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ANT CONTROL ON SHIP BOARD

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Early in December, 1921, the Pacific Mail Steamship Company asked for help in the control of ants infesting certain of their passenger ships. This Company runs a line of vessels to and through the Panama Canal and thence northward to Havana, Cuba, and to Atlantic seaboard points in the United States. The ants were said to be very troublesome on the ships of this line. They not only caused a considerable pecuniary loss in the destruction of food stuffs but attacked passengers and crew. Their bite was reported to be very painful, causing a local swelling and inflammation with much itching. The situation as reported was worthy of careful study to develop control measures and the writer took up the study.

A careful search of the literature on ants failed to disclose any report of these creatures having been made on ship board and the problem developed, for this reason, into an entirely new study aided, to be sure, by the successful control measures used on shore. It was finally decided that to do the problem some degree of justice the study should extend through an entire voyage of one of the Company's ships. The ship chosen was the Colombia due to sail from San Francisco December 12, 1921, on its twenty-second voyage, outward destination being Baltimore, Maryland. Before the ship sailed a careful inspection was made and no ants found. As the weather was quite cold at the time, the presumption was made that the ants were dormant. Officers and members of the crew who had been on the Colombia on the previous voyage were unanimous in stating that the ants had been present in overwhelming

numbers and had caused much discomfort to all hands. Careful questioning failed to bring out any clear description of the ant so no definite fact was available on which to base a theory of control. In view of the conditions present it was thought best to provide poisons to meet various situations as they might arise. Beside a number of non-proprietary insecticides a quite complete stock of proprietary ant poisons was obtained and rather fully equipped for a thirty day campaign we left San Francisco on December 12, 1921, as scheduled. Cool weather conditions prevailed until December 14, 1921, when under the warmer conditions experienced at San Pedro, California, ants began to appear. These ants were small, not more than three millimeters in length, and were very active. They were later identified by Dr. W. M. Wheeler, Harvard University, Bussey Institution for Research in Applied Biology, as follows: "The ants . . . are specimens of *Monomorium (Parholcomyrme) destructor* Jordan. The species is originally Indian and has long been known as an unpleasant house ant and is even suspected of carrying the plague. During more recent years it has become tropicopolitan. . . . It is interesting to find it on a ship, and of course one would expect it to become active while the ship was in the tropics."¹

From San Pedro southward to the port of Manzanillo, Mexico, well within the tropic of Cancer, the ants increased in numbers and were exceedingly troublesome in the passengers' rooms and in the steward's crew quarters in the waist of the ship alongside the engine where the heat was greatest. They were also very troublesome in the pantries, galleys and store rooms. Experiments with various poisons and contact insecticides were begun as soon as the ants began to appear at San Pedro. Capsules containing arsenical poisons made up as per formulas A and B, (last page) were placed, opened, wherever ants were seen. Sponges moistened with the same poisonous syrups and contained in perforated tins were also freely used. These capsules and tins were inspected daily and it was found that only occasional ants visited them. Indeed it may be stated that the arsenical poisons, as used, proved to be only a partial control and not quick enough to afford the necessary relief to passengers and crew. Complaints were made and no doubt the reports as to the viciousness of their attack on human beings were correct. They would find their way in small or large numbers into the beds and their bites were very painful. Proprietary ant poisons were used dusted into the

¹The determination was secured through the courtesy and help of the Division of Entomology and Parasitology, University of California.

beds and were found to be fairly effective in destroying ants in these situations. All of these proprietary materials had a tendency to take up atmospheric moisture and to become lumpy. As the voyage continued further southward in the tropics atmospheric humidity became greater and distribution of these remedies because of the lumpiness became more difficult. As these control agents were placed in the beds the odors coming from some of them were objectionable. Also in some cases the control was almost as bad as the ant bites inasmuch as the powder was very irritating to the skin and mucous membranes of humans. It was soon evident that a powder should be developed that was non-absorbent of moisture, practically odorless and, further, non-irritating. After considerable experimenting such a powder was developed, its component parts being sodium flouride, pyrethrum (ground stems and flowers) and starch. Formula C, last page, gives the make up of this powder in detail. It was found to be a very efficient insecticide and numerous observations showed that death of the ants followed in from twenty to thirty seconds after the material had touched them. In addition to its killing power the powder met the non-moisture absorbing, non-odorous and non-irritating conditions before mentioned. By the time the ship arrived at Manzanillo, Mexico, December 19, 1921, the overwhelming strength of the infestation was shown and the efficacy of the formula C powder demonstrated. The powder was dusted freely in passengers' rooms, steward crew's quarters, pantries, on grated floors of galleys and in the store rooms. The ants were well in control through this treatment by the time the ship arrived at San José de Guatemala, December 23d. From this point on, though tropical weather conditions with much humidity prevailed, through the Canal and to Havana, Cuba, but few ants were seen and no complaints from either passengers or crew were registered. The few ants that did appear in the pantries and syrup lockers were quickly disposed of with the formula C powder. From Havana northward past Cape Hatteras to Norfolk, Virginia and Baltimore, Maryland, cool to blizzard weather was experienced. The ants disappeared entirely, going into dormancy because of the cold and very careful search failed to disclose their nesting places.

It is interesting to note that but one formicary was found on the outward trip. This was a small one comprising but a few hundred individuals and was located in a fairly large pot of earth in which was growing an ornamental plant. This was in the dining saloon and its removal and destruction resulted in nearly complete relief from the pest in that part of the ship.

The Colombia remained at Baltimore four days and began the return trip on January 12, 1922, and left Norfolk, Virginia, on the 14th. Arsenical syrups, formulas A and B, were placed in all rooms on that day though no ants were seen. Indeed they did not appear till we left Havana, Cuba and were in the Caribbean Sea January 18th. The attack was light and easily controlled with the formula C powder. On the night of January 20th a vicious attack by the ants were reported in three rooms directly across from the engine room. These rooms were visited at midnight and it was found that the ants were attempting to establish formicarys in the beds. They were carrying pupae to these beds in great quantity. A liberal use of the powder quickly relieved the situation. The following day the cause of the migration was discovered. A boy had been sent up the ventilator shaft connecting with the engine room. The boy's visit was for purposes other than ant hunting but he got into a well populated formicary in the shaft. He came out in a hurry, literally covered with ants. He was severely bitten. This disturbance had undoubtedly made the ants uneasy, hence the attempt to establish new formicarys. Owing to the necessity of keeping these ventilators in active use while the engines were going, drastic treatment of them had to be put off till January 23d while the ship was lying at the dock at Cristobal, Canal Zone. Here we had the outside ends of the ventilators covered with canvas and then ran live steam into them for an hour. Vast numbers of ants were destroyed by this action. From January 24th on, only occasional small straggling groups of ants were seen and no complaints were registered. The last ants were seen as we left Manzanillo, Mexico, northbound on February 3, 1922. We here experienced cold weather conditions which continued until our arrival in San Francisco on February 10th. Careful inspection and search failed to disclose a single ant. They undoubtedly had again gone into dormancy and so ended the ship board ant campaign.

The frequently recurring dormant periods seem to stimulate these ants to very active work when warm conditions supervene. In the period that this study was made, fifty-eight days, the ants were dormant three times and the time devoted to reproduction and the gathering of stores was brief as compared with the same activities under normal conditions on shore. Certain it is that these ants were numerous, active and vicious.

In view of the seriousness of the pest on shipboard, the money loss due to their depredations on stores and the extreme discomfort their

presence gave passengers we recommended, first: A complete fumigation of the affected ships with sodium cyanide gas. Second: The equipment of the Chief Steward's office with a full supply of perforated tins, with sponges, and a quantity of the formula A and B syrup. Third: That formula C powder be furnished the same office in quantity. These last two recommendations were made so that the steward and his helpers might be in a position to combat ants did they appear in spite of the fumigation. These recommendations have been acted upon and the economic control of this pest on shipboard has been accomplished.

FORMULA A, GOVERNMENT FORMULA FOR ARGENTINE ANT POISON:

Granulated sugar	9 lbs.
Water	9 pts.
Tartaric acid (crystalized)	6 grams
Benzoate of soda	8.4 grams
Boil slowly for 30 minutes. Allow to cool.	
Dissolve sodium arsenite (C.P.)	15 grams
In hot water	$\frac{1}{2}$ pt.
Cool. Add poison solution to syrup and stir well. Add to the poisoned syrup:	
Honey	1 $\frac{1}{4}$ lbs.
Mix thoroughly.	

FORMULA B, FORMULA FOR NATIVE ANT POISON:

White Arsenic	2 oz.
Caustic soda	2 oz.
Sugar	1 lb.
Water	1 pt.

FORMULA C

6 parts by bulk—Sodium flouride	
2 " " "—Pyrethrum (Buhach) powdered stems and flowers	
2 " " "—Corn starch	

Teaspoon, tablespoon, cup, indeed any convenient measure may be used in making up this powder. Care should be taken to maintain the above given proportions. This powder can be easily used in beds and where ants are by dusting from can with perforated top.

THE ATTRACTION OF *CHLORIDEA OBSOLETE* FABR. TO THE CORN PLANT¹

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A complete study of the life economy of any insect must eventually include a consideration of the fundamental activities necessary for the

¹Contribution No. 65 from the Entomological Laboratory, Kansas State Agricultural College. This paper embodies some of the results obtained in the prosecution of project No. 9 of the Agricultural Experiment Station. The writer desires to express his appreciation for the assistance rendered by Mr. H Yuasa in the experimental work of 1919, and in securing certain literature not available in the Station Library.