were sold to local growers on Vancouver Island. For the past two years the nursery has ceased to exist, and the owner is at present on military service in Europe. The books of the company, therefore, are closed and we are not able to obtain the names of purchasers.

The importance of this mite is well understood by those who have experienced its ravages in England; consequently prompt and efficient steps are urgently required to stamp it out. Growers of currants are advised to report its presence to the Government if their suspicions are aroused. Affected bushes are most easily observed in the early spring, when the buds of such bushes swell abnormally, eventually dropping off or setting no fruit. The only remedy advised in consideration of the present status of the currant industry of the Island is to destroy affected bushes by burning.

SUPERHEATING AS A CONTROL METHOD FOR INSECTS WHICH INFEST STORED PRODUCTS.

BY ARTHUR GIBSON, CHIEF ASSISTANT ENTOMOLOGIST, DEPARTMENT OF AGRICULTURE, OTTAWA.

There are several important insects which collectively are responsible every year for serious losses to flour, stored grain, etc., in various parts of Canada, such losses amounting to many thousands of dollars. The Mediterranean flour-moth (*Ephestia kuehniella*) is largely a flour insect, but it also works in other manufactured foods. The Indian-meal moth (*Plodia interpunctella*) has a wide range of food, attacking, freely, grain and other seeds, meal, dried fruits, nuts, etc. The meal snout-moth (*Pyralis farinalis*) is some years found causing considerable injury to stored grain, etc. The Angoumois grain-moth (*Sitotroga cerealella*) is occasionally found in shipments of corn-seed imported from foreign countries. The power of granary-weevils and similar small beetles to destroy grain and other stored products when held for any length of time in stores or warehouses is enormous. The weevils which cause the greatest damage are the grain-weevil (*Calandra granaria*) and the rice-weevil (*Calandra oryzæ*). In addition to these weevils there are several small reddish-brown beetles which commonly infest stored grain and mill products. Breakfast foods, flour, meal, dried fruits, nuts, etc., are all attacked.

Recently the Entomological Branch has had opportunities of experimenting with high temperatures for the control of insects infesting mills and warehouses, and the results obtained have been highly satisfactory. In the superheating method of control it is necessary to install a system of heating which will give and maintain a temperature of from 120° to 125° Fahr. for about six hours. In stores or warehouses the established heating system will require to be augmented by coal, wood, or gas stoves, particularly in autumn and during the colder months. A number of flour-mills in the United States which are heated by steam have installed additional radiation at a cost not exceeding the expense of one fumigation with hydrocyanic-acid gas, which has been used to such an extent in the past for destroying insects infesting flour and other stored products. The additional system of radiation is permanent, and one application of the superheating method each year has been found to be sufficient to control such insects. In Canada, also, the superheating method has been adopted in flour-mills to control the Mediterranean flour-moth. In the Montreal district, for instance, the flour-mills are regularly, each summer, subjected to high temperatures to destroy this insect. In instances where mills and warehouses have been infested with such small beetles as the confused flour-beetle (*Tribolium confusum*), and fumigated with hydrocyanic-acid gas, it has been found that the gas did not penetrate sufficiently deep into all cracks, etc., to kill the insect in every stage. The superheating method, however, reaches the places inaccessible to gas and destroys any insects which may be present.

The following brief statement will indicate the value of high temperatures as a control measure for such insects as I have mentioned:—

In October, 1913, Mr. W. A. Ross, Field Officer of the Entomological Branch, conducted an experiment in a large feed-store at Dundas, Ont., which was badly infested with the Mediterranean flour-moth. Myriads of the moths were present and the meal and flour in the sacks were literally alive with caterpillars. The heating system consisted of five steam-pipes, which extended half-way around the walls, and four box stoves. Practically half of the second floor was occupied by a suite of offices heated by steam-radiators. In the unheated portion of this flat one box and two steam-gas stoves had been installed, and on the top flat four gas-stoves.

At 6 p.m. the steam was turned on and the stoves were lighted. At 1 a.m. the moths in the bins on the top flat commenced to succumb to the heat (114° Fahr.). At 10.30 p.m. the following day no living insects could be found on the second and third flats. The temperature on the third floor had reached 120° Fahr., and on the second floor 108° Fahr. in one place and 120° Fahr. in another. The thermometers available and used on these floors did not register higher than 120° Fahr. On the first floor five extra stoves were installed owing to the fact that the temperature in the immediate neighbourhood of the floor was not sufficiently high to prove fatal. The heating on this floor was begun at 9 a.m. and discontinued at 6 p.m. Better thermometers were obtained and these registered as high as 147.2°, 120°, and 150.8° Fahr. The one which registered 120° Fahr. was lying on the floor near a door. Two weeks later Mr. Ross again visited the store and no sign of the insect could be seen, nor had any been noticed by the owner of the warehouse or his men since the building was superheated.

One other experiment to which I will refer took place in a large seed-store at Victoria, B.C. The insects present in this instance were the two granary-weevils—namely, the grain-weevil (*Calandra granaria*) and the rice-weevil (*Calandra oryzæ*). Both weevils had been found working freely in stored grain. Towards the end of April, 1914, we recommended to the proprietors of this store that they adopt superheating to destroy the insects. This they did, the temperature being raised to between 115° and 125° Fahr. and maintained for about eight hours, with the desired effect. Steel oil-barrels were used as stoves to raise the temperature. Holes were punched in these, near the bottom, so as to provide a draught, and coke was used as a fuel. Previous to the superheating, fumigation with bisulphide of carbon had been tested, the amount of bisulphide used being approximately 3½ lb. to every 1,000 cubic feet of space. The building consisted of four floors, of a size 30 x 110 feet, three being 10 feet high and one 14 feet high. The liquid was poured into tin vessels which were distributed throughout the building. This fumigation killed large numbers of the adults, but did not have any effect upon the eggs. Consequently, later, the superheating method was adopted with entire satisfaction.

As mentioned above, the heat from a high temperature of 125° Fahr. maintained for several hours penetrates into all cracks, etc., killing all stages of the insects present.

CONTROL OF CABBAGE-APHIS BY PARASITES IN WESTERN CANADA.

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The cabbage-aphis (*Aphis brassicæ* Linn.), though a native of Europe, is now widely distributed in America, where it was first recorded in 1791. In Fletcher's report for 1895 it was stated that a "grey aphis (possibly *A. brassicæ*)" had been very destructive on Vancouver Island, and that the worst year on record was 1876. There can be little doubt but that this note referred to *A. brassicæ*, which has been recorded frequently from this locality since that date. It has therefore been present in British Columbia for at least forty years.

Very briefly the life-history of this aphis is as follows: The small shining black eggs are laid in the fall on cabbage stumps and leaves. They may be found also on