

ISOLATION OF *Pasteurella multocida* FROM WILD RACCOONS AND FOXES: PRELIMINARY REPORT 1

Authors: BONDS, R. E., McCUNE, E. L., and OLSON, L. D.

Source: Journal of Wildlife Diseases, 8(3) : 296-299

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-8.3.296>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

ISOLATION OF *Pasteurella multocida* FROM WILD RACCOONS AND FOXES: PRELIMINARY REPORT¹

R. E. BOND², E. L. McCUNE³, and L. D. OLSON²

Abstract: *Pasteurella multocida* was isolated from the tonsillar fossa of five of twelve wild raccoons (*Procyon lotor*) and one of two red foxes (*Vulpes vulpes*) which were collected with humane wire-cage traps near turkey farms. In one raccoon, the organism was recovered from the mouth in addition to the tonsillar fossa. The fermentation pattern of these isolates was the same as that for 84% of the 214 isolates of *P. multocida* recovered from turkeys in Missouri veterinary medical diagnostic laboratories during the last 5 years. Although these isolates were pathogenic for turkeys, the organism was not transmitted from raccoons to turkeys.

INTRODUCTION

Pasteurella multocida can survive as a saprophyte in the respiratory system of many wild and domestic animals^{9,11,12,13}. Its existence in a carrier animal has caused infections in man through animal bites and scratches^{1,7,8,9,10}.

In reviewing our diagnostic laboratory case reports of turkey cholera, it was noted that wild raccoons (*Procyon lotor*) and red foxes (*Vulpes vulpes*) are frequent predators of turkeys on range. Since predator attacks often precede outbreaks of fowl cholera in turkeys by 7-10 days, there exists the possibility that these predators may be carriers or a reservoir for *P. multocida*.

The purpose of this study was first, to determine if wild raccoons and foxes could carry *P. multocida* and second, to determine the site for isolating this organism from live predators.

MATERIALS AND METHODS

Isolation of *P. multocida*: All raccoons and foxes were captured with

humane wire-cage traps on or near turkey farms and brought to the Veterinary Diagnostic Laboratory, University of Missouri for study and evaluation. The raccoons were physically restrained for collecting swab samples, whereas the foxes were tranquilized due to their size and viciousness.

The buccal cavity including the teeth, the pharynx, and the tonsillar fossae were swabbed and the swabs streaked on dextrose-starch agar (DSA)*. After incubation for 18 hours at 37 C, the growth was examined for *P. multocida* using a stereomicroscope with an oblique source of light³. The mouths of most animals were swabbed at least three times.

Biochemic Tests of *P. multocida*: Suspected isolates of *P. multocida* were tested for their fermentative reactions and gas production in eight carbohydrates and for motility, hydrogen sulfide production and indole production in SIM medium*.

Fermentation reactions were determined in dextrose, lactose, sucrose, maltose, arabinose, dulcitol, xylose and

¹ Contribution from the Missouri Agriculture Experiment Station. Journal Series No. 6326. Approved: 3-1-72.

² Department of Veterinary Pathology, School of Veterinary Medicine, University of Missouri, Columbia, Missouri 65201, U.S.A.

³ Department of Veterinary Microbiology, School of Veterinary Medicine, University of Missouri, Columbia, Missouri 65201, U.S.A.

*Difco Laboratory, Detroit, Michigan.

mannitol. Purple broth base and phenol red broth base* containing 1.0% of one of the carbohydrates were used for determining acid production. Durham gas tubes were placed in the tubes containing dextrose, lactose, sucrose and maltose to test for gas production. The tubes were examined daily for 6 days.

Pathogenicity of *P. multocida* in Turkeys: Six groups of three clinically healthy turkeys, 21 weeks of age, were inoculated with the six confirmed isolates of *P. multocida* to check for pathogenicity. The isolates were grown in tryptose phosphate broth for 24 hours at 37 C. One ml containing approximately 500 organisms was injected into the breast muscle of each turkey. The colony-forming units per dose were determined by plate count on DSA. One group of six clinically healthy turkeys were used as controls. These turkeys received identical treatment as the test birds except they were not inoculated. All turkeys were observed for 21 days postinoculation and all survivors necropsied.

RESULTS

Pasteurella multocida was isolated from five of twelve raccoons and one of two red foxes (Table 1). All of the isolates were obtained from the tonsillar fossa (Fig. 1). In addition, *P. multocida* was isolated from the naso-pharynx, tongue, teeth, and buccal mucosa in one adult male raccoon.

Each of the six isolates fermented dextrose, sucrose, xylose, and mannitol with no gas production. They produced indole, were nonmotile and did not produce hydrogen sulfide in SIM medium (Table 2).

Two of the isolated colonies from the raccoons were iridescent and three were

intermediate. The colony isolated from the red fox was iridescent.

Classification of the raccoon isolates was made using Dorsey's¹⁴ system of classification which is based on the fermentation of xylose, arabinose and dulcitol. All of the isolates in this study were classified in Dorsey's group II which fermented xylose and were negative with dulcitol and arabinose.

Eighteen of the 21 exposed turkeys became dull, depressed and rough appearing in 3 days postinoculation (PI). Food and water consumption was also decreased. One turkey became lame in 5 days PI with death occurring at 9 days PI. Ten days PI, the turkeys inoculated with *P. multocida* became more alert with feed and water consumption being increased. From this time until necropsy at 21 days PI, these turkeys appeared the same as the uninoculated controls.

There was a necrotic area at the site of injection and a caseous exudate in the joints of the turkey dying 9 days PI. Cultures of the liver, joints, and injection site of this turkey were positive for *P. multocida*.

All surviving turkeys necropsied at 21 days PI had a large area of necrosis at the injection site with no other gross lesions observed. Cultures of the liver and injection site of each bird were negative for *P. multocida*.

Efforts to transmit *Pasteurella* directly from the raccoon to the turkey in common housing were unsuccessful. The raccoons did not attempt to attack the turkeys. One raccoon died from a secondary infection of an old injury unrelated to the present study. One escaped through a screen covering an open window, after 3 days confinement with eight turkey poults.

TABLE 1. Incidence of *Pasteurella multocida* in tonsillar crypts of wild raccoons and foxes.

Animal Species	No. Positive/No. Tested
Raccoon (<i>Procyon lotor</i>)	5/12
Red Fox (<i>Vulpes vulpes</i>)	1/2



Figure 1. Technique used to swab Tonsillar fossa of raccoon.

DISCUSSION

The fermentation patterns of the raccoon and fox isolates were comparable with the results of a study by Donahue⁵ who found that 83.6% of 214 turkey isolates from Missouri could be placed in Dorsey's group II. From results of this study, it is suggested that the *P. multocida* isolated from the raccoons and fox were the same as that causing fowl cholera in turkeys.

Since only one death occurred and all groups of turkeys were clinically ill for a period of 7 days after inoculation, the isolates used in this study were probably of low virulence and similar to the isolates from naturally diseased turkey

flocks in Missouri.

It was found that *P. multocida* could be isolated consistently from the tonsillar fossae with little contamination. Swabs taken of other areas of the oral cavity were frequently contaminated with a *Proteus* swarmer that made impossible the identification of any *P. multocida* present.

Bergerud¹ has reported the transmission of *P. multocida* by predation of lynx on caribou calves. Therefore, the theory that the transmission of *P. multocida* in turkeys on range may be caused by the predation of wild carnivores was not rejected, even though attempts to demonstrate the phenomenon in this study were unsuccessful.

TABLE 2. Bacteriological characteristics of isolates of *Pasteurella multocida* from raccoons and foxes.

Culture No.	2876	2940	4001	4015	4179	4384
Source Date	Raccoon 6-2-71	Raccoon 6-15-71	Raccoon 6-24-71	Raccoon 6-29-71	Raccoon 8-2-71	Red Fox 9-7-71
Dextrose	A*	A	A	A	A	A
Lactose	—	—	—	—	—	—
Sucrose	A	A	A	A	A	A
Maltose	—	—	—	—	—	—
Arabinose	—	—	—	—	—	—
Dulcitol	—	—	—	—	—	—
Xylose	A	A	A	A	A	A
Mannitol	A	A	A	A	A	A
Motility	—	—	—	—	—	—
Gram Stain	—	—	—	—	—	—
H ₂ S-SIM	—	—	—	—	—	—
Indol-SIM	+	+	+	+	+	+
Type: Colony						
Iridescent	+	+				+
Intermediate			+	+	+	
Blue						

A* = acid produced; — = negative observation; + = positive observation.

LITERATURE CITED

1. BERGERUD, A. T. 1971. The population dynamics of Newfoundland caribou. Wildlife Monographs, No. 25.
2. BOISVERT, P. L., and M. D. FOUSEK. 1941. Muman infection with *Pasteurella lepipectica* following rabbit bite. J. Amer. med. Assoc., 116: 1902-1903.
3. BOND, R. E., J. M. DONAHUE and L. D. OLSON. 1970. Colony features of *Pasteurella multocida* and their use in diagnosing fowl cholera in turkeys. Avian Dis. 14: 24-28.
4. BRANSON, D. and F. BUNKFELDT, JR. 1967. *Pasteurella multocida* in animal bite of humans. Amer. J. clin. Path. 48: 552-555.
5. DONAHUE, J. M. and L. D. OLSON. 1971. Biochemic study of *Pasteurella multocida* from turkeys. Accepted for publication in Avian Diseases.
6. DORSEY, T. A. 1963. Studies on fowl cholera. I. A biochemic study of avian *Pasteurella multocida* strains. Avian Dis. 7: 386-392.
7. EMSON, H. E. 1957. Local infection with *Pasteurella multocida* after a dog bite. J. clin. Path. 10: 187-190.
8. HANSMANN, G. H., and M. TULLY. 1945. Cat bite and scratch wounds with consequent *Pasteurella* infection of man. Amer. J. clin. Path. 15: 312-318.
9. HOLLOWAY, W. J., E. G. SCOTT, and Y. B. ADAMS. 1969. *Pasteurella multocida* infection in man. Amer. J. clin. Path. 51: 705-708.
10. McGEACHIE, J. 1958. Isolation of *Pasteurella septica* from a lion bite wound and lion's mouth. J. Path. Bact. 75: 467-470.
11. OWEN, C. R., E. O. BUNKER, J. F. BELL, and W. L. JELLISON. 1968. *Pasteurella multocida* in animal's mouths. Rock Mt. Med. J. 65: 45-46.
12. SCHIPPER, G. J. 1947. Unusual pathogenicity of *Pasteurella multocida* isolated from the throats of common wild rats. Bull. Johns Hopkins Hosp. 81: 333-356.
13. SMITH, J. E. 1955. Studies on *Pasteurella septica*. I. The occurrence in the nose and tonsils of dogs. J. comp. Path. 65: 239-245.

Received for publication March 20, 1972