

since we terminate our efforts with hole filling and rough levelling, it is apparent that every acre of ground cleared is another acre opened to private enterprise for finish levelling or agricultural preparation.

There is no question in the minds of our trustees that a great measure of the success of this permanent control program is attributable to the efficiency and close working harmony of the operators of our heavy equipment who have acquired a specialty in this type of work.

In summarizing this phase of our program we can only say that this course of permanent mosquito control work supported by the land owners themselves is the most sound means of eliminating a costly yearly control problem. Particularly with the present rise in cost of insecticides and the apparent resistance of certain mosquitoes to some insecticides, we feel that real economy is effected when we eliminate the source of our river bottom mosquitoes.

A BIRD'S EYE VIEW OF MOSQUITO EXTERMINATION IN AND AROUND WINNIPEG AFTER THE FLOOD OF 1950

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President and Chairman, Greater Winnipeg Anti-Mosquito Campaign

This is in no sense a highly technical discourse. It begins with a brief picture of the geography of the Red River of the North, and my first remark is that Winnipeg, the capital city of the Province of Manitoba, derives its name from the Indian word "Winnipic," signifying "Muddy River." That describes the Red River exactly, but why this more aesthetic name was given to our river I cannot tell. However I do know that in the spring when the grass grows green upon its banks its muddy waters take on a reddish tinge.

I can hear somebody say, "But why 'Manitoba' as a name?" Back in the early 1880's we boys at school in England were

told by a gallant Protestant missionary, Bishop Horden, that the name is a Cree compound of two words—Manitou "the Great Spirit" and Ba "the Country." I am free to admit that such a view of Manitoba is justifiable in early June before mosquitoes buzz, but dubious in mid-July!

I rather fancy that a good many of our mosquito controllers here present have only a vague conception of the geography of the Red River, even though it begins its existence as the small Ottertail River in Minnesota and then takes its usually lazy tortuous course for 300 miles north to become the western boundary between Minnesota and N. Dakota right up to the 49th parallel which is the International Boundary between the U.S.A. and Canada. After passing through Fargo and Grand Forks it gathers some volume and strength from a dozen or more insignificant looking tributaries but capable in some springs of rising to a surprising height and flooding alarmingly along its shallow valley. It crosses the International boundary at Emerson in Mani-

¹ Read by E. J. Stansfield, Assistant Manager.

As noted in the March issue of *Mosquito News*, Dr. Speechly died on March 17, 1951. The present paper is one of the last—possibly the last—of his contributions to the literature on mosquito control. We note, in presenting it, that even here, in a factual treatment of serious moment, something is present of the genial personality and refreshing wit that made Dr. Speechly so well beloved among his colleagues in the AMCA.

toba and then wriggles 100 miles straight north through Winnipeg to the south end of Lake Winnipeg where its marshy delta lies several miles west of the more impressive entry into Lake Winnipeg of the nobler stream of the Winnipeg River. In this last stretch the Red River receives another half dozen tributaries, the largest of which, the Assiniboine, joins the Red in the heart of Winnipeg City.

I will now quote from our City Engineer, W. D. Hurst's excellent report.

"Greater Winnipeg has undergone six major and five minor floods since 1826, a major being defined as one where the water level exceeds $24\frac{1}{2}$ feet above average ice level, thus:

"In 1826 the Red River reached $36\frac{1}{2}$ feet above ice level.

"In 1852 the Red River reached $34\frac{3}{4}$ feet above ice level.

"In 1861 the Red River reached $32\frac{1}{2}$ feet above ice level.

"In 1850 the Red River reached $30\frac{1}{3}$ feet above ice level.

"In 1882 the Red River reached 26 feet above ice level.

"In 1904 the Red River reached $24\frac{2}{3}$ feet above ice level.

"In 1948 the Red River reached $23\frac{1}{2}$ feet above ice level.

"In 1950 the Red River reached $30\frac{1}{3}$ feet above ice level.

"The conditions giving rise to a major flood are definite after this manner:—

(1) A wet fall, (2) an early winter, (3) heavy snowfall during the winter plus low temperatures, (4) a late sudden spring break-up, (5) cloudy rainy weather during the spring run-off, (6) similar conditions affecting the Red and Assiniboine Rivers. Except that there was very little snow in the Assiniboine Valley all the factors prevailed in early May, 1950. The Assiniboine River was only shouldered back by the Red River at their confluence for a distance of about 3 miles. Although the flooded area within the city was only about 7 per cent of the city the effects of the flood extended over the entire city through the backing up of the sewerage system."

The Spirit of Cooperation Wins. In presenting this report just before the opening of our 25th season of continuous mosquito control we look back proudly upon the splendid support given to the Greater Winnipeg Anti-Mosquito Campaign of 1950 by the joint cooperation of the Federal Government, the Province of Manitoba, and the City of Winnipeg in using our campaign executive as the spear-head for the successful attack on an expected plague of flies and mosquitoes. This plague was certain to follow the flooding of Winnipeg and the Red River Valley if nothing was done. As usual the campaign executive was ready in April to deal with mosquito control long before the flood was ever feared. Never were we better equipped, owing to foresight. We had a two-ton truck and a half-ton truck, a Buffalo Turbine sprayer, two Tifa foggers of our own, and knew where we could hire two more if necessary. Two breweries combined to present us with the one Tifa, and with the material aid of the T. Eaton Co. we were able to buy another. Larval development was later than usual owing to the cold rainy weather, as proved by our field inspection during the first week of May, but we covered certain city areas on the north and west flanks of the city. Suddenly the flood came down upon us from Minnesota and N. Dakota where heavy snowfalls and rain had just fallen. It was on May 8 that the City Engineer requested the use of our trucks and squad of 17 men. This we gladly did and as we manned our own trucks, we nursed them carefully and safely through the emergency. Thus, after May 18 they were in good working order for our normal occupation. Just at that critical time an Ottawa doctor arriving by air to lecture to the Medical Society described the appearance of Winnipeg as an island surrounded by water.

We soon found, as the flood subsided, that no larvae were present in the deep flooded area, but that on the perimeter and from outwards a flight of mosquitoes increased so rapidly that in the first week of June we began to fog. Normally

fogging would not be needed till late in June, but we did not make the mistake of relying on fogging. We put our hand-sprayers and the Buffalo sprayer to work on areas showing larvae as usual.

Finance. Our financial position was such that, until the more complicated method of extracting funds from the Federal Treasury by the Provincial Department of Health and Welfare was established, we had to depend on the city grant of \$10,000.00 (which was increased in August by \$1,500.00) and a sum of \$978.00 subscribed by suburban municipalities. In fact, it was not until the end of June that we learned that the Federal Government had granted the sum of \$29,500.00 for fly and mosquito control for Greater Winnipeg and parts of the Red River valley. This estimate was arrived at by the Provincial Department based on the advice of our Assistant Field Manager, E. J. Stansfield, who was eventually placed in control of the whole of our mechanized operations in Greater Winnipeg. In all these preliminaries we were indebted to the cooperation of the Hon. Ivan Schultz, K.C., Provincial Health Minister, and his Director of Sanitation, Hugh Malcolmson, M.D. Further, a separate office with telephone and stenographer was placed at Mr. Stansfield's disposal for the duration of the campaign as well as convenient parking spaces for our vehicles.

Another phenomenon of unusual import occurred. We were visited by no less than six entomologists at the instance of Dr. Robert Glen, Chief, Division of Entomology, Dominion Dept. of Agriculture at Ottawa. In 1927 and 1928 we had the support of Dr. A. Gibson, then the Dominion Entomologist and his Assistant, the late Eric Hearle, M.Sc., who was then the leading mosquito expert in Canada. Before World War 2 we drew upon the Senior Science students of the University of Manitoba for our supply of Field Managers, but only one of these able young men was bitten with the entomological side of mosquito control. Our first Field Manager, Jack Tully, dallied with

it, but John McLintock, M.Sc., after serving with us for three years was the only one who really specialized in mosquitoes. It was a happy thing for us when we learned that he was commissioned to spend a week with us, because owing to his past association with our campaign we knew we would get his sympathetic knowledge of our problem. His advice was of great practical value. In addition we appreciated Dr. R. Glen's suggestion that Dr. C. R. Twinn, Director of Household and Medical Entomology with Dr. A. W. A. Brown, Professor of Zoology, Western University of London, Ont., both experienced in Arctic Mosquito Control should inspect and report on our campaign. They also directed the splendid work done by two R.C.A.F. planes piloted by pilots experienced in Arctic control work. They covered very thoroughly the north, south and west districts outside the built-up areas and along the river banks. We also were inspected by three field officers, Messrs. D. G. Peterson, D. Watson and P. Morrison. To quote one of these six entomologists, "this was the first time in Canada that mosquito control by space spraying had been attempted over so large an urban area." Actually the area covered by this project as a whole included approximately 250 square miles. In addition we engaged the services of a private firm, Hastings and Sons Ltd., to spray by a Tiger Moth plane certain parts of the river banks. During this interesting period Field Manager George Kurdydyk attended to careful ground inspections, spraying and improving drainage ditches all round the city.

Over-all Fogging. By the time the expert entomologists had completed their task we had arrived at the beginning of July, just when flies began to appear and the "foreign" mosquitoes began to raid the city. McLintock's advice was to fog thoroughly as often as necessary every street and lane in Greater Winnipeg. The total distance covered was 2,654 miles, often at a speed of 10 miles per hour. Mr. Stansfield used a squad of six intelligent

young men to ply three Tifa foggers. He himself by dint of strict overseeing of this tremendous job during the whole of July and August ensured its complete success. In our climate when the wind speed is less than 8 miles per hour the best fogging time is between 7 p.m. and 7 a.m. This involves considerable loss of sleep in bed for the field manager who had the human element to direct, the remedying of machinery defects, and the care of much bookkeeping. Carelessness in directing fogging in relation to trees, shrubs, vegetables, flowers, bees and fish must be avoided, and on occasion the irascible type of citizen, male or female, must be met and pacified. All these our field manager handled with unflinching good temper and judgment. Nor was he satisfied with land operations but assumed a naval role by mounting a Tifa on a suitable power boat from which he successfully fogged some 24 miles of trees and bush-lined banks of the Red and Assiniboine Rivers.

Hence it came to pass that universal ap-

proval and satisfaction was widely expressed for the complete victory over the winged barbarians. With regard to the common fly we had certain areas associated with industrial plants, certain lanes and stables which required vigorous DDT application to rid them of flies.

Outside Greater Winnipeg six small riverside towns were visited by John McLintock who advised the use of a Tifa fogger for residential districts and hand sprayers for breeding areas. DDT in oil solution was supplied for the purpose by the campaign. Excluding these towns the total area covered by the Greater Winnipeg Campaign included ten suburban municipalities and parts of three others, a coverage of approximately 250 square miles. During the past 24 years we have always maintained that just such a campaign would secure freedom from the mosquito pest. This has been achieved by adequate finance and the use of mechanical sprayers manned by intelligent operators in the 1950 campaign.

A NEW TYPE OF LARVICIDE FOR SPECIALIZED MOSQUITO PROBLEMS

LEROY KINSEY

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We, in mosquito control work, are always searching for better methods of control. Sometimes a new and better larvicide is discovered in the course of trying to solve a particularly stubborn problem. These problems present a challenge leading to experiments which often go beyond the demands of routine operations.

Such a problem has existed in Nassau County in connection with the use of abandoned sand pits as public dumps. One of the most troublesome of these is located adjacent to a large housing de-

velopment. Children use the pit as a swimming hole and several have drowned. Authorities were forced to fence in this area to prevent trespassing. They have been trying to reclaim the pit by filling it with refuse that is not incinerated such as grass cuttings, brush, trash, ashes, discarded building materials, etc.

This particular pit comprises an area of about 11 acres and has banks which slope steeply some thirty feet to the surface of the water. The water in the pit covers an area of five acres and varies in depth from 45 to 50 feet. More than 10,000