

A Catalogue of the Ephemeroptera of Korea

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ABSTRACT: Mayflies (Ephemeroptera) of Korea have been described in various literatures since 1940, but there have been many taxonomic or nomenclatural changes in the members of the order. A comprehensive literature and type material review of the Ephemeroptera resulted herein the recognition of 56 nomenclaturally valid species previously described from Korea: *Acerella longicaudata* (Uéno), *Ameletus costalis* (Matsumura), *A. montanus* Imanishi, *Baetiella japonica* (Imanishi), *B. tuberculata* (Kazlauskas), *Baetis thermicus* Uéno, *Bleptus fasciatus* Eaton, *Choroterpes altioculus* Kluge, *Cincticostella castanea* (Allen), *C. tshernovae* (Bajkova), *Cinygmula grandifolia* Tshernova, *C. hirasana* (Imanishi), *Cloeon dipterum* (Linnaeus), *Drunella aculea* (Allen), *D. cryptomeria* (Imanishi), *D. lepnevae* (Tshernova), *D. triacantha* (Tshernova), *D. trispina ezoensis* (Gose), *Ecdyonurus bajkovae* Kluge, *E. dracon* Kluge, *E. joernensis mongolicus* Bajkova & Varychanova, *E. kibunensis* Imanishi, *E. levis* (Navás), *E. scalaris* Kluge, *E. subspinosa* (Braasch & Soldán), *Epeorus curvatus* Matsumura, *E. hiemalis* Imanishi, *E. latifolium* Uéno, *E. pellucidus* (Broadsky), *Ephemerella awivillii* Bengtsson, *E. imanishii* Gose, *E. keijoensis* Allen, *E. notofascia* Yoon & Bae, *Ephemerella orientalis* McLachlan, *E. separigata* Bae, *E. strigata* Eaton, *Ephoron shigae* (Takahashi), *Heptagenia guranica* Belov, *H. kihada* Matsumura, *H. kyotoensis* Gose, *Iron aesculus* (Imanishi), *I. koreanicus* Braasch & Soldán, *I. maculatus* Tshernova, *Isonychia japonica* (Ulmer), *I. ussurica* Bajkova, *Paraleptophlebia chocolata* Imanishi, *Potamanthellus rarus* Tiunova & Levanidova, *Potamanthus formosus* Eaton, *P. yooni* Bae & McCafferty, *P. luteus oriens* Bae & McCafferty, *Rhithrogena japonica* Uéno, *Rhoenanthus coreanus* (Yoon & Bae), *Serratella setigera* (Bajkova), *Siphonurus chankae* Tshernova, *S. sanukensis* Takahashi, and *Uracanthella rufa* (Imanishi). The asterisked species were known to larvae only from Korea, and the double asterisked were adults only (*C. tshernovae* and *E. keijoensis* were females and larvae only, and *P. luteus oriens* was subimagos only). The following 10 species were known to larvae only from Korea, but have not been determined: *Baetis* KUa: Yoon & Bae, *Baetis* nla: Imanishi, *Brachycercus* KUa: Yoon & Bae, *Caenis* KUa: Yoon & Bae, *Cinygmula* KUa: Yoon & Bae, *Cinygmula* na: Imanishi, *Ecdyonurus* KUb: Yoon & Bae, *Ecdyonurus* na: Imanishi, *Paraleptophlebia* nb: Imanishi, and *Rhithrogena* na: Imanishi.

For each species, original and secondary sources of the descriptions, materials used, type information, distributions, synonyms, and nomenclatural changes were chronologically provided. A checklist of the Ephemeroptera previously recorded from South Korea was appended with their proposed Korean name.

Key words: Mayflies, Ephemeroptera, Systematics, Catalogue, Korea

INTRODUCTION

Mayfly systematics of Japan was intensively studied in 1920-30s (e.g., Uéno, 1928; Imanishi, 1930-1937). Mayfly fauna in Far East Russia has been investigated since 1950s centering the Amur river basin (e.g., Tshernova, 1952, 1958; Bajkova, 1962-1980; Kluge, 1983-1989). Because of rare communication between mayfly workers of Northeast Asian countries, especially between Japan and Russia, mayfly materials in this region have not been brought together and studied comparatively until mid-1980s. Imanishi (1940) published a report on mayfly fauna as part of a limnological survey to Northeast Asia, covering Japan, Korea, Manchuria, and Inner Mongolia. That report has been the only inclusive mayfly study in this region.

Early this century, Ulmer (1919) reported *Chironetes japonicus* [= *Isonychia japonica*] from Korea. Imanishi (1940) described 36 species of Ephemeroptera larvae from Korea, as follows, and that was the first comprehensive mayfly study in Korea: ***Ephemerella strigata* Eaton, ***Potamanthus* nb [= *Rhoenanthus coreanus* (Yoon & Bae)], **Paraleptophlebia chocolata* Imanishi, **Paraleptophlebia* nb, *Choroterpes trifurcata* Uéno, **Ephemerella trispina* na [= *Drunella triacantha* (Tshernova)], **E. trispina* naa [= *D. trispina ezoensis* (Gose)], *Ephemerella* nG [= *D. cryptomeria* (Imanishi)], **E. basalis* Imanishi [= *D. basalis*], *E. basalis* na [= *D. aculea* (Allen)], **Ephemerella* nM [= *D. lepnevae* (Tshernova)], **Ephemerella* nba [= *Ephemerella notofascia* Yoon & Bae], **Ephemerella* nF [= *E. imanishii* Gose], **Ephemerella* nN [= *E. aurivillii* (Bengtsson)], *Ephemerella* nax [= *Cincticostella tshernovae* (Bajkova)], *Ephemerella rufa* Imanishi [= *Uracanthella rufa*], **Baetis thermicus* Uéno, *Baetis* nla, **Baetiella japonica* na [= *Baetiella tuberculata* (Kazlauskas)], ***Siphonurus sanukensis* Takahashi, ***Isonychia japonica* (Ulmer), **Ameletus montanus* Imanishi, ***A. costalis* Matsumura, **Cinygma hirasana* Imanishi [= *Cinygmula hirasana*], **Cinygma* na, **Rhithrogena japonica* Uéno, **Rhithrogena* na, *Epeorus latifolium* Uéno, *E. curvatulus* Matsumura, **E. aesculus* Imanishi [= *Iron aesculus*], ***Bleptus fasciatus* Eaton, *Ecdyonurus*

yoshidae Takahashi [= *E. levis* (Navás)], *E. kibunensis* Imanishi, **Ecdyonurus* na, and *Heptagenia* nb [= *H. kyotoensis* Gose]. (Asterisked species were known to North Korea only; double asterisked were South Korea only).

Allen (1971) described larvae of four new species of Ephemerellidae, *Ephemerella* (*Cincticostella*) *castanea*, *E. (C.) imanishii*, *E. (Drunella)* *aculea*, and *E. (Ephemerella)* *keijoensis*, from Korea, but he (Allen, 1975) later synonymized *E. (C.) imanishii* with *E. (C.) tshernovae* Bajkova. Yoon & Kim (1981), again, reviewed larvae of eight species of Ephemerellidae from South Korea: *E. (D.) bicornis* Gose [= *D. lepnevae* (Tshernova)], *E. (D.) aculea* Allen, *E. (D.) cryptomeria* Imanishi, *E. (D.) trispina* Uéno [= *D. triacantha* (Tshernova)], *E. (C.) castanea* Allen, *E. (E.) imanishii* Gose, *E. (Serratella)* *setigera* Bajkova, and *E. (S.) rufa* Imanishi.

Bae (1985) studied mayfly fauna, mainly larvae, of South Korea based on a good series of materials collected from more than 120 localities in South Korea since 1960s, and described 47 species of Ephemeroptera (see Yoon & Bae, 1988a and Appendix 1, below), including 14 species previously unknown to Korea and 25 species of adult stages. That work has been subsequently separated for publications on the Heptageniidae (Yoon & Bae, 1984), Ephemeroidea (Yoon & Bae, 1985), Ephemerellidae (Yoon & Bae, 1988b), and the Ephemeroptera of South Korea in general (Yoon & Bae, 1988a).

Mayfly fauna of North Korea has not been intensively investigated since Imanishi (1940), but Braasch & Soldán (1988) reported 12 nominal species of Heptageniidae, including two new species: *Notacanthrus dracon* (Kluge) [= *Ecdyonurus dracon*], *Paracinygmula zhiltzovae* Bajkova [= *Ecdyonurus bajkovae* Kluge], *Cinygmula zachvatkini* (Tshernova) [= *Ecdyonurus levis* (Navás)], *Ecdyonurus scalaris* Kluge, *E. kibunensis* Imanishi, *Nixe subspinoso* n. sp. [= *Ecdyonurus subspinoso*], *N. mongolica* (Bajkova) [= *Ecdyonurus joernensis mongolicus* Bajkova & Varychanova], *Heptagenia guranica* Belov, *Iron koreanicus* n. sp., *Epeorus curvatulus* Matsumura, *E. hiemalis* Imanishi, and *E. pellucidus* (Broadsky). Braasch & Soldán (1988), in addition, reported five undetermined species

of Heptageniidae (*Cinygmula*, *Rhithrogena*, and *Epeorus*) larvae.

In a revision of the Potamanthidae, Bae & McCafferty (1991) described four species of Potamanthidae, *Rhoenanthus coreanus* (Yoon & Bae), *Potamanthus luteus oriens* n. subsp., *P. yooni* n. sp., and *P. formosus* Eaton, from Korea. Bae (in press) recently described a new species of Ephemeridae, *Ephemerella separigata*, from South Korea.

In this catalogue, we include all the Ephemeroptera species previously recorded from Korea. We, however, exclude certain species that appeared in some faunistic or ecological literatures in Korea and that were determined by non-taxonomists and those identifications were highly suspicious.

Families, adopted from McCafferty (1991), genera, and species are alphabetically arranged with information on materials, types, and distributions. Chronological synonyms and nomenclatural changes are also indicated.

Type information has not been provided in detail in most earlier Japanese and Russian literatures. We therefore have provided any available type information, including type designation, locality, and deposition, in case we have confirmed those types from various sources in literatures or personally from those countries.

In Japan, Matsumura's materials, all consisting of dried specimens, were deposited at Hokkaido University [Entomological Institute, Hokkaido University, Kita 9 Nishi 9, Kitaku, Sapporo, Japan], but part of them were lost (S. Takagi, pers. comm.: Y. Takemon, pers. comm.). Most Imanishi's materials have been at Kyoto University [Center for Ecological Research (previously Otsu Hydrobiological Station), Kyoto University, Kyoto 606, Japan] (Takemon, pers. comm.: S. Ishiwata, pers. comm.). Kobayashi & Ishiwata (in ms) prepared a list of Imanishi's type specimens, in part, deposited at Kyoto University (Takemon, pers. comm.). According to various sources, Ueno's materials, if preserved, may be at Kyoto University, but has not been checked so far (Takemon, pers. comm.). Takahashi's materials have not been preserved in any places where he had involved in (Ishiwata, pers. comm.). Most Gose's materials may be at

Nara Women's University, Nara, Japan.

In Russia, most Tshernova's, Sinitshenkova's, Bajkova's, Belov's, and Kluge's type specimens have been deposited at Zoological Institute in St. Petersburg [Department of Entomology, Zoological Institute, Russian Academy of Sciences, St. Petersburg 199034, Russia]. Part of Tshernova's and Sinitshenkova's materials have been at Moskva University and part of Bajkova's materials have been in Khabarovsk. Part of Kluge's materials are currently at St. Petersburg University, but those will be deposited at Zoological Institute in St. Petersburg in the future (Kluge, pers. comm.). Kluge is preparing a list of mayfly type specimens deposited at Zoological Institute in St. Petersburg (Kluge, pers. comm.).

As to lectotypes of Navás (1912) and Tshernova (1949, 1952), we have identified the lectotype labels among the type materials at Zoological Institute in St. Petersburg. Most of the lectotypes, however, have not been formally designated elsewhere.

Initials used in mayfly materials are as follows: M (male imago), F (female imago), A (adult), Ms (male subimago), Fs (female subimago), S (subimago), L (larva), and E (egg).

In Appendix 1, a checklist of Ephemeroptera of South Korea, mainly incorporated with Yoon & Bae (1988a), is provided with their proposed Korean name.

CATALOGUE OF THE EPHEMEROPTERA OF KOREA

Order Ephemeroptera 하루살이목

Family Ameletidae McCafferty 피라미하루살이과

Genus *Ameletus* Eaton 피라미하루살이속

Ameletus costalis (Matsumura) 피라미하루살이
Chimura costalis Matsumura, 1931: 1474 [Material: M (Japan: Hokkaido, Honshu): Type information: unknown (types may be in Matsumura's collection)].

Ameletus sapporensis (Matsumura): Imanishi, 1932: 526 [Misidentification: corrected by Imanishi, 1933: Material: M, F (Japan)].

Ameletus costalis (Matsumura): Imanishi, 1933: 65 [Generic combination: Material: L (Japan)]; Imanishi, 1940: 237 [Material: L (Korea: Seoul)]; Sinitshenkova & Tshernova, 1976: 16 [Material: M, F, Ms, L (Russia: Sahalin, Primor'ye)]; Yoon & Bae, 1988a: 107 [Material: L (South Korea)].

Ameletus montanus Imanishi 멧피라미하루살이

Ameletus montanus Imanishi, 1930: 265 [Material: M (Holotype): Holotype locality: Japan; Holotype deposition: in Imanishi's collection]; Uéno, 1931b: 208 [Material: M, F, Ms, Fs, L (Japan)]; Imanishi, 1940: 236 [Material: L (North Korea: Kungang Mt.)]; Sinitshenkova & Tshernova, 1976: 17 [Material: Ms, L (Russia: Kamchatka, Khabarovsk, Primor'ye)]; Bajkova 1976a: 582 [Material: M, F, L (Russia: Amur, Primor'ye)]; Yoon & Bae, 1988a: 106 [Material: M, Fs, L (South Korea)].

Family **Baetidae** Leach 꼬마하루살이과

Genus **Baetiella** Uéno 애하루살이속

Baetiella japonica (Imanishi) 애하루살이

? *Acentrella* (n. sp.?): Uéno, 1928: 51, pl. 17 [Material: L (Japan, Japanese Alps)].

Acentrella japonica Imanishi, 1930: 263 [M (Holotype): Holotype locality: Japan; Holotype deposition: in Imanishi's collection].

Baetiella japonica (Imanishi): Uéno, 1931b: 220 [Generic combination: as type species of *Baetiella* Uéno: Material: M, L (Japan)]; Imanishi, 1940: 226 [Material: L (Japan)]; Waltz & McCafferty, 1987: 561 [Generic recombination: generic status of *Baetiella* Uéno revalidated: Material: M, L (Japan), L (Korea)].

Pseudocloeon japonica (Imanishi): Gose, 1980: 211 (Generic combination: *Baetiella* Uéno was synonymized with *Pseudocloeon* Klapálek); Yoon & Bae, 1988a: 114 [Material: L (South Korea)].

Baetiella tuberculata (Kazlauskas) 애호랑하루살이
Baetiella japonica na: Imanishi, 1940: 227 [Material: L (North Korea: Hamgyongbuk-do)].

Pseudocloeon (*Baetiella*) *tuberculatum* Kazlauskas, 1963: 583 [Material: L (Holotype): Type locality: Russia, Irkutsk Province; Holotype deposition: Zoological Institute (St. Petersburg, Russia)].

Baetiella noseogawaensis Gose, 1965: 218 [Material: M (Holotype): Holotype locality: Japan, Nara Prefecture; Holotype deposition: Nara Women's University (Japan); Synonymized by Kluge, 1983a].

Pseudocloeon tuberculatum Kazlauskas: Kluge, 1983a: 64 [Material: M, S, L (Russia: Primor'ye)].

Baetis (*Baetiella*) *tuberculatus* (Kazlauskas): Tshernova *et al.*, 1986: 134 (Generic combination).

Baetiella tuberculata (Kazlauskas): Waltz & McCafferty, 1987: 563 [Generic combination: Material: L (South Korea)].

Pseudocloeon japonica na (Imanishi): Yoon & Bae, 1988a: 115 [Material: L (South Korea)].

Genus **Baetis** Leach 꼬마하루살이속

Baetis thermicus Uéno 꼬마하루살이

Baetis thermicus Uéno, 1931a: 91 [Material: M (Holotype), F: Holotype locality: Japan, Shinano Prov.; Holotype deposition: in Uéno's collection]; Imanishi, 1940: 219 [Material: L (North Korea)]; Yoon & Bae, 1988a: 110 [Material: L (South Korea)].

Baetis KUa: Yoon & Bae

Baetis KUa: Yoon & Bae, 1988a: 111 [Material: L (South Korea)].

Baetis nla: Imanishi

Baetis nla: Imanishi, 1940: 221 [Material: L (North Korea, Manchuria, Japan)]; Yoon & Bae, 1988a: 111 [Material: L (South Korea)].

Genus **Cloeon** Leach 연못하루살이속

Cloeon dipterum (Linnaeus) 연못하루살이

Ephemera diptera Linnaeus, 1761 [Material: Adult (Type not preserved and Neotype not designated: Sowa, 1975)].

Cloeon dipterum (Linnaeus): Leach, 1815: 137

(Generic combination): Eaton, 1885: 182 [Material: M, F, S, L (Europe): A (Japan)]: Uéno, 1928: 49 [Material: L (Japan)]: Imanishi, 1940: 215 [Material: L (Manchuria, Japan)]: Sowa, 1975: 215 [*sensu stricto*: Material: M, F, S, L, E (Europe)]: Yoon & Bae, 1988a: 112 [Material: M, F, L (South Korea)].

Family **Caenidae** Newman 등딱지하루살이과

Genus **Brachycercus** Curtis 세뿔등딱지하루살이속

Brachycercus KUa: Yoon & Bae

Brachycercus KUa: Yoon & Bae, 1988a: 184 [Material: L (South Korea)].

Genus **Caenis** Stephens 등딱지하루살이속

Caenis KUa: Yoon & Bae

Caenis KUa: Yoon & Bae, 1988a: 183 [Material: L (South Korea)].

Family **Ephemerellidae** Klapálek 알락하루살이과

Genus **Acerella** Allen 긴꼬리하루살이속

Acerella longicaudata (Uéno) 긴꼬리하루살이

Ephemerella longicaudata Uéno, 1928: 42 [Material: L (Holotype): Holotype locality: Japan, Omi Prov., Lake Biwa; Holotype deposition: in Uéno's collection]; Imanishi, 1937: 323 [Material: M, F, S (Japan)].

Ephemerella (*Serratella*) *longicaudata* Uéno: Edmunds, 1959: 545 (Subgeneric combination).

Ephemerella (*Acerella*) *longicaudata* Uéno: Allen, 1971: 518 [Subgeneric combination: Material: M, L (Japan)].

Acerella longicaudata (Uéno): Allen, 1980: 82 (Generic combination): Yoon & Bae, 1988a: 172 [Material: M, L (South Korea)]: Yoon & Bae, 1988b: 30 [Material: M, F, Fs, L (South Korea)].

Genus **Cincticostella** Allen 민하루살이속

Cincticostella castanea (Allen) 민하루살이

Ephemerella (*Cincticostella*) *castanea* Allen,

1971: 514 [Material: L (Holotype): Holotype locality: Korea, Kyonggi-do, Kwang Nung; Holotype deposition: University of Utah (USA)]: Allen, 1975: 19 [Material: L (South Korea)]: Yoon & Kim, 1981: 38 [Material: L (South Korea)].

Cincticostella (*Cincticostella*) *castanea* (Allen): Allen, 1980: 83 (Generic combination).

Cincticostella castanea (Allen): Yoon & Bae, 1988a: 169 [Material: M, L (South Korea)]: Yoon & Bae, 1988b: 29 [Material: M, F, Ms, Fs, L (South Korea)].

Cincticostella tshernovae (Bajkova) 먹하루살이

Ephemerella nax: Imanishi, 1940: 205 [Material: L (Korea): Synonymized by Bajkova, 1962].

Ephemerella tshernovae Bajkova, 1962: 203 [Material: L (Holotype): Holotype locality: Russia, Ussuri basin, Hor River; Holotype deposition: Zoological Institute (St. Petersburg, Russia)].

Ephemerella (*Cincticostella*) *imanishii* Allen, 1971: 517 [Named based on Imanishi's (1940) description of *Ephemerella nax*: Holotype: L (Fig. 17 in Imanishi, 1940); Holotype deposition: in Imanishi's collection: Synonymized by Tshernova, 1972].

Ephemerella (*Cincticostella*) *tshernovae* Bajkova: Allen, 1975: 21 (Subgeneric combination).

Cincticostella (*Cincticostella*) *tshernovae* (Bajkova): Allen, 1980: 83 (Generic combination).

Cincticostella tshernovae (Bajkova): Yoon & Bae, 1988a: 170 [Material: F, L (South Korea)]: Yoon & Bae, 1988b: 30 [Material: F, L (South Korea)].

Genus **Drunella** Needham 뿔하루살이속

Drunella aculea (Allen) 뿔하루살이

Ephemerella basalis Na: Imanishi, 1940: 196 [Material: L (Korea): Synonymized by Allen, 1971].

Ephemerella basalis Imanishi: Tshernova, 1952: 271 (Misidentification: corrected by Allen, 1971).

Ephemerella (*Drunella*) *aculea* Allen, 1971: 522 [Material: L (Holotype): Holotype locality: Korea, Kyonggi-do, Kwang Nung; Holotype deposition: University of Utah (USA)]: Yoon & Kim, 1981: 36 [Material:

- L (South Korea)].
- Drunella (Tribrochella) aculea* (Allen): Allen, 1980: 80 (Generic and subgeneric combination).
- Drunella aculea* (Allen): Yoon & Bae, 1988a: 164 [Material: M, F, L (South Korea)]; Yoon & Bae, 1988b: 25 [Material: M, F, L (South Korea)].
- Drunella cryptomeria*** (Imanishi) 알통하루살이
- Ephemerella cryptomeria* Imanishi, 1937: 328 [Material: M (Holotype): Holotype locality: Japan, Kyoto, Kibune: Holotype deposition: in Imanishi's collection].
- Ephemerella* nG: Imanishi, 1940: 195 [Material: L (Korea): Synonymized with *Ephemerella latipes* Tshernova by Tshernova, 1952: Synonymized with *Ephemerella yoshinoensis* Gose by Gose, 1970].
- Ephemerella latipes* Tshernova, 1952: 273 [Material: L (Lectotype): Lectotype locality: Russia, Sahalin, Sango River: Lectotype deposition: Zoological Institute (St. Petersburg, Russia): Synonymized by Tshernova *et al.*, 1986].
- Ephemerella (Drunella) cryptomeria* (Imanishi): Edmunds, 1959: 546 (Subgeneric combination): Yoon & Kim, 1981: 36 [Material: L (South Korea)].
- Ephemerella yoshinoensis* Gose, 1963b: 142 [Material: M (Holotype), F: Holotype locality: Japan, Nara Pref., Gojo: Holotype deposition: Nara Women's University (Japan): Synonymized by Gose, 1980].
- Ephemerella (Drunella) yoshinoensis* Allen, 1971: 525 (Subgeneric combination).
- Drunella (Tribrochella) cryptomeria* (Imanishi): Allen, 1980: 80 (Generic and subgeneric combination).
- Drunella cryptomeria* (Imanishi): Yoon & Bae, 1988a: 167 [Material: L (South Korea)]; Yoon & Bae, 1988b: 27 [Material: L (South Korea)].
- Drunella lepnevae*** (Tshernova) 쌍혹하루살이
- Ephemerella* nM: Imanishi, 1940: 198 [Material: L (North Korea): Synonymized with *Ephemerella longipes* Tshernova by Tshernova, 1952].
- Ephemerella lepnevae* Tshernova, 1949: 152 [Material: L (Lectotype): Lectotype locality: Russia, Altay, Yantshili River: Lectotype deposition: Zoological Institute (St. Petersburg, Russia)].
- Ephemerella longipes* Tshernova, 1952: 294 [Material: L (Holotype): Holotype locality: Russia, Stzastie, R. Iski: Holotype deposition: Zoological Institute (St. Petersburg, Russia): Synonymized with *Ephemerella (Drunella) lepnevae* Tshernova by Tshernova *et al.*, 1986].
- Ephemerella (Drunella) bicornis* Gose: Yoon & Kim, 1981: 36 [Misidentification: Material: L (South Korea)].
- Ephemerella (Drunella) lepnevae* Tshernova: Tshernova *et al.*, 1986: 139 (Subgeneric combination).
- Drunella longipes* (Tshernova): Yoon & Bae, 1988a: 168 [Generic combination: Material: L (South Korea)]; Yoon & Bae, 1988b: 28 [Material: L (South Korea)].
- Drunella triacantha*** (Tshernova) 삼지창하루살이
- Ephemerella trispina* na: Imanishi, 1940: 193 [Material: L (North Korea): Synonymized by Tshernova, 1952].
- Ephemerella triacantha* Tshernova, 1949: 151 [Material: L (Holotype): Holotype locality: Russia, Altay; Holotype deposition: unknown (Holotype not in Zoological Institute in St. Petersburg)]; Tshernova, 1952: 271 [Material: L (Russia: Amur)]; Bajkova, 1972a: 190 [Material: Ms, L (Russia: Ussuri, Amur)].
- Ephemerella (Drunella) triacantha* (Tshernova): Edmunds, 1959: 546 (Subgeneric combination).
- Ephemerella (Drunella) trispina* Uéno: Yoon & Kim, 1981: 37 [Misidentification: Material: L (South Korea)].
- Drunella (Tribrochella) triacantha* (Tshernova): Allen, 1980: 80 (Generic and subgeneric combination).
- Drunella triacantha* (Tshernova): Yoon & Bae, 1988a: 166 [Material: M, L (South Korea)]; Yoon & Bae, 1988b: 26 [Material: M, L (South Korea)].
- Drunella trispina ezoensis*** (Gose) (국명 미정)
- Ephemerella trispina* naa: Imanishi, 1940: 194

[Material: L (North Korea)].

- Ephemerella* (*Drunella*) *trispina ezoensis* Gose, 1980: 287 [Named Imanishi's *Ephemerella trispina* naa: Type information: unknown].
Drunella trispina ezoensis (Gose): Ishiwata, 1987: 28 (Generic combination).

Genus *Ephemerella* Walsh 알락하루살이속

- Ephemerella aurivillii* (Bengtsson) (국명 미정)
Chitonophora aurivillii Bengtsson, 1909: 8 [Material: M, F (Sweden): Type information: unknown]; Tshernova, 1949: 156 [Material: L (Russia: Altay)].
Ephemerella nN: Imanishi, 1940: 203 [Material: L (North Korea): Synonymized with *Ephemerella* (*Ephemerella*) *taeniata* Tshernova by Tshernova, 1952].
Ephemerella taeniata Tshernova, 1952: 279 [Material: L (Russia: Okhotsk, R. Iski: Ussuri, R. Hor): Type information: unknown (Types not in Zoological Institute in St. Petersburg): Synonymized with *Ephemerella aurivillii* (Bengtsson) by Bajkova, 1972a].
Ephemerella aurivillii (Bengtsson): Bajkova, 1972a: 185 [Material: M, F, Ms, Fs (Russia: Amur, Ussuri)].
Ephemerella imanishii Gose 철성하루살이
Ephemerella nF: Imanishi, 1940: 202 [Material: L (North Korea)].
Ephemerella (*Ephemerella*) *imanishii* Gose, 1980: 366 [Named Imanishi's *Ephemerella* nF: Type information: unknown]; Yoon & Kim, 1981: 38 [Material: L (South Korea)].
Ephemerella imanishii Gose: Yoon & Bae, 1988a: 177 [Material: L (South Korea)]; Yoon & Bae, 1988b: 33 [Material: L (South Korea)].

- Ephemerella keijoensis* Allen 알락하루살이
Ephemerella (*Ephemerella*) *keijoensis* Allen, 1971: 526 [Material: L (Holotype): Holotype locality: Korea, Seoul: Holotype deposition: Illinois Natural History Survey (USA)].
Ephemerella keijoensis Allen: Yoon & Bae, 1988a: 177 [Material: F, L (South Korea)];

Yoon & Bae, 1988b: 34 [Material: F, Fs, L (South Korea)].

- Ephemerella notofascia* Yoon & Bae 흰등하루살이
Ephemerella nba: Imanishi, 1940: 202 [Material: L (North Korea): Synonymized by Yoon & Bae, 1988b]; Yoon & Bae, 1988a: 179 [Material: L (South Korea)].
Ephemerella notofascia Yoon & Bae, 1988b: 34 [Material: L (Holotype): Holotype locality: Korea, Kangwon-do, Hongchon, Mt. Kyebang: Holotype deposition: Seoul Women's University (Seoul, Korea) (previously at Korean Entomological Institute in Seoul)].

Genus *Serratella* Edmunds 범꼬리하루살이속

- Serratella setigera* (Bajkova) 범꼬리하루살이
Ephemerella setigera Bajkova, 1967: 333 [Material: L (Holotype): Holotype locality: Far East Russia, Ussuri River: Holotype deposition: Zoological Institute (St. Petersburg, Russia)].
Ephemerella (*Serratella*) *setigera* Bajkova: Gose, 1980: 366 (Subgeneric combination); Yoon & Kim, 1981: 39 [Material: L (South Korea)]; Tshernova et al., 1986: 138 (adult key with male genitalia figure).
Serratella setigera (Bajkova): Yoon & Bae, 1988a: 174 [Generic combination: Material: L (South Korea)]; Yoon & Bae, 1988b: 31 [Material: L (South Korea)].

Genus *Uracanthella* Belov 등줄하루살이속

- Uracanthella rufa* (Imanishi) 등줄하루살이
Ephemerella rufa Imanishi, 1937a: 327 [Material: M (Holotype), F: Holotype locality: Japan, Kyoto, Shimogamo: Holotype deposition: in Imanishi's collection]; Imanishi, 1940: 208 [Material: L (Korea)]; Tshernova, 1952: 275 [Material: L (Russia: Amur)]; Bajkova, 1972a: 179 [Material: M, Ms (Russia: Amur)].
Ephemerella lenoki Tshernova, 1952: 275 [Material: Female mature L (Lectotype): Lectotype locality: Russia, Amur, Onon River: Lectotype deposition: Zoological Institute (St. Petersburg, Russia): Syno-

nymized by Tshernova *et al.*, 1986].

Uracanthella markevitchi Belov, 1979: 579 [Material: L (Holotype): Holotype locality: Central USSR, Irtysh R.: Holotype deposition: Zoological Institute (St. Petersburg, Russia): Synonymized by Tshernova *et al.*, 1986].

Ephemerella (Serratella) rufa (Tshernova): Gose, 1980: 366 (Subgeneric combination); Yoon & Kim, 1981: 39 [Material: L (South Korea)].

Ephemerella (Uracanthella) rufa (Tshernova): Tshernova *et al.*, 1986: 138 (Subgeneric combination).

Serratella rufa (Tshernova): Ishiwata, 1987: 29 (Generic combination); Yoon & Bae, 1988a: 175 [Material: M, L (South Korea)]; Yoon & Bae, 1988b: [Material: M, F, Ms, Fs, L (South Korea)].

Uracanthella rufa (Tshernova): Ishiwata, 1993: 15 (Generic combination).

Family **Ephemeridae** Latreille 하루살이과

Genus *Ephemer* Linnaeus 하루살이속

Ephemer **orientalis** McLachlan 동양하루살이

Ephemer orientalis McLachlan, 1875: 167 [Material: M (Holotype): Holotype locality: Japan: Holotype deposition: Leiden Museum (Netherlands)]; Demoulin, 1965: 215 (redescription of holotype); Tshernova, 1973: 326 [Material: M, F, Ms, L (Siberia, Far East Russia, Korea, China, Japan)]; Gose, 1981: 13 [Material: M, L (Japan)]; Yoon & Bae, 1985: 99 [Material: M, F, Ms, Fs, L (South Korea)]; Yoon & Bae, 1988a: 160 [Material: M, L (South Korea)].

Ephemer **amurensis** Navás, 1912: 414 [Material: M (Lectotype): Lectotype locality: Russia, Amur: Lectotype deposition: Zoological Institute (St. Petersburg, Russia): Synonymized by Tshernova, 1973]; Tshernova, 1952: 234 [Material: M, L (Russia)].

Ephemer **lineata** Eaton: Imanishi, 1940: 176 [Material: L (China, Manchuria): as senior synonym of *Ephemer orientalis* McLachlan].

Ephemer **modesta** Broadsky, 1930: 31 [Ma-

terial: Ms (Lectotype): Lectotype locality: Russia, Southern Siberia, Ob River: Lectotype deposition: Zoological Institute (St. Petersburg, Russia): Synonymized by Tshernova, 1952].

Ephemer **separigata** Bae 가는무늬하루살이

Ephemer separigata Bae, (in press) [Material: M (Holotype), F, S, L (South Korea): Holotype locality: Korea, Kangwon-do, Wonju, Mt. Chiak: Holotype deposition: Seoul Women's University (Seoul, Korea)].

Ephemer **strigata** Eaton 무늬하루살이

Ephemer strigata Eaton, 1892a: 302 [Material: M (Lectotype: designated by Kimmins, 1960), F: Lectotype locality: Japan: Lectotype deposition: Natural History Museum (London, England)]; Imanishi, 1940: 175 [Material: L (South Korea)]; Tshernova, 1952: 237 [Material: M (Russia, Amur)]; Tshernova, 1973: 332 [Material: M, L (Far East Russia)]; Gose, 1981: 11 [Material: M, L (Japan)]; Yoon & Bae, 1985: 98 [Material: M, F, Fs, L (South Korea)]; Yoon & Bae, 1988a: 158 [Material: M, L (South Korea)].

Family **Heptageniidae** Needham 납작하루살이과

Genus *Bleptus* Eaton 맷시하루살이속

Bleptus **fasciatus** Eaton 맷시하루살이

Bleptus fasciatus Eaton, 1885: 243 [Material: M (Holotype): Holotype locality: Japan, Yagohara: Holotype deposition: Natural History Museum (London, England)]; Horasawa, 1931: 29 [Material: Fs, L (Japan)]; Uéno, 1931b: 194 [Material: L (Japan)]; Imanishi, 1940: 252 [Material: L (South Korea)]; Yoon & Bae, 1984: 4 [Material: M, L (South Korea)]; Yoon & Bae, 1988a: 121 [Material: M, L (South Korea)].

Genus *Cinygmula* McDunnough 불처너하루살이속

- Cinygmula grandifolia* Tshernova 봄처녀하루살이
Cinygmula grandifolia Tshernova, 1952: 256 [Material: L (Lectotype); Lectotype locality: Russia, Stzastie (Lower Amur); Lectotype deposition: Zoological Institute (St. Petersburg, Russia)]; Bajkova, 1974: 816 [Material: Ms, L (Far East Russia)]; Tshernova & Belov, 1982: 285 [Material: M, F (Far East Russia)].
- Cinygmula* KUa: Yoon & Bae, 1984: 10 [Material: L (South Korea); NEW SYNONYM].
- Rhithrogena (Cinygmula) grandifolia* (Tshernova): Kluge, 1988: 306 (Generic combination).
- Cinygmula hirasana* (Imanishi) (국명 미정)
Cinygmula hirasana Imanishi, 1935: 214 [Material: M (Holotype), F, S, L (Japan); Holotype locality: Japan, Shiga, Hiragawa; Holotype deposition: in Imanishi's collection]; Imanishi, 1940: 240 [Material: L (North Korea)].
- Cinygmula kurobensis* Imanishi, 1935: 215 [Material: M (Holotype), F; Holotype locality: Japan, Kyoto, Takagamine; Holotype deposition: in Imanishi's collection; Synonymized by Imanishi, 1940].
- Cinygmula hirasana* (Imanishi): Tshernova, 1974: 812 (Generic combination).
- Cinygmula* KUa: Yoon & Bae
Cinygmula KUa: Yoon & Bae, 1984: 9 [Material: L (South Korea)]; Yoon & Bae, 1988a: 131 [Material: L (South Korea)].
- Cinygmula na*: Imanishi
Cinygmula na: Imanishi, 1940: 241 [Material: L (North Korea, Hamgyongbuk-do); NEW COMBINATION].
- Genus *Ecdyonurus* Eaton 참납작하루살이속
- Ecdyonurus bajkova* Kluge 몽족하루살이
Paracinygmula zhiltzovae Bajkova, 1975: 56 [Originally misprinted as "*P. zniltzovae*"; Species name was preoccupied by Tshernova, 1972 as *Ecdyonurus zhiltzovae*; Material: L (Holotype); Holotype locality: Russia, Primor'ye, Tigrovaya R.; Holotype deposition: Zoological Institute (St. Petersburg, Russia)]; Braasch & Soldán, 1988: 24 [Material: M, L (North Korea)].
- Ecdyonurus zhiltzovae* (Bajkova): Kluge, 1983b: 31 [Generic combination; Material: M, F, Ms, Fs (Far East Russia)].
- Ecdyonurus bajkova* Kluge: Tshernova et al., 1986: 117 (*nomen novum*).
- Ecdyonurus* KUa: Yoon & Bae, 1984: 14 [Material: L (South Korea)]; Yoon & Bae, 1988a: 139 [Material: L (South Korea)]; NEW SYNONYM.
- Ecdyonurus dracon* Kluge 참납작하루살이
Ecdyonurus dracon Kluge, 1983b: 27 [Material: M (Holotype), F, Ms, L (Far East Russia); Holotype locality: Russia, Primor'ye, Tigrovaya R.; Holotype deposition: Zoological Institute (St. Petersburg, Russia)]; Yoon & Bae, 1984: 13 [Material: M, F, Fs, L (South Korea)]; Yoon & Bae, 1988a: 138 [Material: M, F, Fs, L (South Korea)].
- Notacanthurus dracon* (Kluge): Braasch & Soldán, 1988: 24 [Generic combination; Material: M, L (North Korea)].
- Ecdyonurus joernensis mongolicus* Bajkova & Varychanova (국명 미정)
Ecdyonurus mongolicus Bajkova & Varychanova, 1978 [Material: A (Mongolia); Type information: unknown].
- Ecdyonurus joernensis* (Bengtsson): Landa & Soldán, 1983: 196 [Material: M, F (Mongolia)].
- Ecdyonurus joernensis mongolicus* Bajkova & Varychanova: Tshernova et al., 1986: 177 (as subspecies).
- Nixe mongolica* (Bajkova & Varychanova): Braasch & Soldán, 1988: 25 [Generic combination; Material: M, F, Ms, Fs (North Korea)].
- Ecdyonurus kibunensis* Imanishi 두점하루살이
Ecdyonurus kibunensis Imanishi, 1936: 540 [Material: M (Holotype), F, L (Japan); Holotype locality: Japan, Kyoto, Nishigamo; Holotype deposition: in Imanishi's collection]; Imanishi, 1940: 253 [Material: L (Korea, Manchuria)]; Yoon & Bae, 1984: 12 [Material: L (South Korea)];

- Yoon & Bae, 1988a: 136 [Material: M, L (South Korea)]; Braasch & Soldán 1988: 25 [Material: M, F, L (North Korea)].
- Heptagenia kibunensis* (Imanishi): Tshernova, 1952: 253 (Generic combination).
- Ecdyonurus levis* (Navás) 네점 하루살이
Epeorus levis Navás, 1912: 415 [Material: M (Lectotype); Lectotype locality: Russia, Amur; Lectotype deposition: Zoological Institute (St. Petersburg, Russia)].
- Ecdyonurus yoshidae* Takahashi, 1924: 380 [Material: F (Japan: Shanuki, Shiga, Fukushima); Type information: unknown (type may be at Kyoto University, Kyoto, Japan); NEW SYNONYM]; Imanishi, 1940: 252 [Material: L (Korea, Manchuria)]; Yoon & Bae, 1984: 11 [Material: M, F, Ms, Fs, L (South Korea)]; Yoon & Bae, 1988a: 134 [Material: M, F, S, L (South Korea)].
- Ecdyurus japonicus* Uéno, 1928: 30 [Material: L (Holotype); Holotype locality: Japan, Kai Prov., Mt. Fuji; Holotype deposition: in Uéno's collection; Synonymized with *Ecdyonurus yoshidae* Takahashi by Imanishi, 1940; Synonymized with *Heptagenia yoshidae* (Takahashi) by Tshernova, 1952]; Horasawa, 1931: 30 [Material: Fs (Japan)].
- Ecdyonurus japonicus* Uéno: Uéno, 1931b: 197 [Generic name corrected; Material: M, F, L (Japan)].
- Rhithrogena japonica* (Uéno): Imanishi, 1936: 543 [Generic combination; Material: M, F, Ms, Fs (Japan)].
- Heptagenia yoshidae* (Takahashi): Tshernova, 1952: 251 [Generic combination; Material: L (Russia: Amur)].
- Cinygmula zachvatkini* Tshernova, 1952: 257 [Material: M (Holotype), F: Holotype locality: Russia, Amur; Holotype deposition: Lost (Neotype not designated; Female paratype in Zoological Institute, St. Petersburg); Synonymized by Tshernova *et al.*, 1986]; Bajkova, 1974: 820 [Material: M, F (Russia: Ussuri)].
- Cinygma zachvatkini* (Tshernova): Tshernova, 1974: 812 (Generic combination); Tshernova, 1981: 79 [Material: M, F, Ms, Fs (Russia: Amur)].
- Ecdyonurus zachvatkini* (Tshernova): Kluge, 1983b: 33 [Generic combination; Material: M, F, L (Far East Russia)].
- Ecdyonurus levis* (Navás): Tshernova *et al.*, 1986: 114 (Generic combination).
- Cinygmina zachvatkini* (Tshernova): Braasch & Soldán, 1988: 24 [Generic combination; Material: Ms, Fs, L (North Korea)].
- Cinygmina yoshidae* (Takahashi): Braasch & Soldán, 1988: 24 (Generic combination).
- Ecdyonurus scalaris* Kluge (국명 미정)
Ecdyonurus scalaris Kluge, 1983b: 34 [Material: M (Holotype), F, Ms, Fs, L (Far East Russia); Holotype locality: Russia, Primor'ye; Holotype deposition: Zoological Institute (St. Petersburg, Russia)]; Braasch & Soldán, 1988: 24 [Material: M, F, L (North Korea)].
- Ecdyonurus subspinosa* (Braasch & Soldán) (국명 미정)
Nixe subspinosa Braasch & Soldán, 1988: 25 [Material: M (Holotype); Holotype locality: North Korea, Myohyang Mt., Hyangsan stream; Holotype deposition: Entomological Institute, Ceske Budejovice; Generic combination based on Tshernova *et al.*, 1986].
- Ecdyonurus* KUB: Yoon & Bae
Ecdyonurus KUB: Yoon & Bae, 1988a: 14 [Material: L (South Korea)].
- Ecdyonurus na*: Imanishi
Ecdyonurus na: Imanishi, 1940: 254 [Material: L (North Korea)].
- Genus *Epeorus* Eaton 부채하루살이속
Epeorus curvatus Matsumura 흰부채하루살이
Epeorus curvatus Matsumura, 1931: 1477 [Material: M (Japan, Honshu); Type information: unknown (type may be in Matsumura's collection)]; Imanishi, 1934: 392 [Material: M, F, S, L (Japan)]; Imanishi, 1940: 250 [Material: L (Korea, Manchuria)]; Braasch & Soldán, 1988: 27 [Material: L (North Korea)].

Epeorus (Belovius) curvatulus (Matsumura): Tshernova, 1981a: 326 (Subgeneric combination).

Epeorus (Epeorus) curvatulus Matsumura: Yoon & Bae, 1984: 6 [Material: L (South Korea)]: Yoon & Bae, 1988a: 125 [Material: M, L (South Korea)].

Epeorus hiemalis Imanishi (국명 미정)

Epeorus hiemalis Imanishi, 1934: 386 [Material: M (Holotype), F (Japan): Holotype locality: Japan, Kyoto, Kibune: Holotype deposition: in Imanishi's collection]: Braasch & Soldán, 1988: 27 [Material: L (North Korea)].

Epeorus latifolium Uéno 부채하루살이

Epeorus latifolium Uéno, 1928: 34 [Material: L (Holotype): Holotype locality: Japan, Hokkaido, Iburi Prov.: Holotype deposition: in Uéno's collection]: Horasawa, 1929: 258 [Material: Ms, L (Japan)]: Uéno, 1931b: 192 [Material: M, F (Japan)]: Imanishi, 1934: 389 [Material: A (Japan)]: Imanishi, 1940: 248 [Material: L (Korea, Manchuria)].

Epeorus (Belovius) latifolium (Uéno): Tshernova, 1981a: 329 (Subgeneric combination).

Epeorus (Epeorus) latifolium Uéno: Yoon & Bae, 1984: 5 [Material: M, F, Ms, Fs, L (South Korea)]: Yoon & Bae, 1988a: 123 [Material: M, F, S, L (South Korea)].

Epeorus pellucidus (Broadsky) (국명 미정)

Cinygma pellucida Broadsky, 1930: 35 [Material: M (Holotype): Holotype locality: Russia, Biya River: Holotype deposition: Zoological Institute (St. Petersburg, Russia)].

Epeorus latifolium Uéno: Tshernova, 1949: 146 [Misidentification: corrected by Tshernova, 1981a: Material: L (Russia)].

Epeorus (Belovius) pellucidus (Broadsky): Tshernova, 1981a: 330 [Subgeneric combination: Material: M, F (Russia: Altay, Kazakhstan)].

Epeorus pellucidus (Broadsky): Braasch & Soldán, 1988: 27 [Material: M, F, L (North Korea)].

Genus *Heptagenia* Walsh 납작하루살이

Heptagenia guranica Belov (국명 미정)

Heptagenia guranica Belov, 1981 [Material: M (Holotype): Holotype locality: Russia, Khabarovsk, Amur River: Holotype deposition: Moskva University (Russia)]: Kluge, 1987: 311 [Material: F (Far East Russia: Khabarovsk, Amur)]: Braasch & Soldán, 1988: 25 [Material: M, F, Ms, Fs, L (North Korea)].

Heptagenia kihada Matsumura 납작하루살이

Heptagenia kihada Matsumura 1931: 1478 [Material: F (Japan, Honshu): Type information: unknown (types may be in Matsumura's collection): Imanishi, 1935: 220 [Material: M, F, Ms, Fs (Japan)]: Imanishi, 1936: 538 [Material: L (Japan)]: Yoon & Bae, 1984: 15 [Material: M, F, Ms, Fs, L (South Korea)]: Yoon & Bae, 1988a: 142 [Material: M, F, Ms, Fs, L (South Korea)].

Kageronia suzukiella Matsumura, 1931: 1479 [Material: M (Japan, Honshu): Type information: unknown (types may be in Matsumura's collection): Synonymized by Imanishi, 1935].

Heptagenia kyotoensis Gose 총채하루살이

Heptagenia nb: Imanishi, 1940: 257 [Material: L (South Korea): Synonymized by Gose, 1980].

Heptagenia kyotoensis Gose, 1963b: 143 [Material: Ms (Holotype), Fs (Japan): Holotype locality Japan, Kyoto Pref., Yamashina: Holotype deposition: Nara Women's University (Japan)]: Yoon & Bae, 1984: 16 [Material: L (South Korea)]: Yoon & Bae, 1988a: 144 [Material: L (South Korea)].

Genus *Iron* Eaton 긴부채하루살이속

Iron aesculus (Imanishi) 증부채하루살이

Epeorus aesculus Imanishi, 1934: 384 [Material: M (Holotype), F, S, L (Japan): Holotype locality: Japan, Northern Japanese Alps, Kurobe R., Gorosawa: Holotype deposition: in Imanishi's collection]: Imanishi, 1940: 250 [Material: L (North Korea)].

- Epeorus (Iron) aesculus* Imanishi: Kluge, 1988: 309 [Subgeneric combination; Material: M, F, Fs, L (Russia: Primor'ye)].
- Iron aesculus* (Imanishi): Sinitshenkova, 1978: 50 (Generic combination).
- Iron levanidovae* Sinitshenkova, 1982: 60 [Material: M (Holotype), F, Fs, L (Far East Russia); Holotype locality: Russia Primor'ye; Holotype deposition: Zoological Institute (St. Petersburg, Russia); Synonymized by Kluge & Tiunova, 1989].
- Iron grunini* Sinitshenkova, 1982: 59 [Material: M (Holotype), F (Far East Russia); Holotype locality: Russia, Primor'ye, Sihotealin; Holotype deposition: Zoological Institute (St. Petersburg); Synonymized by Kluge & Tiunova, 1989].
- Iron koreanicus* Braasch & Soldán (국명 미정)
- Iron koreanicus* Braasch & Soldán, 1988: 25 [Material: L (Holotype); Holotype locality: North Korea, Ranggang Prov., Chonwon R., Myong Su; Holotype deposition: Entomological Museum, Ceske Budejovice].
- Iron maculatus* Tshernova 긴부채하루살이
- Iron maculatus* Tshernova, 1949: 148 [Material: L (Lectotype: designated by Kluge & Tiunova, 1989); Lectotype locality: Russia, Altay; Lectotype deposition: Zoological Institute (St. Petersburg, Russia)].
- Iron latericius* Sinitshenkova, 1982: 53 [Material: M (Holotype), F (Far East Russia); Holotype locality: Russia, Kamchatka; Holotype deposition: Zoological Institute (St. Petersburg, Russia); Synonymized by Kluge & Tiunova, 1989].
- Iron tshernovae* Sinitshenkova, 1982: 56 [Material: M (Holotype), F, Ms, L (Far East Russia); Holotype locality: Russia Magadanskaya; Holotype deposition: Zoological Institute (St. Petersburg, Russia); Synonymized by Kluge & Tiunova, 1989].
- Epeorus (Iron) aesculus* Imanishi: Yoon & Bae, 1988a: 127 [Material: M, L (South Korea)].
- Epeorus (Iron) maculatus* (Tshernova): Kluge, 1988: 309 [Subgeneric combination; Material: L (Russia: Primor'ye, Altay)].

- Genus *Rhithrogena* Eaton 산납작하루살이속
- Rhithrogena japonica* Uéno (국명 미정)
- Rhithrogena japonica* Uéno, 1928: 26 [Material: L (Holotype); Holotype locality: Japan, Kyoto; Holotype deposition: in Uéno's collection]; Uéno, 1931b: 203 [Material: F, Ms, Fs (Japan)]; Imanishi, 1936: 543 [Material: M, F, Ms, Fs (Japan)]; Imanishi, 1940: 243 [Material: L (North Korea)].

***Rhithrogena* na: Imanishi**

- Rhithrogena* na: Imanishi, 1940: 246 [Material: L (North Korea)]; Yoon & Bae, 1984: 8 [Material: L (South Korea)]; Yoon & Bae, 1988a: 129 [Material: L (South Korea)].

Family Isonychidae Burks 빗자루하루살이과

Genus *Isonychia* Eaton 빗자루하루살이속

- Isonychia japonica* (Ulmer) 빗자루하루살이
- Chirotonetes japonicus* Ulmer, 1919: 59 [Material: M, F (Japan, Korea); Type information: unknown (type may be in Museum of Berlin or Museum of Brussel)]; Uéno, 1928: 52 [Material: L (Japan)]; Matsumura, 1931: 1474 [Material: M (Japan)].
- Sparrea violacea* Matsumura, 1931: 1475 [Material: F (Japan, Hokkaido); type information: unknown (type may be in Matsumura's collection); Synonymized by Imanishi, 1933].
- Isonychia japonica* (Ulmer): Imanishi, 1933: 67 (Generic combination); Imanishi, 1940: 234 [Material: L (South Korea)]; Bajkova, 1970: 151 [Material: M, F Ms, Fs (Russia: Amur)]; Yoon & Bae, 1988a: 116 [Material: M, L (South Korea)].
- Isonychia ussurica* Bajkova 깃동하루살이
- Isonychia ussurica* Bajkova, 1970: 148 [Material: M (Holotype), F; Holotype locality: Russia, Ussuri basin, Hor River; Holotype deposition: Zoological Institute (St. Petersburg, Russia)].
- Isonychia japonica* (Ulmer): Yoon & Bae, 1988a: 116 [in part (Pl. 2, Fig. 9b); Material: M (South Korea)].

Family **Leptophlebiidae** Banks 갈래하루살이
과

Genus **Choroterpes** Eaton 세갈래하루살이속

Subgenus **Euthraululus** Barnard 참세갈래하루
살리아속

Choroterpes altioculus Kluge 세갈래하루살이

Choroterpes trifurcata Ueno: Imanishi, 1940: 189
[Misidentification: Material: L (Korea,
Japan)]; Gose, 1963a: 140 [Material: M, F
(Japan)]; Yoon & Bae, 1988a: 148 [Mat-
erial: M, F, Ms, Fs, L (South Korea)].

Choroterpes (Euthraululus) altioculus Kluge, 1984:
722 [Material: M (Holotype), F, L: Type
locality: Russia, Primor'ye: Holotype de-
position: Zoological Institute (St. Peter-
sburg, Russia)].

Genus **Paraleptophlebia** Lestage 두갈래하루
살이속

Paraleptophlebia chocolata Imanishi 두갈래하루살
이

Paraleptophlebia chocolata Imanishi, 1937b: 330
[Material: M (Holotype), F, Ms, Fs, L
(Japan): Holotype locality: Japan, Kyoto:
Holotype deposition: in Imanishi's collec-
tion]; Imanishi, 1940: 184 [Material: L
(North Korea)]; Bajkova, 1976b: 64 [Mat-
erial: L (Far East Russia)]; Yoon & Bae,
1988a: 146 [Material: M, L (South Korea)].

Paraleptophlebia cothurnata Tshernova, 1952:
267 [Material: M (Lectotype): Lectotype
locality: Russia, Primor'ye, Sihote-Alin:
Lectotype deposition: Zoological Institute
(St. Petersburg, Russia): Synonymized by
Bajkova, 1976b].

Leptophlebia (Paraleptophlebia) chocolata (Ima-
nishi): Tshernova et al., 1986: 136 (Gene-
ric combination).

Paraleptophlebia nb: Imanishi

Paraleptophlebia nb: Imanishi, 1940: 188 [Mate-
rial: L (North Korea)].

Family **Neophemeridae** Traver 방패하루살
이과

Genus **Potamanthellus** Lestage 큰방패하루살
이속

Potamanthellus rarus Tiunova & Levanidova 방
패하루살이

Neophemera KUa: Yoon & Bae, 1988a: 181
[Material: L (South Korea)].

Potamanthellus rarus Tiunova & Levanidova,
1989: 242 [Material: L (Holotype)]; Holo-
type locality: Russia, Primor'ye, Ussuri
R.: Holotype deposition: Zoological Insti-
tute (St. Petersburg, Russia)]; Tiunova,
1991: 136 [Material: M, F, Ms, Fs, L (Far
East Russia)].

Family **Polymitarciidae** Banks 흰하루살이과

Genus **Ephoron** Williamson 흰하루살이속

Ephoron shigae (Takahashi) 흰하루살이

Polymitarcis shigae Takahashi, 1924: 379 [Ma-
terial: M (Japan: Shiga, Shanuki); Type
information: unknown (type may be in
Takahashi's collection)]; Ueno, 1928: 189
[Material: L (Japan)].

Ephoron shigae (Takahashi): Gose, 1980: 457
(Generic combination); Yoon & Bae, 1985:
97 [Material: M, Fs, L (South Korea)];
Yoon & Bae, 1988a: M, Fs, L (South Ko-
rea)].

Family **Potamanthidae** Albarda 강하루살이
과

Genus **Potamanthus** Pictet 강하루살이속

Subgenus **Potamanthodes** Ulmer 작은강하루
살리아속

Potamanthus formosus Eaton 작은강하루살이

Potamanthus formosus Eaton, 1892b: 186 [Ma-
terial: M (Lectotype: designated by Kim-
mins, 1960), F; Lectotype locality: Burma,
Tenasserim Valley; Lectotype deposition:
Natural History Museum (London, Engl-
and)].

Potamanthodes formosus (Eaton): Ulmer, 1919:
11 (Generic combination).

Potamanthus iyonis Matsumura, 1931: 1469
[Material: F (Japan); Type information:

unknown (type may be in Matsumura's collection); Synonymized by Bae & McCafferty, 1991].

Potamanthus (Potamanthodes) kamonis Imanishi, 1940: 178 [Material: M (Holotype), F, L (Japan); Holotype locality: Japan, Kyoto; Holotype deposition: in Imanishi's collection at Kyoto University (Types examined by Bae & McCafferty, 1991); Synonymized by Ueno, 1969].

Potamanthodes kamonis (Imanishi): You, 1984: 107 (Generic combination).

Potamanthus (Potamanthodes) formosus Eaton: Bae & McCafferty, 1991: 61 [Material: M, F, Ms, Fs, L (Burma, Japan, China, Malaysia, South Korea, Thailand, Vietnam)].

Potamanthus yooni Bae & McCafferty 금빛하루살이

Potamanthodes kamonis (Imanishi): Yoon & Bae, 1985: 94 [Material: M, F, L (South Korea)]; Yoon & Bae, 1988a: 151 [Material: M, F, L (South Korea)].

Potamanthus (Potamanthodes) yooni Bae & McCafferty, 1991: 60 [Material: M (Holotype), F, L (Korea); Holotype locality: Korea, Kyonggi-do, Kapyong, Chojong R. at Chongpyong; Holotype deposition: Seoul Women's University (Seoul, Korea) (Previously at Korean Entomological Institute in Seoul)].

Subgenus *Potamanthus* Pictet 강하루살이아속

Potamanthus luteus oriens Bae & McCafferty 가람하루살이

Potamanthus luteus (Linnaeus): Ueno, 1928: 23 [Material: L (Japan)]; Wu, 1987: 336 [Material: F, L (China)].

Potamanthus na: Imanishi, 1940: 180 [Material: L (Manchuria); Synonymized by Bae & McCafferty, 1991].

Potamanthus naa: Imanishi, 1940: 181 [Material: L (Manchuria); Synonymized by Bae & McCafferty, 1991].

Potamanthus (Potamanthus) luteus oriens Bae & McCafferty, 1991: 54 [Material: M (Holotype), Ms, Fs, L (Far East Russia, North Korea); Holotype locality: Russia, Lower

Amur, Slavyanka; Holotype deposition: St. Petersburg University (Russia)].

Genus *Rhoenanthus* Eaton 장수하루살이속

Subgenus *Potamanthindus* Lestage 왕하루살이아속

Rhoenanthus coreanus (Yoon & Bae) 장수하루살이
Potamanthus nb: Imanishi, 1940: 182 [Material: L (South Korea)].

Potamanthus coreanus Yoon & Bae, 1985: 95 [Material: M (Holotype), F, Ms, Fs, L (South Korea); Holotype locality: Korea, Kyonggi-do, Kapyong, Chongpyong; Holotype deposition: Seoul Women's University (Seoul, Korea) (Previously at Korean Entomological Institute in Seoul)].

Rhoenanthus rohdendorfi Tshernova, 1985: 15 [Material: M (Holotype); Holotype locality: Russia, Primor'ye, Suifun River; Holotype deposition: Zoological Institute (St. Petersburg, Russia); Synonymized by Bae & McCafferty, 1991]; Tiunova, 1990: 818 [Material: L (Far East Russia: Primor'ye)].

Rhoenanthus (Potamanthindus) coreanus (Yoon & Bae): Bae & McCafferty, 1991: 26 [Material: M, F, Ms, Fs (Korea, Far East Russia)].

Family *Siphonuridae* Ulmer 옛하루살이과

Genus *Siphonurus* Eaton 옛하루살이속

Siphonurus chankae Tshernova 옛하루살이
Siphonurus chankae Tshernova, 1952: 263 [Material: M (Lectotype: designated by Kluge, 1985); Lectotype locality: Russia, Lake Khanka; Lectotype deposition: Zoological Institute (St. Petersburg, Russia)]; Bajkova, 1980: 53 [Material: L (Russia: Amur, Primor'ye)]; Yoon & Bae, 1988a: 104 [Material: M, F, L (South Korea)].

Siphonurus sanukensis Takahashi (국명 미정)
Siphonurus sanukensis Takahashi, 1929: 77 [Material: M (Holotype); Holotype locality: Japan, Shikoku, Kagawa-ken, Zentsuji; Holotype deposition: unknown (Holotype may be in Takahashi's collection)].

Siphonurus sanukensis Takahashi: Imanishi, 1933: 67 (Generic correction); Imanishi, 1940: 234 [Material: L (South Korea)].

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국문적요: 韓國産 하루살이목의 카탈로그. 裒淵宰·尹一炳¹·田東堦² (서울女子大學校 生物學科, '高麗大學校 生物學科, ²러시아科學院 動物學研究所) 昆蟲研究誌 20: 31~50, 1994.

韓國産 하루살이목에 관한 研究는 南北韓에 걸친 綜合的인 研究가 이루어지지 못하였고, 1940년 以來 各種 文獻에 記錄된 種들에 있어서도 分類上 혹은 命名上 變動이 많았으나 이를 體系的으로 收錄하지 못하였다. 이 論文

에서는 綜合的인 文獻 및 模式標本 調査를 통하여 다음과 같이 韓國産으로 記錄된 56種의 命名上 有效한 種들에 대한 카탈로그를 작성하였다. *Acerella longicaudata* (Uéno), **Ameletus costalis* (Matsumura), *A. montanus* Imanishi, **Baetiella japonica* (Imanishi), **B. tuberculata* (Kazlauskas), **Baetis thermicus* Uéno, *Bleptus fasciatus* Eaton, *Choroterpes altioculus* Kluge, *Cincticostella castanea* (Allen), *C. tshernovae* (Bajkova), **Cinygmula grandifolia* Tshernova, **C. hirasana* (Imanishi), *Cloeon dipterum* (Linnaeus), *Drunella aculea* (Allen), **D. cryptomeria* (Imanishi), **D. lepnevae* (Tshernova), *D. triacantha* (Tshernova), **D. trispina ezoensis* (Gose), *Ecdyonurus bajkova* Kluge, *E. dracon* Kluge, ***E. joernensis mongolicus* Bajkova & Varychanova, *E. kibunensis* Imanishi, *E. levis* (Navás), *E. scalaris* Kluge, ***E. subspinosa* (Braasch & Soldán), *Epeorus curvatulus* Matsumura, **E. hiemalis* Imanishi, *E. latifolium* Uéno, *E. pellucidus* (Broadsky), **Ephemerella aurivillii* Bengtsson, **E. imanishii* Gose, *E. keijoensis* Allen, **E. notofascia* Yoon & Bae, *Ephemera orientalis* McLachlan, *E. separigata* Bae, *E. strigata* Eaton, *Ephoron shigae* (Takahashi), *Heptagenia guranica* Belov, *H. kihada* Matsumura, **H. kyotoensis* Gose, **Iron aesculus* (Imanishi), **I. koreanicus* Braasch & Soldán, *I. maculatus* Tshernova, *Isonychia japonica* (Ulmer), ***I. ussurica* Bajkova,

Paraleptophlebia chocolata Imanishi, **Potamanthellus rarus* Tiunova & Levanidova, ***Potamanthus formosus* Eaton, *P. yooni* Bae & McCafferty, ***P. luteus oriens* Bae & McCafferty, **Rhithrogena japonica* Uéno, *Rhoenanthus coreanus* (Yoon & Bae), **Serratella setigera* (Bajkova), *Siphonurus chankae* Tshernova, **S. sanukensis* Takahashi 및 *Uracanthella rufa* (Imanishi). 별표한 種들은 幼蟲만이, 쌍별표한 種들은 成蟲만이 韓國産으로 記載되었다. (*C. tshernovae* 와 *E. keijoensis*는 암컷 成蟲과 幼蟲만이, 그리고 *P. luteus oriens*는 亞成蟲만이 韓國産으로 記載되었다.) 다음 10종은 韓國에서 幼蟲만이 記載되었고, 아직 命名上으로 留保된 未決定種으로 남아있다. *Baetis* KUa: Yoon & Bae, *Baetis* nla: Imanishi, *Brachycercus* KUa: Yoon & Bae, *Caenis* KUa: Yoon & Bae, *Cinygmula* KUa: Yoon & Bae, *Cinygmula* na: Imanishi, *Ecdyonurus* KUb: Yoon & Bae, *Ecdyonurus* na: Imanishi, *Paraleptophlebia* nb: Imanishi 및 *Rhithrogena* na: Imanishi. 각 種에 있어서 原記載 및 再記載 文獻, 記載에 使用된 標本, 分布, 模式標本에 대한 情報, 異名과 命名上의 變動을 年代順으로 整理하였다. 附錄으로 南韓種만의 checklist와 分類學的 變動 및 國名の 變動事項을 表로 作成하였다.

검색어: 하루살이, 하루살이목, 분류, 카탈로그, 한국
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Appendix 1. Checklist of Ephemeroptera previously recorded from South Korea with their proposed Korean name.

Mayfly taxa	Previous Korean name	Proposed Korean name
Order Ephemeroptera	하루살이목	하루살이목
Family Ameletidae McCafferty	없음	피라미하루살이과
Genus <i>Ameletus</i> Eaton	참날개하루살이속	피라미하루살이속
1. <i>Ameletus costalis</i> (Matsumura)	큰참날개하루살이	피라미하루살이
2. <i>Ameletus montanus</i> Imanishi	참날개하루살이	멧피라미하루살이
Family Baetidae Leach	꼬마하루살이과	꼬마하루살이과
Genus <i>Baetiella</i> Uéno	없음	애하루살이속
3. <i>Baetiella japonica</i> (Imanishi)	햇날개꼬마하루살이	애하루살이
[= <i>Pseudocloeon japonica</i> (Imanishi)]		
4. <i>Baetiella tuberculata</i> (Kazlauskas)	없음	애호랑하루살이
[= <i>Pseudocloeon japonica</i> na]		
Genus <i>Baetis</i> Leach	꼬마하루살이속	꼬마하루살이속
5. <i>Baetis thermicus</i> Uéno	꼬마하루살이	꼬마하루살이
6. <i>Baetis</i> KUa		
7. <i>Baetis</i> nla		
Genus <i>Cloeon</i> Leach	외날개꼬마하루살이속	연못하루살이속
8. <i>Cloeon dipterum</i> (Linnaeus)	외날개꼬마하루살이	연못하루살이
Family Caenidae Newman	등딱지하루살이과	등딱지하루살이과
Genus <i>Brachycercus</i> Curtis	세뿔등딱지하루살이속	세뿔등딱지하루살이속
9. <i>Brachycercus</i> KUa		
Genus <i>Caenis</i> Stephens	등딱지하루살이속	등딱지하루살이속
10. <i>Caenis</i> KUa		
Family Ephemerellidae Klapálek	알락하루살이과	알락하루살이과
Genus <i>Acerella</i> Allen	혹가슴알락하루살이속	긴꼬리하루살이속
11. <i>Acerella longicaudata</i> (Uéno)	(= 긴꼬리알락하루살이속) 혹가슴알락하루살이 (= 긴꼬리알락하루살이)	긴꼬리하루살이
Genus <i>Cincticostella</i> Allen	민알락하루살이속	민하루살이속
12. <i>Cincticostella castanea</i> (Allen)	민알락하루살이	민하루살이
13. <i>Cincticostella tshernovae</i> (Bajkova)	검은민알락하루살이	머하루살이
Genus <i>Drunella</i> Needham	뿔알락하루살이속	뿔하루살이속
14. <i>Drunella aculea</i> (Allen)	뿔알락하루살이	뿔하루살이
15. <i>Drunella cryptomeria</i> (Imanishi)	알통알락하루살이	알통하루살이
16. <i>Drunella lepnevae</i> (Tshernova)	쌍혹알락하루살이	쌍혹하루살이
[= <i>Drunella longipes</i> (Tshernova)]		
17. <i>Drunella triacantha</i> (Tshernova)	세뿔알락하루살이	삼지창하루살이
Genus <i>Ephemerella</i> Walsh	알락하루살이속	알락하루살이속
18. <i>Ephemerella imanishi</i> Gose	이마니시알락하루살이	칠성하루살이
19. <i>Ephemerella keijoensis</i> Allen	알락하루살이	알락하루살이
20. <i>Ephemerella notofascia</i> Yoon & Bae	등줄알락하루살이	흰등하루살이
[= <i>Ephemerella nba</i>]		
Genus <i>Serratella</i> Edmunds	빗살알락하루살이속	범꼬리하루살이속
21. <i>Serratella setigera</i> (Bajkova)	빗살알락하루살이	범꼬리하루살이
Genus <i>Uracanthella</i> Belov	없음	등줄하루살이속
22. <i>Uracanthella rufa</i> (Imanishi)	등줄빗살알락하루살이	등줄하루살이
[= <i>Serratella rufa</i> (Imanishi)]	(= 세줄알락하루살이)	
Family Ephemeridae Latreille	하루살이과	하루살이과
Genus <i>Ephemerella</i> Linnaeus	하루살이속	하루살이속
23. <i>Ephemerella orientalis</i> McLachlan	동양하루살이	동양하루살이
24. <i>Ephemerella separigata</i> Bae	가는무늬하루살이	가는무늬하루살이
25. <i>Ephemerella strigata</i> Eaton	무늬하루살이	무늬하루살이
Family Heptageniidae Needham	꼬리하루살이과	남작하루살이과
Genus <i>Bleptus</i> Eaton	맷시꼬리하루살이속	맷시하루살이속
26. <i>Bleptus fasciatus</i> Eaton	맷시꼬리하루살이	맷시하루살이
Genus <i>Cinygmula</i> McDunnough	센꼬리하루살이속	봄치너하루살이속
27. <i>Cinygmula grandifolia</i> Tshernova	없음	봄치너하루살이
[= <i>Cinygmula</i> KUb]		
28. <i>Cynigmula</i> KUa		

Appendix 1. Continued.

Genus <i>Ecdyonurus</i> Eaton	꼬리 하루살이속	참납작하루살이속
29. <i>Ecdyonurus bajkova</i> Kluge [= <i>Ecdyonurus</i> KUa]	없음	몽뚝하루살이
30. <i>Ecdyonurus dracon</i> Kluge	큰개꼬리하루살이	참납작하루살이
31. <i>Ecdyonurus kibumensis</i> Imanishi	개꼬리하루살이	두점하루살이
32. <i>Ecdyonurus levis</i> (Navás) [= <i>Ecdyonurus yoshidae</i> Takahashi]	꼬리하루살이	네점하루살이
33. <i>Ecdyonurus</i> KUB		
Genus <i>Epeorus</i> Eaton	흰꼬리하루살이속	부채하루살이속
34. <i>Epeorus curvatulus</i> Matsumura	큰흰꼬리하루살이	흰부채하루살이
35. <i>Epeorus latifolium</i> Uéno	흰꼬리하루살이	부채하루살이
Genus <i>Heptagenia</i> Walsh	참꼬리하루살이속	납작하루살이속
36. <i>Heptagenia kihada</i> Matsumura	참꼬리하루살이	납작하루살이
37. <i>Heptagenia kyotoensis</i> Gose	등줄참꼬리하루살이	총채하루살이
Genus <i>Iron</i> Eaton	꼬마흰꼬리하루살이속	긴부채하루살이속
38. <i>Iron aesculus</i> (Imanishi)	꼬마흰꼬리하루살이	중부채하루살이
39. <i>Iron maculatus</i> Tshernova	없음	긴부채하루살이
Genus <i>Rhithrogena</i> Eaton	여린꼬리하루살이속	산납작하루살이속
40. <i>Rhithrogena</i> na		
Family Isonychiidae Burks	민날개하루살이과	빗자루하루살이과
Genus <i>Isonychia</i> Eaton	민날개하루살이속	빗자루하루살이속
41. <i>Isonychia japonica</i> (Ulmer)	민날개하루살이	빗자루하루살이
42. <i>Isonychia ussurica</i> Bajkova	없음	깃동하루살이
Family Leptophlebiidae Banks	밤색하루살이과	갈래하루살이과
Genus <i>Choroterpes</i> Eaton	세줄밤색하루살이속	세갈래하루살이속
Subgenus <i>Euthraulius</i> Barnard	없음	참세갈래하루살이아속
43. <i>Choroterpes altiocolus</i> Kluge	없음	세갈래하루살이
Genus <i>Paraleptophlebia</i> Lestage	밤색하루살이속	두갈래하루살이속
44. <i>Paraleptophlebia chokolata</i> Imanishi	밤색하루살이	두갈래하루살이
Family Neophemeridae Traver	큰등딱지하루살이과	방패하루살이과
Genus <i>Potamanthellus</i> Lestage	없음	큰방패하루살이속
45. <i>Potamanthellus rarus</i> Tiunova [= <i>Neophemera</i> KUa]	없음	방패하루살이
Family Polymitaeyidae Banks	흰하루살이과	흰하루살이과
Genus <i>Ephoron</i> Williamson	흰하루살이속	흰하루살이속
46. <i>Ephoron shigae</i> (Takahashi)	흰하루살이	흰하루살이
Family Potamanthidae Albarda	강하루살이과	강하루살이과
Genus <i>Potamanthus</i> Pictet	강하루살이속	강하루살이속
Subgenus <i>Potamanthodes</i> Ulmer	강하루살이불리아속	작은강하루살이아속
47. <i>Potamanthus formosus</i> Eaton	작은강하루살이	작은강하루살이
48. <i>Potamanthus yooni</i> Bae & McCafferty	강하루살이불이	금빛하루살이
Subgenus <i>Potamanthus</i> Pictet	강하루살이아속	강하루살이아속
49. <i>Potamanthus luteus oriens</i> Bae & McCafferty	없음	가람하루살이
Genus <i>Rhoenanthus</i> Eaton	없음	장수하루살이속
Subgenus <i>Potamanthindus</i> Lestage	없음	왕하루살이아속
50. <i>Rhoenanthus coreanus</i> (Yoon & Bae)	강하루살이	장수하루살이
Family Siphonuridae Ulmer	쌍꼬리하루살이과	옛하루살이과
Genus <i>Siphonurus</i> Eaton	날개하루살이속	옛하루살이속
51. <i>Siphonurus chankae</i> Tshernova	날개하루살이	옛하루살이
52. <i>Siphonurus sanukensis</i> Takahashi	없음	미정