fair preparations but it was more difficult to find clean fields, probably due to the larger amount of organic material present. Deciduous teeth were crushed, auto-

FIG. 3. Micrograph of cortical bone, autoclaved 2 hr at 27 lb (270° F), agitated in Waring Blendor for 15 min, and subjected to ultrasonics at 400 kc for 15 min. Magnification × 34,500.

claved, blended, and resonated. Glycol-ashed bone was blended and subjected to ultrasonics. Adequate micrographs were obtained in both instances. Bone thus prepared shows the picture of normal bone in the x-ray diffraction pattern.

These methods are being used to investigate the submicroscopic structure of bone. A paper is being prepared which will detail the findings, interpretations, and conclusions obtained from electron micrographs of material prepared by these methods.

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Arrest of Development of *Plasmodium gallinaceum* in Mosquitoes (*Aedes aegypti*) by Radiation Effect of P^{32} [1,2]

P. F. Hahn, Victor H. Haas, and Aimee Wilcox

Department of Biochemistry, Vanderbilt Medical School, Nashville, Tennessee,
and *the Section on Epidemiology (Memphis), Laboratory of Tropical Diseases, National Institutes of Health, Bethesda, Maryland*

During the course of experiments on the radioactive tagging of sporozoites of the avian malaria parasite *Plasmodium gallinaceum*, it was observed incidentally that ingestion of P^{32} by host mosquitoes during the period of extrinsic incubation caused development of the parasite to be arrested. The present report deals with this observation.

One hundred fifty *Aedes aegypti* were allowed to engorge on chicks that were infected with *P. gallinaceum* and that showed many gametocytes in their peripheral blood. Thereafter these mosquitoes were provided daily with 5% glucose solution containing radioactive sodium acid phosphate, the total radioactivity approximating 30 mc. This material was soaked in a cotton pledget which was moistened occasionally with water. One hundred other mosquitoes, exposed to infection at the same time and in the same way, were subsequently provided with glucose solution only. Radioactivity measurements were made on a counting-rate meter (*1*) employing a thin mica window, bell-type Geiger-Müller tube.

Nine days following the blood feeding, ten mosquitoes from each group were dissected for determination of the presence of oöcysts in their stomachs; all ten of those receiving glucose and P^{32} contained oöcysts, as did eight of those receiving glucose alone (see Table 1). No difference in average numbers or stage of development of oöcysts was noted in the two groups of mosquitoes. Five days later, mosquitoes from each group were dissected to determine the presence of sporozoites in the salivary glands. No sporozoites were found in 93 mosquitoes given P^{32}, whereas 11 out of 15 given glucose alone showed these forms (see Table 1).

Measurements of radioactivity were made on the salivary glands of 87 of the mosquitoes given P^{32}. These measurements were corrected for decay to the time of first feeding of the P^{32} glucose solution. The lowest activity for a salivary gland was 334 cpm, the highest was 14,000 cpm, and the average of the 87 was 2,400 cpm. In the absence of a reliable figure for the average amount of tissue involved in the salivary glands, it is difficult to

[1] This study was carried out at the suggestion of Dr. Robert Briggs Watson, then of the Tennessee Valley Authority, who arranged for the partial financial support from that source. Miss Lois Seamans, of the Tennessee Valley Authority, performed many of the final salivary gland dissections.

[2] The radioactive phosphorus (P^{32}) used in this study was prepared in the cyclotron of the Massachusetts Institute of Technology.

TABLE 1

RESULTS OF FEEDING P^{32} TO *Aedes aegypti* DURING PERIOD OF EXTRINSIC INCUBATION OF *P. gallinaceum*

Mosquito lot no.	No. fed on gametocyte carrier (10-26)	Feeding during period of extrinsic incubation	Dissected for oöcysts (11-4)		Dissected for sporozoites (11-9)	
			No.	Positive	No.	Positive
544 A	50	Glucose solution only	5	3	4	2
691 A	50	Glucose solution only	5	5	11	9
688 A	50	P^{32} + glucose	5	5	36	none
692 A	50	P^{32} + glucose	5	5	25	none
692 B	50	P^{32} + glucose	none	..	32	none

estimate the total radiation delivered to the gland itself. The efficiency of our Geiger counter could be estimated as being approximately 20%, and this would mean that there were in the vicinity of 12,000 disintegrations per minute in the average glands during the early part of the feeding process. Owing to the extremely small amount of tissue involved, this would suggest a very high equivalent roentgen dosage. On the other hand, in spite of such a relatively high degree of radioactivity, it was surprising that there were no apparent deleterious effects on the mosquitoes themselves during the period studied. No gut examinations were carried out on the 14th day, and therefore there are no data as to presence or absence of oöcysts at this time in the 93 mosquitoes that showed no sporozoites in the salivary glands.

It appears that the amount of radiation in the salivary glands and/or the mosquito as a whole was sufficient to arrest development of the parasites during the oöcyst stage.

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Toxicity to Mice of Chlordane Vapor and Solutions Administered Cutaneously[1]

Hubert Frings and Joseph E. O'Tousa

Pennsylvania State College, State College, Pennsylvania

The toxicity of DDT to mammals has been rather thoroughly investigated (*2, 4, 7–9*), and it is now known that acute intoxication causes nervous disorders, and chronic intoxication results in fatty degeneration and necrosis of the liver. The newer insecticide, Chlordane,[2] however, has received much less attention. In general, its action is similar to that of DDT, but it is more readily absorbed through the skin (*1, 2, 6, 8*). Like DDT, it causes hepatic necrosis in chronic intoxication (*4, 6–10*). The present investigation was instituted to determine the effects of long-continued application of small quantities of Chlordane to the skin, and also to discover the possible toxicity of its vapor.

Five groups of virgin female Swiss albino mice were used in the experiments: Ten mice received no treatment and served as a control group; 16 mice received cutaneously 0.01 ml of odorless kerosene (Deobase) daily for 5 days per week; 16 mice received cutaneously 0.01 ml of 2% Chlordane solution in odorless kerosene (7.4 mg of Chlordane per kg of body wt per day) daily for 5 days per week; 16 mice received cutaneously 0.04 ml of 2% wettable powder suspension of Chlordane daily for 5 days per week; 60 mice in four subgroups were exposed to Chlordane vapor for different periods of time.

The amounts selected for application to the mice corresponded to doses which a man might receive were he to have his hands and arms wetted to the elbows. Because of the higher surface tension of the wettable powder suspension, more of this than of the kerosene solution is required to effect the same wetting. The solutions were applied from a micropipette to the intrascapular region of the mice. When applied at that spot, the solutions are difficult or impossible for a mouse to remove by itself. Extended observations showed that the mice made no effort to lick each other after one or two tastes of the kerosene or Chlordane solutions. Thus the materials entered the body through the skin and were not ingested. Since some of the Chlordane evaporated from the skin, there must have been some inhalation of the vapor, but probably not in appreciable amounts.

The cutaneous treatments were continued for a total of 20 weeks, 5 days per week. The total amount of kerosene or Chlordane-kerosene solution applied to each mouse was 1 ml and it contained 20 mg of Chlordane (740 mg/kg body weight). The total amount of Chlordane applied to each mouse in the group receiving applications of the wettable powder was four times this. Every month one mouse from each group, selected at random, was sacrificed for autopsy, and the tissues were fixed for histological study. Only the livers have been studied histologically so far.

For tests of vapor toxicity, two types of setup were used. In the first, 16 mice were housed in a wire-mesh cage supported in a box (12 in. × 20 in. × 36 in.) without touching the sides. This box was covered with three pieces of glass with 4-in. spaces between for ventilation. Once every 3 weeks, a strip about 2 in. wide around the inside of the box was painted with about 5 g of Chlordane. The concentration of Chlordane vapor was estimated at about 25% saturation at the start of the experiment, and as a result of accumulation of material on the strip, at about 50% saturation at the conclusion. Since quantitative tests for Chlordane vapor in air do not exist, these are only approximate estimates. The amount applied to the box was considerably higher than that which would be applied in pest control practice, and

[1] Authorized for publication as paper No. 1542 in the Journal series of the Pennsylvania Agricultural Experiment Station. This work was financed by a grant from the John G. Vogel Memorial Fund.

[2] The Chlordane used in these experiments was kindly supplied by the Julius Hyman Company, to which we wish to express our appreciation.