

A Checklist of Japanese Ephemeroptera

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Abstract. Thirteen families, 36 genera, and 140 species of Ephemeroptera were confirmed for the Japanese Islands (Hokkaido, Honshu, Shikoku, Kyushu, and Okinawa). Out of them, one genus and eight species were reported for the first time. The checklist incorporated 21 new synonyms (including one generic synonym), eight new combinations, and one new status. Five species were indicated as *nomina dubia*.

Key words. Ephemeroptera, checklist, Japan

Introduction

Considerable contributions to mayfly taxonomy in Japan were given by Gose's monograph (Gose, 1979a, 1979b, 1979c, 1979d, 1979e, 1980a, 1980b, 1980c, 1980d, 1980e, 1980f, 1980e), in which a total of 95 species and one subspecies were listed as Japanese mayflies. In the monograph, however, 25 out of 35 species and three out of five genera named by Matsumura (1904, 1911, 1931a, 1931b, 1933) were overlooked. On the other hand, a checklist of Japanese insects compiled by Y. Hirashima (Entomological Laboratory of Kyushu University, 1990), which listed 103 species of Ephemeroptera for the Japanese Islands (Hokkaido, Honshu, Shikoku, Kyushu and Okinawa), included 20 of Matsumura's species but lacked 23 species named by Gose (1985). Besides Makibayashi (1998) declared that the Gose's species are to be *nomina dubia* because there were neither an indication nor designation of types for the new taxa.

Most of the species established by Matsumura in his earlier publications (Matsumura, 1904, 1931a, 1933) are available since they were published with descriptions. However, some generic names are not available because of the lack of type designation (Hubberd, 1988, 1989). For establishing new species, Gose gave a diagnostic key to distinguish them from the other species (Gose, 1979c, 1980a, 1980b, 1980c, 1980d, 1980e, 1980f, 1985). Clearly, they are available enough since they satisfy Acts 9.1, 10.1, 11.1-5, and 13.1.1 of the International Code of Zoological Nomenclature (4th Ed).

This paper lists up to 140 valid species of Japanese mayflies based on comprehensive literatures revived. The families are phylogenetically arranged according to McCafferty (1996) with an additional family rank for Dipteromimidae (Kluge *et al.* 1995). Within a family, genera and species are arranged alphabetically. Symbols used in the text are as follows: *: newly recorded species, [()]: geographical distribution, " ": arbitrary name in the original text, [!]: obvious error of spelling, and ? : ?-mark in the original literature.

The types in the present study are deposited in the following institutions: CERK (Center for Ecological Research, Kyoto University, Japan); HU (The collection in the Laboratory of Systematic Entomology, Hokkaido University, Japan); NU (Nara Women's University, Japan); INHS (Illinois Natural History Survey, USA).

Only following 5 species were listed as *nomina dubia* because there were no chance for them to be applied by the original names: i.e., *Ephoron nakamurae* Matsumura, 1941, *Ephemera akiana* Sato, 1969, *Ephemerella gose* Okazaki 1984, *Ameletus towadensis* Matsumura 1931, and *Isonychia mitsukonis* Morishita, 1960. *Ephoron nakamurae* which had

already been known to be *nomen dubium* by Ishiwata (1996). The names *Ephemera akiana* and *Isonychia mitsukonis* by Sato (1969) and Morishita (1961) respectively, lacked any descriptions or types, thus I cannot verify those species. *Ephemerella gosse* by Okazaki (1984) based on the egg stage, also cannot be verified. *Ameletus towadensis* cannot be verified from the original description and none of Matsumura's specimens of the species exist in his collection.

Checklist

Leptophlebiidae (Tobihiro-kagerou-ka)

Genus *Chiusanophlebia* Uéno, 1969 (Ryukyu-tobihiro-kagerou-zoku)

Chiusanophlebia asahinai Uéno, 1969 (Ryukyu-tobihiro-kagerou) [Japan (Kyushu: Amamioshima Is., Okinawa: Okinawa-honto, Ishigaki-jima Is.)]
asahinai Uéno, 1969 (*Chiusanophlebia*).

Genus *Choroterpes* Eaton, 1881 (Hime-Tobihiro-kagerou-zoku)

Subgenus *Euthraulius* Barnard, 1932 (Toyo-hime-tobihiro-kagerou-azoku)

Choroterpes alticulus Kluge 1984 (Hime-tobihiro-kagerou) [Japan (Honshu, Shikoku, Kyushu), China, Korea, Russia]
alticulus Kluge 1984 (*Choroterpes* (*Euthraulius*)).
trifurcata auct., nec Uéno, 1928 (*Choroterpes*).

Genus *Choroterpides* Ulmer, 1939 (Kuro-tobihiro-kagerou-zoku)

**Choroterpides nigella* Kang & Yang, 1994 (Kuro-tobihiro-kagerou) [Japan (Okinawa: Iriomote-jima Is., Ishigaki-jima Is.), Taiwan]
nigella Kang & Yang, 1994 b (*Choroterpides*).

Genus *Paraleptophlebia* Lestage, 1917 (Tobihiro-kagerou-zoku)

Paraleptophlebia japonica (Matsumura, 1931) COMB. N. (Nami-tobihiro-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea, Russia]
japonicus Matsumura, 1931a (*Baetis*).
chocolata Imanishi, 1937b (*Paraleptophlebia*) SYN. N.; Kluge, 1997 (*Leptophlebia* (*Neoleptophlebia*)).
chocorata [!] Imanishi, 1940 (*Paraleptophlebia*).

Note: After examination of the type species of *Baetis japonicus* Matsumura, 1931 in the Matsumura Collection, HU, I found that the species could not belong to Baetidae but to Leptophlebiidae. Although I have not been successful in locating the holotype of *Paraleptophlebia chocolata* Imanishi, 1937, I found the male specimens identified to *P. chocolata* by Imanishi in the Imanishi Collection, CERK, and specimens which I collected in Hiragawa River, Shiga-ken, the type locality of *P. chocolata* are identical to *P. japonica* in the respect of size and morphology of genitalia. Therefore, I regard *P. chocolata* as a synonym of *P. japonica*.

Paraleptophlebia spinosa Uéno, 1931 (Toge-tobihiro-kagerou) [Japan (Honshu, Shikoku)]
spinosa Uéno, 1931b (*Paraleptophlebia*).

Paraleptophlebia westoni Imanishi, 1937 (Uesuton-tobi-ro-kagerou) [Japan (Hokkaido, Honshu, Kyushu)]

(?) *cincta*: Uéno, 1928 (*Paraleptophlebia*); Imanishi, 1940 (*Paraleptophlebia*); Bae *et al.*, 2000.

westoni Imanishi, 1937b (*Paraleptophlebia*).

"sp. n1" Hashimoto, 1955 (*Paraleptophlebia*).

cincta: Gose, 1962 (*Paraleptophlebia*) **Misidentification.**

"sp. PA" Gose, 1962 (*Paraleptophlebia*).

Genus *Thraulius* Eaton, 1881 (Togeera-kagerou-zoku)

**Thraulius fatuus* Kang & Yang, 1994 (Usuguro-togeera-kagerou) [Japan (Okinawa: Okinawa-honto), Taiwan]

fatuus Kang & Yang, 1994b (*Thraulius*).

Thraulius grandis Gose, 1980 (Oo-togeera-kagerou) [Japan (Honshu, Kyushu, Okinawa: Okinawa-honto)]

"sp." Horasawa, 1931 (*Thraulius*).

grandis Gose, 1980c (*Thraulius*).

"sp. 2" Ueno, 1995 (*Thraulius*).

**Thraulius macilentus* Kang & Yang, 1994 (Hime-togeera-kagerou) [Japan (Okinawa: Okinawa-honto), Taiwan]

macilentus Kang & Yang, 1994b (*Thraulius*).

Potamanthidae (Kawa-kagerou-ka)

Genus *Potamanthus* Pictet, 1843 (Kawa-kagerou-zoku)

Subgenus *Potamanthodes* Ulmer, 1920 (Ki-ro-kawa-kagerou-azoku)

Potamanthus formosus Eaton, 1892 (Ki-ro-kawa-kagerou) [Japan (Honshu, Shikoku, Kyushu), Myanmar, China, Korea, Malaysia, Thailand, Vietnam]

formosus Eaton, 1892 (*Potamanthus*); Uéno, 1969 (*Potamanthodes*).

luteus: Uéno, 1928 (*Potamanthus*) **Misidentification.**

iyonis Matsumura, 1931a (*Potamanthus*).

kamonis Imanishi, 1940 (*Potamanthus* (*Potamanthodes*)).

Note: In Japan this species was described at first under the name of *Potamanthus luteus* (Linnaeus, 1767) by Uéno (1928) from central Japan (Setagawa River and Tenryugawa River). Imanishi (1940) regarded that *P. luteus* reported by Uéno (1928) did not belong to the subgenus *Potamanthus*, but to *Potamanthodes* and described a new species under the name of *Potamanthus* (*Potamanthodes*) *kamonis* Imanishi, 1940. Although I have not been successful in examining Uéno's *P. luteus*, it is highly probable that nymphs of Uéno's *P. luteus* will eventually prove to be nymphs of *P. formosus*. Uéno (1969) reported adults of this species from Taiwan and synonymized *P. kamonis* with *P. formosus*, nevertheless the name *P. kamonis* has been used as a valid name incorrectly (Uéno, 1973; Gose, 1970, 1985) until the world revision of Potamanthidae given by Bae & McCafferty (1991). Gose (1985) stated without precise data that *P. formosus* was distributed from Hokkaido to Kyushu. My observations suggest that distribution of this species in Japan extends to northern part of Honshu (Aomori-ken) and not to

Hokkaido.

Subgenus *Potamanthus* Pictet, 1843 (Kawa-kagerou-azoku)

- **Potamanthus huoshanensis* Wu, 1987 (Oo-kawa-kagerou) [Japan (Honshu), China]
huoshanensis Wu, 1987 (*Potamanthus*).
luteus oriens Bae & McCafferty, 1991 (*Potamanthus* (*Potamanthus*)) **Misidentification.**
"sp" Kobayashi & Nishino, 1992 (*Potamanthus*).

Note: It has been believed for many years that a single species, *P. kamonis*, was widely distributed in Japan (Gose, 1985). However, Kobayashi & Nishino (1990) reported the adults of *Potamanthus* sp. collected on the shores of Lake Biwa by light trap. The adults were also collected from Yokkaichi-shi (Yokkaichi City Government, 1990) by me. Bae & McCafferty (1991) assigned *Potamanthus* sp. to *P. luteus* from the descriptive and collecting data. I have examined *Potamanthus* sp. and found that it is conspecific with *Potamanthus huoshanensis* Wu, 1987.

Ephemeridae (Mon-kagerou-ka)

Genus *Ephemera* Linnaeus, 1758 (Mon-kagerou-zoku)

- Ephemera formosana* Ulmer, 1919 (Taiwan-mon-kagerou) [Japan (Okinawa: Okinawa-honto, Iriomote-jima Is., Ishigaki-jima Is.), Taiwan]
formosana Ulmer, 1919 (*Ephemera*); Gose, 1981 (*Ephemera*).
cf. *formosana* Uéno (*Ephemera*).
"sp." Futai, 1963 (*Ephemera*).
japonica: Takara & Azuma, 1972 (*Ephemera*) **Misidentification.**
koshuensis [!]: Takara & Azuma, 1972 (*Ephemera*) **Misidentification.**

- Ephemera japonica* McLachlan, 1875 (Futasuji-mon-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Russia]
japonica McLachlan, 1875 (*Ephemera*); Uéno, 1928 (*Ephemera*?).

- Ephemera orientalis* McLachlan, 1875 (Toyo-mon-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), China, Korea, Mongolia, Russia]
orientalis McLachlan, 1875 (*Ephemera*).
kuccharonis Matsumura, 1931a (*Ephemera*) SYN. N.
lineata: Uéno & Okamoto, 1932 (*Ephemera*) **Misidentification.**

Note: Based on type material examination of *E. kuccharonis* in the Matsumura Collection, HU, I recognized *E. kuccharonis* is a synonym of *E. orientalis*.

- Ephemera strigata* Eaton, 1892 (Mon-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), China, Korea, Mongolia, Russia]
strigata Eaton, 1892 (*Ephemera*).
kuwamayai Navás, 1919 (*Ephemera*) SYN. N.
iwatensis Matsumura, 1931a (*Ephemera*) SYN. N.
japonica Matsumura, 1931a (*Ephemera*) SYN. N.

Note: Judging from the original description of *Ephemera kuwamayai* Navás (1919), the abdominal terga having triangle dark markings are identical to those of *Ephemera strigata* Eaton, 1892, as is wing coloration and collecting data. Based on type material examination of both *E. iwatensis* and *E. japonica* in the Matsumura Collection, HU, I could find no significant

morphological differences between the two. These two species are identical to *E. strigata*. Therefore, I recognize these three species, *E. kuwamayai*, *E. hwatensis*, and *E. jezonica* as synonyms of *E. strigata*.

Ephemera akiana Sato, 1969 *nomen dubium*.
akiana Sato, 1969 (*Ephemera*) *nomen dubium*.

Polymitarciidae (Shiroiro-kagerou-ka)

Genus *Ephoron* Williamson, 1802 (Shiroiro-kagerou-zoku)

Ephoron eophilum Ishiwata, 1996 (Akatsuki-shiro-kagerou) [Japan (Honshu)]
eophilum Ishiwata, 1996 (*Ephoron*).

Ephoron limnobium Ishiwata, 1996 (Biwako-shiro-kagerou) [Japan (Honshu)]
limnobium Ishiwata, 1996 (*Ephoron*).

Ephoron shigae (Takahashi, 1924) (Oo-shiro-kagerou) [Japan (Honshu, Shikoku, Kyushu), Korea, Russia (Far East)]

shigae Takahashi, 1924 (*Polymitarcis* [!]); Uéno, 1931c (*Polymitarcis* [!]); Lestage, 1938 (*Polymitarcis*); Uéno, 1973 (*Ephoron*).

"sp." Uéno, 1930 (*Polymitarcis*); Uéno, 1931c (*Polymitarcis* [!]).

"sp. NI" Hashimoto, 1955 (*Polymitarcis* [!]).

Ephoron nakamurae Matsumura, 1941 *nomen dubium*.
nakamurae Matsumura, 1941 (*Ephoron*) *nomen dubium*.

Caenidae (Himeshiro-kagerou-ka)

Genus *Brachycercus* Curtis, 1834 (Mitsutoge-hime-kagerou-zoku)

Brachycercus japonicus Gose, 1980 (Mitsutoge-hime-kagerou) [Japan (Honshu)]
japonica [!] Gose, 1980f (*Brachycercus*).
japonicus: Bae, 1997 (*Brachycercus*).

Genus *Caenis* Stephens, 1835 (Himeshiro-kagerou-zoku)

Caenis horaria (Linnaeus) 1758 (Himeshiro-kagerou) [Japan (Honshu)]
horaria Linnaeus, 1758 (*Ephemera*); Uéno, 1950 (*Caenis*).
dimidiata Stephens, 1835 (*Caenis*).
lactea sensu Pictet, 1843 (*Caenis*).
lactella Eaton, 1884 (*Caenis*).

Caenis nishinoae Malzacher, 1996 (Biwako-himeshiro-kagerou) [Japan (Honshu), China, Korea].
nishinoae Malzacher, 1996 (*Caenis*).

Ephemerellidae (Madara-kagerou-ka)

Genus *Cincticostella* Allen, 1971 (Toyo-madara-kagerou-zoku)

Cincticostella levanidovae (Tshernova, 1952) (Kasutanea-madara-kagerou) [Japan (Kyushu: Tsushima Is.), China, Korea, Russia]
 "sp. nay" Imanishi, 1940 (*Ephemerella*).
levanidovae Tshernova, 1952 (*Ephemerella*); Edmunds, 1959 (*Ephemerella* (*Serratella*)); Allen, 1971 (*Ephemerella* (*Cincticostella*)); Ishiwata, 1993 (*Cincticostella*).
orientalis Tshernova, 1952 (*Ephemerella*); Bajkova, 1979 (*Ephemerella* (*Cincticostella*)); Edmunds, 1959 (*Ephemerella* (*Serratella*)).
castanea Allen, 1971 (*Ephemerella* (*Cincticostella*)); Ishiwata, 1987 (*Cincticostella*).
delicata Allen, 1971 (*Ephemerella* (*Cincticostella*)).
costanea [!]: Gose, 1980d (*Ephemerella* (*Cincticostella*)).

Cincticostella nigra (Uéno, 1928) (Kuro-madara-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu)]
nigra Uéno, 1928 (*Ephemerella*); Uéno, 1931c (*Chitonophora*(?)); Allen, 1980 (*Cincticostella* (*Cincticostella*)); Gose, 1980d (*Ephemerella* (*Cincticostella*)); Ishiwata, 1987 (*Cincticostella*).

Cincticostella okumai (Gose, 1980) (Okuma-madara-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Russia (Kuril Is.)]
nigra: Horasawa, 1931 (*Ephemerella*); Allen 1971 (*Ephemerella* (*Cincticostella*))
Misidentification.
 "sp. EC" Gose, 1962 (*Ephemerella*).
okumai Gose, 1980d (*Ephemerella* (*Cincticostella*)); Ishiwata, 1987 (*Cincticostella*).

Cincticostella tshernovae (Bajkova, 1962) (Cherunoba-madara-kagerou) [Japan (Hokkaido, Honshu), Korea, Russia]
 "sp. nax" Imanishi, 1940 (*Ephemerella*).
tshernovae Bajkova, 1962 (*Ephemerella*); Bajkova, 1979 (*Ephemerella* (*Cincticostella*)); Ishiwata, 1987 (*Cincticostella*).
imanishii Allen, 1971 (*Ephemerella* (*Cincticostella*)).

Genus *Drunella* Needham, 1909 (Toge-madara-kagerou-zoku)

Drunella basalis (Imanishi, 1937) (Oo-madara-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea, Russia (Kuril Is.)]
 (?) *tuberculata*: Uéno, 1928 (*Ephemerella*).
basalis Imanishi, 1937a (*Ephemerella*); Edmunds, 1959 (*Ephemerella* (*Drunella*)); Ishiwata, 1987 (*Drunella*).

Drunella cryptomeria (Imanishi, 1937) (Futakobu-madara-kagerou) [Japan (Honshu)]
cryptomeria Imanishi, 1937a (*Ephemerella*); Ishiwata, 1987 (*Drunella*).
 "sp. (*trispina* group)" Tanaka, 1966 (*Ephemerella*).
bicornis Gose, 1980d (*Ephemerella* (*Drunella*)) SYN. N.; Ishiwata, 1987 (*Drunella*).

Note: Imanishi (1937) originally described *Ephemerella cryptomeria* based on male imagoes, and the nymphs have never been described. Gose (1980d) originally described *Ephemerella* (*Drunella*) *bicornis* by nymphal stages. The nymphs determined by Gose as *E. bicornis* are identical to nymphs collected from the type locality of *E. cryptomeria*, Kufune, Kyoto-fu, from which I reared adult males. Therefore, I regard *E. bicornis* as a synonym of *E. cryptomeria*.

***Drunella ishiyamana* Matsumura, 1931** (Yoshino-madara-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea, Russia (Primor'ye, Sakhalin, Kuril Is.)]

ishiyamana Matsumura, 1931a (*Drunella*).

cryptomeria auct., nec Imanishi, 1937a.

"sp. nG" Imanishi, 1940 (*Ephemerella*).

ishiyama [!]: Edmunds, 1959 (*Ephemerella* (*Drunella*)).

yoshinoensis Gose, 1963 (*Ephemerella*) SYN. N.

Note: *Ephemerella yoshinoensis* was first reported as "*Ephemerella* nG" based on the nymph by Imanishi (1940). Gose (1974) regarded the nymph "*Ephemerella* nG" as *E. yoshinoensis* and have erroneously made *E. yoshinoensis* a synonym of *Ephemerella cryptomeria* Imanishi without explanation (Gose, 1980d). Hereafter, *E. yoshinoensis* should be known by the name *E. cryptomeria* auct., nec Imanishi (1937a) (see, note under *Drunella cryptomeria*, above).

Although I have not been successful in locating the holotype of *E. yoshinoensis* (types missing, Gose personal communication), I have collected specimens from Gojo-shi, Nara-ken, the type locality of *E. yoshinoensis*. All of them are identical to *D. ishiyamana* in the respects of size, coloration, and ratio of femora to tibiae as *D. ishiyamana*. Therefore *E. yoshinoensis* is valid and should be synonymized with *D. ishiyamana*.

***Drunella kohnoi* (Allen, 1971)** (Kono-madara-kagerou) [Japan (Honshu, Shikoku, Kyushu)]

kohnoi Allen, 1971 (*Ephemerella* (*Drunella*)).

kohnoae [!]: Allen, 1980 (*Drunella* (*Tribrochella*)); Uchida, 1986 (*Drunella*).

kohonoi [!]: Gose, 1980d (*Ephemerella* (*Drunella*)).

kohonoae [!]: Gose, 1988 (*Ephemerella* (*Drunella*)).

***Drunella sachalinensis* (Matsumura, 1931)** (Futamata-madara-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Russia (Kuril Is.)]

sachalinensis Matsumura, 1931a (*Ephemerella*).

trispina: Uéno, 1931c (*Ephemerella*) **Misidentification.**

bifurcata Allen, 1971 (*Ephemerella* (*Drunella*)) SYN. N.; Ishiwata, 1987 (*Drunella*).

Note: Based on type material examination (*Ephemerella sachalinensis* Matsumura, 1931, in Matsumura Collection, HU; *Ephemerella* (*Drunella*) *bifurcata* Allen, 1971, in INHS), I regard *E. bifurcata* as a synonym of *E. sachalinensis*.

***Drunella triacantha* (Tshernova, 1949)** (Ezo-mitsutoge-madara-kagerou) [Japan (Hokkaido), Korea, Russia]

trispina "subsp. naa" Imanishi, 1940 (*Ephemerella*).

triacantha Tshernova, 1949 (*Ephemerella*); Edmunds, 1959 (*Ephemerella* (*Drunella*));

Ishiwata et al., 2000 (*Drunella*).

trispina ezoensis Gose, 1980d (*Ephemerella* (*Drunella*)); Ishiwata, 1987 (*Drunella*).

***Drunella trispina* (Uéno, 1928)** (Mitsutoge-madara-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Russia (Kuril Is.)]

trispina Uéno, 1928 (*Ephemerella*); Allen, 1980 (*Drunella* (*Tribrochella*)); Gose, 1980d (*Ephemerella* (*Drunella*)); Ishiwata, 1987 (*Drunella*).

Genus *Ephacerella* Pacit, 1994 (Shirinaga-madara-kagerou-zoku)

Acerella Allen, 1971, nom. preocc.

Ephacerella Pacit, 1994, replacement name for *Acerella* Allen nec Berlese, 1909.

***Ephacerella longicaudata* (Uéno, 1928)** (Shirinaga-madara-kagerou) [Japan (Honshu, Shikoku,

Kyushu), Korea, Russia)]

longicaudata Uéno, 1928 (*Ephemerella*); Edmunds, 1959 (*Ephemerella* (*Serratella*)); Allen, 1971 (*Ephemerella* (*Acerella*)); Allen, 1980 (*Acerella*); Kluge, 1997 (*Ephemerella* (*Ephacerella*)).

Genus *Ephemerella* Walsh, 1862 (Madara-kagerou-zoku)

Ephemerella atagosana Imanishi, 1937 (Hosoba-madara-kagerou) [Japan (Honshu, Shikoku, Kyushu), China, Korea, Russia]

atagosana Imanishi, 1937a (*Ephemerella*); Gose, 1980e (*Ephemerella* (*Cincticoistella*)); Tshernova *et al.*, 1986 (*Ephemerella* (*Ephemerella*)); Ishiwata, 1987 (*Cincticoistella*); Ishiwata, 1993 (*Ephemerella*).

"sp. nb" Imanishi, 1940 (*Ephemerella*).

"sp. nbx" Imanishi, 1940 (*Ephemerella*); Bae *et al.*, 2000.

dentata Bajkova, 1967 (*Ephemerella*); Tshernova *et al.*, 1986 (*Ephemerella* (*Ephemerella*)).

denticula Allen, 1971 (*Ephemerella* (*Ephemerella*)) SYN.N.; Ishiwata, 1987 (*Ephemerella*).

kejoensis Allen, 1971 (*Ephemerella* (*Ephemerella*)).

Note: I have examined the type of *Ephemerella* (*Ephemerella*) *denticula* Allen, 1971, in IMNS. Although type series of *Ephemerella atagosana* Imanishi, 1937 are not preserved in the Imanishi Collection, CERK (Ishiwata, personal observation), based on examination of adult specimens reared from nymphs collected from the type locality, Mt. Atago, Kyoto-fu, I regard *E. denticula* as a synonym of *E. atagosana*.

Ephemerella aurivillii (Bengtsson, 1908) (Kita-madara-kagerou) [Japan (Hokkaido, Honshu), Korea, North Europe, Central and eastern Asia, North America]

aurivillii Bengtsson, 1908 (*Chitonophora*); Allen & Edmunds, 1965 (*Ephemerella* (*Ephemerella*)); Bajkova, 1972 (*Ephemerella*); Gose, 1988 (*Ephemerella* (*Ephemerella*)).

aroni Eaton, 1908 (*Ephemerella*).

norda McDunnough, 1924 (*Ephemerella*).

aurivilliusi Lestage, 1930 (*Chitonophora*).

concinna Traver, 1934 (*Ephemerella*).

"sp. nN" Imanishi, 1940 (*Ephemerella*).

taeniata Tshernova, 1952 (*Ephemerella*); Gose, 1980e (*Ephemerella* (*Ephemerella*)).

maxima Allen, 1971 (*Ephemerella* (*Ephemerella*)) SYN. N.

ezoensis Gose, 1980d (*Ephemerella* (*Cincticoistella*)) SYN. N.; Ishiwata, 1993 (*Cincticoistella*).

Note: Based on type material examination of *Ephemerella* (*Ephemerella*) *maxima* in IMNS, I regarded it as conspecific with *Ephemerella aurivillii* (Bengtsson, 1908). The type material of *Ephemerella* (*Cincticoistella*) *ezoensis* are lost (Gose, personal communication), so the nymphs of *E. (C.) ezoensis* determined by Gose were compared with *E. aurivillii* and they were found to be indistinguishable morphologically. Therefore, I regard these two species, *E. (E.) maxima* and *E. (C.) ezoensis*, as synonyms of *E. aurivillii*.

Ephemerella cornuta Gose, 1980 Emendation (Tsuno-madara-kagerou) [Japan (Honshu, Shikoku, Kyushu)]

"sp. EA" Gose, 1962 (*Ephemerella*).

cornutus [!] Gose, 1980e (*Ephemerella* (*Ephemerella*)); Ishiwata, 1987 (*Ephemerella*).

Note: Ishiwata & Inada (1996) suggested that this species should be a junior homonym for *Ephemerella cornuta* Morgan, 1911. However, when Gose (1980, October 15) described his *E.*

cornutus, Morgan's *E. cornuta* had been already transferred to *Drunella* (Allen 1980, March). Therefore, Gose's *Ephemerella cornuta* is valid.

Ephemerella imanishii Gose, 1980 (Imanishi-madara-kagerou) [Japan (Honshu, Shikoku, Kyushu), Korea]

"sp. nF" Imanishi, 1940 (*Ephemerella*).

imanishii Gose, 1980e (*Ephemerella* (*Ephemerella*)); Okazaki, 1984 (*Ephemerella*).

Ephemerella ishiwatai Gose, 1985 (Ishiwata-madara-kagerou) [Japan (Honshu, Kyushu)]

ishiwatai Gose, 1985 (*Ephemerella* (*Ephemerella*)); Ishiwata, 1987 (*Ephemerella*).

**Ephemerella notata* Eaton, 1887 (Ki-madara-kagerou) [Japan (Honshu, Kyushu), Europe, Russia]

notata Eaton, 1887 (*Ephemerella*); Tshernova *et al.*, 1986 (*Ephemerella* (*Ephemerella*)).

ishiwatai: Kobayashi, 1986 (*Ephemerella*) Misidentification.

"sp. 2" Kobayashi & Nishino, 1992 (*Ephemerella*).

Ephemerella setigera Bajkova, 1965 (Kushige-madara-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea, Russia]

"sp. EB" Gose, 1962 (*Ephemerella*).

setigera Bajkova, 1965 (*Ephemerella*); Gose, 1980e (*Ephemerella* (*Serratella*)); Yamasaki, 1987 (*Serratella*); Ishiwata, 1987 (*Ephemerella*); Kluge, 1997 (*Ephemerella* (*Torleya*)).

Genus *Torleya* Lestage, 1917 (Erabuta-madara-kagerou-zoku)

**Torleya glareosa* Kang & Yang, 1995 (Yaeyama-madara-kagerou) [Japan (Okinawa: Iriomote-jima Is., Ishigaki-jima Is.), Taiwan]

"sp." Tanida, 1974 (*Ephemerella*).

glareosa Kang & Yang, 1995 (*Torleya*).

Torleya japonica (Gose, 1980) (Erabuta-madara-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu)]

"sp. ED" Gose, 1962 (*Ephemerella*).

japonica Gose, 1980d (*Ephemerella* (*Torleya*)); Ishiwata, 1987 (*Torleya*).

Genus *Uracanthella* Belov, 1979 (Aka-madara-kagerou-zoku)

Uracanthella chinoi (Gose, 1980) (Chino-madara-kagerou) [Japan (Honshu)]

"sp. EE" Chino, 1975 (*Ephemerella*).

chinoi [!] Gose, 1980e (*Ephemerella* (*Serratella*)).

chinoi Gose, 1985 (*Ephemerella* (*Serratella*)); Ishiwata, 1987 (*Serratella*); Takemon, 1990 (*Uracanthella*).

Uracanthella punctisetae (Matsumura, 1931) COMB. N. (Aka-madara-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea, Russia]

punctisetae Matsumura, 1931a (*Drunella*).

rufa Imanishi, 1937a (*Ephemerella*) SYN. N.; Gose, 1980e (*Ephemerella* (*Serratella*)); Uchida, 1986 (*Serratella*); Tshernova *et al.*, 1986 (*Ephemerella* (*Uracanthella*)); Hatta & Ishiwata, 1990 (*Uracanthella*).

Note: I examined the holotype of *Drunella punctisetae* Matsumura, 1931 in the Matsumura

Collection, HU. Although I have not been successful in locating the holotype of *Ephemerella rufa* Imanishi, 1937, I found the male specimen identified with *E. rufa* by Imanishi in the Imanishi Collection, CERK, the specimens I have collected from Ichihara, near Kamogawa River, Kyoto-fu, the type locality of *E. rufa* are identical with *U. punctisetae* in regard to size, coloration, and detail morphology of the genitalia. Therefore, I regard *E. rufa* as a synonym of *D. punctisetae*.

Ephemerella gose Okazaki, 1984 *nomen dubium*.
gose Okazaki, 1984 (*Ephemerella*) *nomen dubium*.

Genus *incertae sedis*

Ephemerella elongatula McLachlan, 1875 (Hoso-madara-kagerou) [Japan (Honshu), China
(?)]
elongatula McLachlan, 1875 (*Leptophlebia*); Eaton, 1885 (*Ephemerella*).

Ameletidae (Hime-futao-kagerou-ka)

Genus *Ameletus* Eaton, 1887 (Hime-futao-kagerou-zoku)
Chimura Navás, 1915.

Ameletus aethereus (Navás, 1915) Emendation (Nabasu-hime-futao-kagerou) [Japan
(Honshu)]
aetherea Navás, 1915 (*Chimura*).
aetherea [!] Edmunds, 1960 (*Ameletus*).

Ameletus costalis (Matsumura, 1931) (Maeguro-hime-futao-kagerou) [Japan (Hokkaido,
Honshu, Shikoku, Kyushu), Korea, Russia]
costalis Matsumura, 1931a (*Ameletus*).

Ameletus croceus Imanishi, 1932 (Yokosuji-hime-futao-kagerou) [Japan (Honshu)]
croceus Imanishi, 1932 (*Ameletus*).

Ameletus kyotensis Imanishi, 1932 (Kyoto-hime-futao-kagerou) [Japan (Honshu)]
kyotensis Imanishi, 1932 (*Ameletus*).
kyotoensis [!]: Gose, 1979b (*Ameletus*).

Ameletus montanus Imanishi, 1930 (Hime-futao-kagerou) [Japan (Hokkaido, Honshu,
Kyushu), Korea]
montanus Imanishi, 1930 (*Ameletus*).
metanus [!]: Gose, 1979b (*Ameletus*).

Ameletus subalpinus Imanishi, 1932 (Kurobe-hime-futao-kagerou) [Japan (Honshu)]
subalpinus Imanishi, 1932 (*Ameletus*).

Ameletus towadensis Matsumura, 1931 *nomen dubium*
towadensis Matsumura, 1931a (*Ameletus*) *nomen dubium*.

Baetidae (Ko-kagerou-ka)

Genus *Acentrella* Bengtsson, 1912 (Mijikao-futaba-ko-kagerou-zoku)

Acentrella gnom (Kluge, 1983) (Mitsuo-mijikao-futaba-ko-kagerou) [Japan (Honshu, Kyushu), Russia, Korea, Taiwan]
gnom Kluge, 1983 (*Pseudocloeon*); Tshernova *et al.*, 1986 (*Baetis* (*Acentrella*)); Waltz & McCafferty, 1987 (*Acentrella*); Kobayashi, 1992 (*Acentrella*).
ultimum Müller-Liebenau, 1985 (*Pseudocloeon*).

Acentrella lata (Müller-Liebenau, 1985) (Minami-mijikao-futaba-ko-kagerou) [Japan (Okinawa: Okinawa-honto), Taiwan]
lata Müller-Liebenau, 1985 (*Pseudocloeon*); Nakasone *et al.*, 1998 (*Pseudocloeon*).
lata: Waltz & McCafferty, 1987 (*Acentrella*).

Acentrella sibirica (Kazlauskas) (Mijikao-futaba-ko-kagerou) [Japan (Honshu), Korea, Russia]
sibiricum Kazlauskas, 1963 (*Pseudocloeon*).
nosegawaensis: Gose, 1980c **Misidentification.** nec Gose, 1965 (*Pseudocloeon*).
sibiricus: Tshernova *et al.*, 1986 (*Baetis* (*Acentrella*)).
sibirica: Waltz & McCafferty, 1987 (*Acentrella*); Ishiwata, 2000 (*Acentrella*).
sp. "B" Kobayshi, 1992 (*Acentrella*).

Note: The nymph described as *Pseudocloeon nasegawaensis* by Gose (1980c) is referred to a species of *Acentrella* because adult specimens reared from the nymphs agreed well with characteristics of *Acentrella* having sharply projected anteronotal protuberance (ANp) on mesothorax (Kluge, 1994; Edmunds & Waltz, 1996).

Acentrella suzukiella Matsumura, 1931 (Suzuki-mijikao-futaba-ko-kagerou) [Japan (Honshu)]
suzukiella Matsumura, 1931a (*Acentrella*).

Genus *Baetiella* Uéno, 1931 (Futaba-ko-kagerou-zoku)

Pseudocloeon Matsumura, 1931a. nom. preocc.

Neobaetiella Müller-Liebenau, 1985.

Matsumuracloeon Hubbard, 1989 SYN. N. replacement name for *Pseudocloeon* Matsumura, 1931a nec Klapálek, 1905.

Note: Based on examination of the type material, I recognized *Pseudocloeon aino* Matsumura, the type species of *Pseudocloeon* Matsumura, 1931, is conspecific with *Baetiella japonica*, the type species of *Baetiella* Uéno 1931. Although the former generic name is senior to the latter, the name *Baetiella* is valid because the name *Pseudocloeon* Matsumura, 1931, is preoccupied by *Pseudocloeon* Klapálek, 1905 (Hubbard, 1988). *Matsumuracloeon* Hubbard, 1989, a replacement name, for *Pseudocloeon* Matsumura (Hubbard, 1989), is therefore a junior synonym of *Baetiella*.

Baetiella bispinosa (Gose, 1980) (Togetoge-futaba-ko-kagerou) [Japan (Okinawa: Iriomote-jima Is., Ishigaki-jima Is.), Taiwan]
bispinosus Gose, 1980c (*Pseudocloeon*).
macani Müller-Liebenau, 1985 (*Neobaetiella*).
bispinosa: Waltz & McCafferty, 1987 (*Baetiella*).

Baetiella japonica (Imanishi, 1930) (Futaba-ko-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu)]
"n. sp.?" Uéno, 1928 (?*Acentrella*).

japonica, Imanishi, 1930 (*Acentrella*).

aino Matsumura, 1931a (*Pseudocloeon*) SYN. N.; Waltz & McCafferty, 1987 (*Baetiella*); Hubbard, 1990 (*Matsumuracloeon*).

japonica: Uéno, 1931a (*Baetiella*).

nosegawaensis Gose, 1965 (*Baetiella*) SYN. N.

japonica [!]: Gose, 1980c (*Pseudocloeon*).

japonicum: Müller-Liebenau, 1985 (*Pseudocloeon*).

Note: *Acentrella japonica* Imanishi, 1930 is a senior synonym of *Pseudocloeon aino* Matsumura (see the note on the genus *Baetiella* above) and *Baetiella nasegawaensis* Gose. Kluge (1983) synonymized *Baetiella nasegawaensis* Gose, 1965 with *Baetiella tuberculata* (Kazlauskas, 1963). I have examined Korean specimens of *B. tuberculata*, and found that the species is much different from *B. nasegawaensis*, in having the median tubercles on posterior margin of each tergum. According to Gose (1980c), *B. nasegawaensis* is distinguished from *B. japonica* by the presence of a projection at basal segment of male genital forceps. However, my examination of reliable materials of *B. japonica* detected the presence of the projection. Although the type material of both of *B. japonica* and *B. nasegawaensis* were missing (personal observation and Gose, personal communication, respectively), I recognize that *Baetiella nasegawaensis* should be considered as a synonym of *Baetiella japonica*.

Genus *Baetis* Leach, 1815 (Ko-kagerou-zoku).

Note: The genus *Baetis* tends to be split into many subgroups by many authors. Waltz *et al.* (1994) and McCafferty & Waltz (1995) created a new genus and gave subgeneric rank based on morphological differences in nymphs. Kobayashi (1987) revised the Japanese species of *Baetis* and presented a nymphal key to seven nominal species together with 13 informal species (20 species in total). He also assigned them to some species groups. Although twenty-two species are listed here, generic or subgeneric assignment is not given. Further taxonomical studies, including generic or subgeneric assignment are needed.

***Baetis acuminatus* Gose, 1980** (Togari-ko-kagerou) [Japan]

acuminatus Gose, 1980b (*Baetis*).

***Baetis atagonis* Imanishi, 1937** (Atago-ko-kagerou) [Japan (Honshu)]

atagonis Imanishi, 1937b (*Baetis*).

***Baetis bicaudatus* Dodds, 1923** (Futao-ko-kagerou) [Japan (Hokkaido, Honshu), Mongolia, Russia, North America]

bicaudatus Dodds, 1923 (*Baetis*); Kluge, 1997 (*Baetis* (*Baetis*)); Ishiwata *et al.*, 2000 (*Baetis*).

"sp. L" Kobayashi, 1987 (*Baetis*).

***Baetis celcus* Imanishi, 1937** (Kerukusu-ko-kagerou) [Japan (Honshu)]

celcus Imanishi, 1937b (*Baetis*).

celcus [!]: Gose, 1980b (*Baetis*).

***Baetis chocoratus* Gose, 1980** (Tobihiro-ko-kagerou) [Japan (Honshu, Shikoku, Kyushu)]

chocoratus Gose, 1980a (*Baetis*).

***Baetis florens* Imanishi, 1937** (Furorensu-ko-kagerou) [Japan (Honshu)]

florens Imanishi, 1937b (*Baetis*).

- Baetis frexifemora* Gose, 1980 (Udemagari-ko-kagerou) [Japan (Honshu)]
frexifemora Gose, 1980b (*Baetis*).
- Baetis fuscatus* (Linnaeus, 1761) (Usuguro-ko-kagerou) [Japan, Europe, Russia, Korea]
fuscatus Linnaeus, 1761 (*Baetis*); Novikova & Kluge, 1987 (*Baetis* (*Baetis*)).
bioculatus Uéno, 1928 (*Baetis*).
 "sp. nla" Imanishi, 1940 (*Baetis*).
- Baetis hyugensis* Gose, 1980 (Hyuga-ko-kagerou) [Japan (Honshu)]
hyugensis Gose, 1980a (*Baetis*).
- Baetis iriomotensis* Gose, 1980 (Iriomote-ko-kagerou) [Japan (Okinawa: Iriomote-jima Is.)]
 "sp. (No.1)" Uéno, 1969 (*Baetis*).
iriomotensis Gose, 1980b (*Baetis*).
- Baetis muticus* (Linnaeus, 1758) (Kiso-ko-kagerou) [Japan (Honshu), Korea, Russia, England, Europe]
muticus Linnaeus, 1758 (*Ephemera*); Novikova & Kluge, 1987 (*Baetis* (*Nigrobaetis*));
 Waltz *et al.*, 1994 (*Alainites*).
pumilus Burmeister, 1839; Horasawa, 1931 (*Baetis*).
furcatus Navás 1934 (*Baetis*).
- Baetis pseudofrequentus* Müller-Liebenau, 1985 (Minami-ko-kagerou) [Taiwan, Japan (Okinawa: Iriomotejima Is.)]
pseudofrequentus Müller-Liebenau, 1985 (*Baetis*); Kobayashi, 1989 (*Baetis*); Kang *et al.*, 1994 (*Baetis* (*Tenuibaetis*)).
- Baetis sacishimensis* Uéno, 1969 (Sakishima-ko-kagerou) [Japan (Okinawa: Ishigaki-jima Is., Iriomote-jima Is.)]
sacishimensis Uéno, 1969 (*Baetis*); Waltz *et al.*, 1994 (*Alainites*).
- Baetis sahoensis* Gose, 1980 (Saho-ko-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu)].
sahoensis Gose, 1980a (*Baetis*).
- Baetis shinanonis* Uéno, 1931 (Shinano-ko-kagerou) [Japan (Honshu)]
shinanonis Uéno, 1931a (*Baetis*).
- Baetis takamiensis* Gose, 1980 (Takami-ko-kagerou) [Japan (Honshu)]
takamiensis Gose, 1980a (*Baetis*).
- Baetis thermicus* Uéno, 1931 (Shirohara-ko-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu, Okinawa), Korea, Russia (Kurul Is.), Taiwan]
thermicus Uéno, 1931a (*Baetis*).
- Baetis totsukawensis* Gose, 1980 (Totsukawa-ko-kagerou) [Japan (Honshu)]
totsukawensis Gose, 1980a (*Baetis*).
- Baetis tsushimensis* Gose, 1980 (Tsushima-ko-kagerou) [Japan (Kyushu)]
tsushimensis Gose, 1980a (*Baetis*).

Baetis uenoi Gose, 1980 (Ueno-ko-kagerou) [Japan (Okinawa: Iriomote-jima Is.)]
"sp. No.2, new species" Uéno, 1969 (*Baetis*).
uenoi Gose, 1980b (*Baetis*).

Baetis yamatoensis Gose, 1980 (Yamato-ko-kagerou) [Japan (Honshu)]
yamatoensis Gose, 1980a (*Baetis*).

Baetis yoshinensis Gose, 1980 (Yoshino-ko-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu, Okinawa: Okinawa-honto), Taiwan]
yoshinensis Gose, 1980a (*Baetis*).

Genus *Centropitulum* Eaton, 1869 (Usuba-ko-kagerou-zoku)

Centropitulum rotundum Takahashi, 1929 (Usuba-ko-kagerou) [Japan (Honshu, Shikoku)]
rotundum Takahashi, 1929 (*Centropitulum*).

Genus *Cloeon* Leach, 1815 (Futaba-kagerou-zoku)

Cloeon dipterum (Linnaeus, 1761) (Futaba-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu)]
diptera Linnaeus, 1761 (*Ephemera*).
dipterum: Leach, 1815 (*Cloeon*); McLachlan, 1875 (*Cloeon*); Matsumura, 1904 (*Cloeon*); Kluge, 1997 (*Cloeon* (*Cloeon*)).

Cloeon kyotonis Matsumura, 1931 (Kyoto-futaba-kagerou) [Japan (Honshu)]
kyotonis Matsumura, 1931a (*Cloeon*).

Cloeon maikonis (Takahashi, 1924) (Amefuri-futaba-kagerou) [Japan (Honshu)]
maikonis Takahashi, 1924 (*Cloeon*).

Cloeon marginale Hagen, 1858 (Akamon-futaba-kagerou) [Japan (Okinawa: Okinawa-honto), Taiwan, China (South), India, Indonesia, Philipines, Sri Lanka]
marginale Hagen, 1858 (*Cloe*).
marginale: Eaton, 1871 (*Cloeon*); Uéno, 1969 (*Cloeon*).

Cloeon okamotoi Takahashi, 1924 (Aoba-futaba-kagerou) [Japan (Honshu, Shikoku)]
okamotoi Takahashi, 1924 (*Cloeon*).

Cloeon ryogokuense Gose, 1980 Emendation (Tamari-futaba-kagerou) [Japan (Honshu, Kyushu)]
ryogokuensis [!] Gose, 1980a (*Cloeon*).

Cloeon tamagawanum (Matsumura, 1931) COMB. N. (Tamagawa-futaba-kagerou) [Japan (Honshu)]
tamagawanum Matsumura, 1931a (*Procloeon*); Hubbard, 1988 (*Promatsumura*).

Genus *Procloeon* Bengtsson, 1915 (Himeusuba-ko-kagerou-zoku)

Procloeon bimaculatum (Eaton, 1885) (Himeusuba-ko-kagerou) [Japan (Okinawa: Ishigaki-jima Is.), Taiwan, Java, Sumatra, Thailand, Sri Lanka]

bimaculatum Eaton, 1885 (*Cloeon*); Kimmins, 1947 (*Procloeon*); Uéno, 1969 (*Cloeon*).

Genus *Promatsumura* Hubbard, 1988 (Matsumura-ko-kagerou-zoku)

Procloeon Matsumura, 1931a, nom. preocc. Not available, no type designated.

Promatsumura Hubbard, 1988, replacement name for *Procloeon* Matsumura, 1931a nec *Procloeon* Bengtsson, 1915.

Promatsumura nipponicum (Matsumura, 1931) (Matsumura-ko-kagerou) [Japan (Honshu)]
nipponicum Matsumura, 1931a (*Procloeon*); Hubbard, 1988 (*Promatsumura*).

Dipteromimidae (Gaganbo-kagerou-ka)

Genus *Dipteromimus* McLachlan, 1875 (Gaganbo-kagerou-zoku)

Dipteromimodes Matsumura, 1931b

Dipteromimus tipuliformis McLachlan, 1875 (Gaganbo-kagerou) [Japan (Honshu, Shikoku, Kyushu)]

tipuliformis McLachlan, 1875 (*Dipteromimus*).

suzukii Matsumura, 1931a (*Dipteromimodes*).

Siphonuridae (Futao-kagerou-ka)

Genus *Siphonurus* Eaton, 1868 (Futao-kagerou-zoku)

Siphonurus binotatus (Eaton, 1892) (Oo-futao-kagerou) [Japan (Hokkaido, Honshu, Shikoku), China]

binotatus Eaton, 1892 (*Siphurus*).

alternatus: Uéno, 1928 (*Siphurus* (?)).

maculosus Takahashi, 1930 (*Siphonurus*).

grandiosa Matsumura, 1931a (*Siphonisca*).

Siphonurus sanukensis Takahashi, 1929 (Nami-futao-kagerou) [Japan (Honshu, Shikoku), Korea]

sanukensis Takahashi, 1929 (*Siphurus*); Imanishi, 1933 (*Siphonurus*).

Siphonurus yoshinoensis Gose, 1979 (Yoshino-futao-kagerou) [Japan (Honshu)]

yoshinoensis Gose, 1979c (*Siphonurus*).

Siphonurus zhelochovtsevi Tshernova, 1952 (Ezo-futao-kagerou) [Japan (Hokkaido), Russia]

zhelochovtsevi Tshernova, 1952 (*Siphonurus*); Itou, 1989 (*Siphonurus*).

Isonychiidae (Chira-kagerou-ka)

Genus *Isonychia* Eaton, 1871 (Chira-kagerou-zoku)

Subgenus *Isonychia* Eaton (Chira-kagerou-azoku)

Isonychia japonica (Ulmer, 1919) (Chira-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), China, Korea, Russia]

japonicus Ulmer, 1919 (*Chiroteneles*); Uéno, 1928 (*Chiroteneles* (?)).

violacea Matsumura, 1931a (*Sparrea*).
japonica: Uéno & Okamoto, 1932 (*Isonychia*).

Subgenus *Prionoides* Kondoratieff & Voshell (Shima-chira-kagerou-azoku)

Isonychia shima (Matsumura, 1931) SP. REV. & COMB. N. (Shima-chira-kagerou) [Japan (Hokkaido, Honshu)]
shima Matsumura, 1931a (*Rhoenanthus*).
jozana Matsumura, 1931a (*Siphonisca*) SYN. N.
sukashii Matsumura, 1931a (*Siphonisca*) SYN. N.

Note: *Rhoenanthus shima* Matsumura, 1931 was declared to be a *nomen dubium* by Bae & MacCafferty (1991). However, it is a valid species since the female syntype has been preserved in the Matsumura Collection, HU. Based on page priority, the last two names in the list above are placed as junior synonyms of *Isonychia shima* (Matsumura, 1931).

Isonychia mitsukonis Morishita, 1961 *nomen dubium*
mitsukonis Morishita, 1961 (*Isonychia*) *nomen dubium*.

Subgenus *incertae sedis*

Isonychia valida Navás, 1919 (Navasu-chira-kagerou) [Japan (Honshu)]
validus Navás, 1919 (*Chirotonetes*).
valida; Imanishi, 1933 (*Isonychia*).

Oligoneuriidae (Hitoriga-kagerou-ka)

Genus *Oligoneuriella* Ulmer, 1924 (Hitoriga-kagerou-zoku)

Oligoneuriella rhenana Imhoff, 1852 (Hitoriga-kagerou) [Europe, Japan (Honshu)]
rhenana Imhoff, 1852 (*Oligoneuriella*); Uéno 1950 (*Oligoneuriella*).

Heptageniidae (Hirata-kagerou-ka)

Genus *Bleptus* Eaton, 1885 (Obi-kagerou-zoku)

Bleptus fasciatus Eaton, 1885 (Obi-kagerou) [Japan (Honshu, Shikoku, Kyushu), Korea]
fasciatus Eaton, 1885 (*Bleptus*).

Genus *Cinygma* Eaton, 1885 (Kita-tanigawa-kagerou-zoku)

Cinygma lyriformis (McDunnough, 1924) (Oo-ezo-kagerou) [Japan (Hokkaido)], Korea, Russia, North America]
lyriformis McDunnough, 1924 (*Ecdyonurus*); Kuhara *et al.*, 1993 (*Cinygma*).
peterseni Lestage, 1930 (*Ecdyonurus*).

Genus *Cinygmoides* Matsumura, 1931 (Ezo-tanigawa-kagerou-zoku)

Cinygmoides hekachii Matsumura, 1931 (Hekachi-ezo-tanigawa-kagerou) [Japan (Hokkaido)]
hekachii Matsumura, 1931a (*Cinygmoides*); Matsumura, 1933 (*Ecdyonurus* (*Cinygmoides*)).

Genus *Cinygmula* McDunnoug, 1933 (Miyama-tanigawa-kagerou-zoku)

Note: The first comprehensive study of the genus *Cinygmula* in Russian Far East and Central Asia was given by Tshernova & Belov (1982), who demonstrated the similarity of the two genera, *Cinygmula* and *Rhithrogena*. Kluge (1988, 1997) regarded *Cinygmula* as a subgenus of the genus *Rhithrogena*, because there are few morphological differences in adults. In Japan and North America, however, no comprehensive works on *Cinygmula* has been carried out.

Cinygmula adusta (Imanishi, 1935) (Chairo-miyama-tanigawa-kagerou) [Japan (Honshu, Shikoku)]
adusta Imanishi, 1935 (*Cinygma*); Tshernova & Belov, 1982 (*Cinygmula*).

Cinygmula cava (Ulmer, 1927) (Ezo-miyama-tanigawa-kagerou) [Japan (Hokkaido), Mongolia, Russia]
cavum Ulmer, 1927 (*Cinygma*).
cavum?: Uéno & Okamoto, 1932 (*Cinygma*).
cava: Tshernova & Belov, 1982 (*Cinygmula*); Kluge, 1988 (*Rhithrogena* (*Cinygmula*)); Ishiwata, 1999 (*Cinygmula*).

Cinygmula dorsalis (Imanishi, 1935) (Sesuji-miyama-tanigawa-kagerou) [Japan (Honshu)]
dorsalis Imanishi, 1935 (*Cinygma*); Tshernova & Belov, 1982 (*Cinygmula*).

Cinygmula hirasana (Imanishi, 1935) (Miyama-tanigawa-kagerou) [Japan (Honshu), Korea]
sp. nov. ? Uéno, 1928 (*Ecdyurus*).
hirasana Imanishi, 1935 (*Cinygma*); Tshernova & Belov, 1982 (*Cinygmula*); Kluge, 1997 (*Rhithrogena* (*Cinygmula*)).
kurobensis Imanishi, 1935 (*Cinygma*); Tshernova & Belov, 1982 (*Cinygmula*).

Cinygmula putoranica Kluge, 1980 (Kuro-miyama-tanigawa-kagerou) [Japan (Hokkaido), Russia]
putoranica Kluge, 1980 (*Cinygmula*); Kluge, 1988 (*Rhithrogena* (*Cinygmula*)); Kuhara *et al.*, 1993 (*Cinygmula*).

Cinygmula sapporensis (Matsumura, 1904) SP. REV. & COMB. N. (Kuro-miyama-tanigawa-kagerou) [Japan (Hokkaido, Honshu), Korea, Russia]
sapporensis Matsumura, 1904 (*Siphilurus*); Matsumura, 1931b (*Cinygma*); Matsumura, 1933 (*Ecdyonurus* (*Cinygma*)).
sapporensis Matsumura, 1931a (*Cinygma*).
sapporensis: Imanishi, 1932 (*Ameletus*) Misidentification.
grandifolia Tshernova, 1952 (*Cinygmula*) SYN. N.; Kluge, 1988 (*Rhithrogena* (*Cinygmula*)).

Note: After examination of type specimens of *Siphilurus sapporensis* Matsumura, 1904, I found that this is a valid species and a senior synonym of *Cinygmula grandifolia* Tshernova, 1952. This species was previously synonymized with *Ameletus costalis* (Matsumura) by Imanishi (1932).

Cinygmula vernalis (Imanishi, 1935) (Haruno-miyama-tanigawa-kagerou) [Japan (Honshu)]
vernalis Imanishi, 1935 (*Cinygma*); Tshernova & Belov, 1982 (*Cinygmula*).

Genus *Ecdyonurus* Eaton, 1868 (Tanigawa-kagerou-zoku)

Note: The concept of the genus *Ecdyonurus* by Kluge (1988) is adopted here until more

reasonable classification is proposed in future. The egg morphology of Japanese species of *Ecdyonurus* indicates several groups in the genus (Okazaki, 1984). In addition, the Japanese species of the genus are distinguishable from European species by the shape of male genitalia and hind margin of nymphal pronotum. In European species, the penis-lobes spread outwards distally to form a broad T-shape apex and the lateral projections of nymphal pronotum are elongated backwards distinctly on either side of mesonotum. Lacking in such features, the Japanese species currently assigned to *Ecdyonurus* should be examined in detail.

Ecdyonurus bajkovae Kluge, 1986 (Onihime-tanigawa-kagerou) [Japan (Honshu, Shikoku, Kyushu), Korea, Russia]

bajkovae Kluge, 1986 (*Ecdyonurus*); Kluge, 1997 (*Ecdyonurus (Afghanurus)*), replacement name for *Paracinygmula zhiltzovae* Bajkova, 1975; Ishiwata, 2000 (*Ecdyonurus*).

"sp. A" Yamasaki, 1987 (*Ecdyonurus*).

subspinosa Braasch & Soldan, 1988 (*Nixe*).

Ecdyonurus flavus Takahashi, 1929 (Kiiro-tanigawa-kagerou) [Japan (Honshu)]

flavus Takahashi, 1929 (*Ecdyurus*); Imanishi, 1936 (*Ecdyonurus*).

**Ecdyonurus fractus* (Kang & Yang, 1994) COMB. N. (Minami-madara-tanigawa-kagerou)

[Japan (Okinawa: Iriomote-jima Is.), Taiwan]

fracta Kang & Yang, 1994a (*Electrogena*).

"sp." Takara & Azuma, 1972 (*Bleptus*) Misidentification.

"sp." Takara & Azuma, 1972 (*Siphonurus*) Misidentification.

Ecdyonurus hyalinus (Ulmer, 1912) COMB. N. (Minami-tanigawa-kagerou) [Japan (Okinawa:

Iriomote-jima Is, Ishigaki-jima Is.), Taiwan]

hyalinus Ulmer, 1912 (*Ecdyurus*); Uéno, 1931c (*Ecdyonurus*); Kang & Yang, 1994a (*Afromurus*).

"sp. No.2" Uéno, 1928 (*Ecdyurus*).

Ecdyonurus kibunensis Imanishi, 1936 (Kibune-tanigawa-kagerou) [Japan (Honshu, Shikoku,

Kyushu), Korea, Russia]

kibunensis Imanishi, 1936 (*Ecdyonurus*).

Ecdyonurus naraensis Gose, 1968 SP. REV. (Ashiguro-tanigawa-kagerou) [Japan (Honshu)]

naraensis Gose, 1968 (*Ecdyonurus*).

Note: After examination of specimens collected from the type locality (Gojo-shi, Nara-ken) (type species lost, Gose personal communication), I have found that this is a valid name for a species previously synonymized with *Rhithrogena satsuki* Imanishi by Gose (1979e). See the note on *Rhithrogena tetrapunctigera* below.

Ecdyonurus scalaris Kluge, 1983 (Hime-tanigawa-kagerou) [Japan (Honshu, Kyushu), Korea, Russia]

scalaris Kluge, 1983 (*Ecdyonurus*); Ishiwata, 2000 (*Ecdyonurus*).

Ecdyonurus tigris Imanishi, 1936 (Tora-tanigawa-kagerou) [Japan (Honshu, Shikoku, Kyushu)]

tigris Imanishi, 1936 (*Ecdyonurus*).

Ecdyonurus tobironis Takahashi, 1929 (Kuro-tanigawa-kagerou) [Japan (Honshu, Shikoku,

Kyushu)]

tobiiironis Takahashi, 1929 (*Ecdyonurus*).

suzukianum Matsumura, 1931a (*Cinygma*) SYN. N.

Note: After examination of type specimen of *Cinygma suzukianum* Matsumura, 1931, I found that this is a junior synonym of *Ecdyonurus tobiiironis* Takahashi, 1929. Imanishi (1936) examined this specimen in the Matsumura Collection and labeled "*Ecdyonurus tobiiironis*". There are, however, no synonymies in his listings.

Ecdyonurus viridis (Matsumura, 1931) COMB. N. (Midori-tanigawa-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Okinawa: Okinawa-honto)]

viridis Matsumura, 1931a (*Heptagenia*).

yoshidae: Uéno, 1938 (*Ecdyonurus*) **Misidentification.**

hyalinus: Uéno, 1969 (*Ecdyonurus*) **Misidentification.**

Ecdyonurus yoshidae Takahashi, 1924 (Shiro-tanigawa-kagerou) [Japan (Honshu, Shikoku, Kyushu)]

yoshidae Takahashi, 1924 (*Ecdyonurus*).

japonicus Uéno, 1928 (*Ecdyurus*).

levis: Ishiwata, 1997 (*Ecdyonurus*) **Misidentification.**

Genus *Epeorus* Eaton, 1881 (Hirata-kagerou-zoku)

Epeorus aesculus Imanishi, 1934 (Kihiro-hirata-kagerou) [Japan (Hokkaido, Honshu, Kyushu), Korea, Russia]

aesculus Imanishi, 1934 (*Epeorus*); Sinitchenkova, 1978 (*Iron*); Kluge, 1988 (*Epeorus* (*Iron*)).

Epeorus cumulus Imanishi, 1939 STAT. N. (Kumurusu-hirata-kagerou) [Japan (Honshu)]

curvatulus f. *cumulus* Imanishi, 1939 (*Epeorus*).

curvatulus cumulus: Takemon, 1990 (*Epeorus*).

Epeorus curvatulus Matsumura, 1931 (Ueno-hirata-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu)]

"sp. ?" Uéno, 1928 (*Iron*).

curvatulus Matsumura, 1931a (*Epeorus*).

uenoi auct., nec Matsumura, 1933 (*Epeorus*).

Note: This species was firstly reported as nymphal stage under the name "*Iron* sp. ?" by Uéno (1928). Imanishi (1934) erroneously assigned this species to the nymph of *Epeorus uenoi* (Matsumura) and described the adults.

**Epeorus erratus* Braasch, 1981 (Minami-hirata-kagerou) [Japan (Okinawa: Ishigaki-jima Is., Iriomote-jima Is.), Taiwan]

psi Eaton, 1885 (*Epeorus*); Ulmer, 1912 (*Epeorus*); Uéno, 1931 (*Epeorus*); Imanishi, 1934 (*Epeorus*) **Misidentification.**

erratus Braasch 1981 (*Epeorus*).

"sp.", Uéno, 1928 (*Epeorus*).

Epeorus hiemalis Imanishi, 1934 (Onaga-hirata-kagerou) [Japan (Honshu)]

hiemalis Imanishi, 1934 (*Epeorus*).

- Epeorus ikanonis* Takahashi, 1924 (Nami-hirata-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu)]
ikanonis Takahashi, 1924 (*Epeorus*).
hanazonoensis Matsumura, 1931a (*Epeorus*).
- Epeorus latifolium* Uéno, 1928 (Erumon-hirata-kagerou) [Japan (Hokkaido, Honshu, Shikoku), Korea]
latifolium Uéno, 1928 (*Epeorus*); Kluge, 1988 (*Epeorus* (*Belovius*)).
- Epeorus l-nigrus* Matsumera, 1931 Emendation (Matsumura-hirata-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu)]
latifolium: Horasawa, 1929 (*Epeorus*) Misidentification.
L-nigrum [!] Matsumera, 1931a (*Epeorus*).
- Note: Based on type material examination of *Epeorus l-nigrus* Matsumera, 1931 in the Matsumura Collection, HU, I recognize it is a valid name for a species confused with *Epeorus latifolium* Uéno, 1928 by previous authors.
- Epeorus napaeus* Imanishi, 1934 (Tani-hirata-kagerou) [Japan (Honshu, Shikoku, Kyushu)]
napaeus Imanishi, 1934 (*Epeorus*).
- Epeorus nipponicus* (Uéno, 1931) COMB. N. (Yumimon-hirata-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea]
nipponicus Uéno, 1931a (*Iron*).
curvatulus f. *curvatulus* Imanishi, 1939 (*Epeorus*) Misidentification.
curvatulus curvatulus: Takemon, 1990 (*Epeorus*) Misidentification.
curvatulus auct., nec Matsumura 1931a (*Epeorus*).
- Note: After original description of *Iron nipponicus* by Uéno (1931b), this species has been listed by some authors (Uéno, 1932; Imanishi, 1934), but after that it has been overlooked by previous authors. Although I have not been successful in locating the holotype of *I. nipponicus*, I have collected specimens from Nakabusagawa River, Shinanozaka, Nagano-ken, the type locality of *I. nipponicus*. All of them are identical in regard to size, coloration, and detail of the male genitalia as *I. nipponicus*.
- Epeorus uenoi* (Matsumura, 1933) [Kita-hirata-kagerou] [Japan (Hokkaido)]
uenoi Matsumura, 1933 nec Imanishi, 1934 (*Iron*).
- Note: Matsumura (1933) described a new species under the name of *Iron uenoi* and cited the name of author as "*Iron uenoi* Imanishi" erroneously. Judging from the examination of the specimens identified with *Epeorus uenoi* (Matsumura, 1933) by Imanishi in the Imanishi Collection, CERK, *uenoi* sensu Imanishi (1934) is not referred to the true *uenoi*. See the note on *Epeorus curvatulus* above.
- Genus *Heptagenia* Walsh, 1863 (Kihada-hirata-kagerou-zoku)
Kageronia Matsumura, 1931b.
- Heptagenia flava* Rostock, 1878 (Sato-kihada-hirata-kagerou) [Japan (Hokkaido, Honshu), China, Europe, Russia]
flava Rostock, 1877(*Heptagenia*) ; Kluge, 1988 (*Heptagenia* (*Heptagenia*)).
"sp." Horasawa, 1931(*Heptagenia*).
"sp. na" Imanishi, 1940 (*Heptagenia*).
"sp. nli" Hashimoto, 1955 (*Heptagenia*).

"sp. HB" Gose, 1962 (*Heptagenia*).

kamonis: Kushiro Insect Lover's Society, 1995 (*Potamanthus*) **Misidentification.**

Heptagenia kihada Matsumura, 1931 (Kihada-hirata-kagerou) [Japan (Honsyu, Shikoku, Kyushu), Korea]
kihada Matsumura, 1931a (*Heptagenia*); Kluge, 1988 (*Heptagenia* (*Kageronia*)).
suzukiella Matsumura, 1931a (*Kageronia*).

Heptagenia kyotoensis Gose, 1963 (Kyoto-kihada-hirata-kagerou) [Japan (Honshu, Shikoku, Kyushu), Korea]
"sp. nb" Imanishi, 1940 (*Heptagenia*).
"sp. nIV" Hashimoto, 1955 (*Heptagenia*).
kyotoensis Gose, 1963 (*Heptagenia*).

Heptagenia pectoralis Matsumura, 1931 (Munaguro-kihada-hirata-kagerou) [Japan (Hokkaido, Honshu, Kyushu)]
pectoralis Matsumura, 1931a (*Heptagenia*).

Genus *Rhithrogena* Eaton, 1881 (Hime-hirata-kagerou-zoku)

Rhithrogena japonica Uéno, 1928 (Hime-hirata-kagerou) [Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea]
japonica Uéno, 1928 (*Rhithrogena*).

Rhithrogena minazuki Imanishi, 1936 (Minazuki-hime-hirata-kagerou) [Japan (Hokkaido, Honshu, Okinawa: Okinawa-honto), Russia (Sakhalin)]
minazuki Imanishi, 1936 (*Rhithrogena*).

Rhithrogena parva (Ulmer, 1912) (Taiwan-hime-hirata-kagerou) [Japan (Okinawa: Iriomote-jima Is, Ishigaki-jima Is.), Taiwan]
parvus Ulmer, 1912 (*Ecdyurus*).
formosicola Matsumura, 1931a (*Rhithrogena*).
vitrea Walker var. *parva* Ulmer: Uéno, 1931c (*Rhithrogena*).
parva: Uéno, 1969 (*Rhithrogena*).

Rhithrogena tateyamana Imanishi, 1936 (Tateyama-hime-hirata-kagerou) [Japan (Honshu)]
tateyamana Imanishi, 1936 (*Rhithrogena*).
magawana Imanishi, 1936 (*Rhithrogena*).

Rhithrogena tetrapunctigera Matsumura, 1931 **Emendation** (Satsuki-hime-hirata-kagerou) [Japan (Honshu), Korea].
4-punctigera [!] Matsumura, 1931a (*Rhithrogena*).
satsuki Imanishi, 1936 (*Rhithrogena*) SYN. N.
"sp. na" Imanishi, 1940 (*Rhithrogena*).
"sp. nI" Hashimoto, 1955 (*Rhithrogena*).
gojoensis Gose, 1968 (*Ameletus*) SYN. N.

Note: Holotype specimen of *Rhithrogena tetrapunctigera* Matsumura, 1931a is a female imago, 1 collected male imagoes of this species near the type locality, Matsumoto-shi, Nagano-ken. The first figure of male genitalia of *Rhithrogena satsukii* Imanishi 1936 was illustrated by Gose (1979e). But the male genitalia of Gose's illustration were that of *Ecdyonurus naraensis* Gose,

1968. Because Gose (1979e) erroneously synonymized *E. naraensis* with *R. satsuki*, and provided drawing of the male genitalia of *E. naraensis* under the name *R. satsukii*. I could not examine the type specimen of *R. satsuki* because no type specimens have been preserved in the Imanishi Collection, CERK. However, my examination of reliable materials of *R. satsuki* showed the presence of four spots on the ventral thorax, absence of dark longitudinal streak on the femora, and widely separated penis-lobes, which were the diagnostic characters of *R. tetrapunctigera*.

Gose (1968) originally described *gojoensis* under the genus *Ameletus* that had four spots on the ventral thorax. This should be transferred to the genus *Rhithrogena* because of the following characters figured by Gose; the cubital intercalaries of forewing not consist of a series of veinlets (consist of two pairs) (Gose, 1968: fig. 1A), basal segment of fore tarsi less than one-third length of segment 2 (ibid. fig. 1D) and penis-lobes widely separated to base (ibid. fig. 1F). These are unique characteristics among genus *Rhithrogena*. I have not been successful in locating the holotype of *A. gojoensis*, but I have collected specimens from Gojo-shi, Nara-ken, the type locality of *A. gojoensis*. All of them are identical to *R. tetrapunctigera* in the respects of body size, coloration, and detail morphology of male genitalia. Therefore, I regard that both *R. satsuki* and *A. gojoensis* as synonyms of *R. tetrapunctigera*.

Genus *incertae sedis*

Ecdyonurus bifasciatus Navás, 1933 (Futaobi-tanigawa-kagerou) [Japan (Honshu)]
bifasciatus Navás, 1933 (*Ecdyonurus* ?).

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