

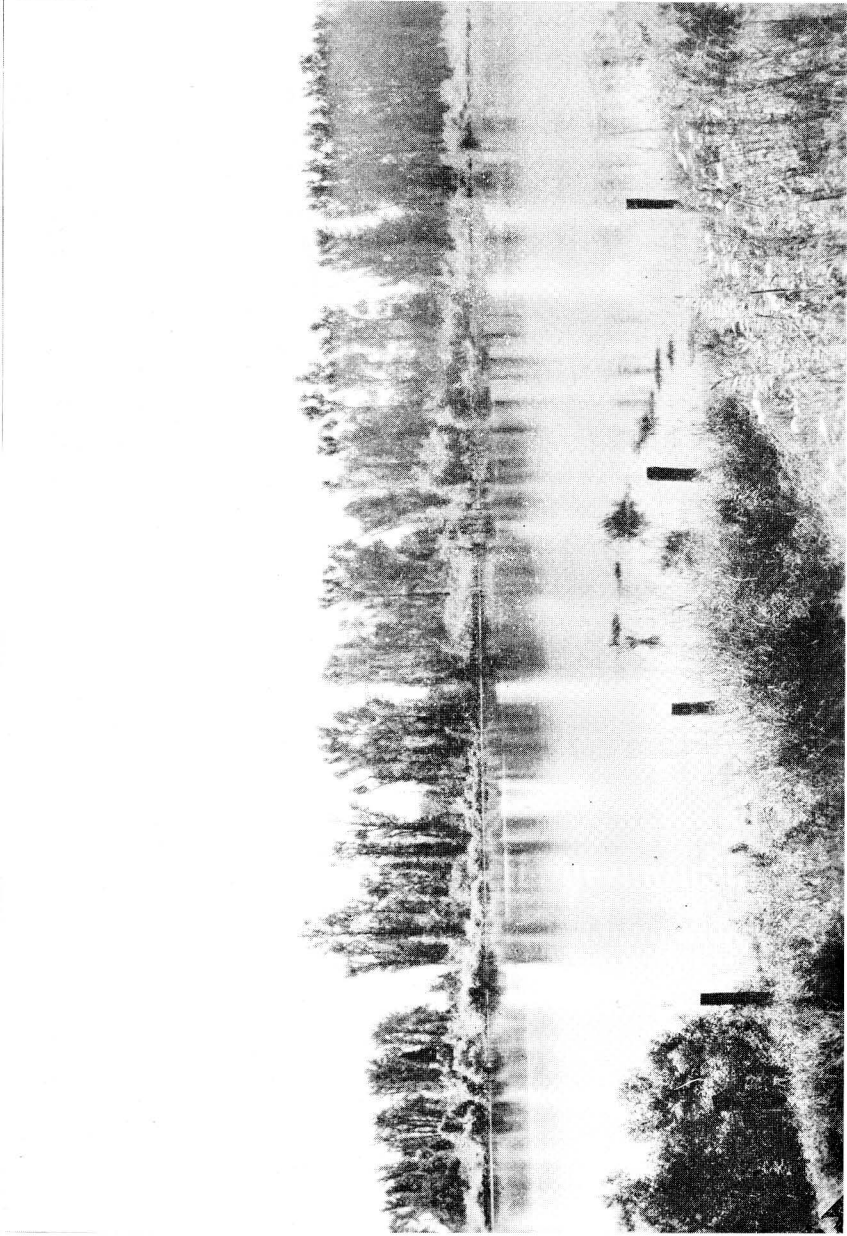
THE IMPORTANCE OF MOSQUITOES, WITH NOTES ON SOME BRITISH COLUMBIA SPECIES.

BY E. HEARLE.

Mosquitoes are responsible for half the entire mortality of the human race. This is due to their position as the transmitters of malaria alone, according to Dr. Creighton, the noted authority on that disease. The mosquitoes of the tropics "have their spears poisoned with death-dealing disease-germs" and do not fight a clean warfare as do their northern relations. They and their accomplices have played a great part in moulding the destiny of the world. The fertile plains of Africa might have been the centre of the world's civilization; but, instead, the deadly swarms of mosquitoes and the malaria carried by them have shut off Africa more effectively than the greatest natural barriers could have done. When one realizes the terrible proportions assumed by malaria, yellow fever, dengue, and filariasis in many parts of the tropical world, and that these diseases are transmitted solely by mosquitoes, it is evident that Dr. Creighton's statement is by no means extravagant. India alone lost 5,000,000 people in one year from malaria.

In temperate and northern countries mosquitoes exert a very important economic influence in many districts. They do not, it is true, invoke the aid of that dread ally, disease; but their own spears are weapons enough with which to wage a terrible warfare. In some areas the bloodthirsty hordes occur in such enormous numbers that progress and development are retarded and life is made intolerable for man and beast. Much of New Jersey was thus effected, and in the 1917 Report of the Department of Conservation and Development the Board states that it "is convinced that the salt-marsh mosquitoes, more than anything or than all else, are responsible for the backwardness of the eastern and southern sections of the State. They have depopulated farms, prevented the growth of towns, hampered the development of shore resorts, and restricted the extension of suburban communities."

A most exhaustive study of the mosquitoes of New Jersey has resulted in the adoption of control measures which, wherever thoroughly carried out, have greatly relieved the situation. Every district has its own particular problem, usually intimately associated with peculiarities of topography and special advantages offered to one or more species in the mosquito fauna. In New Jersey the big problem lay in the salt marshes. At the high tides the flooding of these resulted in the formation of shallow pools where the salt marsh mosquitoes, *Ædes sollicitans*, *Ædes cantator*, and *Ædes tæniorhynchus*, could develop unmolested by their natural enemies, mainly certain fishes. By drainage the conditions so favourable to mosquito-development were eliminated. Where complete drainage was not practicable, ditching was undertaken in such a way that the controlling fishes could penetrate to all breeding-places.



Flooded meadow at Mission. A typical breeding place of *Eptes sulcirostris*.

In various parts of Canada we have mosquito problems which in some cases are almost as serious as that of New Jersey. In Northern Quebec and Ontario, in areas on the East Coast, on the Prairies, in parts of British Columbia and in the North-west Territories mosquitoes at times assume considerable economic importance.

The mosquito problem of the Fraser Valley, British Columbia, is one of the most serious economic factors presented in that district. Agriculture is seriously affected; at times much of the small fruit is lost owing to the difficulty of obtaining pickers; cattle become very emaciated, and on dairy-farms the drop in milk production is marked during years when mosquitoes are troublesome; while calves have actually been killed by them. In exceptionally bad seasons lumber camps and mills have been obliged to close down.

The Dominion Government is undertaking an investigation of the problem, and the writer, under the direction of Dr. C. Gordon Hewitt, the Dominion Entomologist, was engaged during the past summer as a student of the Honorary Research Council in making a preliminary survey of the district and of the species involved. The following notes are taken from a report to the Dominion Research Council: Nineteen species were taken in the Lower Fraser Valley; but only two, *Ædes aldrichi* and *Ædes sylvestris*, were found to be of any great importance. During years when weather conditions cause the rapid and extended melting of the snow on the mountains the Fraser River overflows its banks and floods the surrounding alder bottoms and open flats. This provides ideal conditions for the extensive development of the two species which are responsible for nearly all the mosquito trouble of the district.

SOME MOSQUITOES OF THE LOWER FRASER VALLEY, B.C.

Ædes aldrichi Dyar and Knab. This, the dominant Fraser Delta mosquito, breeds extensively along the river wherever alder bottoms are flooded. This is the first record for Canada, although the species has previously recorded from Idaho and Montana.

Ædes sylvestris (Theobald) Dyar and Knab. A very common Fraser Valley mosquito. It occurs in great numbers wherever the river floods open flats and meadows.

Ædes varipalpus Coquillett. A very beautiful black-and-white mosquito which is fairly common in wooded areas. It is a tree-hole breeder, although occasionally larvæ may be taken in artificial receptacles. The males as well as the females are attracted to the person, although they cannot bite.

Ædes punctor Kirby. This is a fairly common but very localized species. It is restricted to woods, especially those that are dark and gloomy. The larvæ breed in shallow temporary woodland pools.

Ædes cinereus Meigen. This small red-brown species occurs generally throughout the Fraser Valley. Although at times they bite viciously, they are seldom troublesome and never leave the vicinity of their breeding-places. The larvæ are found in shallow, protected surface pools and alder-swamps.

Ædes curriei Coquillett. This species was found only along the Coast and on the outlying islands. It breeds in rock pools filled with brackish water and on salt-marshes. Although a bad biter, it is seldom sufficiently abundant to be troublesome.

Ædes canadensis (Theobald) Dyar and Knab. This is essentially a woodland species, and, although only one specimen was taken during the past season, it may be fairly prevalent in certain localities when the climatic conditions are satisfactory.

Culex saxatilis Grossbeck. This small, dark, inoffensive mosquito is found very generally throughout the district. The larvæ are found mainly in surface pools and ditches, especially those protected by willow or other growth. The adults are not known to attack warm-blooded animals.

Culex tarsalis Coquillett. This species is found in small numbers through the Fraser Valley. It is fortunate that it does not occur more abundantly, as it is one of the worst biters and is very insistent in its efforts to enter houses. The larvæ are found in roadside ditches, surface pools, and alder and open swamps.

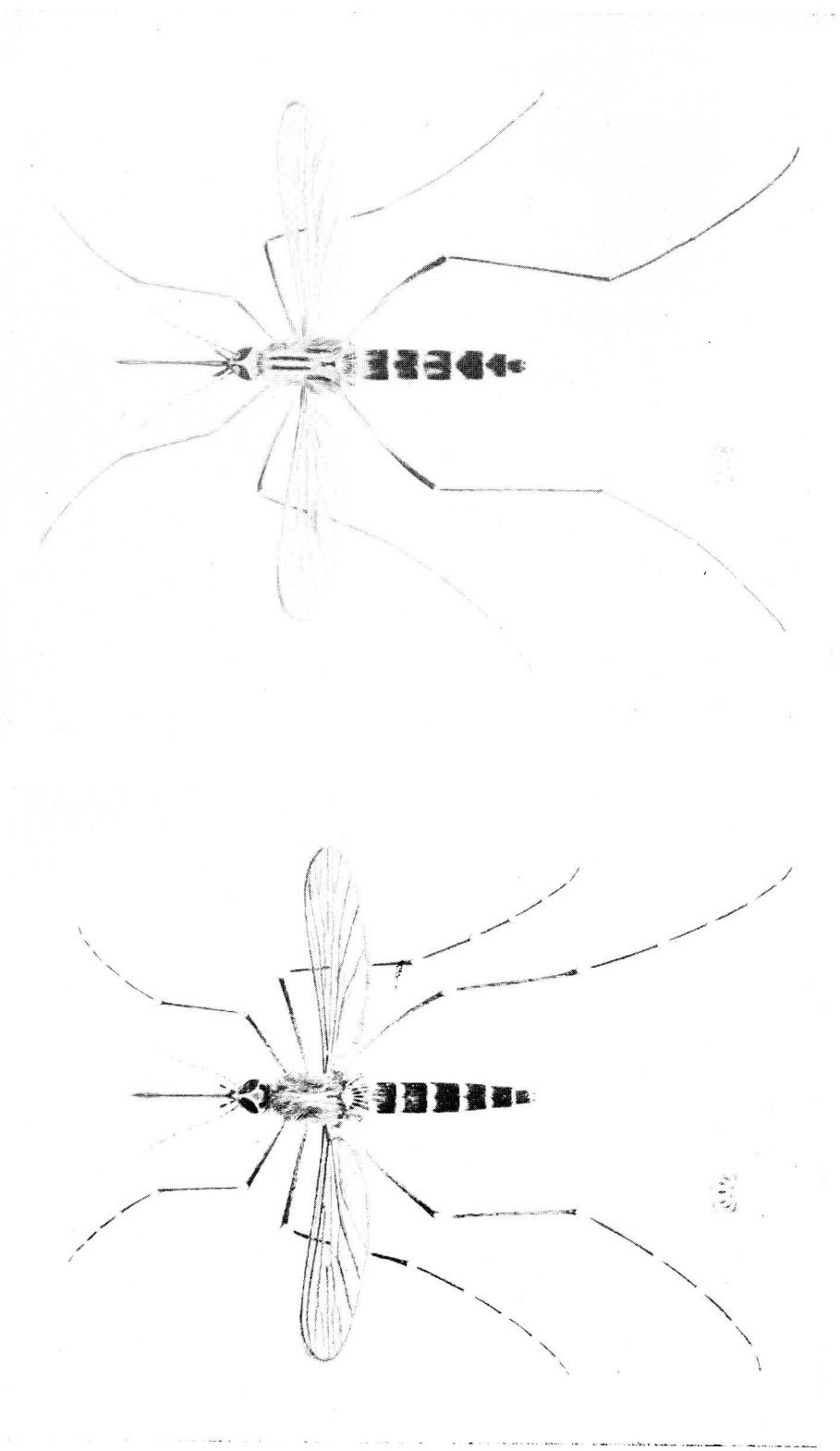
Culex pipiens Linnæus. In spite of the fact that conditions very favourable to the development of ***C. pipiens*** occur throughout the valley, specimens were taken only in Vancouver. This limited distribution indicates a very recent introduction, and it will be interesting to follow the spread from this point. ***Culex pipiens*** is one of those domesticated mosquitoes which have managed to spread far and wide through shipping. Like the English sparrow, they thrive exceedingly wherever introduced.

Culiseta incidens (Thompson) Felt. This is one of the largest of British Columbian mosquitoes and one of the most inoffensive, as it is so timid that it will seldom bite. It is the most generally distributed species in the district—almost every rain-water barrel is teeming with larvæ throughout the summer. Although rain-water barrels provide the main breeding-places, the larvæ are by no means particular, and were taken in alder-swamps, ditches, and roadside pools, and even in brackish water in company with ***Ædes curriei***.

Culiseta impatiens (Walker). This is another very large mosquito. It is found mainly in thinly wooded areas and on mountain-slopes. Usually it is too timid to be troublesome, but at times it will attack with some determination. This species is the one commonly known as the snow-mosquito, from its habit of leaving hibernation quarters on warm days during the winter.

Culiseta alaskænsis (Ludlow). Only one specimen was taken. This was obtained on May 20th at Hope.

Mansonia perturbans Walker. This is a very interesting species. The larvæ and pupæ do not come to the surface, but attach themselves to the submerged stems of water-plants, from which they will obtain the necessary oxygen. As the bite of this species is more painful than that of any other North American mosquito, it is fortunate that it is comparatively rare. Specimens were taken in numbers only in certain areas in Stanley Park, Vancouver.



Edes atchichi Dyar & Knab.

Original drawings by C. W. Young.

Edes subrestris Dyar & Knab.

Anopheles punctipennis Say. Although not common during 1919, this species may be fairly abundant during wet seasons. The larvæ occur almost everywhere throughout the district in roadside ditches, surface pools, and alder swamps.

Anopheles occidentalis Dyar and Knab. This anopheline is found sparsely throughout the district. The larvæ occur mainly in roadside ditches and alder-swamps.

Several species of **Ædes** were also taken in the Fraser Valley, the identity of which could not be determined with certainty on account of the scantiness and condition of the material obtained. Dr. Dyar kindly examined these and reported on them as follows: **Ædes fletcheri** or **riparius**; **Ædes excrucians** or **fitchii**.

The writer desires to express his thanks to Dr. H. G. Dyar for his kindness in verifying his findings and for determining the identity of **Ædes punctor** and **Culiseta impatiens**.

A FURTHER REVIEW OF APPLIED ENTOMOLOGY IN BRITISH COLUMBIA.

BY R. C. TREHERNE, ENTOMOLOGIST IN CHARGE FOR B.C. DOMINION
DEPARTMENT OF AGRICULTURE.

Notable progress has been made in applied entomology during the past six years. The disastrous war in Europe between 1914 and 1918 undoubtedly checked progress to a marked extent, and many entomologists who assisted so materially in establishing our science during its early years in British Columbia will not return. Some lost their lives in France; others who enlisted for the Empire's service, but who survived, have found their billets in other industries in other parts of the world. The campaign for greater production which was carried on industriously during the middle years of the war undoubtedly proved a leading string to foster the development of economic entomology. The closing of the avenues of loss on the farm proved a great incentive to popularize entomology. Farmers, some for the first time, have learnt to realize the serious inroads insect pests are capable of causing in their financial returns. The improved prices for agricultural commodities of recent years also has acted as an impetus towards providing better equipment for fighting agricultural pests, and this same feature has induced growers to take a wider interest in life-histories and modes of combat of our injurious insects.

During the years 1914 and 1915 the names of those engaged in economic-insect investigations numbered three or four. To-day, or rather during the season of 1920, there were twelve individuals who have been actively engaged in solving economic-insect problems. It is true that the majority of these investigators commenced their work in the last two years or since the termination of the European war, and it is pleasing to note that