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The paper was illustrated by maps and photographs.

—Dr. Dyar then read the following paper :

NOTES ON THE MOSQUITOES OF BRITISH COLUMBIA.

By HARRISON G. DYAR.

In conjunction with some other work, I made observations on the mosquitoes of British Columbia, Canada, particularly in the Kootenay District, during the past season. This was done in connection with the mosquito work which is being promoted by Dr. Howard, with the help of the Carnegie Institution.

British Columbia is a mountainous region in general, with a fairly abundant rainfall. Nevertheless, towards the middle of summer it becomes generally dry and most natural breeding places for mosquitoes disappear. The mosquitoes, therefore, come early and are soon gone, and are, in the main, composed of those species which develop rapidly and hibernate in the egg state. *Culex pipiens* was not seen anywhere in British Columbia, nor was any species of *Anopheles* met with except in a single instance. The place of *C. pipiens* in rain barrels and other stagnant water is taken by *C. incidens*.

I will mention the species in the order of their comparative abundance. I desire to express my thanks to Mr. Caudell and Mr. Currie for the kind assistance which they rendered me. I am indebted to Mr. Coquillett for patiently examining my 1,238 specimens.

Culex impiger Walker.*

This was by far the commonest mosquito. Early pools in the mountains, filled by the drainage from the melting snow banks, contained the larvæ and pupæ, apparently by the million. Near Kootenay Lake they had all gone in May; but higher in the hills larvæ could still be found till the middle of June, and at Kokanee Mountain, at the foot of the glacier, I found many larvæ on August 10. The adults soon became very common in the woods, though in a few weeks they were much worn and later disap-

*This is the *C. reptans* of my previous papers. Mr. Coquillett will give the differentiation of *impiger* and *reptans* in the new edition of Dr. Howard's "Mosquitoes."

peared, except in the high damp valleys where they persisted longer. Eggs were obtained of the usual spindle shape but shorter and thicker than those of *C. cantans*. They were laid singly and hibernated. The larva closely resembles that of *C. canadensis*, with which it sometimes occurred mixed. It may be distinguished by the larger and coarser ventral brush of the anal segment, composed of longer stemmed tufts and by most of the chitinized parts being black instead of brown.

Culex cantans Meigen.

These mosquitoes became common in the woods in July, gradually disappearing soon after. Eggs were obtained from captured females, laid singly and of the usual elongate fusiform shape, but they all hibernated, none having hatched at the time of writing. Mr. O. A. Johannsen has described the larva. It falls in the synoptic table in the long-tubed group with *C. restuans*, quite an unexpected association, since its other characters are those of the short-tubed larvæ.

Culex reptans Meigen.

This species appeared rather late in the season, no examples being seen till the end of June, after which it became fairly abundant. The flies were persistent in their attacks, alighting and biting at once, without the preliminary deliberations seen in other species of *Culex*. This is the summer mosquito of the Kootenays and lasted longer than any other of the single-brooded species. Eggs were obtained of the usual spindle shape, rather thick and unusually small, laid singly. They have hibernated. The larva was not seen.

Culex canadensis Theobald.

This mosquito was not rare early in the season, but soon disappeared. The larvæ bred in the early pools left by the melting snows, but apparently made no attempt to continue breeding later in the season, as I observed to be the case in New Hampshire. In fact there was no suitable water left for them, and the eggs must all hibernate, making the species single brooded.

Culex incidens Thomson.

This species was at no time abundant, though occasional specimens were met with all the season from May to September. The species breeds continuously, the larvæ hatching from floating boat-shaped masses of eggs as with *C. pipiens*. They could be found at any time in every old water barrel, pump tub, or dug-out spring hole. Also in holes formed by overturned tree-stumps in swampy land, though nature seemed to furnish surprisingly few breeding places for the larvæ. If it were worth while, this

species could be easily greatly reduced in numbers by treating the artificial breeding places. The larvæ closely resemble the mature larva which I have figured as *C. consobrinus* from specimens sent me by Messrs. Dupree and Morgan. They are generally darker, the chitinized parts being usually black, though some occur of a lighter tint, and these I am at present unable to distinguish from *C. consobrinus* by any character whatever.* I bred adults from larvæ found in a fresh-water pool near the sea at Victoria and in a rain-water barrel at Wellington, B. C. Also from pools impregnated with hydrogen sulphide at Banff, Alberta.

Culex punctor Kirby.

This was one of the very early species. A single larva and several pupæ were taken in a pool full of algæ behind a stump in a boggy part of the woods on May 31. The adults were flying at the same time, with the early *C. incidens*, but they disappeared soon. The eggs are spindle shaped, unusually thick and short, diamond-shaped and rather large. They were laid singly and hibernated. The larva falls in the table with *C. sollicitans*, but is differentiated by having the lateral comb of the 8th segment composed of four or five large thorn-shaped teeth instead of a small patch. It is very close to *Culex serratus* as recently described by Smith.†

Culex sylvestris Theobald.

The adults occurred in July in small numbers, mixed with *C. cantans*. No new facts were learned about the life history.

Culex varipalpus Coquillett.

A few adults were taken at altitudes higher than Kootenay Lake. They were fairly common on the summit of a mountain near Bear Lake at an altitude of 7,000 feet, but only a single specimen was taken anywhere else. I owe the discovery of the larva to Mr. J. W. Cockle, who was on the lookout for new wrigglers for me. Mr. Cockle found some larvæ in a pool, mainly *C. incidens* as we learned afterward, and, having no bottle with him, entered an abandoned Chinaman's shack for a vessel in which to bring the larvæ home. There he saw many small wrigglers in an old dirty tin pan which had been filled with water from rain coming through a hole in the roof. With commendable discrimination, he left the *incidens* larvæ and brought

* The young stages of *C. consobrinus* as sent me are quite unlike the corresponding stages of *C. incidens*. But I have not yet bred *C. consobrinus* myself and still feel some doubt about it.

† Ent. News, xiv, p. 309, 1903.

home those from the shack. They proved to be a pure culture of *C. varipalpus*.

The larva most nearly resembles that of *C. atropalpus*, being furnished with long anal appendages and a short breathing tube, while they wriggle slowly at the bottom of their dish, not coming to the surface for a long time. They differ from *C. atropalpus* in that the ventral brush of the last segment is a sessile tuft of hairs like the dorsal one, without barred area. The general habitus of the larva suggests *Wyeomyia smithii*.

Culex territans Walker.

The larvæ were found in permanent pools by the edge of a small lake, showing the normal appearance and habits. The adults made no attempt to bite. Mr. Currie went down to the edge of the lake and secured several by sweeping, but otherwise all those secured were bred.

Culex dyari Coquillett.

This is a very early species and by no means common. On May 29, immediately after my arrival at Kaslo, I found one larva in a slow, cold stream in the woods. It pupated at once; so that even at that date the species had practically ceased breeding. No more larvæ were found and no adults seen.

Culex tarsalis Coquillett.

Two examples only occurred at Kaslo, one having entered my room at the hotel, the other being taken at night while out sugaring for moths. Larvæ were found in a pool of permanent fresh water near the sea at Victoria, B. C. They were mixed with *C. incidens*. The larva belongs to the long-tubed group, with the antennal tuft at the outer third of the joint, the antennæ broadly white banded. It falls in the synoptic table with *C. nigrifulus*,* but the air tube is not so long. The eggs were not observed and may prove to be something unusual.

Culex perturbans Walker.

A single example was taken by Mr. Currie near the little lake. The species was too rare for us to learn anything of its life history.

Culex curriei Coquillett.

Likewise a single example, taken by Mrs. Dyar near Kaslo Creek. This species also was too rare for us to obtain eggs or learn anything of the larva.

* Not the European *nigrifulus*. Mr. Coquillett has proposed a new name for the American species, *Culex salinarius*, Ent. News, xv, p. 73, 1904.

Culex spenceri Theobald.

Two captured specimens at Kaslo; one by Mr. Currie June 13, the other by myself June 24.

Culex consobrinus Desvoidy.

One captured specimen, July 3.

Anopheles maculipennis Meigen.

One male specimen taken in the hotel at Revelstoke, possibly brought there on one of the trains. No larvæ were seen.

Aedes fuscus Osten Sacken.

Very scarce. It was only met with in one instance, flying near some pools on a hillside above the lake. Three examples were taken which had come out from the shelter of the bushes to bite.

Corethra velutina Ruthe.

Larvæ occurred in a small pool cut off from the little lake, mixed with *Culex territans*, on which they not improbably fed. The larva has a breathing tube and air bubbles in its enlarged, quadrate thorax, as in the figures of this species from Europe.

Sayomyia trivittata Say.

Larvæ occurred in a neighboring pool to the preceding and even in the little lake itself. The queer, transparent, ghost-like things have been figured by me elsewhere.*

Eucorethra underwoodi Underwood.

The larvæ were found in various pools, principally with *Culex impiger*, but also with *C. incidens*. When the mosquito larvæ were abundant enough to feed them, they generally grew up rapidly and matured in July. In other cases, after they had eaten all the mosquito larvæ from a pool, they lingered till late in the season. At Kaslo they were in the cold pools; at Glacier in similar situations, but at Wellington, B. C., I found them in a rain-water barrel. This species is much more injurious to mosquito larvæ than *Corethra* and *Sayomyia* because of its large size and the fact that it seems to eat nothing else. It has been described by Underwood and Johannsen.

Dr. Howard, in commenting upon Dr. Dyar's paper, said it was interesting to compare the number of species (20) found by Dr. Dyar in British Columbia with the number observed by

*Journ. N. Y. Ent. Soc., x, p. 201, 1902.