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ABSENCE OF PASTEURILLA PESTIS IN THE WILDLIFE OF ARKANSAS

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It is generally believed that plague first appeared in the United States in 1900 at San Francisco in the form of an initial "murine" phase which led to wild rodent infection and the phase known as sylvatic plague. Since that time, sylvatic plague has spread eastward until now it is reported in the neighboring states of Kansas, Oklahoma, and Texas (1). If migration continues it may be expected to enter Arkansas in the future. To determine if sylvatic plague had reached Arkansas, the isolation of *Pasteurella pestis* was included in investigations of the incidence of certain diseases in wildlife carried out at the University of Arkansas.

MATERIALS AND METHODS

The methods used for the collection and preparation of the tissue samples was the same as reported previously (2). The medium recommended by Meyer and Batchelder (3) was employed both in liquid and solid form. This medium consists of: Heart Infusion Broth, 25.0 g; Gentian Violet (0.1 per cent solution), 20.0 ml; Na_2SO_3 (10 per cent solution made fresh each time), 2.5 ml; agar (for solid form), 15.0 g; distilled water, 1000 ml. Each tube of broth was inoculated with 1.0 ml of the ground sample suspended in saline. Duplicate tubes were incubated at 30 C; after 4 days, and 10 days incubation, 0.1 ml of broth was spread on the surface of the corresponding agar in duplicate. At the time of inoculation of the broth tubes, 0.1 ml of the original saline suspension was also spread on the surface of agar plates in duplicate. All plates were examined at 2, 4, and 10 days. On this medium colonies of *P. pestis* are marked by a concentration of dye in the center of the colony. All suspicious colonies were subcultured and checked by slide agglutination with antiserum.

RESULTS AND DISCUSSION

Samples were examined from 1530 mammals of 29 species, 18 reptiles of 6 species, and 24 birds of 11 species. A list of species is given as Table 1. *Pasteurella pestis* was not found in any of the specimens examined; furthermore, so far as it is known, the plague bacillus has never occurred in the wildlife

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of Arkansas. Whether this microorganism can be expected to appear in Arkansas is debatable.

Rat borne plague has appeared in the United States repeatedly; San Francisco, 1900 and 1907; New Orleans, 1914 and 1919; Pensacola, Galveston, and Beaumont, 1920; and Los Angeles, 1924 (5). With the exception of San Francisco, none of these outbreaks have ever shown any tendency to spread or even to persist.

It is generally believed that sylvatic plague has been spreading eastward from an original introduction on the west coast. If such migration continues it may be expected to enter Arkansas in the future. On the other hand, some investigators have explained the occurrence of the disease in North America as due to *P. pestis* which, they believe, was carried as a population regulator by rodents in their original emigration by the Bering Strait route.

In each of the major wild-rodent foci, the principal reservoirs are burrowing rodents, Sciuridae, which live in subterranean colonies; secondary reservoirs are mainly to be found among the Leporidae, Muridae, or Cricetidae. Such burrowing Sciuridae are found only in the western part of the United States with Kansas, Oklahoma, and Texas forming their eastern boundaries. Whether plague was introduced into the rodent population of the United States in the 1890's or has been present for a much longer period, its eastern boundary appears to be stabilized at the eastern boundary of the range of these primary reservoirs. Arkansas is, therefore, excluded as the site of a primary reservoir.

Potential secondary reservoirs are found in Arkansas as shown in Table 2. Theoretically, since sylvatic plague is already in Oklahoma, these secondary reservoirs may become infected and bring plague into Arkansas. Such an infection would most likely not be widespread and should not persist as a primary reservoir would be absent. For instance, in Louisiana, where the rodent fauna is essentially the same as Arkansas, plague organisms were found in *Oryzomys palustris* which had presumably contracted it from the plague infected rats of New Orleans (6). In this case plague was transferred from the commensal to the wild rodents, but in the absence of a primary reservoir, did not persist.

From the above discussion it may be concluded that plague does not appear to be present in Arkansas. Furthermore, while its introduction is not likely the possibility can not be entirely ruled out; in as much as, the general movement of the disease is eastward, secondary reservoirs are available, and the Arkansas and Red Rivers drainage runs from west to east.

*Absence of Pasteurella pestis in Arkansas*TABLE 1—Species examined for the presence of *Pasteurella pestis*.

Species	Total Specimens	Species	Total Specimens
Mammals		<i>Sylvilagus aquaticus</i>	44
<i>Blarina brevicauda</i>	6	<i>Sylvilagus floridanus</i>	192
<i>Canis familiaris</i> *	2	<i>Sylvilagus</i> spp.	2
<i>Cryptotis parva</i>	1	<i>Urocyon cinereoargenteus</i>	14
<i>Didelphis marsupialis</i>	64	<i>Vulpes fulva</i>	9
<i>Felis domestica</i> *	8	Reptiles	
<i>Geomys bursarius</i>	17	<i>Agkistrodon mokasen</i>	2
<i>Glaucomys volans</i>	13	<i>Agkistrodon piscivorus</i>	8
<i>Lasiurus borealis</i>	5	<i>Coluber constrictor</i>	2
<i>Mephitis mephitis</i>	18	<i>Coluber flagellum</i>	2
<i>Microtus pinetorum</i>	24	<i>Lampropeltis getulus</i>	2
<i>Mus musculus</i>	170	<i>Natrix sipedon</i>	2
<i>Odocoileus virginianus</i>	70	Birds	
<i>Oryzomys palustris</i>	6	<i>Buteo jamaicensis</i>	1
<i>Peromyscus gossypinus</i>	43	<i>Cathartes aura</i>	5
<i>Peromyscus leucopus</i>	213	<i>Coccyzus americanus</i>	3
<i>Peromyscus maniculatus</i>	8	<i>Cyanocitta cristata</i>	1
<i>Peromyscus nuttalli</i>	26	<i>Dendroica pinus</i>	1
<i>Peromyscus</i> spp.	16	<i>Falco sparverius</i>	1
<i>Procyon lotor</i>	25	<i>Helminthosoma vermivorus</i>	1
<i>Rattus norvegicus</i>	14	<i>Lanius ludovicianus</i>	8
<i>Reithrodontomys fulvescens</i>	232	<i>Quiscalus quiscula</i>	1
<i>Sciurus carolinensis</i>	10	<i>Vireo olivaceus</i>	1
<i>Sciurus niger</i>	51	<i>Zonotrichia albicollis</i>	1
<i>Sigmodon hispidus</i>	227		
*Feral specimens			

TABLE 2—Species and genera of mammals occurring in Arkansas that have been found to be infected with *P. pestis* elsewhere. (After Pollitzer, 5).

Species	Locality	Genera	Locality
<i>Oryzomys palustris</i>	Louisiana	<i>Glaucomys</i>	California, Washington
<i>Peromyscus leucopus</i>	New Mexico	<i>Microtus</i>	California, Washington
<i>Peromyscus maniculatus</i>	California, Washington	<i>Mustela</i> (weasel)	Western States
<i>Sigmodon hispidus</i>	New Mexico	<i>Reithrodontomys</i>	California, Kansas, New Mexico
		<i>Sylvilagus</i>	California, Washington

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