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Spontaneous Ornithosis (Psittacosis) in Chickens the Cause of a Human Infection.

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On December 5, 1940, Dr. Albert W. Van Sickle, Morristown Memorial Hospital, Morristown, New Jersey, kindly submitted for examination the blood serum of a 54-year-old wife of a poultry farmer, who had during the past 2 years lost about 500 chickens from some unknown disease. On November 23 she complained of severe headache, joint pains and grippy-like feelings; her temperature was 102°F, pulse 70 and respirations 20. She had severe chills at 4- to 5-hour intervals. On admission to the hospital with a temperature of 105°F, the X-ray examination on the 28th revealed an early pneumonitic consolidation within the right upper lobe without cough or sputum and a W.B.C. of 7,000. Throat cultures produced no pneumococci and despite sulfathiazole treatment the temperature remained *a continua* at 102 to 103°F. The serum specimens gave a strongly positive reaction in the complement fixation test for psittacosis in a dilution of 1:32 on the 12th, >1:128 on the 41st and 155th days. A few flakes of mucus secured from the buccal cavity on the 32nd day of her illness and after her return from the hospital failed to infect mice. Convalescence was uneventful but slow.

An epidemiological investigation kindly undertaken by the Department of Health of the State of New Jersey conclusively excluded an exposure of the patient to psittacine or any other domesticated birds except chickens. Through the courtesy of Mr. H. R. Nicolas of the Department on January 6th, 1941, 3 chickens were obtained and sent in a frozen state to California. The autopsies revealed no gross lesions suggestive of psittacosis. Although the cadavers showed definite emaciation and anemia, organ emulsions of the spleen, liver and kidneys in pools and separately were inoculated intraperitoneally into mice. The pool from 1 chicken (7754; splenic measurements 15x10 mm) produced in the sacrificed mice by the 20th day definitely enlarged spleens with inconclusive microscopic findings. On the third intraperitoneal passage, aside from splenic enlargement, the blood tinged purulent peritoneal exudate contained numerous polyblasts with few but typical *Microbacterium multiforme* ornithosis (MMO) readily demonstrated in smears stained by the Castaneda and the

Macchiavello methods. A mouse of the fourth passage, sacrificed on the 10th day, showed a much larger number of MMO bodies; in fact, a culture was obtained in the Li-Rivers and Zinsser-Fitzpatrick-Wei media. On intracranial and intranasal injections of 0.03 cc of the exudate, either paralysis with death due to a choriomeningitis on the 8th day or a lobar pneumonia with death on the 11th-12th day was regularly induced in mice and in hamsters. The smears from the lesions were invariably teeming with elementary bodies. Neither the intraperitoneal nor subcutaneous injections of the virus in concentration of one billion infective units estimated microscopically are capable of causing with any regularity fatal infections in a strain of mice highly susceptible for the psittacine viruses. In the non-fatal infections the agent has persisted in the liver and spleen for months. The comparative pathogenicity tests of the chicken virus for birds inoculated by various routes are summarized in Table I.

The chicken virus is indistinguishable from the more recently isolated pigeon viruses; it produces on intramuscular injection in chickens a chronic wasting disease with latency in the spleen, liver and kidneys. Ricebirds and parrakeets are readily infected; intracranial infections in avian species produce fatal meningitides. Antigenically the Microbacterium appears to be identical with two parrakeet viruses with which it has been compared. In the complement fixation test the agent is indistinguishable from the psittacine viruses.

During the latter part of April and during the month of May with the courteous assistance of Mr. W. H. MacDonald of the New Jersey Health Department, which is herewith gratefully acknowledged, the poultry farm was repeatedly visited and the epidemiologic inquiries extended. For the past 5 years the family consisting of husband and wife and 3 children have raised White Leghorn pullets. They claim that in 1939-1940 approximately 500 chickens of their hatchings have died from *"range paralysis"* at the age of 5 months. Shortly before the mortality started a dove(?) roosted with the flock for several weeks. At the time Mrs. B. became ill about 150 to 175 chickens were on the premises. Apparently, the mortality continued and by the middle of May only 31 chickens, mostly emaciated and partly paralyzed, could be secured for autopsies. Since no gross lesions of ornithosis were noted, the sera of 12 birds were tested in the agglutination test with *Microbacterium multiforme*. Two sera gave specific reactions in dilutions of 1:8++++ to 1:16+++ and one in a dilution of 1:2++++ to 1:4++. Three chickens (No. 1, No. 5, and No. 11) with negative serological findings yielded the ornithosis virus by repeated passage through mice. For technical

TABLE I.
Pathogenicity of Chicken-Ornithosis Virus.

Bird	Mode of infection cc	Source of virus	Clinical and anatomical findings at time of death	Microscopic findings	C.F.
Pigeon 1	IC.* 0.03	MB‡ (approximately 100,000 M.L.D. per cc)	Paralysis, death 7th day, meningitis	∞ MMO¶	—
" 2	"	"	" " 10th " "	" "	—
Dove 1 (Streptopelia)	"	"	" " 4th " "	" "	—
Dove 2	"	"	" " " " "	" "	—
Ricebird 1	IM† 0.3	"	Typical course, death 10th day, splenic tumor, purulent exudate over pericardium	" "	—
" 2	"	"	Same on 15th day	" "	—
Dove 3	IM 0.5	MS§ (approximately 1,000 M.L.D. per cc)	Sick, recovered and sacrificed 104th day	Negative, no passage	1:256++++
" 4	"	"	Same	Negative but virus in spleen by passage	1:256++++
Pigeon 3	"	"	Sick, death 11th day, slight exudate	Moderate number of MMO	—
" 4	"	"	Sick, death 41st day, emaciated, exudates	∞ MMO	>1:256
Chicken 1 (6 weeks old)	"	MS (approximately 10,000 M.L.D. per cc)	Sick, anemia, emaciated, death 69th day, pericarditis	Negative, virus in spleen and kidney by passage	—
Chicken 2	"	"	Sick but recovered, sacrificed 165th day	No virus by passage	—
" 3	IC 0.5	"	Paralyzed, death 26th day, meningitis	∞ MMO	—
" 4	"	"	" " 11th " "	" "	—
Ricebird 3	IM 0.5	"	Sick, death 8th day, typical lesions	" "	—
" 4	"	"	" " " " " "	" "	—
Parrakeet 1	"	"	" " 10th " " "	" "	—
" 2	"	"	" " 19th " " "	" "	—
Pigeon 5 (C.F.O.)	IC 0.03	ML‖ (approximately 100,000 M.L.D. per cc)	Paralyzed, death 3rd day, meningitis	" "	—
Pigeon 6	"	"	" " 10th " "	" "	—

*IC = Intracranial.
†IM = Intramuscular.
‡MB = Mouse brain.
§MS = Mouse spleen.
‖ML = Mouse lung.
¶MMO = *Microbacterium multiforme* ornithosis.
C.F. = Complement fixation reaction.

reasons, the nature of the paralysis has not been investigated, and thus it is impossible to state with any degree of certainty that the mass mortalities on the poultry ranch colloquially designated as "range paralysis" were in any way attributable to ornithosis. However, the evidence conclusively proves the existence of spontaneous latent infections with this virus in the flock, and inductively connects the barnyard fowl with human illness. The patient not only fed the chickens but she cleaned the eggs soiled with excreta and removed the entrails in dressing the carcasses. There is likewise suggestive evidence that the virus may have in an inapparent manner infected the other members of the family. The serum of the father (age 53), the daughter (27) and the oldest son (25) gave specific complement fixation reactions in dilutions of 1:4 to 1:8++++. That of the 7-year-old son was negative. Such reactions are significant since similar titers have been previously recorded in latent infections. In their broader implications to public health, these observations denote the existence of a large reservoir of psittacosis or ornithosis-like viruses in the bird kingdom. More than ever will it be the duty of the epidemiologist to study the ecology of the inhabitants of the barnyards and the pigeon lofts when he encounters a patient from which a meningo-pneumonitis-psittacosis-like virus has been isolated, or is being suspected on account of a positive serological reaction. Indirect transfer of virus with soiled feeds should not be overlooked. There is every reason to anticipate that as part of a broad evolutionary development, other birds will be found to be the hosts of an ornithosis parasite which has accompanied them through generations of their ascendency.

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In vitro Response of Lymphocytes to Minimal Doses of X-Rays.*

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The minimal dose of X-ray that produces a significant change in activity has been investigated for several types of living cells. Las-

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