part of median tube of aedegus, this species has a pair of hump on lateral and upper side respectively.

Genus *Kiotina* Klapalek, 1907

### 8. *Kiotina decorata* (Zwick, 1973)

*Schistoperla* (*Kiotina*) *decorata* Zwick, 1973, p. 166.

**Material examined.** 4 ♂♂, 15 ♀♀, Tongkok valley, Mt. Packun, Kwangyang, 5 Jun. 1990, S.K. Baik & Y.G. Cho. Nymphs: Tongkok valley, Mt. Packun, Kwangyang, 5 May 1990, S.K. Baik & Y.



**Fig. 7.** *Neoperla coreensis* n. sp. A, nymphal habitus, dorsal view; B, mandible; C, maxilla; D, labrum; E, cercus; F, hindleg (scales. A: 2 mm, B: 0.2 mm, C-E: 0.5 mm).

G. Cho; P'iagol valley, Mt. Chiri, Kurye, 8 May 1990, Y.G. Cho & M.C. Lee.

**Distribution.** Korea.

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한국산 강도래류 3과(넓은가슴강도래과, 그물강도래과, 강도래과)에  
관한 분류학적 연구

나 철 호 · 김 중 선 · 강 양 원 · 함 순 아  
(전남대학교 생물학과)

요 약

한국산 강도래목(Plecoptera) 3과 (Peltoperlidae, Perlodidae, Perlidae)의 성충, 유충, 난을 대상으로 분류학적 연구를 실시한 결과 총 3과 8속 8종으로 나타났다. 이 중 *Perlodes stigmata* n. sp., *Kamimuria coreana* n. sp., *Neoperla coreensis* n. sp., 3종이 신종으로 밝혀져 도판을 작성하고 기재하였다.