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A SEROLOGICAL SURVEY OF ORNITHOSIS IN BIRD BANDERS*

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INTRODUCTION

Ornithosis is a chlamydial (somewhat virus-like) disease occurring at times among birds of many species including pheasants, chickens, pigeons, turkeys, ducks, certain wading birds and even fulmars. It is related to, and may be identical with, psittacosis which occurs in psittacine birds. All avian species tested to date have been found to be susceptible to infection by experimental inoculation. There have been well-marked epidemics associated with commercial enterprises such as breeding aviaries, transport agencies, poultry and pheasant farms and poultry-processing plants. It has occurred also among bird hunters in Louisiana. Infection of human beings by the causative agent may be followed by mild or severe illness or may not be attended by clinical symptoms.

Little is known of the occurrence of ornithosis in the native wild avifauna of the United States. Only the Herring Gull, Snowy Egret, Willet, Magpie, Painted Bunting and Goldfinch have thus far been found naturally infected. If the disease exists among the hundreds of other native species to any appreciable extent, especially among other

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passerine species, it would seem reasonable to expect that some bird-banders would acquire it from them. In this country bird-banders are the only group in the population who regularly come into intimate contact with small wild birds. This contact, moreover, is a sustained one that persists over a long span of years, since bird-banders do not as a rule embrace this activity as a whim or passing hobby. It therefore becomes of interest to learn whether bird-banders as a class show serological evidence of a higher past incidence of ornithosis infection than that of the general population. This, in turn, provides an indirect clue to the degree of incidence of ornithosis among small native birds in the wild state.

MATERIALS AND METHODS

The following study reports the findings on the sera of thirty-five individuals who graciously contributed specimens of their blood at the annual meeting of the Eastern Bird Banding Association at Washington Crossing Park, Pennsylvania, on April 21, 1956‡. The individuals, all of whom were Caucasians, were asked to fill in a questionnaire as to their avian contacts and past medical histories. A summary of this information is given in the accompanying tables. Tables 6 and 7 by no means include all the types of birds banded, since some banders regularly handle fifty or more species each year. The backyard banding stations were located in Connecticut, New York, New Jersey and Pennsylvania, so that a fairly homogeneous geographic area is represented. Colonial banding studies were made chiefly along the Atlantic Coast from Maryland to Maine.

TABLE I. *Age and sex of bird-banders.*

Age Group	11-15	16-20	21-30	31-40	41-50	51-60	61-70	Not Specified	Total
Male	3	2	0	7	6	4	3	1	26
Female	0	0	0	0	4	4	1	0	9
Totals	3	2	0	7	10	8	4	1	35

TABLE II. *Banders giving history of past "chest infection."*

Years Ago	0-1	2-5	6-10	11-20	21+	Not Specified
No. Banders	1	0	0	2	1	2

TABLE III. *Banders having contact with domestic birds.*

Species of Bird	Parakeets	Pigeons	Chickens
No. Banders	6	2	4

TABLE IV. *Duration of banding activities.*

No. Years	0-1	1-2	2-5	6-10	11-20	21+	Never Banded, Although Maintain Bird-Feeding Stations
No. Banders	4	6	8	4	6	5	2

‡ The assistance of Dr. Philip S. Brachman and Mr. Albert Ketler in drawing blood specimens is gratefully acknowledged.

TABLE V. *Total birds handled annually.*

No. Birds	1-100	101-500	500+	None	Not Specified
No. Banders	2	11	19	2	1

TABLE VI. *Birds most frequently handled at 32 backyard banding stations.*

No. Banders	Species	No. Banders	Species
1	Chimney Swift	7	"Grackle"
1	Mourning Dove	2	Cowbird
1	Bank Swallow	6	Redwing
2	Barn Swallow	1	"Blackbirds"
1	"Chickadee"	1	Towhee
3	Catbird	2	Evening Grosbeak
1	Brown Thrasher	4	Purple finch
1	"Wrens"	1	House finch
2	Robin	16	Junco
1	Bluebird	18	Whitethroat
1	American Pipit	4	Tree Sparrow
1	Blue Jay	7	Song Sparrow
8	Starling	4	"Sparrows"

TABLE VII. *Colonial or water birds handled by eight bird-banders.*

No. Banders	Species	No. Banders	Species
5	Common tern	1	Arctic tern
4	Herring gull	1	"Terns"
3	Black skimmer	1	Black guillemot
2	Laughing gull	1	"Cormorant"
2	"Night heron"	1	Leach's petrel
2	Least tern	1	"Waterfowl"
1	Black-backed gull	1	Bank swallow

The sera were tested as follows:

A. Sera

All blood specimens were centrifuged on the day they were drawn and the sera obtained were stored at -20°C until used. Serum specimens were inactivated in a water bath at 56°C for $\frac{1}{2}$ hour before use in complement fixation tests.

B. Amboceptor

Commercially prepared rabbit amboceptor was used in all tests. The amboceptor was titrated before each test and diluted to contain three units in 0.25 ml.

C. Sensitized cell suspension

Sheep cells were washed three times by centrifugation in physiologic saline and were then diluted in saline to comprise a 3% suspension. Equal volumes of 3% sheep cells and diluted amboceptor containing three units in 0.25 ml. were mixed and allowed to stand at room temperature for $\frac{1}{2}$ hour before use.

D. Complement

Commercially prepared dehydrated complement was rehydrated and titrated before each test. The complement was diluted to contain 2 complete units in 0.5 ml.

E. Antigenes

Squibb Lygranum and Lygranum control antigens were used in all tests. The antigens were diluted to contain two units of antigen in 0.2 ml.

F. Procedure

Serial twofold dilutions of sera were made in tubes in 0.25 ml. amounts to which were added 0.5 ml. of complement and 0.2 ml. of antigen. This mixture was incubated for one hour in a water bath at 37°C. Five-tenths ml. of sensitized cell suspension was then added and the tubes were reincubated in a 37°C water bath for 30 minutes and then read according to the amount of hemolysis present. The highest serum dilution tube showing no hemolysis (complete fixation of complement) was considered the complement fixing titer for that particular serum specimen. All the necessary controls were included in each complement fixation test.

RESULTS

Thirty-two sera were nonreactive at 1:5 dilution. Two were slightly reactive at 1:5 dilution but not at greater dilutions; these results were regarded as being of no significance. One serum was positive at 1:20 dilution, a result that may be accepted as being clinically significant. The individual contributing the latter specimen is a fifteen-year-old male who has assisted in the operation of a bird-banding station at his school for only the past nine months. The annual turnover at this station is 800 birds, chiefly tree sparrows and white-throated sparrows. The individual concerned has stated in subsequent correspondence that the only pets maintained at his home are a dog and a cat and that he has no knowledge of any past respiratory infection except the common cold. His school is in New York State.

DISCUSSION

Since psittacosis and ornithosis in man may escape clinical detection owing to the mildness of some infections, its incidence in the population at large is unknown. Serological surveys for determining the level of past infection in various groups of people are handicapped in two ways: positive results due to cross reactions are recorded if individuals are infected with the agent of lymphogranuloma venereum; negative reactions may occur in persons whose ornithosis antibodies have dropped to undetectable levels due to spontaneous "burning out" of their infections, or in persons who possibly may have eradicated latent ornithosis infections by taking a course of antibiotics incidental to the treatment of other illnesses.

Lymphogranuloma venereum occurs most frequently in the colored race. Among Caucasians it is most frequent among persons experiencing the common venereal diseases. This cross-reaction was therefore not to be expected as a confusing factor in the present survey.

We are left, then, with the problem of surveys among bird-handlers. The most pertinent investigation seems to be a recent study of positive

serology among railway express messengers known to have had various animals, including parakeets, under their care in transit (1). Of 24 persons thus engaged, 17 (71%) reacted positively. However, among 19 loaders and 20 office workers in the same organization, none of whom was aware of having had contact with the animals and birds in transit, only 5 (13%) reacted similarly.

The latter figure seems too high to be accepted as the general level of infection of the unexposed public. Undoubtedly the loaders and office workers were receiving some degree of contamination unbeknownst to themselves, e.g., the loaders might have been coming into contact with feral pigeons, a notoriously heavily infected host species. This would indicate that if ornithosis is present, even in a somewhat remote form, the risk of acquiring infection remains at a significant level.

In view of these considerations it appears that much of our native wild avifauna, and particularly the vast passerine segment, cannot be regarded as an effective potential source of ornithosis infection among bird-banders. Granted that the number of specimens in the present survey was not as great as might be desired, the range of bird species covered was large and many of the sera were obtained from some of our real "old-timers" in the banding game.

The one positive reaction was found in an individual with the least possible experience in bird-banding. It is implausible to ascribe his serology to such brief exposure in view of the remaining non-reactive sera, although the assumption cannot be disproved.

It remains possible that bird-banders may acquire ornithosis occasionally from wild birds. Even if this is the case, the results of this survey tend to emphasize that the hazard must be remarkably small.

SUMMARY

A serological survey for ornithosis was conducted among thirty-five ornithologists, thirty-three of them bird-banders, from Connecticut, New York, New Jersey and Pennsylvania. Thirty-four sera were negative. The single positive specimen came from a youth with minimal experience in bird-banding: he may easily have acquired his infection from a different source, although this could not be ascertained. It is concluded that most species among our native wild birds are not a hazardous reservoir of ornithosis infection.

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APPENDIX I.

Scientific Names of Species Mentioned in the Text

- Fulmar, *Fulmarus glacialis*
 Leach's Petrel, *Oceanodroma leucorhoa*
 Snowy Egret, *Egretta thula*
 Pheasant, *Phasianus colchicus*
 Chicken, *Gallus* sp. (hybrid?)
 Turkey, *Meleagris gallopavo*
 Willet, *Catoptrophorus semipalmatus*

Great Black-backed Gull, *Larus marinus*
Herring Gull, *Larus argentatus*
Laughing Gull, *Larus atricilla*
Common Tern, *Sterna hirundo*
Arctic Tern, *Sterna paradisaea*
Least Tern, *Sterna antillarum*
Black Skimmer, *Rhynchops nigra*
Black Guillemot, *Cephus grylle*
Domestic Pigeon, *Columba livia*
Mourning Dove, *Zenaidura macroura*
Chimney Swift, *Chaetura pelagica*
Bank Swallow, *Riparia riparia*
Barn Swallow, *Hirundo erythrogaster*
Blue Jay, *Cyanocitta cristata*
Magpie, *Pica pica*
Catbird, *Dumetella carolinensis*
Brown Thrasher, *Toxostoma rufum*
Robin, *Turdus migratorius*
Bluebird, *Sialia sialis*
American Pipit, *Anthus spinoletta*
Starling, *Sturnus vulgaris*
Redwing, *Agelaius phoeniceus*
Cowbird, *Molothrus ater*
Painted Bunting, *Passerina ciris*
Evening Grosbeak, *Hesperiphona vespertina*
Purple Finch, *Carpodacus purpureus*
House Finch, *Carpodacus mexicanus*
Goldfinch, *Spinus tristis*
Towhee, *Pipilo erythrophthalmus*
Junco, *Junco hyemalis*
Tree Sparrow, *Spizella arborea*
White-throat, *Zonotrichia albicollis*
Song Sparrow, *Melospiza melodia*
"Parakeets," Family Psittacidae
"Ducks," Family Anatidae
"Night Heron," Probably *Nycticorax nycticorax*
"Cormorant," Probably *Phalacrocorax auritus*
"Chickadee," Probably *Parus atricapillus*
"Wren," Probably *Troglodytes aëdon*
"Grackle," Probably *Quiscalus quiscula*

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