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Authors: Aranda, Marcelo, and López-de Buen, Lorena

Source: Journal of Wildlife Diseases, 35(3) : 574-577

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-35.3.574

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Journal of Wildlife Diseases, 35(3), 1999, p. 574–577
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Rabies in Skunks from Mexico

Marcelo Aranda,[1,2] **and Lorena López-de Buen**[1] [1] Instituto de Ecología, A.C. Departamento de Ecología y Comportamiento Animal. Apdo. Postal 63, 91000 Xalapa, Veracruz, Mexico; and [2] Corresponding author (e-mail: arandarn@ecologia.edu.mx).

ABSTRACT: An enzootic focus of rabies in skunks in Mexico is described. Fifty three wild animals including two badgers (*Taxidea taxus*), 32 bats (various species), one bobcat (*Lynx rufus*), two coatis (*Nasua narica*) three foxes (*Urocyon cineroargenteus*), one raccoon (*Procyon lotor*) and 12 skunks (see below) were tested for rabies by direct immunofluorescence assay from 1991 to 1997 in the central part of San Luis Potosi State, Mexico. Rabies occurrence was 21% of all tested mammals, with 19% in skunks and only 2% in other wild species (one bobcat). Skunks represented 23% of all mammals tested and had a rabies prevalence of 83%. Only 10 individuals were identified: three hog-nosed skunks (*Conepatus leuconotus*) and seven spotted skunks (*Spilogale putorius*). All were involved in human attacks; the spotted skunk attacks were inside bedrooms while people were sleeping, and the hog-nosed skunk attacks occurred outdoors. Skunk cases of rabies represented 40% of all rabies cases in 1997, and 100% of cases registered for wild animals in San Luis Potosi state. This situation constitutes an important public health problem and requires further epidemiological research to make the human population aware of the problem and to establish measures to limit further human attacks by rabid skunks.

Key words: *Conepatus leuconotus,* hog-nosed skunk, rabies, *Spilogale putorius,* spotted skunk, survey.

In Mexico, the problem of rabies in wild animals is mainly associated with hematophagous bats, especially *Desmodus rotundus* (Flores-Crespo et al., 1998). In the United States and Canada, where there are no hemathophagous bats (Hall, 1981), cases of rabies in wild animals occur principally in raccoons (*Procyon lotor*), skunks (*Mephitis mephitis* and *Spilogale putorius*), foxes (*Vulpes vulpes* and *Urocyon cinereoargenteus*), coyotes (*Canis latrans*), and non-hematophagous bats (Organización Panamericana de la Salud, 1993). Other species occasionally affected are badgers (*Taxidea taxus*), bobcats (*Lynx rufus*), deer (*Odocoileus* spp.), groundhogs (*Marmota* sp.), opossums (*Didelphis virginiana*), otters (*Lutra canadensis*), rabbits (*Sylvilagus* spp.), shrews (*Sorex* sp., and *Blarina* sp.), squirrels (*Sciurus* spp.), and weasels (*Mustela* spp.) (Verts, 1967).

Rabies in wild animals recently has become of more importance in North America. In the United States, more cases in wild than domestic animals have been reported, since rabies in dogs is nearly eliminated as a result of vaccination of dogs and stray-dog control programs (Krebs et al., 1996). During 1989–90 dogs and cats accounted for more than 94% of rabies cases in Mexico (Reid-Sanden et al., 1990; Uhaa et al., 1992), but from 1990 to 1998 there were fewer cases of rabies in humans and dogs (Dominguez et al., 1998).

In Mexico, and Latin America in general, cases of rabies in terrestial wild animals are rarely reported. Damude (1974) mentioned two cases of rabid skunks, one in Guatemala involving *Conepatus semistriatus*, and one in Mexico. Loza et al. (1998) reported additional cases of skunk rabies from South Baja California and Aguascalientes states in Mexico; they suggested a new variant of rabies virus in the skunks from Mexico. In both cases the authors did not identify the skunk species involved. Seven species of skunks are found in Mexico (Hall, 1981), with at least one species probably inhabiting every part of the country. These include *M. mephitis* and *M. macroura; Conepatus mesoleucus, C. leuconotus* and *C. semistriatus;* and *S. putorius* and *S. pygmaea*.

In San Luis Potosi (Mexico) some cases of sylvatic rabies, mainly in skunks, have been reported. These cases suggest an enzootic focus of rabies in the area. Skunks are important rabies transmitters to humans due their high susceptibility, long in-

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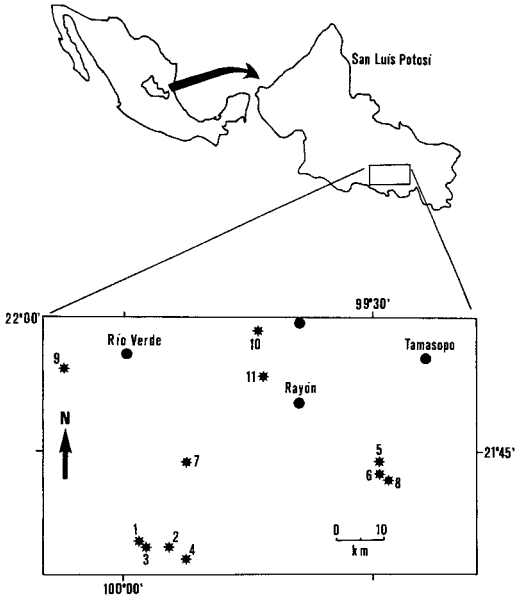


FIGURE 1. Area where rabies skunk cases have been reported in San Luis Potosi (Mexico). The black circles (●) show the most important populations, and the asterics (*) with numbers the order in which cases occurred.

cubation periods (Parker and Wilsnack, 1966), and their ability to live near human populations (Leopold, 1965). Many skunk species have been benefited from human activities, making dense populations feasible near small rural communities.

From 1991 to 1997, 53 wild animals including two badgers, 32 bats, one bobcat, two coatis (*Nasua narica*), three foxes (*U. cinereoargenteus*), one raccoon (*P. lotor*) and 12 skunks (*C. leuconotus* and *S. putorius*) were tested by the direct immunofluorescence assay (dIFA) on brain tissue, in the Centro Estatal de Investigación y Control de Zoonosis (San Luis Potosi City, Mexico).

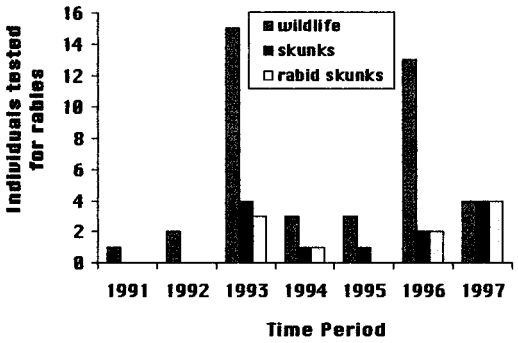


FIGURE 2. Number of wildlife animals tested for rabies and number of rabid skunks in the San Luis Potosí state (México) from January 1991 to April 1998. All cases were tested by the direct immunofluorescence assay.

The occurrence of rabies in the tested wild animals was 21% (11/53 samples). This represented 19% (10/53) of the tested skunks and only the 2% (1/53) other wild species (one bobcat). Skunks represented 23% (12/53) of all mammals tested, with a rabies prevalence of 83% (10/12) (Fig. 2). The enzootic area of rabid skunks was approximately 1,900 km^2 (21°30′ to 22°00′N, 99°00′ to 100°30′W) (Fig. 1). It has a high level of human activity, mainly agricultural. The area is located in a transition zone between the arid high plateau and the tropical region at an altitude between 500 and 1,500 m; the vegetation is natural submontainous chaparral and heavy mesquite in the central region of San Luis Potosi state (Instituto Nacional de Estadística, Geografía e Informática, 1988).

From 10 positive skunks identified, three were hog-nosed skunks (*G. leuconotus*) and seven were spotted skunks (*S. putorius*). All were involved in attacks to humans. Seven spotted skunk attacks were at night, inside the bedrooms while the victims were sleeping. Three hog-nosed skunk attacks were outside the houses. One was at night and provoked by victim, but the others were at dawn without provocation and with great aggression on the part of the animals.

Although the number of rabies cases is low, the situation in San Luis Potosi illustrates some important aspects of sylvatic rabies. It may represent an enzootic focus in skunks that has not been reported in Mexico.

In the United States and Canada, the spotted skunk is identified as an uncommon host for sylvatic rabies because there are only isolated cases involving this species. Epizootic outbreaks are more common in the striped skunk (*M. mephitis*;

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Charlton et al., 1991; Schubert et al., 1998). The hog-nosed skunk, is not even mentioned as a host for rabies in this part of North America. However, there have been rare cases of rabies in *C. leuconotus*. This species is seldom reported rabid, possibly because their relative scarcity and infrequent contact with humans (Parker, 1975). The southern part of the United States is the northern limit of distribution of the genus *Conepatus* (Ceballos and Miranda, 1986). This may explain its naturally low population, and the resulting unlikelihood that rabies would not be a problem in these species. The cases described herein constitute the first reporting of *C. leuconotus* in connection with an enzootic focus of rabies in Mexico. Unlike the situation in the United States, the genus *Conepatus* and the spotted skunk (*S. putorius*) are relatively common in Mexico, especially in the tropical and subtropical regions. *Mephitis mephitis* is not found in the state of San Luis Potosi. The hooded skunk (*M. macroura*) is present, although no case of rabies has been reported for this species (Ceballos and Miranda, 1986). The hog-nosed skunk is considered the least abundant of the three genera, but this could be due to the difficulty of capturing the skunks, because of its more insectivorous habits (Leopold, 1965).

Another relevant finding regarding skunk rabies in Mexico relates to the attacks themselves. The difference in the number of attacks between the spotted (70%) and the hog-nosed skunks (30%) could be linked to the relative abundance of each species. Compared to other more omnivorous species, the insectivorous hog-nosed skunk may find human dwellings less attractive. Frequently, spotted skunks locate their den in rock piles or under houses, but hog-nosed skunks, prefer rock crevices. Also, the spotted skunk is more aggressive by nature than other species (Leopold, 1965); this, coupled with its ability to climb, omnivorous habits, and small size permits the spotted skunk to enter human dwellings with ease. The houses where the human attacks occurred had a great variation in their structure and construction, but all of them had in common areas that permitted access by which the small skunks could get inside the bedrooms (Parker, 1975). Details of the attacks were unobtainable because the victims were asleep. But, if these skunks are naturally aggressive, it is likely that during the furious phase of the disease, a person could be bitten without provocation. In fact, most cases involved children.

The number of rabied skunks reported from 1993 to 1997 in San Luis Potosi, suggest the presence of peaks in prevalence every 4 yr (1993, 1997) (Fig. 2). However, García et al., (1998) cited only 12 cases of human attacks by rabid skunks in 1998. The rabid antigenic variant was V-8 (skunk-center-south).

Further research is necessary to answer several as yet unadressed questions. Are there other wild species that have been affected by the rabid skunks? Are patterns detectable in terms of gender, age and time of the year? It is impossible to determine from the information we have at present if this rabies enzootic zone could reach an epizootic level. We do not known the relationship of rabies prevalence with host sex, age, or reproductive state. However, there is no doubt that it constitutes a public health problem. In San Luis Potosi, the incidents reported herein represented 40% of all rabies cases reported in 1997, and 100% of the cases reported in wild animals. Salazar and Mejia (1998) mentioned that sylvatic rabies is emerging as a new problem in the Jalisco state, and Suzán and Ceballos (1998) found 18% of the wildlife and feral cats and dogs tested were positive for rabies near México, D. F. Presently, the health service organizations in the state of San Luis Potosi have begun a campaign to make the human population aware of the rabies problem and to establish measures to limit, as much as possible, the likelihood of further attacks by rabid skunks.

We thank O. García and A. Uresti for

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their help in submitting information about the cases of wildlife rabies presented herein.

LITERATURE CITED

CEBALLOS, G., AND A. MIRANDA. 1986. Los mamíferos de Chamela, Jalisco. Universidad Nacional Autónoma de México. México, D. F., 436 pp.

CHARLTON, K. M., W. A. WEBSTER, AND G. A. CASEY. 1991. Skunk rabies. *In* The natural history of rabies, G. M. Baer (ed.). CRC Press, Boca Raton, Florida, pp. 307–324.

DAMUDE, D. F. 1974. Epizootiología de la rabia selvática. Salud Pública de México. 16: 419–428.

DOMINGUEZ, J., F. VARGAS, L. A. LECUONA, AND T. LEGASPI. 1998. Comportamiento epidemiológico de la rabia humana en México. *In* Proceedings of the 9th International Meeting on Research Advances and Rabies Control in the Americas, F. Vargas, H. G. Hernández, T. Legaspi, and A. Lecuona (eds.). Mexico, D. F., pp. 14–15.

FLORES-CRESPO, R., E. ALVAREZ, AND J. FERNANDEZ. 1998. Rabia en humanos transmitida por murciélagos vampiros, antecedentes historicos y situación actual en México. *In* Proceedings of the 9th International Meeting on Research Advances and Rabies Control in the Americas, F. Vargas, H. G. Hernández, T. Legaspi, and A. Lecuona (eds.). Mexico, D. F., pp. 63.

GARCIA, J. O., R. ESTRADA, J. L. SALDAÑA, AND J. C. CAMACHO. 1998. Agresiones a humanos por zorrillos rabiosos. *In* Proceedings of the 9th International Meeting on Research Advances and Rabies Control in the Americas, F. Vargas, H. G. Hernández, T. Legaspi, and A. Lecuona (eds.). Mexico, D. F., pp. 63.

HALL, E. R. 1981. The mammals of North America, 2nd Edition, Vol. 1, 2. John Wiley and Sons, New York, New York, 1,181 pp.

INSTITUTO NACIONAL DE ESTADISTICA, GEOGRAFIA E INFORMÁTICA. 1988. Atlas Nacional del Medio Físico. Instituto Nacional de Estadística, Geografía e Informática. Aguascalientes, Aguascalientes, Mexico, 224 pp.

KREBS, J. W., J. S. SMITH, C. E. RUPPRECHT, AND J. E. CHILDS. 1996. Rabies Surveillance in the United States during 1996. Journal of the American Veterinary Medical Association 211: 1525–1539.

LEOPOLD, A. S. 1965. Fauna silvestre de Mexico. Instituto Mexicano de Recursos Naturales Renovables, México, D. F., 655 pp.

LOZA, E., A. AGUILAR-SETIEN, AND N. TORDO. 1998. Evidencias de una nueva variante de virus de rabia en México, que circula en zorrillos. Folleto de Investigación No. 1, División Pecuaria. Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias, Palo Alto, México, D. F., 13 pp.

ORGANIZACIÓN PANAMERICANA DE LA SALUD. 1993. Vigilancia epidemiológica de la rabia en las Américas. Organización Panamericana de la Salud, Organización Mundial de la Salud 25: 20–21.

PARKER, R. F., AND R. F. WILSNACK. 1966. Pathogenesis of skunk rabies virus: quantitation in skunks and foxes. American Journal of Veterinary Research 27: 33–38.

PARKER, R. L. 1975. Rabies in skunks. *In* The natural history of rabies, G. M. Baer (ed.). Academic Press, New York, New York, pp. 41–51.

REID-SANDEN, F. L., J. G. DOBBINS, J. S. SMITH, AND D. B. FISHBEIN. 1990. Rabies surveillance in the United States during 1989. Journal of the American Veterinary Medical Association 197: 1571–1583.

SALAZAR, L., AND O. MEJIA. 1998. Panorama epidemiológico de la rabia humana en Jalisco 1968–1998. *In* Proceedings of the 9th International Meeting on Research Advances and Rabies Control in the Americas, F. Vargas, H. G. Hernández, T. Legaspi, and A. Lecuona (eds.). Mexico, D. F., pp. 15–16.

SCHUBERT, C. A., R. C. ROSATTE, C. D. MACINNES, AND T. D. NUDDS. 1998. Rabies control: An adaptive management approach. The Journal of Wildlife Management 62: 622–629.

SUZÁN, G., AND G. CEBALLOS. 1998. Seroprevalencia de anticuerpos contra rabia, toxoplasma y parvovirus en mamíferos de dos reservas con diferente grado de aislamiento del D. F. *In* Proceedings of the 4th Congreso Nacional de Mastozoología, A. Castro (ed.). Universidad Autónoma Metropolitana, Unidad Iztapalapa, Mexico, pp. 54.

UHAA, I. J., E. J. MANDEL, R. WHITEAWAY, AND D. B. FISHBEIN. 1992. Rabies surveillance in the United States during 1990. Journal of the American Veterinary Medical Association 200: 920–929.

VERTS, B. J. 1967. The biology of the striped skunk. University of Illinois Press. Chicago, Illinois, 218 pp.

Received for publication 10 March 1998.

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