Four undescribed Oligocene craneflies from Florissant, Colorado, (Diptera:Tipulidae)

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The following described craneflies were discovered during ongoing research at the Museum of the University of Colorado in preparation of parts of the Colorado Natural History Inventory.

These Oligocene shale specimens are somewhat difficult to study. This is especially true of Limoniinae with lightly sclerotized veins. With proper illumination and a good binocular microscope, the veins often appear as glittering lines on the shale. The veins often are better seen when the specimen is placed so the veins are illuminated from one end. Sometimes the shale is so rough that this lighting does not improve their visibility

The help of Dr. George W. Byers of University of Kansas was immeasurable during the preparation of this manuscript. He not only verified, or suggested, generic assignment but also prepared the illustrations of venation. Mrs. Grace H. Kemper, as usual, helped with measurements and processing of the manuscript.

Tipulidae:Tipulinae

Tipula (Micrapsis) decorata, (Fig. 1)

The holotype had originally been determined as **Micrapsis paludis** Scudder, very similar in important details, by an unknown student of fossils in the University Museum. I accepted this determination until I set upon verification of all of the determined Tipuloidea preparatory to a report on them for the Inventory. The specimen is somewhat better preserved than is Scudder's type of **paludis**.

Two features immediately set **decorata** apart from **paludis**: the discal cell of the latter is quadrilateral, almost rectangular, probably an "atypical" anomaly; in **decorata** it is crudely hexagonal. Only the stigma of **paludis** is colored; in **decorata** there is considerable coloration on the wing, and the stigma is very much darker than the rest of the pattern. The pattern in **decorata** consists of rather broad marginings of the veins throughout the wing except the basal part of R; a rather large patch from cell R_1 to the small discal cell; several diffuse patches in the apical area; no light patches like those in **Tipula carpenteri** Alexander appear to be present.

The following details describe **decorata**. All measurements are in millimeters.

Body length 10; wing length 9.5, wing depth 2.3, wing ratio 4.13. Head in fair condition. Eyes prominent, about 0.8 in diameter, rostrum protruding, palpi not well defined, antennae fragmental, one 1.4 with only 8 segments exposed. Thorax prominently convex in profile 2.7 long, 1.8 deep. Legs in poor condition. Part of one T_3 leg in place: femur 6.6 long, tibia 5.9 long and tarsus represented by a short fragment. Abdomen 6.5 long and insect clearly male. Abdominal markings these: on each segment posterior edge broadly dark brown with short, broad, long extension forming a broken lateral band; in lateral aspect a strong suggestion of a broad, dark mediodorsal stripe.

Cell R_1 1.0 long and 0.3 deep, R_s only 0.45 long. Stigma subtriangular with broad base on costa and filling apical two-thirds of cell R_1. Sc_2 0.2; R_{1+2} 0.4, R_3 1.8, R_{4+5} 2.7. Median branches, M_1 1.55, M_2 1.60, M_3 partly covered thus immeasurable, M_4 1.5 and M_s 4.9. Cubital vein bends toward the posterior margin more and more as wing margin is approached; Cu and the cubital fold very close and Cu much the stronger; from m-cu to margin 1.2 and from m-cu to basal end of vein 6.0. Tip of 1A 0.9 basad of tip of Cu on margin; at margin 2A about 2.6 from 1A; 2A not much more than one-third length of wing (3.4 vs 9.5). Discal cell 0.4 x 0.23; on one wing nearly triangular. Length of cell M_1 more than half the distance from the bifurcation M_s to the margin in the apex (1.5 vs 2.8). In one wing a short stub extends apicad from the discal cell (see drawing).

Holotype: UCM 29988 and its reverse (30067). Collected by Wilmette P. Cockerell, probably in 1908, station 14, Florissant Lake Bed Shales, Oligocene.

The considerable natural coloration of the wing that must have occurred in life gave rise to the specific name, **decorata**.

The placement of **decorata** in **Micrapsis** Scudder ignores the quadrate discal cell of the type species of the genus, **paludis** Scudder. Otherwise, the specimen is quite in keeping with **Micrapsis**. A quadrate discal cell occurs among **Tipula** now and then as an abnormality. The greatest difference from **Tipula** is the short R_s; which is characteristic of Scudder's **Tipulidea**.

This genus too fits into the genus **Tipula** in its current interpretations. In fact, Scudder (1894:238) seemed a bit reluctant to erect the new genus, except for the short praefurca (R_s). The apparent absence of Sc in **Micrapsis** probably is an illusion. It may well be hidden beneath the radius.

Tipulidae: Limoniinae

Limonia (Dicranomyia) rohweri, n.sp. (Fig. 2.)

The fossil is a male in fair condition. The veins are best seen with flat illumination (fiber-optic ring light) and magnification of 30-40 diameters. Only the stigma is colored. All dimensions are in millimeters.

Body: 5.5 long, segmentation and genitalia visible; thorax moderately convex; head small, more or less globular, mouth parts not well preserved, only two or three basal segments of one antenna remaining. Legs slender and long, no pronounced increase in diameter at any joints, each successive segment of less diameter: Leg T_1, femur 4.7 long, tibia 4.6 long, tarsus 5.5 long but claws invisible; Leg T_3, femur 5.3 long, tibia 6.6 long, tarsus 3.5 long, but

Wing: 5.0 long, 1.25 wide, length four times the width. Stubby cross vein (Sc_1 ?) connects Sc with R_1 near origin of R_s. Sc continues to costal margin above middle of cell R_1. There are three radial and three median branches. Cu has a pronounced turn toward the hind margin at m-cu. Cubital fold ends just beyond m-cu. Anal veins undecipherable.

Vein measurements are these: R_{1+2}, 0.12 long; R_{3+4}, 0.9 long; R_5, 1.2 long; M_1 plus M_{1+2}, 1.6 long. Marginal parts of rest of veins obscured. M_2 estimated 1.0 long and M_{3+4} 1.2 long; Cu extends about 0.5 beyond m-cu; R_s (Scudder's praefurca) 0.6 long.

Measurements related to cells are these; cell R_1 1.12 long and 0.3 deep; discal cell 0.6 long and 0.25 deep; cell M_{3+4} (nominally fifth posterior) about twice as wide at margin as m-cu is long (0.7 vs 0.32.)

Holotype; a male, UCM 30017 collected by George N. Rohwer at Cockerell (U of Colo) pit 17 probably in 1908. The species is named for him.

Dicranota cockerelli, n.sp. (Fig. 4.)

Byers' comment (in litt): "I am inclined to think this specimen is a **Dicranota**, something near **D. flaveola** (Osten-Sacken) ...Too bad we can't check details such as little hairs on the eyes. I actually tried this." Thus **Dicranota** is used with reservation. The venation is not all that it could be , but what is preserved does not deny the generic placement. In fact, it is better preserved than it at first appears to be. The specimen is obviously unlike anything that has been named from Florissant. What appear to be only three visible veins in the wing resolve into almost a full complement when viewed at 40x magnification with ring lighting. Most of the veins appear to be colorless but glisten.

In addition to the stigma there are several patches on the wing as intense in color as the stigma. These are: a large one on origin of R_{4+5} extending broadly along the cross vein r-m to base of the discal cell; a small one on origin of R_s. Much lighter is a broad margining patch on m-cu; another vaguely on M_s about its midpoint. There may be narrow marginings on most veins.

All measurments in millimeters.

Body length: 7.4 , incomplete, probably was about 8.5 at most. Head appendages not clear. Thorax moderately convex; abdomen represented by six segments, apex lost, sex unknown. Legs appear short for a tipulid and in too poor condition to be measured or described.

Wing: 7.7 long and 2.5 wide, about 3.1 times as long as wide. Anterior apical area difficult to interpret. Sc stands free of R. Cross vein between them not found. Sc terminates in margin above where R_3 springs from R_s. R_1 0.4 long, R_2 about 0.8, R_3 2.1; R_{4+5} 2.65 long and the strongest branch of radius in this specimen. Median branches: M_{1+2} 1.9; M_1 and M_2 from fork to margin each 1.2; M_3 more than 1.9 with marginal tip buried in stone; even more of M_4 buried, the visible bit about 1.0 long; m-cu 0.45 long but marginal width of fifth posterior cell (M_4) cannot be measured. Cu about 5.3 long with outermost 0.9 deflected toward hind margin. Cubital fold seen in traces close to Cu as far as m-cu. 1A meets margin 0.3 (?) basad of tip of Cu; 2A reaches margin 2.7 farther basad, very gently curved.

Cell R_1 2.1 long with R_s (Scudder's praefurca) 1.5 long. Origin of R_s perpendicularly 0.9 from Cu. Greatest depth of cell R_1 is 0.4. Discal cell difficult to see but appears to measure 0.9 long and 0.4 wide. Thus stalk of second posterior cell (M_1) about 1.0 long.

Holotype: UCM 4920, collected by T. D. A. Cockerell at Florissant, Teller County, Colorado, in the Oligocene Lake Bed Shales. Cockerell's precise station for this fossil is not known.

Named for Theodore Dru Allison Cockerell, second only to Samuel Hubbard Scudder as an explorer of the insect fossils of Florissant.

Gnophomyia (Idiognophomyia?) seiverti, n.sp. (Fig. 3)

If this insect were flying today, its capture would cause no consternation. It is so like modern species of **Gnophomyia** that there appears no question about the antiquity of that genus. The apparent absence of cross-veins between Sc and R above cell R_1, the general shape of the wing and of the discal cell, among other features, suggests the subgeneric assignment made above.

Probably a female, with wings in fairly good condition. Most of the head appendages are missing and only one leg is complete enough to measure. Wings slightly overlapping and the apical margins still narrowly covered by shale. It would be too risky to try to scale this off.

In addition to the moderately large stigma, there are narrow marginings along most of the veins in the radial and medial fields. There appears to be a rather large

apical dusky patch that follows the contour of the apex to M_4. The full extent of this patch is hidden by shale that covers the apex of one wing completely and marginally on the other. There may be some diffuse patches in the middle and basal parts of the wing, but these are very vague and may not really exist. All measurments in millimeters.
Body: 6.7 long in a straight line, probably around 7 if straightened. Head small and globular; eyes very large, possibly holoptic; mouth parts confused; antennae absent beyond basal three or four segments, 0.4 remaining. Thorax somewhat crushed, probably not strongly convex. Abdomen rather stout but only last four segments including genitalia visible.

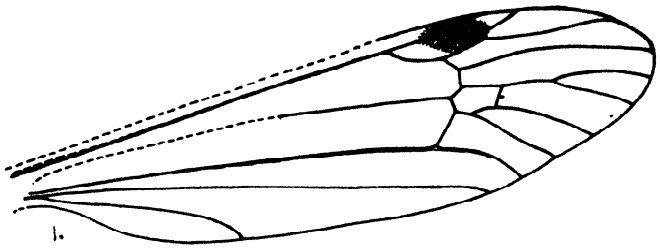
Only leg T_3 on left side measurable, a fragment of another femur present. T_3 femur 4.9; tibia 4.4 est.; three tarsomeres clear, measuring 1.85, 0.9 and 0.4 from tibia outward; only 0.3 of fourth segment partly visible, claws invisible.

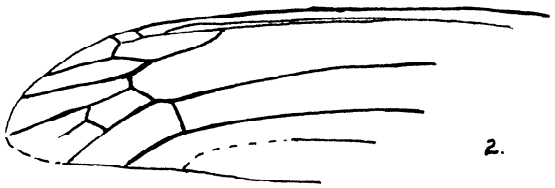
Wing; about 7 long, extreme apical margin concealed, width 2.35, about 3 times as long as wide. Venation very much like that figured by Alexander in Curran (1934), Tipulidae Pl. IV, f. 43, differing only in minor features. Sc joins C at level of middle cell R_1. A tiny cross-vein (Sc_2?) ties Sc to R_1 about 1.75 beyond origin of R_s. Radial branches measure: R_{1+2} 1.1; R_3 2.3; R_4 2.8; R_5 2.9 (all measurements approximate because of attempt to estimate position of wing margin.)

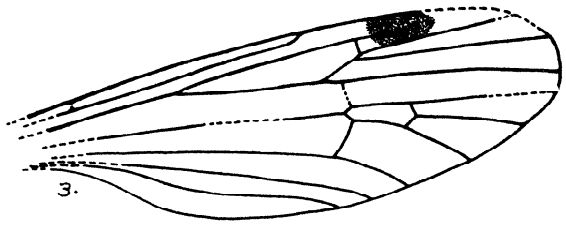
Median branches measure: M_{1+2}, 2.9; M_3, 1.6; M_4, 1.7 ; and the median stalk 3.2. Cu measures approximately 3.4 from base to m-cu, and 1.15 from there to wing margin. 1A appears to meet wing margin 0.6 basad of Cu and 2A 0.8 basad of 1A.

Cell R_1 2.3 long and 0.3 deep at its deepest. Origin of R_s is 0.7 perpendicularly from Cu; R_s (Scudder's praefurca) 2.1 long. Discal cell 0.9 long and 0.4 at its widest. Cross vein m-cu meets discal cell just apicad base of discal cell.
Holotype: a female, UCM 30066, collected by Seivert A. Rohwer at Cockerell (U of Colo.) station 17, probably in 1908. The fossil is named for him.

The greatest differences seen between the venation of **Gnophomyia tristissima**, the type of the genus, and **seiverti** are the terminations of the two anal veins being closer than usual, the somewhat straighter branches of the radial vein, and a more slender cell R_1.







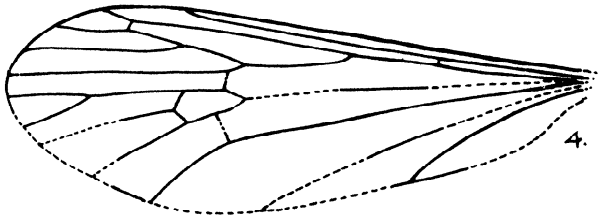


Figure 1. Holotype, Tipula (Micropsis) decorata, n.sp. Drawing by George Byers. UCM No. 29988

Figure 2. Holotype, Limonia (Dicranomyia) rohweri, n.sp. Drawing by Brown. UCM No. 30017

Figure 3. Holotype, Gnophomyia (Idiognophomyia ?) sieverti, n.sp. Drawing by George Byers, UCM 30066.

Figure 4. Holotype, Dicranota (s.l.), cockerelli, n.sp. Drawing by George Byers. UCM 4920.