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NEW SPECIES OF *EPHEMERELLA* FROM ILLINOIS
(Ephemeroptera)

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This paper presents descriptions of three new species of Ephemeroptera from Illinois, all belonging to the genus *Ephemerella*. These are forms segregated from material in the Illinois Natural History Survey collection; the types are deposited in that collection. Two of these species are closely related to the genotype, *E. excrucians* Walsh, and it was thought for some time that one or the other of them would prove to be that species. Study of the lectotype of *excrucians* showed, however, that both of these species are recognizably distinct from *excrucians*.

The third new species described here is known from the nymph only. All the specimens of this form were collected at least 20 years ago, and intensive more recent collecting in the same areas has failed to produce more specimens. The species may have actually disappeared by now from the Illinois fauna. It seems desirable to describe this form, in order to call attention to this distinctive nymph. More collecting and rearing in the states to the north of Illinois may quite possibly produce additional material of this species.

***Ephemerella argo* new species**

Figs. 1, 5

Male.—Length of body 8 mm., of forewing 9 mm. General color light yellowish-tan, with brown markings. A member of the *invaria* group of species.

Head deep cream colored, with obscure darker markings on vertex between eyes and dorsad of anterior ocellus, fig. 1; bases of ocelli very dark gray, almost black; antennal flagellum five times as long as pedicel, scape and pedicel cream colored, flagellum brown; upper portion of compound eyes yellowish-tan, contiguous on meson. Thorax light yellowish-tan, vaguely tinted with brown on dorsal area of pronotum, at apex of mesoscutellum and on basal area of metanotum; all legs deep cream colored, apices of tibiae and second and third tarsal segments of foreleg slightly darkened; relative proportions of parts of foreleg: femur 17, tibia and first tarsal segment 26, second tarsal segment 11, third 9, fourth 7, fifth 4. Wings hyaline, with stigmatic area milky; anterior veins and anastomosed stigmatic crossveins of forewing slightly yellow. Ground color of abdomen light yellowish-tan, tergites shaded with brown: median dorsal line of all tergites unshaded, but on basal four abdominal tergites, brown

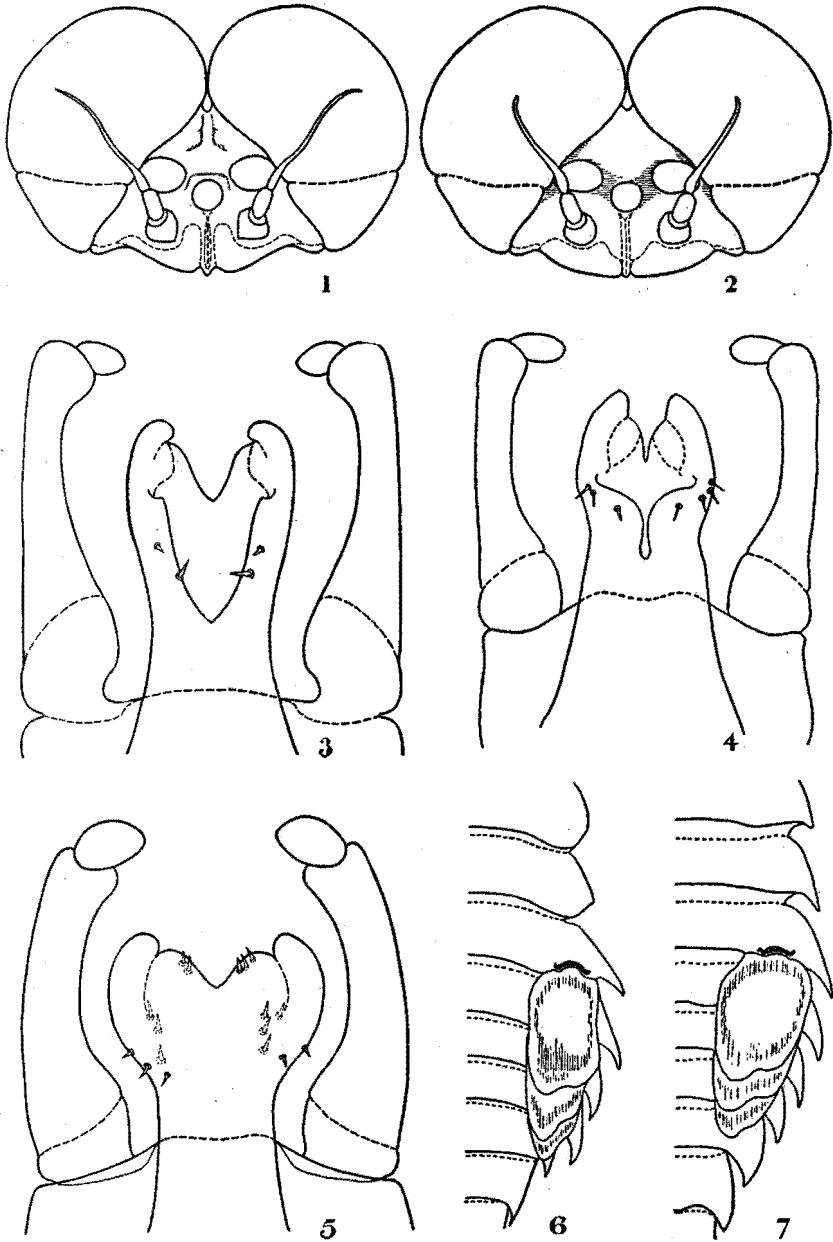


Fig. 1, Head, cephalic aspect, *Ephemera Argo* ♂; 2, Head, cephalic aspect, *Ephemera ora* ♂; 3, Genitalia, dorsal aspect, *Ephemera excrucians* ♂; 4, Genitalia, dorsal aspect, *Ephemera ora* ♂; 5, Genitalia, dorsal aspect, *Ephemera argo* ♂; 6, Abdomen, right half, dorsal aspect, *Ephemera lita* N.; 7, Abdomen, right half, dorsal aspect, *Ephemera lita* N.

shading covers entire balance of dorsal area, with a vague, darker brown spot at each antero-lateral angle of each tergite; on tergites five and six, brown shading reduced to relatively small areas near meson, but brown shaded area again enlarged to cover entire dorsal area on following tergites; sternites unmarked except for a vague, longitudinal brown line at lateral margin of each sternite. Genitalia, fig. 5., light yellowish-tan, forceps relatively short and stout; terminal

forceps segment as long as wide; penis lobes with numerous spines, basal ones dorsal, median ones ventral, apical ones both dorsal and ventral; distribution of spines not entirely symmetrical. Caudal filaments yellowish-tan, brown at articulations.

Nymph.—Length of body of mature specimens 7-9 mm.; caudal filaments 4-5 mm. long. Ground color yellowish-tan, with brown markings and areas as follows: area on frons between and ventral to antennae, longitudinal stripe between eyes on vertex, area on head posterior and ventral to compound eyes, wide lateral stripes on pronotum, broad transverse stripe on mesonotum, vague spot at tip of each wing pad of forewings, small irregular spot near base of each hindwing pad, irregular spot dorsad of each coxa, broad median band on each femur, band near apex of each tibia, broad band near base of each tarsus, median spot, between tips of wing pads, on first abdominal tergite, almost entire dorsum of second and third tergites, area between gill plates on fourth tergite, small vague spot near gills on fifth and sixth tergites, central portions, between plates, of following abdominal tergites, minute marginal spot near base of lateral projection of each abdominal tergite, and entire abdominal sternum except for narrow band at either lateral margin; dorsal brown areas of abdominal tergites interrupted by small, irregular, submedian and median spots; brown areas of abdominal sternites interrupted by median yellowish-tan spot at base of sternites five to nine; caudal filaments with one, two, or three vague transverse brown stripes; entire color pattern subject to slight variation: brown areas may be freckled with minute, pale spots.

Maxillary palpi well developed; fore femora not bearing teeth or spines on anterior margin, posterior margins of fore femora bearing scattered spicules; tarsal claws with 6-9 denticles; abdominal tergites without dorsal spines or tubercles; caudal filaments bearing long hairs in apical portion.

Holotype, male.—White river, Rogers, Indiana; nymph collected April 16, 1936, adult emerged in rearing cage in creek near Urbana, Illinois, May 7, 1936, Ross and Mohr. Specimen in alcohol, with subimaginal exuviae; genitalia on microscope slide.

Nymphs.—Wabash river, Mt. Carmel, Illinois, April 2, 1932, Frison and Ross, 2 specimens, White River, Mt. Carmel, Illinois, April 2, 1932, Frison and 4 specimens; April 4, 1940, Mohr and Burks 3, specimens.

This species is related in structure of genitalia to *E. excrucians* Walsh, as, in both *excrucians*, fig. 3, and *argo*, the second segment of the forceps is not greatly enlarged at the apex, and the penis lobes bear stout spines. The two differ in that the forceps and penis lobes are shorter and more stout in *argo* than they are in *excrucians*. The arrangement of the spines borne by the penis lobes is also different in the two. The dorsum of the thorax in *excrucians* is deep, reddish-brown, while it is light yellowish-brown in *argo*.

The figure of the genitalia of *excrucians* was drawn from a slide preparation made from the male lectotype at the Museum of Comparative Zoology. Mr. Banks very kindly permitted me to dissect the lectotype. It should be noted that this lectotype is a specimen of *excrucians* sent to Hagen by Walsh and is from the original type lot, whereas the true type was destroyed in the Chicago fire in 1871. Mr. Banks designated the male of *excrucians* now in the Hagen collection at the M. C. Z. as lectotype. The figure I give of the genitalia of this specimen differs slightly, but not significantly, from that published by McDunnough (1925, p. 169).

In this connection it may be noted that extensive collections made at Rock Island have failed to produce any specimens of *Ephemerella* that could be called *excrucians*. Since Walsh's time, the Mississippi and Rock Rivers have been so greatly altered by dredging and damming operations that the aquatic insect fauna has apparently changed almost completely. I have seen specimens of the true *excrucians* collected at lights near the Mountain Fork River, Hochtown, Oklahoma.

Ephemerella ora new species

Figs. 2, 4

Male.—Length of body 7 mm., of wing 8 mm. General color yellow, with tan and brown markings. A member of the *invaria* group of species.

Head yellow, shaded with tan around bases of ocelli and between eyes, fig. 2; antennal flagellum four times as long as pedicel, scape and pedicel yellow, flagellum brown; upper portion of compound eyes in living insect pinkish-tan, contiguous on meson. Prothorax yellow, with tan shading on median dorsal area of pronotum; mesothorax mostly tan, but yellow at anterior tip of scutellum, on mesal area enclosed by inner parapsidal furrows, at wing bases along anterior wing processes, on praescutum and prealar bridge, on area around coxal cavities, along anterior margin of basisternum, and along median groove of furcisternum; metathorax yellow, tan dorsad of coxal cavities; all legs yellow, with apices of fore tibiae and apices of basal three foretarsal segments darkened; wing veins and membrane hyaline, with anterior two veins and stigmatic area very slightly yellowish. Abdominal segments with ground color yellow, basal and middle tergites with broad dorsal area heavily shaded with brown; apical tergites pinkish-tan (same shade as compound eyes in living insect); sternites yellow, with postero-lateral angles of eighth sternite pink; genitalia yellow, forceps, fig. 4, with second segment relatively slender, apex not enlarged, third segment as long as wide; penis lobes bearing a band of stout, dorsal spines in the basal position, no median nor apical spines present, lateral apical processes incurved, median, apical notch deep, narrow; caudal filaments light yellow, articulations black.

Female.—Length of body 7.5 mm., of wing 9 mm. Color pattern in general almost identical with that of male but slightly lighter in shade. Caudal filaments white, with articulations black.

Holotype, male.—Mt. Carmel, Illinois, April 22, 1946, collected at light, Mohr and Burks. Specimen dry, on pin; genitalia on a microscope slide.

Allotype, female.—Same data as for *Holotype*. Specimen dry, on pin.

This species is related to *E. excrucians* on the basis of the second forceps segment of the male genitalia not being enlarged at the apex, by the presence of stout spines on the penis lobes, and by the dorsal dark brown shading of the abdominal tergites. The two differ in the number and distribution of the spines borne by the penis lobes, and in the shape of the penis lobes themselves; in *ora* the thorax is, also, tan and yellow, while it is deep, reddish-brown in *excrucians*. Were it not for the fact that the living male type of this species had pinkish-tan eyes, I would have placed it as a specimen of *excrucians* on the basis of macroscopic characters. Walsh, however, definitely stated that the eyes of his living specimens of *excrucians* were egg-yellow, while this species had them clearly pinkish-tan. Further study of this Mt. Carmel specimen showed, as well, the above noted genitalic and color differences between it and the lectotype of *excrucians*.

Ephemerella lita new species

Fig. 7

Nymph.—Length of body of mature specimen 8 mm., caudal filaments 5.5 mm. long. General color very light tan, with a few small, brown markings. A member of the *simplex* group of species.

Head and thorax light tan, without color markings; legs entirely unmarked except for a median brown band on each tarsus, claws brown at tips; dorsum of abdomen light tan, with a pair of submedian, brown spots at anterior margins of tergites 4-7, and on tergite 9; each gill socket at posterior margin of tergites 4-7 with dark brown border; tergites 6-8 with small, vaguely-defined brown lateral spot on area covered by mesal margins of gills; basal two-thirds of gills brown, gills very light tan at apex; abdominal sternites unmarked; caudal filaments with a single narrow, brown cross-band near base.

Head and body conspicuously hairy; head and thorax entirely without spines or tubercles, dorsal abdominal spines wanting; head semi-quadrate, with clypeo-genal margin beneath each antenna slightly incised, and occiput between eyes bearing a pair of tufts of long hair; maxillary palpi well developed. Pronotal shield semi-quadrate, with lateral margins almost parallel; thoracic legs with coxae not tuberculate; femora broad, somewhat flattened, margins bearing neither teeth nor spicules, apico-dorsal angle of each femur not produced as an acute spine; dorsal surface of each forefemur with a single, transverse row of long hairs located at the middle; all femora, tibiae, and tarsi with a conspicuous row of long hair at each lateral margin; tarsal claws without denticles. Postero-lateral angles of abdominal segments 2-9 produced, spine-like, fig. 7, a single pair of filamentous gills present on first abdominal segment; plate-like gills borne by segments 4-7, first pair of these semi-operculate; caudal filaments bearing spines at each articulation, these spines slightly longer in apical region of filaments than at base.

Holotype, female nymph.—Oakwood, Illinois, May 22, 1928, T. H. Frison. Specimen in alcohol.

Paratypes—Dixon, Illinois, Rock River, May 21-22, 1925, D. H. Thompson, 1 ♂, 4 ♀ nymphs. Rockford, Illinois, Rock River, June 2, 1927, D. H. Thompson, 1 ♀ nymph.

This species is similar to *simplex* McDunnough in that the head and body are conspicuously hairy, but lack spines and tubercles, in that the maxillary palpi are well developed, the tarsal claws lack denticles, and the plate-like gills are borne by abdominal segments 4-7, with the first pair semi-operculate. The two differ in that the clypeogenal margin of the head beneath the antennal sockets is incised in *lita*, while that margin is straight in *simplex*; the pronotal shield in *lita* is semi-quadrate, with the antero-lateral angles almost square and the two lateral margins almost parallel, while, in *simplex*, the antero-lateral angles of the pronotum are rounded, and the two lateral pronotal margins diverge slightly posteriorly; and the postero-lateral angles of the second and third abdominal segments are produced and spine-like in *lita*, while these angles are not produced in *simplex*, fig. 6. *E. lita* also differs from *hirsuta* Berner (1946, p. 70) in that *lita* completely lacks occipital, thoracic, and dorsal abdominal spines or tubercles.

LITERATURE CITED

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McDunnough, J. 1925. New Canadian Ephemeridae with notes. III. Canadian Entomologist, 57 (7): 168-176. 1 pl.