# MAYFLIES OF THE GENUS AMELETUS EATON (EPHEMEROPTERA) IN THE AMUR BASIN

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The only species of the genus Ameletus Eaton previously known in the Soviet Far East, A. camtschaticus Ulmer, was described by Ulmer (1927) from waters in Kamchatka. Chernova (1952) records one member of this genus from collections from the Okhota River. The species to which this nymph belonged was not established. When processing material collected in the Amur basin we discovered four species of the genus Ameletus (Baykova, 1970), three of which turned out to be new.

The types of the new species are in the collection of the Zoological Institute, USSR Academy of Sciences in Leningrad.

## Genus Ameletus Eaton, 1887

### Ameletus montanus Iman., 1930 (Figs. 1-7).

The species was described by Imanishi (1930) from Japan on the basis of the winged and nymphal stages. Males collected in the Amur basin differ from the original description of this species only in the size of the 2nd and 3rd tarsal segments, which are arranged in decreasing order of length in the series: 2nd, 3rd, 4th, 5th and 1st, while in specimens from Japan the series is 3rd, 2nd, 4th, 5th and 1st segments. The genitalia of specimens from the Amur are similar to the genitalia of A. montanus; the penis has small spinules (Figs. 1, 2). The genital plate of the 9th sternite of the female has a small apical notch (Fig. 3).

Body length of males 9.5-11.0 mm, of females 9.5-11.5 mm.

The color of the labrum varies in numphs of this species from the Amur basin, as does the pattern of the markings (Figs. 4, 5 and 6). The general body color of the nymphs varies, but the light spots located on the abdominal tergites are little subject to variation in most nymphs (Fig. 7). In contrast to the A. montanus nymphs collected in waters in Japan (Ueno, 1931, Fig. 18), the color of the 10th abdominal tergite is lighter in some nymphs from the Amur; the shape of the dark markings on the 2nd abdominal tergite is also sometimes altered (Fig. 7).

Range and material. Japan and the Korean peninsula (Imanishi, 1940). Widely distributed in the Amur basin. Middle reach of the Amur: Amur, near the settlement of Leninskoye; Bira River near Lake Teploye; same locality, the old bed of the Teplovskaya stream as far as its mouth; Yaurin River, Upper Bureya district: lower reach of the Amur, Khor River, Bol'shaya channel; B. Ussurka River, Fedurovskaya channel; same locality, near the settlement of Roshchino; Amur, stream flowing into Lake Bolon'; Amgun' River, mouth of the Nizhnyaya Uda; Samnya River, 5 km from the mouth, Ostakan spring; Bol'shaya River; Lake Kizi; same locality, Yay River, near the mouth. Southern Maritime Territory: Naumovka River, beyond Novo-Pokrovskaya; Koppi River (Baykova, 1965); Sitsa River, near the bridge; same locality, Tigrovaya station, near the saw mill; Kamenka River, in the Partizanskiy region; Artemovka, near the hamlet of Shtykovo (material of the Zoological Institute, USSR Academy of Sciences).

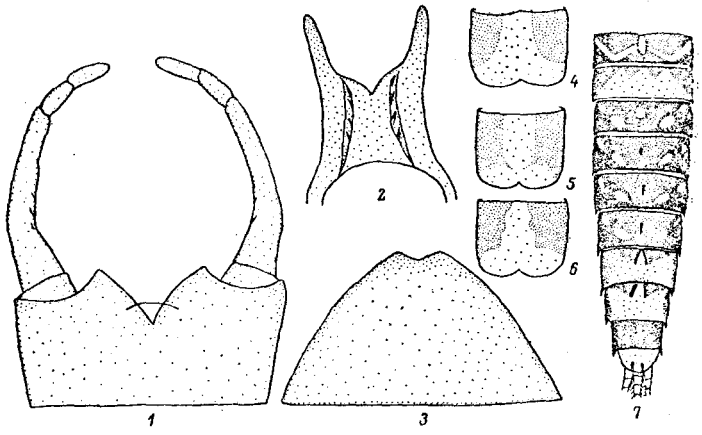
In all we collected 50 nymphs. Three male and four female imagines were reared from the nymphs, which were collected from submerged vegetation along the bank around stones on a sand and shingle bottom. In the Teplovskaya stream nymphs were taken from hornwort beds in a fast current. In the Ostakan spring (Samnya River) nymphs were found on clean shingle and on the remains of submerged trees at a water temperature of 6°C in June, at all points from the water's edge to a depth of 0.5 m. In the Bol'shaya channel (Khor River) and in the Fedurovskaya channel (B. Ussurka River) nymphs were collected in fingerling traps at a depth of 1-2 m, while in the Ussuri River they were collected down to a depth of 5 m. The Russian sturgeon feeds on nymphs of this species.

The emergence of winged forms occurs from early June to early July. Mass flight occurs in the second and last thirds of June.

### Ameletus micus Bajkova, sp. n. (Figs. 8-10).

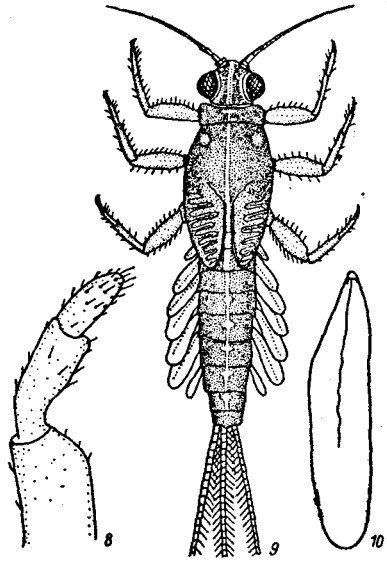
Nymph (alcohol). Head light brown; labrum with a weakly developed pattern; maxilla with well developed apical denticles; last segment of maxillary palp slightly shorter than 2nd segment; basal segment of palp practically equal to 2nd segment (Fig. 8), middle lobe of hypopharynx with two shallow pits, between which there is a weakly convex semi-oval projection in the middle; 1st segment of labial palp thickened and convex on the inside; 2nd and 3rd segments long, the 2nd with a semicircular protuberance on the inner side. Thorax dard brown; prothorax with two light rounded spots nearer the lateral margins; dark, weakly developed striae at base of wings, a light stripe along median line of head and thorax; legs yellowish, without spots.

Abdomen light brown. Narrow, a weakly developed light stripe on dorsal surface of abdomen; this stripe slightly broadened near the anterior margin of abdominal tergites 5-9 (Fig. 9). Ventral surface of abdomen pale brown with a yellowish tinge; first pair of gill leaflets small, half the width of the 2nd segment; gill leaflets of 3rd-6th segments long (Fig. 10); all gill leaflets bluntly rounded on posterior margin, tracheation weak. Caudal filaments broken off.



Figs. 1-7. Ameletus montanus Iman.

1-3) male imago: 1 - genostyles; 2 - penis; 3 - genital plate;
4-7) nymph: 4-6 - labrum, 7 - dorsal view of abdomen.



Figs. 8-10. Ameletus micus, sp. n., nymph.

8) labial palp, 9) dorsal view, 10) gill leaflet of 3rd abdominal segment.

Body length of nymph before emergence 7 mm.

Material. Maritime Territory: 1 nymph (holotype) found in the Malinovka River near the "Ubitogo" coniform hill, 3 Aug. 1958, shingle and sand bottom, water temperature 17.3°C, fast current; a second very young and deformed nymph was caught in a fingerling trap at a depth of 1 m in the B. Ussurka River, in the Fedurovskaya channel.

The nymph described differs from the nymphs of other members of the genus Ameletus in the coloration of the body and the very long gill leaflets (a gill leaflet is practically as long as 2.5 abdominal segments). In body size this species is most similar to A. gojoensis K. described by Kyuemon (1968) on the basis of adult insects from Japan.

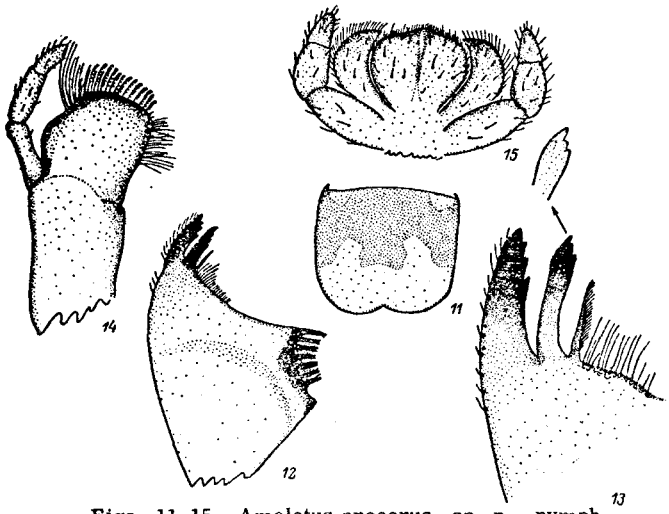
Ameletus procerus Bajkova, sp. n. (Figs. 11-24).

Nymph (alcohol). Head brown, with a white spot on clypeus. Anterior margin of labrum light (Fig. 11); maxillae with well developed apical teeth, of which the inner teeth are serrate on the inside (Figs. 12-13); basal segment of maxillary palp twice as long as terminal segment (Fig. 14); labium with a 3-segmented palp, of which the terminal segment is the smallest (Fig. 15). Thorax with numerous light spots of various sizes and shapes above: the largest, which is C-shaped, is located on the mesothorax and metathorax. Femora with a transverse brownish band in the middle; articulations of femora and tibia dark; tarsus with two dark bands at the ends, claws light.

Abdomen very variegated above and below (Fig. 16); 2nd and 10th abdominal tergites almost light; 3rd-6th tergites with three light rounded spots nearer the median line; 7th tergite light, except for two small dark spots at the anterior margin and two fine striae extending obliquely from its sides to the posterior margin; sternites of 1st and 2nd abdominal segments light, with two pairs of punctate spots located nearer the median line. Three light spots on each of the 3rd-8th sternites, one each on the 9th-10th (Fig. 17). Gill leaflet of 2nd pair of typical structure: narrow and long, its length 1.5 times that of the leaflets of the 3rd-6th pairs; gill leaflet of 4th pair broad and short, leaflet of 7th pair with slightly extended lateral margins, terminally bluntly rounded (Figs. 18-21); caudal filaments with a broad dark band.

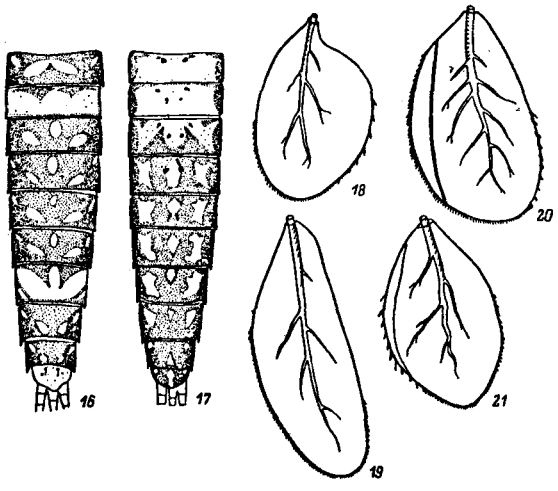
Body length of last instar nymphs 11.5-14.0 mm, length of caudal filaments 3.5-4.0 mm.

Female imago (alcohol). Head dark; eyes black, with light plum tinge. Thorax brown, without spots, and with only brownish-yellow tinges on the sides; wings transparent, costal and subcostal veins pale brown; all crossveins at apex of costal area branching and interconnecting in the anal area; only the 3rd anal vein linking $A_1$ of the fore wing to the posterior margin divides once; crossveins at apex of costal



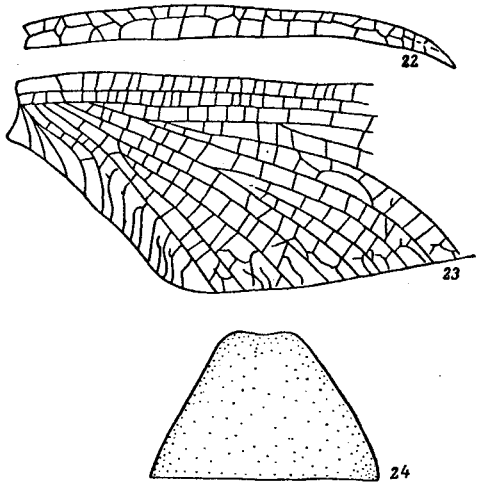

Figs. 11-15. Ameletus procerus, sp. n., nymph.

11) labrum, 12) maxilla, 13) apical teeth of maxilla, 14) mandible, 15) labium.




Figs. 16-21. Ameletus procerus, sp. n., nymph.

16) dorsal view of abdomen, 17) ventral view of abdomen; gill leaflets: 18) of 1st abdominal segment, 19) of 2nd segment, 20) of 4th segment, 21) of 7th segment.




Figs. 22-24. Ameletus procerus sp. n., female imago.

22) part of fore wing of female, 23) apical part of fore wing, 24) genital plate of 9th abdominal sternite.

area of hind wing very small (Figs. 22, 23). Legs brown; tibia of fore leg slightly shorter than femur; the tarsal segments of the fore leg in a series of decreasing length: 2nd, 3rd, 1st, 5th and 4th, those of the hind leg in the series 2nd, 1st, 5th, 3rd and 4th.

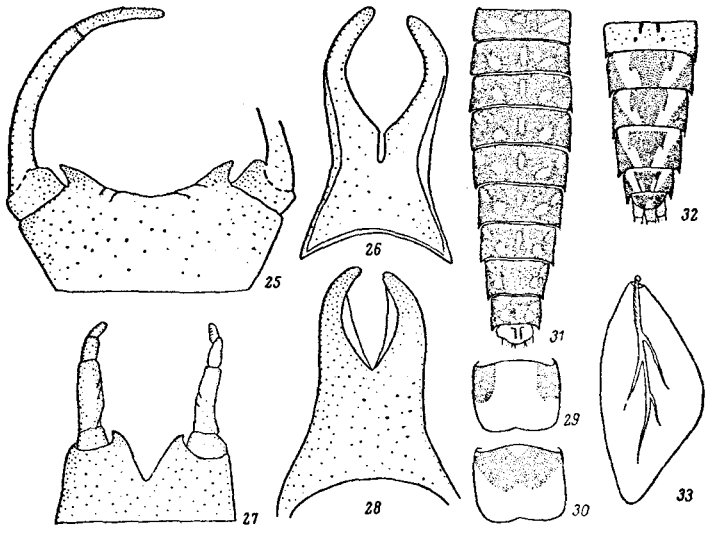
Abdomen light brown, last segments of abdomen dark above and below; oblique light markings on abdominal tergites extending from the anterior angle to the posterior margin of the tergite; these markings are weakly expressed in females; genital plate of 9th sternite (Fig. 24) with a weak notch.

Body length of female 15.0 mm, length of wing 13.8 mm, of caudal filaments 12.0 mm.

The species described differs from other species of this genus in that the second pair of gill leaflets are narrow and long and there are three light spots on the 3rd-8th abdominal sternites of the nymphs.

Material. Khabarovsk Territory: Bira River, Teplovka stream, old bed, two nymphs, 1 female imago reared from a nymph (holotype), 30 May 1956.

The nymphs were collected by dipnet in the fast-flowing river among hornwort beds at a May water temperature of 8-9°C.



Figs. 25-33. Ameletus cristatus, sp. n.

25) gonostyles; 26) penis; 27-28) male subimago: 27 - gonostyles, 28 - penis; 29-33) nymph: 29, 30 - labrum, 31 - dorsal view of abdomen, 32 - ventral view of apical abdominal tergites, 33 - gill leaflet of 7th abdominal segment.

The subimago has a life span of 48 hours, the molt lasts 1.5 minutes. The life span of the imago is 20 days.

Ameletus cristatus Bajkova, sp. n. (Figs. 25-33).

Male imago. Head dark. Eyes black, with light violet tinge. Thorax dark brown above and below; light striae and spots on sides, shiny; wings transparent. Costal and subcostal veins brownish, remaining longitudinal veins yellow; crossveins light yellow; fore legs brown, light brown in some specimens; dark spots located at articulations of femur, tibia and tarsus; tibia of fore leg slightly shorter than femur, tarsal segments arrangeable in the same decreasing order as in A. montanus Iman. Second and 3rd pairs of legs yellow, with dark striae on articulations; hind tibia slightly longer than femur; tarsal segments arrangeable in decreasing length in the series: 1st, 2nd, 5th, 3rd and 4th.

Abdomen brownish, with a yellowish-violet tinge; each abdominal tergite with three light longitudinal spots, of which the middle one is the narrowest, in some specimens the spots along the median line form a narrow moniliform band; lateral spots comparatively broad and elongate, except that on the last abdominal tergites they are considerably shorter and weaker, as in A. alexandrae (Brodsky, 1930). Abdomen brownish yellow below, last abdominal sternite darker; dark spots along median line of last sternites; 10th sternite deeply notched, its lateral parts extended forward and pointed (Figs. 25-27). Genitalia light brown, lobes of penis comparatively broad (Figs. 26, 28).

Female imago. Head and thorax dark brown, practically black; light yellow striae along sides of thorax. Wings transparent; costal, subcostal and radial veins brownish yellow; remaining longitudinal veins and crossveins yellow. Fore legs brown, tarsi dark brown; middle and hind legs yellow; there is a single oblong spot on both femora, less expressed on the hind femur.

Abdomen dark brown, with a weak rose pinkish-brown tinge. Pale rose moniliform stripe along median line of abdomen; two light stripes on each abdominal tergite, extending obliquely from the anterior to the posterior margin of the tergite; 10th tergite yellow; abdomen dark brown below, with a brownish-reddish tinge; genital plate of 9th sternite slightly shorter than abdomen, weakly curved apically; caudal filaments yellow, with dark annuli.

Male and female subimago. Body of the same color as the imago, but considerably paler. Thorax brownish yellow; legs brownish. Wings dusky, veins slightly shaded. Dimensions of male and female subimagines as follows.

| Dimensions (mm) | Males | Females |
|---|---|---|
| Body length | 9.5-10.5 | 9.0-11.5 |
| Wing length | 9.0-9.5 | 10.0-11.5 |
| Length of caudal filaments | 16.0-18.0 | 10.0-12.0 |

Nymph (alcohol). Head ranging from light to dark brown; labrum pale yellow, with two dark spots at base nearer its lateral margins and sometimes merging (Figs. 29-30). Thorax dark; two arcuate light bands on pronotum, nearer the median line; pale yellow small spots of various sizes and shapes on mesonotum and metanotum, near the lateral margins. Fore legs brown; fore femur with one dark brown spot; a similar spot on tibia at its articulation with the femur; tarsus dark, with one transverse band in the middle; middle and hind legs brownish; bands and spots on legs brownish but weak.

Abdomen brown above; all abdominal tergites with three light spots, of which those along the median line of the body are narrow and long, while the lateral ones

are more rounded (Fig. 31); lateral spots on 9th abdominal tergite meeting; 10th tergite light, except for two dark curved striae; before the emergence of the subimago the nymph has only a distinct light moniliform stripe along the median line of the body. Gill leaflets of first pair elongate and pointed on posterior margin; gill leaflet of 7th pair greatly elongate and with drawn out lateral margins (Fig. 33); abdomen light yellow below; two dark striae on each of the first abdominal sternites, beneath which there are two light dots; 6-9th abdominal sternites with dark markings taking the form of an irregular triangle or a T-shaped pattern along the median line of the abdomen; lateral margins of tergites dark (Fig. 32). Caudal filaments with dark annuli.

Body length of adult nymph 10-15 mm, length of caudal filaments 5 mm.

Seven species of this genus are known from Japan, and the nymphs are known for three of them (Imanishi, 1932, 1933; Kyuemon, 1968). In addition, Ulmer (1927) has described one species, A. kamtschaticus Ulmer, from Kamchatka on the basis of adult insects.

The imagines and nymphs of the species described are well distinguished from all the Japanese species, and also from A. alexandrae Brod. described by Brodskiy (1930) from Soviet Central Asia. The winged A. cristatus, sp. n., is more similar to A. kamtschaticus Ulmer in the structure of the 10th abdominal sternite and the penis. However, the lateral parts of the 10th abdominal sternite are drawn out in A. kamtschaticus to form more slender sharp spines than in A. cristatus.

Material. Lower reach of Amur, Lake Kizi, Yay River, mouth, two nymphs and two male imagines (including the holotype), June 1965. The single nymph listed by Chernova (1952) from the Okhota River apparently belongs to the same species. Chernova does not give a description of the nymph or its dimensions.

Nymphs were collected in submerged vegetation by dipnet at a depth of 2-20 cm; water temperature in June 10°C.

LITERATURE CITED


BAYKOVA, O.Ya. 1965. The Ephemeroptera of the Far East. Voprosy geografii Dal'nego Vostoka. Dan'nevostochnyy filial im. V.L. Komarova SO AN SSSR, 7 : 301-330.

BAYKOVA, O.Ya. 1970. The Ephemeroptera of the Amur Basin. Author's abstract of thesis, Irkutsk : 1-17.

BRODSKY, K.A. 1930. Zur Kenntnis der mittelasiatischen Ephemeropteren. I. (Imagines). Zool. Jahrb., 59 : 681-720.

CHERNOVA, O.A. 1952. Ephemeroptera of the Amur Basin and adjacent waters and their role in the nutrition of the Amur fishes. Tr. Amurskoy ikhtiol. eksped. 1945-1949, 3 : 229-360.

IMANISHI, K. 1932. Mayflies from Japanese torrents II. Further notes on the genus Ameletus. Ann. Zool. Japon., 13 : 525-532.

IMANISHI, K. 1933. Mayflies from Japanese torrents III. Third notes on the genus Ameletus with a list of the Japanese Siphlonuridae. Ins. Mats., 8 (2) : 64-69.

IMANISHI, K. 1940. Ephemeroptera of Manchoukuo, Inner Mongolia and Chosen. Report of the Limnobiological Survey of Kwantung and Manchoukuo : 169-263.

KYUEMON, G. 1968. Two new mayflies from Japan, Kontyu, 36 (2) : 147-150.

UENO, M. 1931. Contributions to the knowledge of Japanese Ephemeroptera. Repr. from Annot. Zool. Japonen., 13 (3) : 189-231.

ULMER, G. 1927. Entomologische Ergebnisse der schwedischen Kamtchatka-Expedition 1920-1922. Ephemeropteren. Ark. for Zoologi, Stockholm, 19A (8) : 10-17.



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