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THE MOSQUITOES OF COLORADO

(Diptera, Culicidae)

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I have shown in discussing the mosquitoes of the Yellowstone National Park that the Canadian fauna follows the mountain crests into Wyoming. It extends also into Colorado along the 7,000 foot level, not much below that. Collections were made at Grand Lake in the early spring of 1923, and I was fortunate enough to arrive before the Public Health Service had completed its extermination work. These mountain mosquitoes are so easy to destroy that it seems almost like taking an undue advantage of nature. Certainly the able and sharp-eyed man who had been employed to spread oil on the pools left little enough for a late collector.

The existence of the Canadian fauna in the higher altitudes of Colorado has not been fully realized. Professor T. D. A. Cockerell published a list of the mosquitoes of the State (Journ. Econ. Ent., xi, 195-200, 1918) in which only two or three species of the Canadian fauna are included. For comparison, this list is reproduced, Wyoming localities omitted, and some of the determinations commented upon.

Anopheles quadrimaculatus Say. Only from the western border of the State. The determination is uncertain until verified by a male. The specimens mentioned from Hotchkiss and Delta in the Monograph (Howard, Dyar & Knab, Mosq. No. & Cent. Am. & W. I., iv, 1032, 1917) cannot now be found.

Culex tarsalis Coquillett. "Common up to about 6,000 feet."

Culex pipiens Linnaeus. "Recorded from Denver by Tucker in 1907." The identification was wrong. In the Monograph a second error was made, the specimen having been transferred to *Culiseta inornatus* (Howard, Dyar & Knab, Mosq. No. & Cent. Am. & W. I., iii, 493, 1915). The specimen still exists in the National Museum collection, being a male of *Aedes trivittatus* Coq., a species not otherwise in Cockerell's list. It is an inhabitant of flood-pools along rivers at low altitudes.

Theobaldia inornata Williston. Said to range from 5,000 to

9,800 feet, but I think some confusion has occurred, as the material collected by me at the higher levels comprised only *Culiseta impatiens* Walk. as specified below.

Theobaldia incidens Thomson. Recorded only from the western part of the State.

Aedes pullatus Coquillett (*acrophilus* Dyar). "It is a mountain species in Colorado, belonging especially to the Canadian Zone."

Aedes aldrichi Dyar & Knab. Recorded from Boulder. This may be the form of *idahoensis* with dark veins referred to below. The species cannot be recorded from Colorado without further confirmation.

Aedes curriei Coquillett. "Common at lower altitudes in Colorado."

Aedes idahoensis Theobald. "In Colorado, *idahoensis* is of the Transition and Canadian Zones."

Aedes mimesis Dyar. "A species of the higher mountains." This is the western form of *fitchii*.

Aedes nigromaculis Ludlow. "A species of the plains."

Aedes sansoni Dyar & Knab. The types of *sansoni* were a mixture of *fitchii* (*mimesis*) and *excrucians*, restricted by me to the latter. Both these species occur in the Canadian Zone as specified below and are probably mixed under *sansoni*. See also *hewitti* and *mutatus*.

Aedes stimulans Walker. Not known to occur in Colorado. The record should be cancelled.

Aedes vexans Meigen. "Very common at lower levels."

The following is a record of the species collected at Grand Lake and vicinity, 8,000 to 10,000 feet, to which is added Cockerell's records not otherwise included, making a list of the known mosquitoes of Colorado.

As compared with my captures in Wyoming (Ins. Ins. Mens., xi, 36-46, 1923), five species are omitted, *Aedes hirsuteron*, *spencerii*, *canadensis*, *diantaeus* and *cacothius*, while three are added from Cockerell's list, *Anopheles quadrimaculatus*, *Aedes trivittatus* and *Culiseta incidens*, and two from my captures, *Culiseta impatiens* and *Aedes riparius*.

Anopheles quadrimaculatus Say.

Recorded from western Colorado. The species actually present may be *maculipennis* Meig., males being necessary to decide.

Aedes fitchii mimesis Dyar.

The larvae were found at Grand Lake, breeding in grassy marshes and in a small pond near Columbine Lake where they were scattered about in the middle of the shallow water. The first adults appeared June 17. The commonest of the ring-legged *Aedes*.

The name *mimesis* is based on males from Drummond, Montana. At the time, larvae of *excrucians* from Kaslo, British Columbia, were wrongly associated (Ins. Ins. Mens., v, 116, 1917). Later (Ins. Ins. Mens., viii, 15, 1920), I showed the development of the form westward, and associated the correct larva from Dawson, Yukon Territory. Finally (Ins. Ins. Mens., viii, 117, 1920), I associated *mimesis* as the western race of *fitchii*. Relying on the supposed weakness of the basal hypopygial spine in *mimesis*, I stated (Ins. Ins. Mens., xi, 40, 1923) that adults from the Yellowstone National Park were true *fitchii* and not the form *mimesis*. The larvae were not at hand in that instance or it would have been evident that the form was *mimesis*. The weakening of the spine in the western form is slight and not diagnostic. The lengthening of the claspette filament is a more reliable character; but the male genitalic differences between *fitchii* and *mimesis* are weak at best.

Aedes riparius Dyar & Knab.

Larvae agreeing with those of this species were found in a pool near Columbine Lake, June 2, 1923, but no adults were secured. They occurred with *excrucians* and others. I think there can be no doubt of the identification of this characteristic larva.

Aedes increpitus hewitti Hearle.

This is the *mutatus* of my Yellowstone Park list and was not met with by me in Colorado. It occurs, however, being re-

corded by Cockerell under "*sansoni*" as "Here also a small variety which looks distinct." His locality was Crystal River near Red Stone. Specimens of this form are in the National Museum as follows:

COLORADO: Crystal River above Red Stone, July 27, 1917 (P. Andrews).

Florissant, July 4, — (T. D. A. Cockerell).

Florissant, June 26, 1907 (S. A. Rohwer).

Aedes increpitus mutatus Dyar.

The larger form inhabiting the river valleys in dry plains.

COLORADO: Modern (between Denver and Boulder), May 28, — (T. D. A. Cockerell).

Mr. Hearle has lately proposed (Can. Ent., iv, 265, 1923) to unite *hewitti* and *mutatus* on the ground of absence of genitalic differences. I can detect no larval differences either; but *hewitti* is uniformly smaller, and inhabits the upper river valleys in the mountains. In the present paper the forms are separated in this sense. Probably the two will be found to run together at intermediate levels; but there seems to be an incipient differentiation here, for which the two names may be used if desired.

Aedes excrucians Walker.

Found in the Grand Lake region, almost as common as *mimesis*. A typical male was mounted, collected above the East Inlet, June 21, 1923, and larvae were found in a pool near Columbine Lake, June 2, 1923.

Aedes punctor Kirby.

Not uncommon about Grand Lake, the male hypopygium and larvae normal. The species occurred also at Poudre Lakes, 10,740 feet, breeding in pools in a sloping meadow recently vacated by the snow banks and still overrun with water from the melting snow. With it were associated larvae of *Aedes pullatus*, whose occurrence is normal in such a situation. The situation is distinctly unusual for *punctor*; but no differences are observable in male structures or larvae. The adults have

the mesonotum entirely brown, as in *punctodes* from northern Alaska. Male mounted, Grand Lake, June 19, 1923; twelve specimens from Poudre Lakes, July 4-8, 1923.

Aedes idahoensis Theobald.

Found breeding in pools in a grassy meadow at Grand Lake early in the season with *cataphylla* and *impiger*. The larvae agree with my description (Ins. Ins. Mens., v, 187, 1917), but the adults have the second and fourth veins only slightly paler than the third, thus resembling *aldrichi*, *hirsuteron* or *cacothius*. From the first two it differs in the larva, that of *hirsuteron* while having spicular skin, has a much larger comb, and the air-tube is shorter and without detached teeth of the pecten. *Aldrichi* is even more dissimilar, and has a different habit, frequenting large flood-pools. In comparison with *cacothius*, it is somewhat larger, while the mesonotal markings do not correspond, being the usual double brown band on a yellowish gray ground, whereas *cacothius* has a dark grizzled appearance with the lines narrow and illy contrasted. Specimens were also taken, wing-veins all dark, as follows:

COLORADO: Granby, June 26, 1923 (H. G. Dyar).

Fraser River, June 26, 1923 (H. G. Dyar).

Aedes communis DeGeer.

The commonest species about Grand Lake out of doors. The first adult was taken flying June 3. The larvae were abundant in low-lying grassy pools about the lake and in the edges of small ponds. Also in great numbers in a single pool near the river (North Fork of the Colorado) below Camp Wheeler. The bred adults are almost uniformly of the normal *lazarensis* marking.

Aedes pionips Dyar.

The larvae were found in a succession of small ponds for five miles up the valley of the East Inlet of Grand Lake. *Communis* bred out earlier in the edges of these ponds and after they were gone the large *pionips* larvae could be found scattered in the deep water. They were accompanied by num-

bers of the larvae of *Corethra* which, however, did not seem to molest the fully grown larvae. Adults of *pionips* began to emerge after the middle of June.

Aedes cataphylla Dyar.

The earliest species on the wing at Grand Lake, the adults in May. The larvae occurred in most of the pools, but especially the open ones in grassy meadows filled by snow-water. A pupa was taken from a pool at Fraser, Colorado, the adult appearing May 31, 1923.

Aedes impiger Walker.

With *cataphylla* at Grand Lake in larger proportion and a little later in emergence on the average. Larvae in late pools were mostly *impiger*, the usual proportion between these species being reversed. Adults of *impiger*, last of May and first of June.

Aedes dorsalis Meigen.

Recorded by Cockerell from lower altitudes (as *curriei*). Absent at Grand Lake (8,000 feet).

Aedes pullatus Coquillett.

Occurring at various places about Grand Lake mixed with other species in lesser proportion, at the highest altitudes occurring alone (except for a form of *punctor* referred to under that heading).

COLORADO: Estes Park Village, June 24, — (T. D. A. Cockerell).

Camp Wheeler, June 25, 1923 (H. G. Dyar).

500 feet above Camp Wheeler, larvae June 15, 1923 (H. G. Dyar).

Poudre Lakes, 10,740 feet, July 8, 11, 1923 (H. G. Dyar).

Aedes intrudens Dyar.

The larvae occurred early in grassy pools fed by snow-water. The adults were fairly abundant and made themselves very conspicuous by being the only mosquito to enter the houses.

Dates of emergence at Grand Lake, May 31 to June 6; adults taken through June.

Aedes trivittatus Coquillett.

COLORADO: Denver, August —, — (E. S. Tucker) (2 ♂♂), originally recorded as "*Culex pipiens*" and again as "*Culiseta inornatus*."

Aedes nigromaculis Ludlow.

Recorded by Cockerell from the plains. Absent at Grand Lake.

Aedes vexans Meigen.

Recorded by Cockerell from low altitudes, not reaching Grand Lake.

Aedes cinereus Meigen.

Occurring at Grand Lake in most of the pools after the other mosquitoes had nearly all emerged. The first adults were obtained on July 3, 1923.

Culiseta incidens Thomson.

Only one record is known to me, viz:

COLORADO: Plateau Canyon below Mesa, 30 miles east of Grand Junction (7,000 feet), August 23, 1906 (E. P. Taylor).

Culiseta inornatus Williston.

Recorded by Cockerell up to 10,000 feet, but not met with by me at Grand Lake. I have the following records:

COLORADO: Florissant, June 20, 29, 1907 (S. A. Rohwer).
Boulder, September —, — (T. D. A. Cockerell).
Cochetopa National Forest, July 11, 13, 1911 (A. K. Fisher).
Mt. Carbon, June 26, 1910 (C. D. Marsh).

Culiseta impatiens Walker.

Common at Grand Lake and very conspicuous by flying early before any other mosquitoes have appeared. Specific dates of

capture, May 23 to June 22, 1923. The larvae appeared in permanent pools, usually dark and cold, much preyed upon by larvae of *Eucorethra*. Also the following record:

COLORADO: Whittier Range, Cochetopa National Forest, July 9, 1911 (A. K. Fisher).

***Culiseta alaskaensis* Ludlow.**

Two adults were captured at Grand Lake, May 24 and 30, 1923.

***Culex tarsalis* Coquillett.**

Recorded by Cockerell as common at low altitudes, not reaching Grand Lake. I have the following exact records:

COLORADO: Grand Junction, July 23, August 26, 28, 1906 (E. P. Taylor).

Boulder, August —, November 15, — (T. D. A. Cockerell).