THE OCCURRENCE OF *ENTEROBIUS VERMICULARIS* OVA IN DUST FROM HOMES AND PUBLIC BUILDINGS

WAYNE W. WANTLAND, MARY HO, MILDRED M. CARMICHAEL AND CLIFFORD STORM

Illinois Wesleyan University, Bloomington

In recent studies, a theory has been proposed concerning the occurrence of ova of the pinworm *Enterobius vermicularis* in household dust. Lentze (1935) showed that eggs were liberated into the air when sheets and clothing contaminated with them were shaken, and suggested that the ova might be inhaled to produce infection. In studies by Noland and Reardon (1939) (see table 1) and Schuffner and Swellengrebel (1944), ova were found in dust at all levels of rooms examined, on the floor, upholstery, light fixtures, and on the moulding of doors and windows. The conclusion drawn from their experiments was that viable ova may be present in the air throughout an infected household and that the possibility of reinfection by inhalation of the ova must be considered in prophylaxis and in the therapy of individuals in such households. Our investigation was made to check further this possibility and to ascertain the occurrence of *Enterobius vermicularis* ova in the dust of institutions and homes in the Bloomington-Normal, Illinois, area.

In the study by Noland and Reardon (1939) of the incidence of *Enterobius vermicularis* in persons residing in or near Washington, D. C., the method of procedure consisted of collecting dust samples from various parts of the houses studied and subsequent microscopic examination. Pinworm ova were demonstrated in 221 of 241 samples studied (91.7 percent). Schuffner and Swellengrebel (1944) found enormous quantities of pinworm eggs on two-meter high window seats of school lavatories, in schoolrooms and in dining rooms where children stayed only for short periods.

In the work here reported 3 households and 24 public buildings were examined (see table 2). The 3 homes consisted of families with children. Two of them were not clean according to cleanliness standards. In the third home, the entire family was being treated for pinworm infection. Twenty-two samples of dust were obtained from these homes. Of the three samples of dust from the home where infection was known to be present, two positive findings were obtained. The 19 samples from the other two homes were all negative. A 9.09 percent positive finding resulted from examination of the 22 dust samples from the three homes.

The public institutions examined included: 8 schools, 2 orphanages, a children's ward in a hospital, 3 theaters, 4 hotels, 2 cafes, and 4 other public buildings. A total of 149 samples of dust were obtained from these buildings. Of these, 101 were from the orphanages. Only samples taken from the dormitories and restrooms of the orphanages gave positive results. An 8.1 percent positive finding for public institutions and a 11.8 percent positive

TABLE 1.—COMPARISON OF INCIDENCE OF *Enterobius vermicularis* OVA IN HOUSEHOLD DUST OF WASHINGTON, D. C., AND BLOOMINGTON-NORMAL, ILLINOIS, AREA.

	Washington, D. C. (Nolan & Reardon)	Bloomington-Normal Illinois Area
No. of Homes	7	3
Households of Known Infection	7	1
No. of Samples	241	22
No. of Positives	221	2
Percent of Positives	91%	9.09%

finding for Bloomington-Normal orphanages was obtained.

Most samples from the three homes and the two orphanages were taken from bedrooms or dormitories. A few were taken from the toilet rooms. Samples were taken from all levels of the rooms, especially the framework of beds and places where linen and bed clothing were shaken out, and where night clothing and undergarments were located. In the toilet rooms, dust samples were taken from seats, ledges around the toilet, and the floor. It seems significant that ova were found in only one instance near the floor. They were usually found at levels of from two to five feet from the floor.

Two methods of dust sampling and study were employed: (a) the deep-well slide method as described by Noland and Reardon, and (b) the scotch-tape method as used by Schuffner and Swellengrebel for anal smears. The deep-well method consisted of the collection of dust samples with a small camel's hair brush which had been inserted into a perforated rubber stopper and fitted into a test tube. The brush was moistened with water, passed over a surface, replaced in the test tube, and brought back to the laboratory for examination. The examination consisted of dipping the brush into a few minums of decinormal sodium hydroxide solution

TABLE 2.—THE INCIDENCE OF *Enterobius vermicularis* OVA IN DUST OF PUBLIC BUILDINGS IN BLOOMINGTON-NORMAL, ILLINOIS, AREA.

Public Buildings	Areas Studied	No. of Samples	No. of Positives	Percent
1. Schools	Cloak Rooms Rest Rooms Halls	23	0	0
2. Hospitals	Childrens Ward	8	0	0
3. Orphanages	Dormitories Toilet Rooms	101	12	11.8
4. Theaters	Auditorium Rest Rooms	3	0	0
5. Other Public Buildings	Conjested Areas	14	0	0
Total		149	12	8.1

on a deep-well slide and study of contents under a compound microscope. The ova having a lower density than that of the decinormal sodium hydroxide solution tended to float to the top. A few drops of the solution placed at the hilt of the brush and allowed to flow across it on to the slide seemed to be most effective as a means of cleansing the brush of the dust deposits. Each dust sample was examined three times. No attempt was made to determine the total number of ova present in any sample. In the scotch-tape method, a one and one-half inch strip of tape was placed over a surface and then carefully transferred to a clean slide. The slide was then examined under a compound microscope for ova.

Enterobius vermicularis ova were found in all stages of development from those of clear formative protoplasm with many vacuoles to full-grown embryos. Many of the embryos were in a partially disintegrated condition and their viability questionable. The eggs were clear and plain and were easily identified without staining. They measured from 50 to 60 microns by 20 to 30 microns and in general, were flat on one side with a distinct membranous covering.

The evidence from this study indicates that ova of the internal parasite, *Enterobius vermicularis,* are carried by air currents and may be inhaled, and thus be a source of infection and reinfection.

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