A Survey of Chiropteran Rabies in Western Montana

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IN an earlier report from the Rocky Mountain Laboratory of the Public Health Service, Hamilton, Mont., we described the isolation of rabies virus from a bat caught in Ravalli County, Mont., in the late summer of 1954 (*1*). The lateness of the season limited collections in that year. However, in 1955 we made further attempts to isolate rabies virus from the bats obtained during field trips and by contributions from local residents.

Usually, bats were collected from roosts in attics with the gloved hand or were taken with forceps. Several infected bats were collected under circumstances which we will describe.

In the laboratory one lateral half of the brain of each bat was triturated in sufficient 1 percent albumin-saline diluent to make approximately a 5 percent suspension. A preliminary test for infection was done with each suspension by injecting each of 6 mice intracerebrally with 0.03 ml., and the remainder of the suspension was frozen. When the screen test was positive, the preserved suspension was centrifuged, and the supernate was titrated in mice. The other half of the brain was fixed in Zenker's fluid for microscopic study.

The authors are, respectively, senior surgeon, pathologist, and parasitologist with the Rocky Mountain Laboratory, National Institute of Allergy and Infectious Diseases, Public Health Service, Hamilton, Mont. Dr. Charles O. Handley, Jr., of the Division of Mammals, United States National Museum, Washington, D. C., identified all the bats examined. The museum retained the infected specimens for reference purposes.

Rabies From Three Species

One hundred twenty-one apparently normal bats were collected alive in routine collections in various parts of Ravalli County. The numbers of the various species examined are tabulated:

Myotis yumanensis	14
Myotis lucifugus	47
Myotis yumanensis or *Myotis lucifugus* (juvenile)	17
Myotis volans	3
Myotis evotis	1
Myotis californicus	1
Eptesicus fuscus	37
Unidentified	1

These bats were brought to the laboratory and held in captivity a day or two until it was convenient to test them. None of their brain tissues produced rabies in mice.

Six other bats exhibiting aberrant behavior or found in unusual situations by people who knew of our 1954 findings were submitted for examination. Three of the six bats were rabid. The circumstances under which these three bats were collected are as follows:

A housewife in a small town about 6 miles from the laboratory brought the first infected bat, *Myotis californicus californicus*, to our attention. She said that her dog had bitten a sick bat, which was dead when a messenger arrived to collect it. The dog remained well during a 3-week period of observation.

In western North America, the California little brown bat, *M. californicus*, is represented by four subspecies, which range from southern Alaska to southern Mexico. *M. californicus* is a small insectivorous bat of uncommon occurrence. Hall (*2*) found the species in Nevada hibernating in mine tunnels. Little is known of its habits or its distribution in Montana.

The second infected bat, identified as *Eptesicus fuscus pallidus*, was collected alive by a 10-year-old boy, who found it along with a dead bat on the floor of an unoccupied house in Hamilton. He adopted the bat as a pet, but the next day it died. When the child brought the dead animal to the laboratory, he was questioned carefully but denied having been bitten.

Information on *E. fuscus pallidus* is included in our 1955 report on chiropteran rabies (*1*).

The third infected bat, *Lasiurus cinereus cinereus*, was collected by one of us at Flathead Lake in northwestern Montana. As he was standing near the shore of the lake in open pine woods in bright daylight (6 p. m., August 18, 1955), his attention was attracted to a fluttering bat overhead. The bat flew in a direct line toward a large tree, which it struck without slackening flight. The animal fell to the ground, but it was conscious and squeaked when approached. He killed the bat with a light stick and kept it in a frozen food locker until it was taken to the laboratory.

The hoary bat, *L. cinereus cinereus*, is the largest of the bats found in the Pacific Northwest, but it is also a rather rare species. Its range includes almost the entire United States and southern Canada and northern Mexico. Davis (*3*) has recorded only a single specimen from Idaho. Dalquist (*4*), who mapped only seven collection records for the species in Washington, states that information on the natural history of the hoary bat is meager. He further states that the hoary bat is migratory and leaves Washington in August and September to winter along the coast of central and southern California. Although *L. cinereus cinereus* is largely a forest-dwelling species, Durrant (*5*) writes, "I have taken specimens by shooting over desert water holes."

Table 1. Characteristics of rabies virus isolated from three naturally infected bats

Bat virus No.	Negri bodies in brain of bat	Negri bodies in first mouse passage	Incubation period (days)	Titer of virus [1]
1	Present	Present	9	4.0
2	Present	Present	10	6.1
3	Present	Present	9	3.6

[1] Log of the number of LD_{50} per 0.03 ml. of brain tissue.

Table 2. Characteristics of rabies virus after serial passage in mice

Bat virus No.	Mouse brain passage	Incubation period [1] (days)	Titer of virus [2]	Mouse brain passage	Incubation period [1] (days)	Titer of virus [2]
1	1st	6	4.4	3d	7	3.0
2	1st	18	3.4	5th	7	4.5
3	1st	7	4.8	8th	8	4.5

[1] Ten percent suspension injected.
[2] Log of the number of LD_{50} per 0.03 ml. of brain tissue.

Some characteristics of the three isolates of rabies virus are noted in tables 1 and 2.

Although Negri bodies were found in microscopic sections of the brain of each of the three bats (table 2), there was no evidence of inflammatory changes in the material available for study. Negri bodies were most numerous in the single specimens of *E. fuscus pallidus* and *L. cinereus cinereus*. Both Negri bodies and inflammatory lesions were found in the brains of first-passage mice. Titers of virus and incubation periods in first and subsequent mouse-brain passages are shown in table 2.

Rabies antiserum was prepared in this laboratory with the National Institutes of Health-Pasteur strain PV–1 as an antigen. The serum was used in neutralization tests against the PV–1 virus, the rabies virus isolated in our 1954 bat studies, and the three strains isolated in this study. As a control, the serum was also used against a virus isolated by Dr. Harald Johnson from a bat and known not to be rabies. The serum neutralized all viruses to titer except the one obtained from Dr. Johnson. There was no evidence of reaction with the latter virus.

Discussion and Summary

Three of the 127 bats, comprising 7 species, collected in western Montana for the Rocky

Mountain Laboratory of the Public Health Service, were found to be infected with rabies virus. The infected bats were *Myotis californicus californicus*, *Eptesicus fuscus pallidus*, and *Lasiurus cinereus cinereus*.

It is noteworthy that none of 121 bats collected while roosting were infected whereas 3 of 6 bats that exhibited abnormal behavior had rabies. The titers of virus in the brains of mice infected with the 3 strains were rather low and remained low even after several passages. Stamm and his associates (*6*) found the same to be true of one Florida bat strain. The three isolations from bats were the only isolations of rabies virus in Montana in 1955.

REFERENCES

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(*2*) Hall, E. R.: Mammals of Nevada. Berkeley, Calif., University of California Press, 1946.

(*3*) Davis, W. B.: The recent mammals of Idaho. Caldwell, Idaho, Caxton Printers, 1939.

(*4*) Dalquist, W. W.: Mammals of Washington. Museum of Natural History (University of Kansas Publication) 2: 1–44, 1948.

(*5*) Durrant, S. D.: Mammals of Utah. Museum of Natural History (University of Kansas Publication) 6: 1–549, 1952.

(*6*) Stamm, D. D., Kissling, R. E., and Eidsen, M. E.: Experimental rabies infection in insectivorous bats. J. Infect. Dis. 98: 10–14, January-February 1956.

FDA Renews Hoxsey Warning

The Food and Drug Administration is intensifying its efforts to warn cancer patients and their families against the Hoxsey treatment for internal cancer. Help in disseminating the official United States Government warning is sought to offset increased promotion of the "treatment" launched following an adverse ruling against the Hoxsey clinic at Portage, Pa.

Information has been received that additional Hoxsey clinics are planned in other States. Hoxsey supporters are soliciting funds to "pay expenses" and "fight the medical trust."

On November 15, 1956, a Federal court jury at Pittsburgh sustained FDA charges that a half million pills seized at the Portage clinic were misbranded because they are of no value in the treatment of cancer. During the 6-week trial 80 witnesses, including some of the world's outstanding cancer experts, testified for the Government. Their evidence showed that persons claimed to have been cured by the Hoxsey medicines have since died of cancer; that others did not have cancer at all, while still others were effectively treated by X–ray or surgery before taking the Hoxsey treatment. It was indicated that some users may have died of cancer because they relied on the Hoxsey treatment instead of seeking competent medical care in the early stages of the disease.

For more than 30 years Harry M. Hoxsey has made false claims for his liquid medicines and pills, and thousands of users have been deceived in spite of numerous local and State court actions.

Following the official public warning last April, FDA inspectors reported a very substantial decline in patients at the Portage, Pa., and Dallas, Tex., clinics. During the ensuing 7 months an estimated 3,000 to 6,000 persons were dissuaded from patronizing the clinics.

Copies of the FDA public warning may be obtained by writing to the Food and Drug Administration, Washington 25, D. C. A shorter public notice is also available for use in local newspapers, shopping news, farm, fraternal, and religious publications, or as a basis for radio or TV announcements.