

MAYFLIES FROM JAPANESE TORRENTS
VIII. NOTES ON THE GENERA *PARALEPTOPHLEBIA*
AND *BAETIS*¹

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ONE PLATE

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This paper deals with the genus *Paraleptophlebia* of the family Leptophlebiidae and the genus *Baetis* of the family Baetidae. After examining my several years' collection closely, I have found two new species of the genus *Paraleptophlebia* and three new species of the genus *Baetis*, on which I will give the descriptions.

It is to be regretted to leave out of account *Paraleptophlebia* (?) *cincta*, which was reported on the nymphal stage by Dr. Uéno², as I have not been able to finish the rearing of nymphs corresponding to this one and find the opportunity to examine its imagines. With regard to the genus *Baetis*, the redescription as well as the notes on the seasonal dimorphism of *Baetis thermicus* Uéno, one of the commonest mayflies from Japanese torrents, will be included to mention.

I wish to express my sincere thanks to Prof. T. Kawamura and Dr. M. Uéno of the Otsu Hydrobiological Station, Kyoto Imperial University, to Prof. Dr. C. Harukawa and Dr. M. Tokunaga of the Entomological Laboratory, Kyoto Imperial University for their constant encouragement and useful suggestions.

Genus: *Paraleptophlebia* Lestage, 1917

1. *Paraleptophlebia chocolata* n. sp.

This species is similar to *P. spinosa* Uéno³, but is smaller in size and differs in type of genitalia; the apical half of the fore wing is not amber-coloured in this species.

¹ Contribution from the Otsu Hydrobiological Station, Kyoto Imperial University. Contributions from the Entomological Laboratory, Kyoto Imperial University, No. 62.

² *Paraleptophlebia* (?) *cincta* (Retzius): Uéno, 1928. Mem. Coll. Sci., Kyoto Imp. Univ., Ser. B. 4, p. 39.

³ Uéno, 1931. *Lansania*, vol. 3, no. 24, p. 57.

Measurement:	Male	Female
Body, length	6.0-7.5 mm	5.0-7.0 mm
Fore wing, length	6.0-8.0	7.0-7.5
Cercus, length	7.0-8.5	6.5-7.0

Description. Male:—General colour brownish or chocolate brown. Eyes holoptic; upper division of the eyes yellowish brown; lower division of them blackish; each antenna with a pale yellowish band on its base. Head and thorax blackish brown above, ruddy brown on the sides and beneath. In the fore leg, femur and tibia pale yellowish brown, tarsus paler; femur:tibia:tarsus=6.0:8.5:10.5, tarsal joints rank 2, 3, 4, 5, 1; middle and hind legs pale yellowish brown; in the hind leg, tibia about three times as long as tarsus, tarsal joints rank 4, 1, 2, 3; claws dissimilar in all legs. Wings hyaline, pterostigmatic portion obscured, veins whitish. Abdominal segments 2-6 semi-hyaline, with a touch of faint yellowish brown; segments 1 and 7-10 deep brownish above, ruddy brown beneath; in some specimens the basal portion of segment 7 also semi-hyaline and in other specimens segment 2 not semi-hyaline but brownish as in segment 1; each of the tergites 1-9 widely banded with brown or purplish brown on its posterior margin; each segment with a brownish lateral stripe on the pleural fold; postero-lateral angles of the sternites 1-7 shaded with brown; sternite 10 produced into a pair of triangular lobes on its posterior margin. Forceps pale yellowish brown; penis-lobes pale yellowish brown, separated for about half their length by a narrow cleft; each lobe with a sickle-shaped apical process which is extended laterally; cerci and median caudal filament subequal, whitish or slightly tinted with brown.

Female:—Similar to the male. General colour reddish brown; eyes dichoptic, black; each ocellus margined with black. Legs pale reddish brown; wings hyaline, veins slightly tinted with pale yellow. Each of the abdominal tergites with a narrow, pale, median streak and shaded with smoky brown; in some specimens brownish lateral lines obscure in each of the segments 1-7, but each of these segments with one dark spot in the pleural fold near its posterior margin; sternite 9 prolonged, with a deep incision on its posterior margin.

Subimago:—Similar to the imago. General colour brownish to pale brownish. Legs pale brownish with darker knees: tarsi not paler. Wings greyish, subhyaline; vein Sc brownish at its extreme base. Abdominal segments 2-6 paler but not semi-hyaline; segments 8-10 darker; brownish band on the posterior margin of each tergite

conspicuous; postero-lateral corners of the tergite 9 produced into flat spines. In the male, penis-lobes characteristic for this species. Length of cercus 4.0-5.0 mm.

Nymph:—General colour shining, chocolate brown above; paler below. Antennae paler. Head with three paler round spots, each of which is situated on the outside of the ocellus; there is a darker band between the antennae, passing through the median ocellus; there is also a narrow blackish band between two lateral ocelli. Mesonotum with a pair of paler spots near its posterior margin, but these spots obscure in some specimens; legs paler without markings. Each of the abdominal tergites 1-7 infuscated on its lateral and posterior portions; each of the tergites 8-9 wholly infuscated, with lateral spines on its postero-lateral corners; in some specimens, each of the tergites 2-6 with a pale median spot on its posterior margin and a lateral spot on each side of this median one; tracheae of the gills with small lateral branches; cerci and median caudal filament paler with minute hairs; cercus 5.0-5.5 mm, median caudal filament 6.5 mm in length in the full grown nymphs.

Holotype:—Male.

Allotype:—Female.

Type locality:—Kibune, Kyoto. **Specimens:** alcoholic; nymphs collected for the first time in Kamiyagawa, Kyoto, on Apr. 19, 1931; types obtained on May 17, 1935 by rearing nymphs.

The emergence of imago of this species takes place a little later in the season than that of *P. spinosa*. I have also collected imagines on flight in the following localities and dates: Mt. Atago, Kyoto, altitude 700-800 mtr., on May 31, 1931; Hiwada and Nishino, villages in the foot-hills of the Northern Japanese Alps, altitude 1100-1200 mtr., on June 17, 1936.

2. *Paraleptophlebia westoni* n. sp.

This species is similar to *P. chocolata*, but differs from it in type of genitalia.

Measurement:	Male
Body, length	7.5-8.0 mm
Fore wing, length	8.0-9.0
Cercus, length	10.5-11.0

Description. Male:—General colour brownish. Eyes not touched to each other; head and thorax chestnut-brown above, paler on the

sides and below. Legs yellowish brown except for the fore tarsi which are paler; joining of femur and tibia darker in all legs; in the fore leg, femur:tibia:tarsus=10.0:13.0:14.4, tarsal joints rank 2, 3, 4, 5, 1; in the hind leg, femur:tibia:tarsus=6.5:9.0:2.5, tarsal joints rank 4, 1, 2, 3; claws dissimilar in all legs. Wings hyaline, longitudinal veins yellowish brown to pale yellowish, cross veins whitish; median axillary membrane of the fore wing brownish. Each of the abdominal segments 1-2 and 7-10 reddish brown above, a little paler below; each of the segments 3-6 semi-transparent; each tergite with a darker band on its posterior margin and shaded heavily with smoky brown; each segment darker at the postero-lateral angles with a lateral stripe on the pleural fold; sternite 8 darker along its posterior margin and sternite 9 darker along its lateral margin; sternite 10 somewhat yellowish, divided into two triangular lobes; forceps yellowish brown; penis-lobes yellowish brown, separated by an U-shaped notch; each lobe pointed on its distal end, with a large reflexed spur on its ventral side. Median caudal filament 1.5 mm longer than the cercus; each of them brownish, joinings blackish, paler distally.

Female:—Unknown.

Nymph:—Unknown.

Holotype:—Male.

Paratopotypes:—Males.

Type locality:—Kamikôchi, Northern Japanese Alps. Specimens: alcoholic; collected by K. Imanishi; holotype on Sep. 9, 1935; paratypes on Oct. 16, 1932.

The name of this species is dedicated to Rev. W. Weston, one of the pioneers of the Japanese Alps for congratulation of his seventy-seven years' birthday.

Genus: *Baetis* Leach, 1815

1. *Baetis thermicus* Uéno, 1931

Baetis thermicus Uéno: 1931. Ann. Zoo. Jap., vol. 13, p. 91.

Measurement:	Male	Female
Body, length	6.5-9.0 mm	7.0-9.5 mm
Fore wing, length	7.0-9.0	8.0-10.0
Cercus, length	15.0-20.0	14.0-19.0

Description. Male (summer form):—General colour yellowish. Turbinate eyes large, bright red; stalks long, somewhat paler; lower eyes greenish in living specimens, fuscous in alcoholic specimens; each

ocellus ringed with black; each antenna brownish at the base of the flagellum. Thorax ochraceous, with three conspicuous fuscous marks on pleura; legs pale yellowish, joinings and claws darker. Wings hyaline, veins slightly tinted with amber; humeral brace-vein with a fuscous dot on its conjunction with Sc; radius stained fuscous on its basal part from the conjunction with humeral brace-vein; subcosta also stained fuscous on its base in some specimens; in the hind wing, costal projection tinted with brown. Abdominal segments 2-6 semi-hyaline, pale yellowish; segments 7-10 whitish yellow; each of the tergites 1-9 with a brownish line on its posterior margin; on each of the segments 3-7 a blackish stigmatic spot present but often obscure in old specimens. Forceps and cerci whitish; basal joint of the forceps without a tubercle on its inner apical margin, second joint of the forceps conical, tapering toward the apex.

This species is commonest among the species belonging to the genus *Baetis* which are found in the central part of Japan, and decidedly surpasses the remaining species in the number of nymphal individuals in all torrents I have surveyed. Furthermore the nymph is collected in all seasons and the emergence of imago takes place from March to November in the Kyoto district. After examining many specimens from various seasons it seems to me that the male imagines are classified into two seasonal forms, i.e. the winter form and the summer form. The winter form may be collected in Kyoto, roughly, in March, April and November. The type-specimens of this species are identified to this form and collected in October in the Northern Japanese Alps. I also collected specimens belonging to this form in June from other locality of the same mountains. The summer form, on which the description of this paper is based, may be collected in Kyoto from May to October. The length of body of the largest individual of the winter forms is 1.0 mm larger than that of the summer forms. Female imagines and nymphs do not exhibit the seasonal dimorphism as in the male, and when comparing the general coloration of both sexes, the winter form of the male seems to be rather similar to the female than to the summer form of the male.

Judging from the description only, the types of *Baetis shinanonis* Uéno* may be the subimagines of this species and some mayflies hitherto reported as *Baetis bioculatus* L. will be synonymous to this species. I have not yet been able to find any specimens which is identified with certainty to *B. bioculatus* L. in our empire.

* Uéno, 1931. Ann. Zoo. Jap., vol. 13, p. 93.

2. *Baetis celcus* n. sp.

This species is closely allied to *Baetis thermicus* Uéno, but the humeral brace-vein without a fuscous dot and the basal joint of the forceps with a tubercle seem to be enough for discriminating this species from it.

Measurement:	Male	Female
Body, length	6.0-7.0 mm	5.0-7.0 mm
Fore wing, length	5.5-6.5	6.5-7.0
Cercus, length	12.0-13.0	9.5-10.5

Description. Male:—Head brownish. Turbinate eyes large, pale reddish; stalks long, pale reddish; lower eyes blackish; each ocellus bordered with brown on its inner margin; antennae pale brownish. Thorax brownish, without three conspicuous fuscous marks on pleura, and in this point, rather similar to the winter form of *B. thermicus*. Legs pale brownish to pale yellowish except for coxae which are brownish. Wings hyaline, veins pale yellowish to whitish; humeral brace-vein without a fuscous dot; radius and sometimes also subcosta stained brownish on their bases as in *B. thermicus*; venation of the hind wing as in *B. thermicus*, costal projection pale brownish. Abdominal segments 2-6 semi-hyaline, whitish or slightly tinted with yellow; tergites 7-8 or 7-9 yellowish brown; tergites 9-10 or tergite 10 yellowish; sternites 7-10 yellowish; each tergite without a brownish line on its posterior margin; a conspicuous blackish stigmatic spot always present on each of the segments 2-6, in some specimens this spot also present on each of the segments 7 and 8. Forceps and cerci pale yellowish; basal joint of the forceps with a weakly developed tubercle on its inner apical margin.

Female:—Similar to the female of *B. thermicus*, but general colour distinctly much more yellowish. Eyes blackish; legs pale yellowish brown; wings hyaline, veins greyish to whitish; radius stained brownish as in the male; costal projection of the hind wing greyish. Abdomen yellowish brown above, paler beneath; each of the tergites 2-8 darker laterally, with a narrow darker band on its posterior margin; a conspicuous blackish stigmatic spot as in the male present on each of the segments 2-7 or 2-8; segments 8-10 appearing pruinose; cerci greyish, paler distally.

Nymph:—Unknown.

Holotype:—Male.

Allotype:—Female.

Paratopotypes:—Males and females.

Type locality:—Shimogamo, Kyoto. Specimens: alcoholic; collected by K. Imanishi, in May, August and November, during the years 1932-1937.

There is no seasonal dimorphism such as in *B. thermicus* in this species, but is some seasonal difference in the size of individuals. The above-mentioned measurements are based upon the specimens collected in May and November. Specimens collected in August are smaller than these, namely, as follows: length of body, male 5.0 mm; length of fore wing, male 4.5 mm, female 4.0 mm; length of cercus, male 11.0 mm.

3. *Baetis florens* n. sp.

This species is similar to *Baetis celcus*, but differs from it in the venation of the hind wing and in type of genitalia.

Measurement:	Male
Body, length	6.0 mm
Fore wing, length	6.5
Cercus, length	12.0-13.0

Description. Male:—Head brownish. Turbinate eyes reddish, similar in shape to the preceding species; lower eyes blackish. Thorax dark brownish; mesonotum with a broad, paler median stripe; posterior margin of the scutellum narrowly yellowish; sternum wholly brownish. Legs pale brownish; coxae dark brownish. Wings hyaline, veins pale yellowish to whitish; humeral brace-vein and radius not stained brownish or fuscous; hind wing with two longitudinal veins, costal projection not stained brownish. Abdominal segments 2-6 semi-hyaline, yellowish; each of the tergites 2-6 pale brownish on its posterior one-third, with a narrow, dark brownish line on its posterior margin; segments 7-8 brownish, segments 9-10 yellowish; each of the tergites 1-8 with a dark brownish stripe on its lateral margin; stigmatic spots obscure; each of the sternites 1-4 shaded with brown on its antero-lateral angles. Forceps pale, more or less shaded with brown; type as in *B. thermicus*; each cercus brownish at its base, paler distally.

Female:—Unknown.

Nymph:—Unknown.

Holotype:—Male; Shimogamo, Kyoto; May 11, 1932.

Paratype:—Male; Kibune, Kyoto; Nov. 29, 1936.

Specimens: alcoholic; collected by K. Imanishi.

4. *Baetis atagonis* n. sp.

This species is similar to *Baetis celcus*, but the second longitudinal vein of the hind wing is forked in this species.

Measurements:	Male	Female
Body, length	4.5 mm	4.0-5.0 mm
Fore wing, length	5.0	5.0-5.5
Cercus, length	10.0	

Description. Male:—General colour reddish brown. Turbinate eyes pale reddish; stalks short; lower eyes blackish. Thorax light reddish brown without any conspicuous marking. Legs pale yellowish. Wings hyaline, veins almost whitish; humeral brace-vein and radius not stained; median axillary membrane somewhat brownish; hind wing with three longitudinal veins, the second of which is forked with two intercalaries between these forked veins; the third longitudinal vein terminated at the middle of the hind margin; costal projection not stained. Abdominal segments 2-6 semi-hyaline, shaded with pale yellow; segments 7-10 yellowish; each of the tergites 6-8 with a brownish band on its posterior margin; no blackish stigmatic spot present. Forceps and cerci whitish, slightly tinted with pale yellow; basal joint of the forceps with a tubercle on its inner apical margin.

Female:—Similar to the male. General colour reddish brown. Eyes blackish; each ocellus ringed with a fuscous band; legs pale yellowish. Wings similar to those of the male. Each of the abdominal tergites 1-8 more or less infuscated on its posterior margin; no blackish stigmatic spot as in the male.

Nymph:—Unknown.

Holotype:—Male.

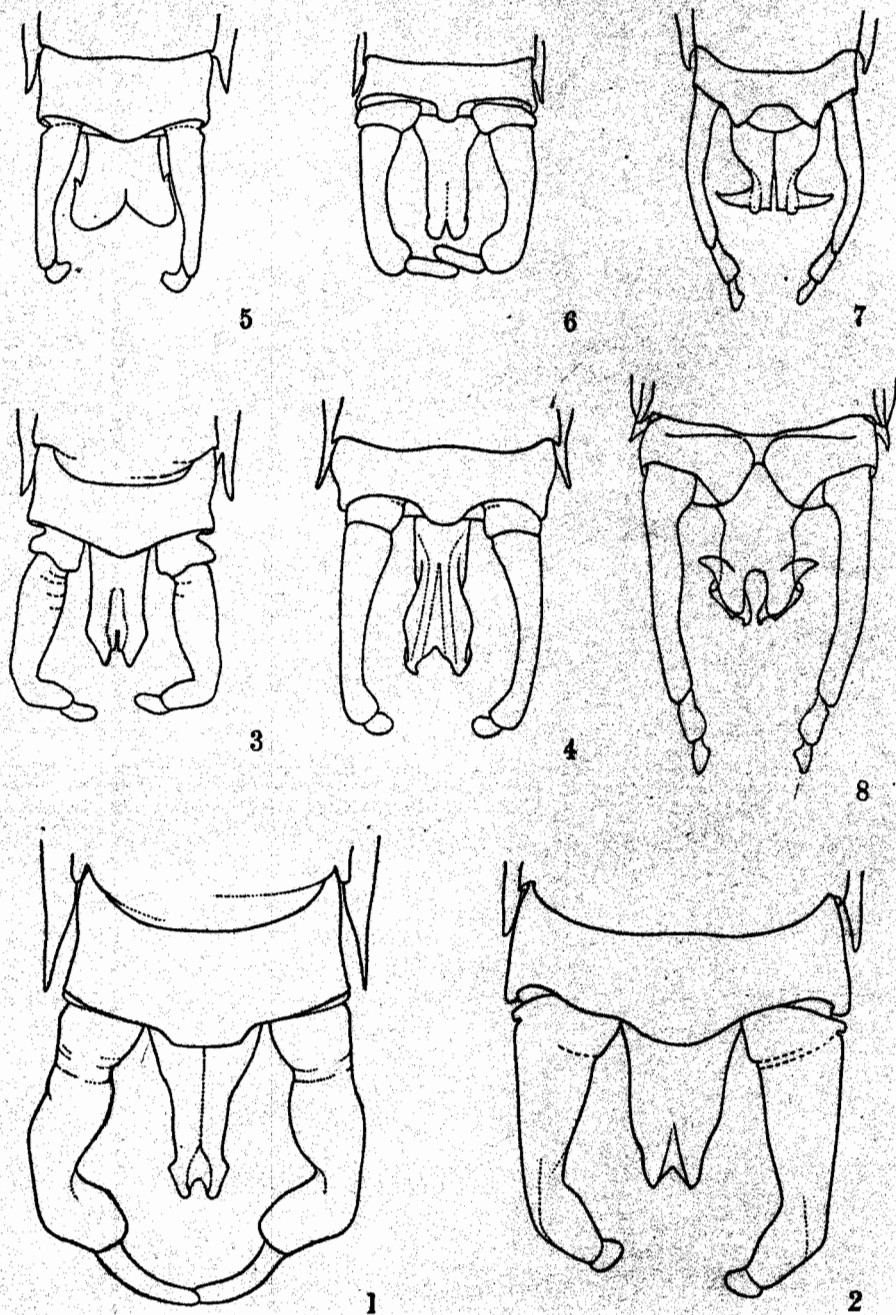
Allotype:—Female.

Paratopotypes:—Females.

Type locality:—Mt. Atago, Kyoto. Specimens: alcoholic; collected by K. Imanishi, on May 31, 1931.

EXPLANATION OF PLATE

- Fig. 1. End of the abdomen of *Ephemerella basalis* n. sp., male, ventral view.
Fig. 2. End of the abdomen of *E. longicaudata* Uéno, male, ventral view.
Fig. 3. End of the abdomen of *E. nigra* Uéno, male, ventral view.
Fig. 4. End of the abdomen of *E. atagosana* n. sp., male, ventral view.
Fig. 5. End of the abdomen of *E. rufa* n. sp., male, ventral view.
Fig. 6. End of the abdomen of *E. cryptomeria* n. sp., male, ventral view.
Fig. 7. End of the abdomen of *Paraleptophlebia chocolata* n. sp., male, ventral view.
Fig. 8. End of the abdomen *P. westoni* n. sp., male, ventral view.



K. IMANISHI: MAYFLIES FROM JAPANESE TORRENTS VIII