An epidemic of one year, if not controlled, may increase 150 to 200% the next. Control work will decrease it at least 80%. If our forests were not disturbed, only large windfalls would increase these infestations to epidemic proportions, but promiscuous cuttings, unless regulated by the government, upset the natural balance and cause such outbreaks as we are having at the present time, which would answer the question, "Why is the Forest Entomologist"?

In conclusion, I wish to state that if a thorough campaign of slash disposal and control of incipient outbreaks is carried on in the future, the tremendous loss caused in the past to the forests of the province will not only be stopped, but much of the fire risk now caused by slash and dead standing timber will cease to exist.

MOSQUITO CONTROL AT BANFF

BY ERIC HEARLE, DOMINION ENTOMOLOGICAL BRANCH

In the Agricultural Gazette for May-June, 1922, the writer contributed a brief statement on an aerial survey of mosquito breeding places, conducted in the Lower Fraser Valley of British Columbia, which survey was made in 1921. In the same year, in company with Mr. Arthur Gibson, Dominion Entomologist, a brief survey was made of mosquito infested areas in the Rocky Mountains' National Park, adjacent to the town of Banff and the station of Lake Louise, Alberta.

It has been recognized for some time that relief from the mosquito trouble might be possible, and in the summer of 1916 the late Dr. Hewitt undertook a preliminary survey and drew up valuable recommendations. During the last three or four years a certain amount of control work has been conducted under Messrs. Sanson and Childe, of the Parks Branch, and considerable success was met within the reduction of the mosquitoes. In the Spring of 1922, Mr. Arthur Gibson, the Dominion Entomologist, arranged for a detailed investigation into the pest, and the writer was given charge of all the investigational and control work. Oiling operations were extended much further than previously, and as a result the mosquito pest in the vicinity of Banff was reduced to a negligible quantity during the past season.

The 1922 investigations showed that out of a mosquito fauna of some 18 species only three of the species were important pests.

Constituents of the Pest:

There were found to be two main problems—the snow-pool problem in the early summer and the flood water problem dependent upon the river freshets. In the former, one species only is important—**Aedes cataphylla Dyar**; but in the latter, while **Aedes cataphylla Dyar** is the species of main importance, **Aedes intrudens Dyar** and **Aedes vexans Meigen** have also to be reckoned with. In May the melting snows fill

depressions with water, and larvae of **Aedes cataphylla** are to be found in these pools in great numbers; the majority of these emerge during the last week of May and constitute the snow-pool pest.

The time of the river freshet varies—in 1922 it occurred in the first week of June. Mosquito larvae were found in vast numbers in the flooded areas, and most of those that escaped the oilers completed development before the end of the month. Collections of larvae carried out throughout the district showed that the low-lying area to the west and north of the town is mainly responsible for the pest. In some parts of this basin fairly extensive meadows occur, but dense willow growth clothes the remainder. The breeding areas appear to be of importance to some four miles west of the town.

During the past season oiling was mainly resorted to in dealing with the pest. Four men were employed through May and June to apply oil, and occasional extra help was provided as needed. Oiling occupied some 194 days' labour and about 2,800 gallons of oil were applied; watering cans and knapsack sprayers were utilized in spreading the oil. The whole breeding area was divided into three districts; one man being held responsible for the work in each. Large drums of oil were distributed by truck to various points in each district, and from these points the oil was transported in smaller containers to a number of stations in the breeding areas—a pack pony and a canvas boat were found useful for this. Oil was spread on all water where larvae were found, and, whenever oiling was completed in any one section, patrols were made to ascertain if effective killing had been secured. Coal oil was used alone, as, owing to the cold nights, it was thought inadvisable to use heavier oils.

A number of the breeding pools were undoubtedly missed owing to the difficult nature of the territory involved; and in some of the more open stretches wind rendered the oil film partially ineffective. In spite of this, however, the results of oiling were very marked, and about 77% control was realized—the town of Banff and the immediate vicinity were rendered comparatively free of mosquitoes.

After the necessity for oiling was over, the mosquito squad worked on permanent improvements. A number of ditches were dug to divert small streams feeding various swampy areas. In many parts of the district the willow growth was found to be so dense that penetration was extremely difficult and the work of oiling was greatly retarded; to mitigate this a large number of trails were cut through these areas and the majority were rendered easily accessible.

During the season of 1923 the Entomological Branch plan to continue investigations into the mosquito situation at Banff; flight experiments will be conducted to ascertain the actual distance from which infestation is possible; and it is hoped to secure data regarding the possibility of introducing certain natural control elements, such as the

minnows, which would materially reduce the costs of oiling operations. Experiments have also been projected to test out the comparative values of oils, larvicides, etc., and their adaptability to the needs of the district.

It is hoped that at the conclusion of these investigations mosquito control at Banff will have been placed on a fairly sound scientific basis, and that freedom from the mosquito nuisance will be possible with the greatest economy in labour and materials.

THE STATUS OF SPREADERS IN THE POISON SPRAY SOLUTION

BY A. L. LOVETT, ENTOMOLOGIST,
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Commercially prepared spreaders were used rather extensively in orchard spraying for the first time this past season. The interest manifested in this recent innovation in our spray practices makes it appear desirable to undertake a general survey of the situation, attempting to develop a summary of the opinions, observations, experiments and reactions of the growers, experimentors and others following the close of the year's trial of the use of spreaders.

HISTORICAL

The addition of materials to the spray solution for the improvement of its physical properties is by no means new. Various materials, including glue, molasses, soap, saponin, casein, gelatine, aluminum sulphate, etc., have been added as spreaders from time to time where the investigator, dealing with a specific pest or disease, appreciated the desirability of improving the wetting and adhering properties of the spray solution.

Probably the first large scale investigation of spreaders for use with poison sprays, having a rather definite application to the economic control of orchard pests, were those undertaken by the Oregon Experiment Station. A variety of materials were tested as spreaders; among the more promising were caseinate, glue, gelatine, saponin and mineral oil emulsions. In considering their qualities as a spreader, the following factors were necessarily taken into account: (1) Availability, (is the source of supply easily accessible and adequate?); (2) Compatibility, (the spreader must not react unfavorably with any ordinary spray water, spray material or combination of spray materials); (3) Efficacy, (in reasonable amounts they must actually give satisfactory results in increased wetting, adherence, etc.); (4) Ease in preparation, (complicated manipulations, cooking; any operation requiring close attention or much additional work meets little favor with the grower); (5) Cost, (must be reasonable in price).