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A Serologic Survey for Leptospires in Nine-banded Armadillos (*Dasypus novemcinctus* L.) in Florida

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Leptospiral infections caused by pathogenic serovars of *Leptospira interrogans* occur worldwide in man, domestic animals and wildlife (Acha and Szyfres, 1980, Communicable diseases common to man and animals, PAHO/WHO Sci. Pub. No. 354: 65–67). Serologic evidence indicates that subclinical infections are more common than the clinical disease (Hathaway et al., 1981, Vet. Rec. 108: 396). A wide range of wild animal species are suitable reservoir hosts for the long-term survival of leptospires (Sullivan, 1974, Aust. Vet. J. 50: 216). Although the majority of the carriers are rodents, including the gray squirrel (*Sciurus carolinensis*) and porcupine (*Erethizon dorsatum*) other disseminators of particular significance include the striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), palm civet (*Paradoxurus hermaphroditus*), bobcat (*Felis rufus*), white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), the nine-banded armadillo (*Dasypus novemcinctus*), and the hairy armadillo (*Chaetophractus villosus*) (Roth et al., 1965, J. La. State Med. Soc. 117: 111–115; Myers et al., 1977, PAHO Bull. 11: 131–139). In a study of 50 nine-banded armadillos in Louisiana 38% were seroreactive for leptospiral antibodies of which serovar *grippotyphosa* comprised 10%, and serovars *sentot* and *pomona* were isolated from two animals each (Stuart et al., 1977, J. Wildl. Dis. 13: 240–243). There was a 23% seroreaction prevalence among 497 hairy armadillos in Argentina of which 5.4% were the *bataviae* serogroup (Carillo et al., 1972, Trop. Geogr. Med. 24: 377–381).

The clinical disease has been reported in the hairy armadillo in Argentina (unpubl. data). A hairy armadillo that died at this Institute had signs of jaundice in the subcutaneous fat and the skin on postmortem examination and a bright yellow liver. Leptospirosis was suspected. A search of the literature did not reveal any previous investigation of leptospirosis in armadillos in Florida.

Serum samples were collected during 1980–1983 from 291 nine-banded armadillos of both sexes and varying ages, the youngest being over a year old at the time of capture, judging from their anatomical development, and the color of the carapace. All animals were housed at the Medical Research Institute of the Florida Institute of Technology and acclimatized for a week before they were bled. Of these samples, 286 were obtained from armadillos captured in central Florida (Fish-eating Creek area, Glades County), four from Louisiana (supplied by Dr. Paul R. Ramsey, Louisiana Tech University, Ruston, Louisiana 71272, USA) and one from Venezuela (obtained from Dr. Jacinto Convit, Instituto Nacional de Dermatologia, Caracas, Venezuela). The samples were stored at −70 C until tested at the Pan American Zoonoses Centre, Leptospirosis Reference Laboratory, Buenos Aires, Argentina. Each serum sample was tested for leptospiral agglutinins against 19 serovars used as antigens in the standard microscopic agglutination test (MAT) ac-

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cording to recommended procedures (Faine, 1982, WHO Pub. No. 67: 61, 76, 115–117). These serovars included the following leptospiral reference strains provided by the Centers for Disease Control, Atlanta, Georgia 30333, USA: *pomona* strain Pomona, *australis* strain Ballico, *ballum* strain Castelloni 3, *grippotyphosa* strain Moskva V, *tarassovi* strain Perepelicin, *hebdomadis* strain Hebdomadis, *bataviae* strain Van Tienen, *canicola* strain Hond Utrecht IV, *hardjo* strain hardjoprajitno, *wolffi* strain 3705, *celledoni* strain Celledoni, *pyrogenes* strain Salinem, *icterohaemorrhagiae* strain RGA, *sejroe* strain M84, *autumnalis* strain Akiyami A, *cynopteri* strain 3522 C, *javanica* strain Veldrat Bataviae 46, *shermani* strain LT821 and *andamana* strain CH11.

The cultures were grown for 4–7 days at 30 C in Stuart (DIFCO Laboratories, P.O. Box 1058, Detroit, Michigan 48232, USA) liquid media supplemented with 10% pooled normal rabbit serum. Each serum sample was screened against the antigens at a final serum dilution of 1:100. Those serum samples showing 50% or greater agglutination after 2 hr at room temperature were further titrated using twofold serum dilutions to determine their endpoint titer. A seroreaction of 1:100 or greater was considered significant of a past or current infection. All antigens used for the tests were checked against their homologous hyperimmune antisera for sensitivity.

Of the 291 armadillos tested 33 (11.3%) were immunoreactors. Titers in these armadillo sera ranged from 1:100 to 1:400 with titers of 1:100 predominating (45.5%) followed by reactors at the 1:200 and 1:400 dilutions, each being 27.3%. Thirty-two of the 286 (11.2%) armadillos from Florida were seropositive. Titers ranged from 1:100 to 1:400. Titers of 1:100 were found in 43.8% (14/32) of the reactors; titers of 1:200 and 1:400 each comprised 28.1% (9/32) of the reactors. One of four armadillos examined from Louisiana reacted positively while the only one from Venezuela was negative. The seroreaction in this Louisiana animal occurred against serovars *shermani* (1:400), *pomona* (1:400) and *tarassovi* (1:100). The serovar reactions found amongst all 33 reactors were: *shermani* (3.8%), *canicola* (2.4%), *tarassovi* (2.1%), *pomona* (0.3%), *javanica* (0.7%), *australis* (1.0%), *grippotyphosa* (0.3%), *bataviae* (0.3%) and *celledoni* (0.3%). The highest titers (1:400) occurred consistently against serovar *shermani*. In Florida, this serovar predominated, comprising 31.2% (10/32) of all seropositive armadillos. There appeared to be no age or sex differences among the reactors.

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