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RABIES SURVEILLANCE REPORT
ANNUAL SUMMARY 1976
= Issued October 1977

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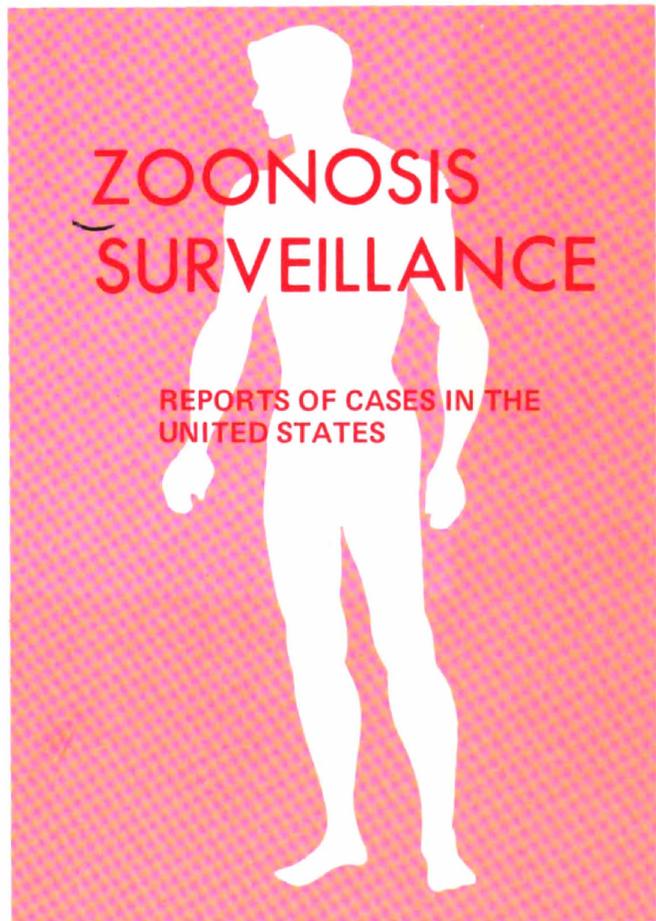
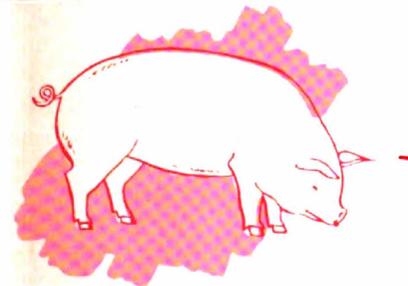
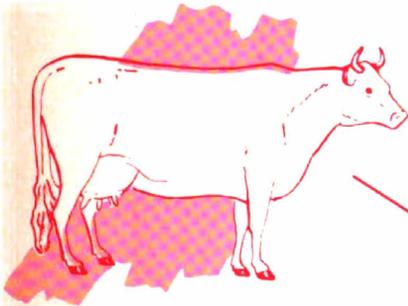
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RABIES

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U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

PREFACE

Summarized in this report is information received from health, agriculture, and wild-life officials from the various states and their counterparts in the Federal government. Much of this information is preliminary. It is intended primarily for the use of those with responsibility for disease control activities. Anyone desiring to quote this report should verify data at the original source for accuracy and interpretation.

Contributions to the Surveillance Report are most welcome. Please address to:

Center for Disease Control
Attention: Chief, Respiratory and Special Pathogens Branch
Bureau of Epidemiology
Atlanta, Georgia 30333

SUGGESTED CITATION

Center for Disease Control: Rabies Surveillance,
Annual Summary 1976--Issued October 1977

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I. REPORTS OF CASES IN THE UNITED STATES--1976

A. Summary

A total of 3,146 laboratory-confirmed cases of rabies were reported in the United States and outlying areas of United States jurisdiction in 1976--471 more cases than for 1975 but 14% below the average for the preceding 5 years. Wild animals (primarily skunks, raccoons, and bats) accounted for the increase over the previous year's total. Forty-eight states and Puerto Rico reported infected animals; only the District of Columbia, Hawaii, Vermont, Guam, and the Virgin Islands reported no rabies cases. States reporting 100 or more cases were California (357), Texas (347), Georgia (225), Minnesota (193), Oklahoma (181), Arkansas (155), North Dakota (137), Iowa (125), South Dakota (114), and Florida (100). Thirty-four states and Puerto Rico reported more cases of rabies in 1976 than in 1975 and 13 reported less. Infected animals most frequently reported, by percentage of the total cases, were the following: skunks, 47%; bats, 23%; raccoons, 9%; foxes, 6%; cattle, 5%; dogs, 4%; cats, 3%; and horses and mules, 1%. Two human deaths caused by rabies were reported; a boy from Texas died after he was bitten by a dog while visiting in Mexico, and a woman from Maryland died after she was bitten by a bat. Tables 1-8 and Figures 1-16 provide general and specific data on rabies incidence.

B. Case Reports

Rabies was reported in 2,724 wild animals (approximately 87% of the total cases), 420 domestic animals (approximately 13%), and 2 humans.

1. Rabies in Wildlife. Rabies was reported in the following major wildlife hosts: skunks (53.9% of wildlife cases); bats (27.1%); raccoons (10.2%); foxes (6.9%); and mongooses (1.5%).

Skunks. Twenty-eight states reported 1,468 cases in 1976, 242 more than in 1975. For the 16th consecutive year, infected skunks were the animals most frequently reported, accounting for 47% of all cases. States that reported over 100 cases in skunks were California (210), Texas (205), Minnesota (145), Arkansas (127), and Oklahoma (122). Twenty-one states reported increases in the number of skunk cases in comparison with the preceding year, with Arkansas (+68), Oklahoma (+52), and California (+43) reporting the greatest increases. Eleven states reported decreases in comparison with 1975, but Montana was the only state reporting an appreciable decrease (152 in 1975 compared with 73 in 1976). In 1975 only 12 states reported increases whereas 24 reported decreases.

The 1 case of skunk rabies reported from North Carolina was vaccine-associated. A modified live virus vaccine (CEO, LEP, Flury Strain) approved for use only in dogs was mistakenly injected into a pet skunk.

Bats. Forty-six states reported a total of 737 cases of bat rabies in 1976, 223 more cases than in the previous year and 50% higher than the annual average for the preceding 5-year period. This is the highest total of bat cases reported for any year since rabies was first diagnosed in bats in 1953. The reporting of a human case of rabies from bat exposure in Maryland may have stimulated an increased submission of bats to the state laboratories for examination. The states reporting no cases in bats were Alaska, Hawaii, North Dakota, and Vermont. Thirteen states primarily in the northwest and on the eastern seaboard reported cases only in bats. For the seventh consecutive year California (128) reported by far the largest number of cases, followed by Texas (71). Cases of rabies in bats continued to be more widely distributed than those in any other animal host.

Raccoons. Thirteen states reported 277 cases of rabies in raccoons, 85 more cases than were reported in the previous year and 66 more than the average for the preceding 5 years. This is the highest number of cases ever reported for a year;

the highest number previously reported was 255 in 1969. Georgia (201) and Florida (53) reported 92% of the total cases. The other cases were scattered and did not appear to be geographically or temporally associated.

Foxes. Twenty-two states reported 187 fox rabies cases in 1976, 89 fewer than in 1975. This is the lowest total of fox cases reported in any year on record and is 45% below the annual average reported for the preceding 5 years. Six states reported foxes as the animals most frequently infected: Alaska, Connecticut, Kentucky, Maine, Virginia, and West Virginia. The states reporting the most cases were Alaska (37), Maine (31), Virginia (28), and Kentucky (26).

Other Wildlife. Forty cases of mongoose rabies were reported by Puerto Rico, where rabies is enzootic in this species. Other cases reported were in coati mundi's (2), an opossum, a badger, and a white mouse.

The mouse bit the finger of a pest control operator who was spraying insecticide under a dark stairway in a biological laboratory that manufactures rabies vaccine. The Veterinary Diagnostic Laboratory at Kansas State University examined the mouse and found the brain to be positive for rabies antigen by the fluorescent antibody staining technique (FRA). Since mice are used at the biological laboratory in titrating the rabies vaccine virus, it is assumed that this animal had escaped from a cage after receiving an injection of the virus. The person bitten was given post-exposure antirabies treatment. This is an example of the bizarre type of exposure that can occur in a laboratory where rabies virus is being used; therefore, all persons who work in rabies laboratories should receive preexposure immunization as recommended by the U.S. Public Health Service Advisory Committee on Immunization Practices (note Section II C).

2. Rabies in Domestic Animals. Twenty-nine states and Puerto Rico reported 420 cases in domestic animals in 1976, 13 fewer cases than in 1975 and 44% below the average annual total for the preceding 5 years. Cases were reported in 164 cattle, 116 dogs, 106 cats, 30 horses and mules, 3 swine, and 1 goat. In general, cases in domestic animals were reported from areas of high endemicity in skunks or foxes. The number of cases in dogs (116) was the lowest reported in any year on record.

Epizootic canine rabies (dog-to-dog transmission) has become rare in the United States. The only recent exceptions have been sporadic outbreaks on the U.S.-Mexico border. The first case of dog rabies in 29 years was reported in Laredo (Webb County), Texas, in the week of November 22, 1976; by December 31, 18 cases in dogs had been identified. This is the third dog rabies outbreak along the border since 1972, the others having occurred in the Nogales, Arizona, area in 1972 and the El Paso (Texas)-Dona Ana County (New Mexico) area in 1973-1975.

The first case of feline rabies in the state of Washington since 1951 was documented by the state laboratory in October 1976. A 10-year-old domestic, unvaccinated cat displayed bizarre and aggressive behavior, biting or scratching 7 family members in Olympia, Washington. Results of the first FRA test were reported to be negative by the state laboratory.

Ten days later the laboratory noted that 2 mice previously inoculated with the cat brain homogenate were dead, another was paralyzed, and 2 more were sick. Immediate FRA test of the mice brains confirmed the diagnosis of rabies. The original cat-brain suspension was sent to CDC, where it was confirmed as being positive for rabies.

Three weeks before onset of the cat's bizarre behavior a bat had flown down the chimney of the family's home, but it is not known whether the cat had contact with the bat and the bat was not examined for rabies. There are many bats in the vicinity of the residence. Nine bats from the Olympia area were examined for rabies in 1976, 1 of which was positive (11%).

3. Rabies in Humans. There were 2 human deaths reported in 1976--in Maryland and Texas.

Maryland. The first case of human rabies reported to CDC in 1976 occurred in a 55-year-old woman who lived in northeast Maryland. On May 10 she was bitten by a bat on the fourth finger of her left hand. Shortly thereafter she washed the small wound with soap and water. The bat was captured, and the Maryland State Department of Health and Mental Hygiene laboratory found the brain to be positive for rabies antigen by the FRA staining technique.

Approximately 44 hours after the biting incident, the woman was given the currently recommended dose of human rabies immune globulin (20 IU/kg body weight) and started on the recommended 23 doses of duck embryo vaccine (DEV)--a primary series of 21 doses with 2 reinforcing doses. The 21 doses (1 dose per day for 21 days) were completed on June 2. Two days later the patient experienced tingling and numbness in the left hand and arm, and on June 6 she had symptoms of slight weakness of the left arm, abdominal pain, and vomiting. Diagnoses of a possible vaccine reaction or serum sickness were considered, and she was started on a regimen of oral prednisone, 30 mg per day.

On June 8 the patient had increased weakness and decreased sensation in the left hand and arm, along with bilateral Babinski's sign. She was admitted to the Wilmington Medical Center with diagnosis of transverse myelitis secondary to DEV, and dexamethasone therapy was begun. On June 10 she was agitated and complained of chest tightness. Neurologic examination revealed nystagmus, weakness on the left side of the face, and a flaccid left arm with decreased sensation. There was a marked decrease of vital capacity, and she was intubated and placed on a respirator. The next day she had weakness of the right arm, fever of 101.6 F, myoclonus of all extremities, and grand mal seizures; a diagnosis then was made of possible rabies.

The patient's hospital course was marked by further neurologic deterioration and by multiple physiologic dysfunctions. By June 14 she was flaccid and comatose, without reflexes, response to pain, or cranial nerve function. She experienced hypotension, at times refractory to multiple pressor agents, bradycardia, inappropriate secretion of antidiuretic hormone, diabetes insipidus, hypothermia, and hyperthermia. On June 27, 23 days after initial paresthesia, the woman had cardiac arrest and died.

Laboratory tests revealed that a corneal impression and a nuchal skin biopsy obtained June 15 were FRA-positive. Tests made by the rapid fluorescent focus-inhibition technique (RFFIT) revealed that serum neutralizing antibodies were 1:54 on June 14 and 16 and 1:280 on June 22. Postmortem examination of the brain via the FRA technique was positive, and rabies virus was isolated by intracerebral mouse inoculation.

This was the tenth case of human rabies known to be associated with exposure to rabid bats in the United States. Numerous bat colonies have been found in Cecil County, where this patient lived, and several other rabid bats have been recovered from the area.

Texas. In August 1976 a case of human rabies occurred in a 17-year-old boy from Texas; he died in early September. In late July he had been bitten by a stray dog while visiting in Monclova, Coahuila, Mexico, approximately 155 miles south of Eagle Pass, Texas.

The boy became ill on August 30 with symptoms of high fever, sore throat, dysphagia, and seizures. On that date he was hospitalized in Monclova and was transferred the next day, August 31, to a hospital in San Antonio, Texas. On admission there he had a temperature of 106 F and was delirious. He reacted violently toward those who attempted to care for him, spitting on and biting them. Subcutaneous crepitus was present over the neck and anterior chest.

Two days after the patient was hospitalized members of the family who had been with him in Mexico arrived in San Antonio. They reported that in Monclova a stray dog had bitten the boy on the right wrist late in July, and he had not been treated for the bite. They recalled that the patient had complained of having a burning sensation in the right hand on August 27 and of having right arm soreness on August 28. On August 30 he complained that air currents and the sound of water dripping from the tap caused him to have throat pain.

A clinical diagnosis of rabies was made on September 1. Initial attempts to diagnose rabies by an FRA examination of skin biopsy and corneal impressions were unsuccessful. The remainder of the patient's hospital course was marked by hypoxia, hypotension, cardiac arrhythmia, and anuria. Approximately 72 hours after his admission the patient died of his fifth cardiac arrest, despite intensive medical care.

Postmortem skin biopsy, brain, and spinal cord specimens were all positive for rabies by FRA technique.

Fifteen hospital employees and 4 relatives of the patient were judged to have had significant exposure to his potentially infectious secretions. These exposures consisted of: a) a bite from the patient, b) a cut from a scalpel which had been in contact with the patient's tissues, c) contamination of open cuts with the patient's saliva, or d) repeated contamination of mucous membranes with the patient's saliva. These 19 contacts were treated with rabies immune globulin (RIG) and duck embryo rabies vaccine (DEV).

II. SPECIAL REPORTS

A. Human Rabies in the United States--A Change in Animal Sources of Exposure

Before 1951 all cases of human rabies in the United States for which a source of exposure was reported were caused by bites of dogs or cats. Since that time, wild animals have been reported as significant sources of human exposure; bats have been implicated in 10 human cases, skunks in 9, foxes in 7, and a bobcat in 1 (Table 5).

Since 1966 (11 years) a total of 18 human cases of rabies have been reported. Of these, 7 have been exposed to dogs outside of the continental United States: 3 in Mexico, 2 in Africa, and 1 each in the Philippines and Puerto Rico. The last reported human case caused by a dog bite in the continental United States occurred in 1965. Of the other 11 cases in which exposure was known to have occurred in the continental United States, 8 reportedly were due to rabies in wildlife (4 were from bat exposures, 3 from skunks, and 1 from a bobcat). Sources of exposure for 2 of the other 3 cases were a cat and a laboratory accident, and in 1 instance the source was unknown.

B. Rodent Rabies

On the cover of the March 15, 1976, issue of the Journal of the American Medical Association, there was a photograph of a red squirrel and a statement referring to the picture which said that the bite of the squirrel "can leave one with rabies." The fact is that there has never been a reported case of human rabies attributed to the bite of a squirrel or any other rodent (chipmunk, mouse, or rat) in the United States. Rabies is not endemic in rodents in the United States.

In 1972 a report was published that reviewed the public health implications of rodents as vectors of rabies (1). The author reported that although about 25,000 rodents are examined annually for rabies, only 4 or 5 are found to have the disease. There is no evidence that the few cases in rodents significantly affect the spread of rabies to the major wildlife hosts in the United States.

No case of human rabies has ever been traced to a rodent in the United States, despite the fact that at least 24,000 persons are bitten by rodents annually in this country. Available data suggest that many of the 4,000 persons in the United States who receive antirabies treatment after being bitten by rodents do so unnecessarily. An example of the type of exposure for which treatment would be warranted is a bite by a rodent that has laboratory-confirmed rabies.

Most states have stopped the routine examination of rodents for rabies, although many will test rodents if the attending physician insists. The reasons given are that rabies is rare if not nonexistent in rodents, and the money spent on these programs can best be spent on some other health problem.

PART II B REFERENCE

1. Winkler WG: Rodent rabies in the United States. *J Infect Dis* 126:565-567, 1972

C. Recommendation of the Public Health Service Advisory Committee on Immunization Practices--Rabies

RECOMMENDATION OF THE PUBLIC HEALTH SERVICE ADVISORY COMMITTEE ON IMMUNIZATION PRACTICES

RABIES

INTRODUCTION

Although rabies rarely affects humans in the United States, every year thousands of persons receive rabies prophylaxis. Managing those who have possibly been exposed to rabies infection is of paramount importance. The following is an interpretation of both the risk of infection and the efficacy of treatment. It incorporates many current concepts of the World Health Organization Expert Committee on Rabies.

The problem of how to treat persons bitten, scratched, or otherwise exposed to rabies by animals suspected of being infective is a perplexing one for physicians. All available methods of systemic treatment are complicated by instances of adverse reactions, a few of which have resulted in death or permanent disability. Furthermore, decisions on management must be made immediately, because the longer treatment is postponed, the less likely it is to be effective.

Data on the efficacy of active and passive immunization after rabies exposure have come principally from studies with animals. Because rabies has occasionally developed in humans who had received antirabies post-exposure prophylaxis, the efficacy of vaccine has been questioned. Evidence from laboratory and field experience in many areas of the world, however, indicates that postexposure prophylaxis is usually effective when appropriately used.

Rabies in the United States

Rabies in humans has decreased from an average of 22 cases per year in 1946-1950 to only 1-3 cases per year since 1960. The number of cases of rabies in domestic animals has decreased similarly. In 1946, for example, there were more than 8,000 cases of rabies in dogs, compared with 116 in 1976. Thus, the likelihood of humans' being exposed to rabies by domestic animals has decreased greatly, although bites by dogs and cats continue to be the reason for giving the majority of antirabies treatments.

The disease in wildlife—especially skunks, foxes, raccoons, and bats—has become increasingly prominent in recent years, accounting for more than 70% of all reported cases of animal rabies every year since 1968. Wild animals constitute the most important source of infection for humans and domestic animals in the United States today. In 1976 only Vermont, Hawaii, and the District of Columbia reported no wildlife rabies.

Nerve tissue origin rabies vaccine of the Semple type (NTV)—no longer available in the United States—was used almost exclusively until 1957, when duck embryo origin vaccine (DEV) was licensed. Treatment failure

rates for the 2 vaccines were not significantly different, and the lower incidence of central nervous system reactions with DEV made it preferable to NTV.

Effectiveness of Antirabies Treatment in Humans

Comparative effectiveness of treatment can be judged in the United States only by reported failures. During the years 1957-1971, when both vaccines and antirabies serum were available, 6 of the 125,000 NTV-treated persons died of rabies (1/20,800), and 12 of the 310,000 treated with DEV (1/25,800) died. An estimated 105,000 persons were treated with DEV in 1972-1975; only 1 rabies death was reported. Fatalities have been reported in several cases in which the course of treatment was not started immediately or was not completed.

RABIES IMMUNIZING PRODUCTS

Duck Embryo Vaccine (DEV)

DEV is a killed vaccine prepared from embryonated duck eggs infected with a fixed virus and inactivated with beta-propiolactone. It is supplied as 1-ml, single-dose vials of lyophilized vaccine with diluent ampoule.

Rabies Immune Globulin, Human (RIG)

RIG is antirabies gamma globulin concentrated by cold ethanol fractionation from plasma of hyperimmunized human donors. Neutralizing antibody content is standardized to contain 150 International Units (IU) per milliliter. It is supplied in 2-ml (300 IU) and 10-ml (1,500 IU) vials for pediatric or adult use.

Antirabies Serum, Equine (ARS)

Antirabies serum is a refined, concentrated serum obtained from hyperimmunized horses. Neutralizing antibody content is standardized to contain 1,000 IU per vial. Volume is adjusted by manufacturer on the basis of antibody potency in each lot. Currently a 1,000-IU vial contains approximately 5 ml.

Reactions

Local reactions to postexposure treatment with DEV are very common. Most patients experience pain, erythema, and induration at the injection site. Approximately 13% have itching at the site. Systemic symptoms (fever, malaise, myalgia) occur in 33%, usually after 5-8 doses. Anaphylaxis develops in less than 1% of persons receiving DEV and may occur after the first dose, particularly in persons previously sensitized with vaccines containing avian tissue. Neuroparalytic reactions occur

rarely with DEV. Between 1958 and 1975, 5 cases of transverse myelitis, 7 cases of cranial or peripheral neuropathy, and 9 cases of encephalopathy (2 fatal) were reported among an estimated 595,000 recipients of DEV. Neuroparalytic reactions were estimated to occur at the rate of 1 case for every 2,000 of the now discontinued NTV.

Local pain and slight febrile response may follow receipt of RIG. Although not reported for RIG, angioneurotic edema, nephrotic syndrome, and anaphylaxis have been reported, but rarely after routine injection of immune serum globulin (ISG). These reactions occur so rarely that the causal relationship between ISG and these reactions is not clear.

ARS produces serum sickness in at least 40% of adult recipients; reaction rates for children are lower. Anaphylactic reactions may occur. When ARS is indicated, the patient should be tested for sensitivity to equine serum. (In rare instances the sensitivity test has induced anaphylactic reaction.)

Because adverse reactions are associated more frequently with ARS than with RIG, and ARS might sensitize recipients to equine protein, RIG is the product of choice. ARS should be used only when RIG cannot be obtained within 24 hours.

RATIONALE OF TREATMENT

Every possible exposure to rabies infection must be individually evaluated.

In the United States the following factors should be considered before specific antirabies treatment is initiated:

Species of Biting Animal

Carnivorous animals (especially skunks, foxes, coyotes, raccoons, dogs, and cats) and bats are more likely than other animals to be infected with rabies. Bites of rabbits, squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice, and other rodents have never resulted in human rabies in the United States and almost never call for antirabies prophylaxis.

Circumstances of Biting Incident

An UNPROVOKED attack is more likely to mean that the animal is rabid. (Bites inflicted on a person attempting to feed or handle an apparently healthy animal should generally be regarded as PROVOKED.)

Type of Exposure

Rabies is commonly transmitted by inoculation with infectious saliva. The likelihood that rabies infection will result from exposure to a rabid animal varies with the nature and extent of the exposure. Two categories of exposure should be considered:

Bite: Any penetration of the skin by teeth.

Nonbite: Scratches, abrasions, open wounds, or mucous membranes contaminated with saliva.

Vaccination Status of Biting Animal

A properly immunized animal has only a minimal chance of contracting rabies and transmitting the virus.

Presence of Rabies in Region

If adequate laboratory and field records indicate that there is no rabies infection in a domestic species within a given region, local and state health officials are justified in considering this in making recommendations on antirabies treatment for bites by particular species. Such officials should be consulted for current interpretations.

MANAGEMENT OF BITING ANIMALS

A healthy domestic dog or cat that bites a person should be confined and observed by a veterinarian for 10 days. Any illness in the animal should be reported immediately to the local health department. If signs suggestive of rabies develop, the animal should be humanely killed and its head removed and shipped under refrigeration to a qualified laboratory designated by the local or state health departments for examination. Stray or unwanted dogs or cats should be killed immediately and their head submitted for rabies examination by fluorescent microscopy.

Signs of rabies in wild animals cannot be interpreted reliably; therefore, any wild animal that bites or scratches a person should be killed at once (without unnecessary damage to the head) and the brain examined for evidence of rabies.

If the brain is negative by fluorescent antibody examination for rabies, one can assume that the saliva contains no virus, and the bitten person need not be treated.

LOCAL TREATMENT OF WOUNDS

Immediate and thorough local treatment of all bite wounds and scratches is perhaps the most effective rabies preventive. Experimentally the incidence of rabies in animals can be markedly reduced with local therapy alone.

First-Aid Treatment to be Carried Out Immediately

The wound should be thoroughly cleansed immediately with soap and water.

Treatment by or under Direction of Physician

1. The wound should be thoroughly cleansed immediately with soap solution.

2. Tetanus prophylaxis and measures to control bacterial infection should be given as indicated.

A combination of passive and active immunization (vaccine and immune globulin) is considered the best postexposure prophylaxis and is recommended both for treatment of ALL BITES by animals suspected of having rabies and for nonbite exposures inflicted by animals suspected of being rabid. Passive immunization should be used in conjunction with active immunization regardless of the interval between exposure and treatment.

Immunization

RIG and DEV: Passive antibody, RIG (ARS only if RIG is not available), is administered only once, at the beginning of antirabies therapy. The recommended dose of RIG is 20 IU/kg or approximately 9 IU/lb body weight. (When ARS must be used, the recommended dose is 40 IU/kg, approximately 18 IU/lb or 1 vial of 1,000 IU/55 lb body weight.) Up to half the dose of RIG (or ARS) should be thoroughly infiltrated around the wound and the rest administered intramuscularly in the buttocks.

Twenty-three 1-ml doses of DEV should be given, beginning the day passive antibody is administered.

Vaccine may be given as 21 daily doses or 14 doses in the first 7 days (2 injections each day) and then 7 daily doses. This should be followed by the 2 "booster" doses, the first booster 10 days after the 21st dose and the second booster 10 days later. Vaccine should be injected subcutaneously in the abdomen, lower back, or lateral aspect of the thigh; rotation of sites is recommended.

All persons who receive vaccine and RIG (or ARS) should have serum collected for rabies antibody testing at the time of the second booster. Testing for rabies antibody can be arranged by state health department laboratories. If no antibody is detected, additional boosters should be given.

POSTEXPOSURE ANTIRABIES TREATMENT GUIDE

The following recommendations are only a guide. They should be applied in conjunction with knowledge of the animal species involved, circumstances of the bite or other exposure, vaccination status of the animal, and presence of rabies in the region.

WILD			DOMESTIC		
SPECIES OF ANIMAL	CONDITION OF ANIMAL AT TIME OF ATTACK	TREATMENT OF EXPOSED HUMAN	SPECIES OF ANIMAL	CONDITION OF ANIMAL AT TIME OF ATTACK	TREATMENT OF EXPOSED HUMAN
Skunk Fox Coyote Raccoon Bat	Regard as Rabid	RIG + DEV ¹	Cat Dog	Healthy Unknown (escaped) Rabid or Suspected Rabid	None ² RIG + DEV RIG + DEV ¹
Other	Consider individually – See "Rationale of Treatment"				

1. Discontinue vaccine if fluorescent antibody (FA) tests of animal killed at time of attack are negative.
2. Begin RIG + DEV at first sign of rabies in biting dog or cat during holding period (10 days).

Precautions

Since RIG (or ARS) partially suppresses active production of antibody, no more than the recommended dose of RIG (or ARS) should be given, and the 2 "booster" doses of vaccine must be given.

Local reactions to vaccine (DEV) are common and do not contraindicate continuing treatment.

When rabies vaccine must be given to a person with a history of hypersensitivity, especially to avian tissues, antihistamine drugs may be given. Epinephrine is indicated to counteract anaphylactoid reactions. If serious allergic manifestations preclude continuing prophylaxis with DEV, state health departments can advise physicians about possible use of experimental vaccines.

If neurologic reactions develop, vaccine treatment should be discontinued. Corticosteroids may interfere with development of active immunity and should be used only to treat life-threatening neuromuscular reactions when the possibility of clinical rabies has been ruled out. The Center for Disease Control, Bureau of Epidemiology, Viral Diseases Division, should be contacted for additional information on the differential diagnosis of rabies.

PREEXPOSURE PROPHYLAXIS

The relatively low frequency of severe reactions to DEV has made it practical to offer preexposure immuni-

zation to persons in high-risk groups: veterinarians, animal handlers, certain laboratory workers, and persons—especially children—living in places where rabies is a constant threat. Others whose vocational or avocational pursuits bring them into contact with potentially rabid dogs, cats, foxes, skunks, or bats should also be considered for preexposure prophylaxis.

Two 1-ml injections of DEV given subcutaneously in the deltoid area 1 month apart should be followed by a dose 6-7 months after the second dose. This series of 3 injections can be expected to produce neutralizing antibody in 80%-90% of vaccinees.

For more rapid immunization, 3 injections of DEV, 1-ml each, should be given at weekly intervals with the fourth dose 3 months later. This schedule elicits an antibody response in about 80% of the vaccinees.

All who receive the preexposure vaccination should have serum collected for rabies antibody testing 3-4 weeks after the last injection. Testing for rabies antibody can be arranged by state health department laboratories. If no antibody is detected, booster doses should be given until a response is demonstrated. Persons with continuing exposure should receive boosters every 2 years.

When an immunized person with previously demonstrated rabies antibody is bitten by a rabid animal, he or she should receive 5 daily doses of vaccine plus a booster dose 20 days after the fifth dose. Passive immunization should not be given in this case; it might inhibit a rapid

anamnestic response. For nonbite exposures an immunized person with antibody needs only one 1-ml dose of vaccine. If the immune status of a previously vaccinated person is not known, postexposure antirabies treatment may be necessary. In such cases, if antibody can be demonstrated in a serum sample collected before vaccine is given, treatment can be adjusted accordingly.

MANAGEMENT OF PERSONS WHO FAIL TO DEVELOP ANTIBODY FOLLOWING VACCINATION

Some individuals receiving postexposure or preexposure prophylaxis fail to develop demonstrable antibody after completion of the recommended regimens. Additional booster doses of DEV may produce the desired seroconversion. The patient's serum should be tested for antibody 3-4 weeks after each booster dose of DEV. If 2 additional booster doses of vaccine do not result in demonstrable antibody, authorities at the state health department or CDC should be consulted to determine if alternative procedures, such as the use of experimental vaccines, may be indicated.

ACCIDENTAL INOCULATION WITH LIVE RABIES VIRUS VACCINE

Persons exposed to Flury or the SAD (formerly ERA) vaccine should not be considered at risk, and antirabies prophylaxis is not indicated. There is no reliable information on which to judge the risk associated with accidental human exposure to new animal vaccines incorpo-

rating these strains in other substrates or to animal vaccines incorporating other rabies virus strains, and they should be regarded as potentially virulent for purposes of managing the treatment of exposed humans.

Published MMWR: Vol 16 No. 19, 1967; revised Vol 18 No. 43 - Supp 1969; revised Vol 21 No. 25 - Supp 1972; revised Vol 25 No. 51, 1976

SELECTED BIBLIOGRAPHY

- Corey L, Hattwick MAW: Treatment of persons exposed to rabies. *JAMA* 232:272-276, 1975
- Greenberg M, Childress J: Vaccination against rabies with duck embryo and Semple vaccine. *JAMA* 173:333-337, 1960
- Hattwick MAW: Human rabies. *Public Health Reviews* 2:229-275, 1974
- Hattwick MAW, Rubin RH, Music S, et al: Postexposure rabies prophylaxis with human rabies immune globulin. *JAMA* 227:407-410, 1974
- Johnson HN: Rabies virus. In Horsfall and Tamm, *Viral Rickettsial Infections of Man*. 4th Edition, JB Lippincott, Philadelphia, 1965, 814-840
- Peck FB Jr, Powell HM, Culbertson CG: A new antirabies vaccine for human use. *J Lab Clin Med* 45:679-683, 1955
- Rubin RH, Hattwick MAW, Jones S, Gregg MB, Schwartz VD: Adverse reactions to duck embryo rabies vaccine - Range and Incidence. *Ann Intern Med* 78:643-649, 1973
- Tierkel ES, Sikes RK: Preexposure prophylaxis against rabies. *JAMA* 201:911-914, 1967
- World Health Organization: Sixth Report of the Expert Committee on Rabies (WHO Techn Rep No. 523). 1973

D. Postexposure Rabies Treatment--Georgia

Based upon manufacturers' distribution data, an estimated 30,000 persons in the United States receive postexposure rabies treatment each year with DEV (1). The majority of those treated receive prophylaxis after licks, scratches, or bites of stray dogs or cats and other animals not available for rabies examination. Many other persons are unnecessarily treated after exposures that could not have resulted in disease. The most severely exposed persons--about 4,000-6,000 each year--receive a combination of rabies antiserum and vaccine. The other 25,000 vaccinations given each year may thus be unnecessary.

In an effort to minimize unnecessary postexposure rabies treatment, the Georgia Department of Human Resources many years ago established a consultative service for private physicians and health departments regarding recommended postexposure treatment for rabies. The recommendations are based upon the Public Health Service's Advisory Committee on Immunization Practices' guidelines and upon knowledge of where rabies is enzootic in Georgia. Primary considerations of exposure are species of biting animal, circumstances of the bite, vaccination status of the biting animal, and the presence of rabies in the area. When treatment is recommended, the State Epidemiologist's office sends antiserum and vaccine without cost within 4 hours to the attending physician anywhere in the state. This service is available on a 24-hour, 7-day-a-week basis.

Over the past 5 years 70 to 80 persons have been treated each year through this consultative mechanism, for a postexposure treatment rate of 1.6/100,000. This is approximately 15% of the estimated national rate of 14/100,000. The estimated cost of postexposure treatment in Georgia is approximately \$500 (antiserum, vaccine, and medical fees)--a savings in treatment costs of over \$200,000 per year when compared with the estimated national cost of treatment.

PART II D REFERENCE

1. Center for Disease Control: Postexposure Rabies Treatment--Georgia. Morbidity Mortality Weekly Rep 26:92, 1977

E. Revised Rabies Film Now Available

The CDC film "Clinical Rabies in Animals" has just been revised and is now available for loan or purchase as a 16mm color, sound movie (M-2796) or as a 3/4-inch color, sound video-tape (V-2796) cassette. The newer version incorporates minor editorial changes from the earlier film and also includes a small amount of footage on clinical rabies in humans; it does not include any discussion of clinical disease in humans, however.

The movie is no longer available from the Viral Zoonoses Section, Viral Diseases Division, Bureau of Epidemiology, but is available on short-term, free loan from the Materials Utilization Branch, National Medical Audiovisual Center (Annex), Station K, Atlanta, GA 30324. A \$10 service fee is charged for loans to foreign countries not under the U.S. Agency for International Development/National Library of Medicine Agreement. Films must be returned from other countries by air mail.

To purchase the movie or videotape, or to obtain ordering and price information, write to Order Section, National Audiovisual Center, General Services Administration, Washington, DC 20409.

F. Changes in CDC's National Rabies Surveillance Program

Starting with the 1974 Annual Summary of Rabies Surveillance, reported data have been compiled and analyzed by use of computers. Rabies data received from each state--including confirmed cases and total specimens examined, by type of animal and county--are recorded, and printouts are prepared by the computer in the form of line listings and United States maps. These maps are reproduced for inclusion in the quarterly and annual reports. This system has resulted in more rapid compilation and simplified recall of rabies surveillance data.

In January 1976 all of the contiguous states were reporting positive rabies cases by type of animal, month, and county, but only 8 states were also reporting the total specimens examined by type of animal, month, and county. These were Massachusetts, Montana, New Jersey, New York, North Carolina, Rhode Island, Vermont, and

Washington. In May a request was made to all other states for the additional data, and by December 1976, 36 states were reporting the information requested. In addition, 9 states were reporting total specimens examined by type of animal, month, and state (but not by county), and only 3 states were not reporting the total number of specimens examined.

The denominator data requested--including the total number of specimens examined by type of animal, county, and month--are essential for accurately identifying rabies problem areas in the United States. The excellent cooperation by states to provide this information is greatly appreciated.

Although the data received regarding total specimens examined are incomplete, some interesting information can be derived. Approximately 75,000 specimens were examined for rabies in the United States in 1976. Table 6 indicates the approximate percentages of total specimens examined and the number found to be positive by type of animal.

It should be noted that approximately 50% of the specimens examined are dogs and cats, which represent only about 7% of the "positives." Although skunks represent less than 6% of the specimens examined, they account for approximately 47% of the positives.

Approximately 20% of the specimens examined in 1976 were rodents (rats, mice, chipmunks, squirrels, etc.) and lagomorphs (rabbits and hares), but only 1 was positive. This was a white mouse which bit the finger of a pest control operator in a biological laboratory that manufactures rabies vaccine (see Section I B 1, Other Wildlife). The Public Health Service Advisory Committee on Immunization Practices (see Section II C) advises that bites of rabbits, squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice, and other rodents have never resulted in human rabies in the United States and almost never call for antirabies prophylaxis. Some states have discontinued the examination of rodents and lagomorphs except in rare instances where unusual human exposures have occurred.

III. INTERNATIONAL REPORTS

A. Rabies in Canada

In 1976 there were 1,696 cases of rabies reported in Canada, 578 less than were reported in 1975. These included (increase or decrease from previous year in parenthesis) 775 foxes (-163), 269 cattle (-307), 334 skunks (-17), 89 dogs (-18), 83 cats (-7), 56 bats (-2), 41 horses (-15), 22 sheep (-24), 10 swine (-4), 4 wolves (-11), 5 raccoons (-7), 4 coyotes (+1), 2 goats, 1 deer (-1), and 1 rabbit (Table 7 and Figure 12).

B. Rabies in Mexico

In 1976 there were 4,525 cases of rabies reported in Mexico, 250 more than were reported in 1975. These included (increase or decrease from previous year in parenthesis) 3,940 dogs (+169), 288 cattle (+32), 189 cats (+16), 58 equines (+49), 12 swine (-7), 7 sheep (+7), 5 bats (-1), 4 goats (-3), 4 squirrels (+3), 1 fox, 1 rat (+1), and 16 other unidentified animals (Table 8 and Figure 13).

C. Rabies in Spain

The World Health Organization reported that based on epidemiologic surveys, including postmortem examination of both domestic and wild animals, before July 1975 Spain had been considered free of rabies for more than 10 years.

In July 1975 routine tests on dogs from the area of Malaga revealed 2 positive cases that were confirmed by FRA test and mice inoculation. Subsequently the infection spread along the coast both to the east and west of the town, and cases were detected up to 80 km to the east in the province of Granada. Although there was some spread to villages to the north of Malaga, the disease remained in the coastal area. The whole province of Malaga is densely populated, with villages in many instances being confluent. Transportation facilities in the whole area are good. In addition there is a large transient population, mainly tourists. These conditions made it imperative to undertake prompt and widespread control activities.

In the province of Malaga, there were 111 cases (67 dogs and 44 cats), and in the coastal area of Granada 2 dogs and 2 cats were found to be positive for rabies. Toward the end of August there was a fatal human case. A man had been bitten by a dog on June 6, 1975, 1 month before the first animal case was detected by routine surveillance as described above. The dog had not been kept under surveillance nor was it submitted for postmortem examination when it died. Furthermore, it had not been vaccinated, even though vaccination of dogs is compulsory. The man was given postexposure treatment 3 days after the bite but refused to continue after the fifth injection.

The origin of the outbreak was not established, but in the period July 1, 1975, to October 30, 1976, rabies infection was detected in 6 dogs in Melilla and in 1 dog in Ceuta in northern Africa.

From July 1975 through October 1976, 2,114 persons had a history of possible exposure to rabies in the province of Malaga. On the basis of further investigation 1,288 persons were given postexposure treatment, although this was terminated in some cases after surveillance of the biting animal. Antirabies serum and Semple and Fuensalida (suckling mouse brain) vaccine were given according to the circumstances of each exposure. Of those treated, 142 were later shown to have been exposed to animals positive for rabies, but there were no human cases.

One case of paralysis associated with treatment was recorded, but the affected person subsequently recovered completely.

D. Rabies Outbreak in the Metropolitan Area of Buenos Aires, Argentina

According to the Vigilancia Epidemiológica, December 1976, Buenos Aires and its surroundings reported 14 cases of human rabies in 1976. In the same year almost 5,000 cases of animal rabies were also reported.

A comparison of this situation with that in the United States in the same year shows the following results:

	U.S.A.	Buenos Aires Metropolitan Area
Inhabitants (in millions)	216	7
Cases of animal rabies	3,144	5,000
Cases of human rabies	2	14

In Buenos Aires, with a population of scarcely 3% of the U.S. population, there were 1.6 times more cases of animal rabies and 7 times more cases of human rabies. The period March through May was the most critical because of the serious scarcity of antirabies vaccines for human use. This emergency was overcome through the procurement of several thousand doses from Colombia, Venezuela, Guatemala, and Uruguay. It was not until October that there was enough canine vaccine available to carry out a massive campaign which by December 31 had vaccinated 900,000 animals; these, plus the 260,000 animals vaccinated previously, amount to 1,160,000 animals, i.e., a coverage of 75% of the population.

Status of Rabies and Control Measures--Metropolitan Area of Buenos Aires, Argentina, 1972-1976*

	Y E A R S				
	1972	1973	1974	1975	1976
No. of human cases	-	8	6	4	14
No. of animal cases	847	1,107	1,065	1,728	4,998
No. of vaccinated animals	289,904	587,125	461,987	328,158	1,168,343
No. of captured animals	114,537	79,173	67,258	54,609	128,055

*Data taken from: Dr. G. R. Gonzalez Rescigno. Instituto Pasteur (Avellaneda), Provincia de Buenos Aires. Dr. Nestor Juan, Depto de Zoonosis, Secretaria de Salud Publica de la Nacion.

For 2 months there were restrictions in the availability of vaccine for human use to satisfy the demand; in addition, the animal vaccination campaign had to be postponed for 6 months until the necessary doses were obtained. The Pan American Health Organization and the Pan American Zoonoses Center are cooperating with the countries concerned to avoid the repetition of situations similar to the one in Buenos Aires.

E. Wildlife Rabies Research Program in Europe

The Bulletin of the World Health Organization, Volume 54, 1976, contains an article entitled "Characteristics of the Spread of a Wildlife Rabies Epidemic in Europe" by K. Bogel, H. Moegle, F. Knorpp, A. Arata, K. Dietz, and P. Diethelm. The control of rabies in wildlife by reducing the fox population has led in Europe to inconsistent results, since little was known of the dynamics of the fox population and the interaction between rabies epizootics, host populations, and control measures. As part of the World Health Organization/Food and Agriculture Organization Coordinated Research Program on Wildlife Rabies in Europe, data on epizootics and persisting reservoirs of the disease were processed by computer. The results led to a better understanding of the epizootic's mechanism of spread and to proposals for the improvement of rabies control in animals and for the protection of man.

F. Estimated Net Distribution of Modified Live and Inactivated Rabies Vaccines for Animals in the United States, Fiscal years 1972-1976

The following information has been received from the Biologics Licensing and Standards Staff, Animal and Plant Health Inspection Service, United States Department of Agriculture, regarding the number of doses of modified live and inactivated animal rabies vaccines distributed in the United States in the past 5 years. There are currently 6 modified live and 2 inactivated types of animal rabies vaccines being marketed in the United States.

<u>Fiscal Year</u>	<u>Modified Live</u>	<u>Inactivated</u>	<u>Total</u>
1972	6,963,979	6,493,520	13,457,499
1973	9,170,260	2,464,036	11,634,296
1974	13,337,444	3,969,142	17,306,586
1975	10,940,754	3,035,668	13,976,422
1976	15,675,821	4,584,169	20,259,990

IV. FOREIGN TRANSLATIONS OF SUMMARY

A. Resumen (Spanish)

En los Estados Unidos y sus territorios fueron confirmados un total de 3.146 casos de rabia en el año 1976 - 471 mas que en 1975 pero un 14% por debajo del promedio de los cinco años anteriores. Los animales silvestres (principalmente zorillos, mapaches, y murcielagos) fueron las especies responsables por este aumento. Hubo animales infectados en 48 estados y Puerto Rico; solamente el Distrito de Columbia, Hawaii, Vermont, Guam, y las Islas Virgines no notificaron casos. Los estados con mas de cien casos fueron California (357), Texas (347), Georgia (225), Minnesota (193), Oklahoma (181), Arkansas (155), Dakota del Norte (137), Iowa (125), Dakota del Sur (114), y Florida (100). En 34 estados y Puerto Rico hubo mas casos que en el año anterior, pero en 13 hubo menos. Las especies mas involucradas fueron zorillos (47%), murcielagos (23%), mapaches (9%), Zorros (6%), bovinos (5%), perros (4%), gatos (3%), caballos y mulas (1%). Se notificaron dos muertes humanas de rabia: un muchacho de Texas quien contrajo la enfermedad en Mexico atravez de la mordedura de un perro, y una mujer de Maryland quien murió despues de una mordedura de murcielago. Las tablas y los cuadros muestran datos especificos de la incidencia de la enfermedad.

B. Résumé (French)

Un total de 3,146 cas de la rage confirmées par un laboratoire ont été signalés dans les Etats-Unis l'Amérique et les territoirres sous sa juridiction en 1976. Ceci fut 471 cas de plus qu'en 1975 mais 14% moins que la moyenne pours les 5 années précédentes. Les animaux sauvages, surtout les mouffettes, les ratons laveur et les chauves-souris ont causé l'augmentation de l'année dernière. Quarante-huit états ainsi que Le Puerto Rico ont signalé des cas d'animaux infectés; suels le District du Columbia, Hawaii, Vermont, Guam et les Isles Vierges n'ont rapporté aucuns cas de la rage. Les seuls états qui ont signalé plus de 100 cas sont: La Californie (357), Le Texas (347), La Georgie (225), Le Minnesota (193), L'Oklahoma (181), L'Arkansas (155), Le North Dakota (137), L'Iowa (125), Le South Dakota (114), et La Floride (100). Trente-quatre états et Le Puerto Rico ont signalé plus de cas en 1976 qu'en 1975, et 13 en ont signalé moins. Les animaux infectés les plus souvant signalés, par pourcentage du total, sont les suivant: les mouffettes, 47%; les chauves-souris, 23%; les ratons laveur, 9%; les renards, 6%; les bestiaux, 5%; les chiens, 4%; les chats, 3%; et les chevaux et les mules, 1%. Deux décès humains à cause de la rage ont été rapportés: un garçon du Texas est mort après avoir été mordu par un chien pendant sa visité au Mexique, et une femme de Maryland est morte après avoir été mordue par une chauve-souris. Les tableaux 1-8 et les figures 1-16 presentent les donnés generaux et précis sur l'incidence de la rage.

**TABLE 1 REPORTED RABIES CASES IN THE UNITED STATES^a BY TYPE OF ANIMAL
1953 - 1976^b**

YEAR	DOGS	CATS	FARM ANIMALS	FOXES	SKUNKS	BATS	OTHER ANIMALS	MAN	TOTAL
1953	5,688	538	1,118	1,033	319	8	119	14	8,837
1954	4,083	462	1,032	1,028	547	4	118	8	7,282
1955	2,657	343	924	1,223	580	14	98	5	5,844
1956	2,592	371	794	1,281	631	41	126	10	5,846
1957	1,758	382	714	1,021	775	31	115	6	4,802
1958	1,643	353	737	845	1,005	68	157	6	4,814
1959	1,119	292	751	920	789	80	126	6	4,083
1960	697	277	645	915	725	88	108	2	3,457
1961	594	217	482	614	1,254	186	120	3	3,470
1962	565	232	614	594	1,449	157	114	2	3,727
1963	573	217	531	622	1,462	303	224	1	3,933
1964	409	220	594	1,061	1,909	352	238	1	4,784
1965	412	289	625	1,038	1,582	484	153	1	4,584
1966	412	252	587	864	1,522	377	183	1	4,198
1967	412	293	691	979	1,568	414	250	2	4,609
1968	296	157	457	801	1,400	291	210	1	3,613
1969	256	165	428	888	1,156	321	307	1	3,522
1970	185	135	399	771	1,235	296	252	3 ^c	3,276
1971	235	222	484	677	2,018	465	289	2	4,392
1972	232	184	547	645	2,095	504	218	2	4,427
1973	180	139	448	477	1,851	432	170	1	3,698
1974	232	121	303	302	1,421	537	239	0	3,155
1975	129	104	200	276	1,226	514	223	3	2,675
1976	116	106	198	187	1,468	737	332	2	3,146

^a Includes Guam, Puerto Rico, and Virgin Islands

^b Data prior to 1960 from USDA, ARS. Subsequent data from PHS, CDC.

^c 1 patient recovered.

TABLE 2 HUMAN RABIES DEATHS, UNITED STATES, 1976

Locality	Age	Sex	Nature of Exposure	Postexposure Treatment	Incubation Period	Duration of Illness	Date of Death
1. Maryland	55	F	Bitten on finger by bat that landed on her clothing	Washed small wound with soap and water. Human rabies immune globulin (RIG-20 IU/kg body weight) and 21 daily doses of duck embryo vaccine (DEV) starting 44 hours after bite.	25 Days	23 Days	6/27/76
2. Texas	17	M	Bitten on wrist by stray dog in Monclova, Mexico	None	Approximately 1 month	7 Days	8/31/76

**TABLE 3 CASES OF RABIES IN THE UNITED STATES BY STATE
1961 - 1976**

STATE	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
	3,470	3,727	3,933	4,784	4,584	4,198	4,609	3,613	3,522	3,276	4,392	4,427	3,698	3,155	2,675	3,146
Alabama	64	31	35	36	18	22	52	29	60	49	61	82	52	48	34	18
Alaska	9	15	7	11	10	2	2	33	7	21	43	11	7	14	6	46
Arizona	25	26	75	71	60	53	66	65	39	48	40	61	39	50	26	31
Arkansas	92	51	75	124	84	78	93	57	37	53	108	112	108	61	83	155
California	254	294	307	328	222	308	324	372	313	322	322	275	401	358	290	357
Colorado	11	4	15	11	11	18	15	9	40	66	33	23	19	50	32	52
Connecticut	0	0	0	2	4	1	0	1	12	4	17	7	5	7	8	5
Delaware	0	0	2	0	0	0	0	1	0	0	4	7	6	1	6	22
District of Columbia	0	0	0	0	0	0	6	3	0	0	0	0	0	0	0	0
Florida	68	72	85	106	78	78	82	111	178	97	76	87	43	50	37	100
Georgia	8	12	85	123	74	110	121	83	118	116	146	109	94	138	170	225
Hawaii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idaho	0	2	3	2	15	7	5	4	3	4	4	1	1	3	0	8
Illinois	163	133	157	229	313	192	195	135	88	158	318	277	202	120	65	50
Indiana	109	196	54	37	77	116	89	90	58	31	82	84	57	15	10	24
Iowa	349	349	343	460	232	168	136	126	103	136	240	350	214	130	102	125
Kansas	7	5	23	38	148	65	109	52	72	107	112	129	101	75	60	68
Kentucky	128	143	122	64	104	125	227	413	212	141	187	271	238	157	96	63
Louisiana	65	26	54	87	90	58	70	42	42	69	62	49	52	25	8	8
Maine	0	1	2	30	4	26	27	55	7	49	198	100	69	5	52	41
Maryland	5	3	2	3	27	6	5	5	3	3	3	19	16	27	15	40
Massachusetts	1	3	6	1	3	4	5	6	3	4	6	6	7	4	12	26
Michigan	80	48	50	59	68	43	25	17	13	28	48	9	12	7	10	8
Minnesota	144	237	273	416	177	218	178	259	179	126	265	295	373	254	184	193
Mississippi	1	0	0	67	42	22	11	7	6	3	5	4	1	3	1	2
Missouri	219	163	178	192	131	262	178	123	155	125	148	110	92	41	42	72
Montana	1	1	1	12	8	8	10	15	9	3	6	7	41	36	172	92
Nebraska	46	26	33	41	39	34	72	30	16	17	12	18	7	5	4	20
Nevada	0	1	11	15	0	10	10	2	13	11	5	2	4	4	7	17
New Hampshire	0	0	17	1	6	28	48	3	5	2	4	4	38	3	2	1
New Jersey	7	10	16	18	21	23	21	14	16	11	20	21	18	28	22	27
New Mexico	23	13	43	50	21	19	30	42	20	16	9	16	7	78	42	22
New York	92	107	89	121	259	215	90	45	244	260	136	45	30	43	76	27
North Carolina	14	1	15	6	3	4	3	13	4	3	5	4	14	26	12	16
North Dakota	37	52	72	83	50	88	171	137	79	57	193	147	159	114	103	137
Ohio	77	386	308	288	349	200	138	90	75	60	123	101	38	32	18	35
Oklahoma	20	33	69	102	143	190	377	126	74	103	283	299	174	164	105	181
Oregon	16	17	17	12	9	5	5	6	4	4	9	4	8	6	6	11
Pennsylvania	14	58	29	11	14	16	16	11	14	4	23	63	29	18	20	24
Rhode Island	0	0	0	0	1	0	2	0	0	3	1	2	1	4	4	5
South Carolina	0	0	10	2	3	1	2	0	0	0	20	13	6	6	11	5
South Dakota	105	116	112	90	69	118	142	132	53	119	167	132	151	164	85	114
Tennessee	186	213	138	571	681	353	559	282	132	65	108	316	149	53	21	48
Texas	658	531	525	358	399	448	401	264	330	227	323	344	264	396	326	347
Utah	8	1	4	3	2	3	3	4	5	2	9	9	3	1	3	21
Vermont	0	0	14	7	32	27	19	11	38	57	16	10	3	1	0	0
Virginia	190	136	238	333	338	259	210	148	386	216	79	109	99	113	114	56
Washington	5	0	20	6	22	15	2	2	5	8	5	9	10	2	10	14
West Virginia	115	147	113	40	28	60	63	55	120	153	121	60	25	32	5	17
Wisconsin	25	43	65	84	71	64	62	53	45	60	93	156	154	109	72	97
Wyoming	0	0	0	0	6	9	6	9	56	6	14	2	0	25	36	19
Guam	0	0	0	0	0	0	89	0	0	0	0	0	0	0	0	0
Puerto Rico	29	21	21	33	18	19	37	21	31	49	80	56	57	49	50	54
Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 4 CONFIRMED RABIES CASES IN THE UNITED STATES, BY STATE AND ANIMAL, 1976

	Dogs	Cats	Cattle	Horses & Mules	Sheep & Goats	Swine	Domestic Animal Total	Skunks	Bobcats	Coyotes	Foxes			Raccoons	Bats	Other Animals	Wild Animal Total	Human	Total	More or Less than 1975	STATE	
											Gray	Red	Not Specified									
TOTALS	116	106	164	30	1	3	420	1,468	3	7		71	75	41	277	737	46	2,724	2	3,146	+	
STATE																						STATE
Alabama	3						3	3						4	7		15		18	-	Alabama	
Alaska	8						9						35				37		46	+	Alaska	
Arizona		2					2	6	1	1					17	2 Coati- mundi	29		31	+	Arizona	
Arkansas		3	7				10	127						2	15	1 Opos- sum	145		155	+	Arkansas	
California	3	1	4	4			12	210				2					345		357	+	California	
Colorado							0	15							37		52		52	+	Colorado	
Connecticut							0								2		5		5	-	Connecticut	
Delaware							0										22		22	+	Delaware	
District of Columbia							0										0		0	0	+	District of Columbia
Florida	1	3					4		1			4		53	38		96		100	+	Florida	
Georgia	3	1					4	4	1			8	1		6		221		225	+	Georgia	
Hawaii							0										0		0	0	+	Hawaii
Idaho							0										8		8	+	Idaho	
Illinois	1	2	6	1			10	31					1		1		7		50	+	Illinois	
Indiana	1						1	18									23		24	+	Indiana	
Iowa	3	7	26	2			38	84						1	2		87		125	+	Iowa	
Kansas		1		2			3	53							9	1 Mouse ^b	65		68	+	Kansas	
Kentucky	12	9	4				25	8				18	1		2		38		63	-	Kentucky	
Louisiana				1			1	4							3		7		8	0	Louisiana	
Maine	1	2	3	1	1		8			1			31		1		33		41	-	Maine	
Maryland							0								39		39	1	40	+	Maryland	
Massachusetts							0								26		26		26	+	Massachusetts	
Michigan							0	2							6		8		8	-	Michigan	
Minnesota	9	5	22	3			39	145							7	1 Badger	154		193	+	Minnesota	
Mississippi							0								2		2		2	+	Mississippi	
Missouri	3	3	4				10	53		1				1	6		62		72	+	Missouri	
Montana		3	5				8	73							1		84		92	-	Montana	
Nebraska	1		3				4	13									16		20	+	Nebraska	
Nevada							0										17		17	+	Nevada	
New Hampshire							0										1		1	-	New Hampshire	
New Jersey							0								27		27		27	+	New Jersey	
New Mexico			1	1			2	9							8		20		22	-	New Mexico	
New York			1				1										24		27	-	New York	
North Carolina							0	1 ^a									16		16	+	North Carolina	
North Dakota		9	21	2		1	33	98		1			1		4		104		137	+	North Dakota	
Ohio	12	17	21	2			0	10				1		1	23		35		35	+	Ohio	
Oklahoma							52	122		2					5		129		181	+	Oklahoma	
Oregon							0										11		11	+	Oregon	
Pennsylvania							0										24		24	+	Pennsylvania	
Rhode Island							0										5		5	+	Rhode Island	
South Carolina							0							2	2		5		5	-	South Carolina	
South Dakota	4	12	9	2		1	28	84						1	1		86		114	+	South Dakota	
Tennessee	3	1	1				5	23									43		48	+	Tennessee	
Texas	28	13	8	7			56	205		1		4		5	71		290		347	+	Texas	
Utah							0								21		21		21	+	Utah	
Vermont							0										0		0	0	Vermont	
Virginia	4						4	1									52		56	-	Virginia	
Washington		1					1										13		14	+	Washington	
West Virginia	1	3	1				5										3		17	+	West Virginia	
Wisconsin	13	2	11	2			28	58									69		97	+	Wisconsin	
Wyoming							0	8							11		19		19	-	Wyoming	
Guam							0										0		0	0	+	Guam
Puerto Rico	2	5	6			1	14										40		54	+	Puerto Rico	
Virgin Islands							0										0		0	0	+	Virgin Islands

^aVaccine Induced

^bWhite mouse found loose in rabies vaccine production laboratory

^cExposed in Mexico

Table 5 Human Rabies Cases, By 4-Year Period and Source of Exposure, United States, 1946-1976

Years	Total Cases	No. Cases with Reported Exposure Source	Source of Exposure ^a							
			Domestic Animals			Wild Animals				
			Dog	Cat	% of Total	Fox	Skunk	Bat	Bob-cat	% of Total
1946-1949	94	48	43	5	100	0	0	0	0	0
1950-1953	81	54	47	2	91	3	1	1	0	9
1954-1957	37	29	23	1	83	1	3	1	0	17
1958-1961	18	15	7	1	53	3	1	3	0	47
1962-1965	5	5	3	0	60	0	1	1	0	40
1966-1969	5	4	2 ^b	0	50	0	1	0	1	50
1970-1973	8 ^c	7	2 ^b	0	29	0	2	3 ^d	0	71
1974-1976 (3 yrs)	5	5	3 ^b	1	80	0	0	1	0	20
Total	253	167	130	10	84	7	9	10	1	16

- a Confirmed or most probable source
- b Exposure not in Continental United States
- c Includes 1 laboratory exposure
- d One person recovered

Table 6 Percentages of Total Specimens Reported Examined and Those Found To Be Positive for Rabies, by Type of Animal, United States, 1976

Type of Animal	Number Reported Examined	Percentage of Total Animals Reported Examined	Number Reported Positive	Percentage Positive of Type of Animal ^a	Percentage of all Positives
Dogs	17,675	24.5	116	.7	3.7
Cats	18,018	25.0	106	.6	3.4
Cattle	1,306	1.8	164	12.6	5.2
Horses and Mules	226	.3	30	13.3	1.0
Sheep and Goats	94	.1	1	1.1	.03
Swine	72	.1	3 ^c	4.2	.1
Skunks	4,116	5.7	1,468	35.7	46.7
Bobcats	63	.1	3	4.8	.1
Coyotes	327	.5	7	2.1	.2
Foxes	1,671	2.3	187	11.2	5.9
Raccoons	3,473	4.8	277	8.0	8.8
Bats	8,368	11.6	737	8.8	23.4
Other Wildlife	2,185	3.0	44	2.0	1.4
Rodents and Lagomorphs	14,521	20.1	1 ^b	<.01	.03
Humans	3	<.01	2	66.7	.06
Total	72,118		3,146		

^aRepresents total specimens of type of animal found to be positive/total specimens of type of animal reported to have been examined. All figures are only rough estimates, since not all specimens examined that were negative were reported.

^bMouse found loose in rabies vaccine production laboratory.

TABLE 7 REPORTS OF RABIES IN ANIMALS BY TYPE AND PROVINCE, CANADA, 1976

PROVINCE OR TERRITORY	DOG	CAT	CATTLE	HORSE	SHEEP	SWINE	GOAT	FOX	SKUNK	WOLF	BAT	RACCOON	COYOTE	OTHER	TOTAL
British Columbia											9				9
Alberta								1	7	1	27				36
Saskatchewan		3	10						116		10				139
Manitoba	3	2	15	3		1		2	68		1		1		96
Ontario	74	75	227	37	22	9	2	735	141	3	9	4	2	1 Deer 1 Rabbit	1,342
Quebec	8	3	15	1				32	2			1	1		63
New Brunswick			2												2
Nova Scotia															0
Northwest Territory	4							5							9
Newfoundland															0
Yukon															0
TOTAL	89	83	269	41	22	10	2	775	334	4	56	5	4	2	1,696

Source: Contagious Disease Division, Health of Animals Branch, Canada Dept. of Agriculture, Ottawa, Ontario.

TABLE 8 REPORTS OF RABIES IN ANIMALS BY TYPE AND STATE, MEXICO, 1976

STATE	DOG	CAT	CATTLE	EQUINE	SHEEP	GOAT	SWINE	COYOTE	FOX	SKUNK	BAT	RAT	SQUIRREL	OTHER	TOTAL
Aguascalientes	22	1	1	0	0		1								25
Baja California	1	1	0	0	0										2
Baja California T.	0	0	0	0	0										0
Campeche	0	1	0	0	0										1
Coahuila	96	3	0	0	0										99
Colima	1	0	0	0	0										1
Chiapas	0	0	0	0	0										0
Chihuahua	32	1	0	0	0										33
Federal District (Mexico City)	1,131	54	6	3	1		4				1	1		3	1,204
Durango	73	1	4	1	0	1									80
Guanajuato	181	5	3	1	0	1	1						1		193
Guerrero	15	0	1	0	0						1				17
Hidalgo	74	2	0	1	0								1	1	79
Jalisco	144	11	8	0	0										163
México	286	24	20	2	1		4							3	340
Michoacán	245	9	8	0	0	1									263
Morelos	125	5	0	0	0		1				1			1	133
Nayarit	4	0	0	0	0						1				5
Nuevo León	25	4	0	0	0					1					30
Oaxaca	10	1	0	0	0										11
Puebla	129	0	1	0	0										130
Querétaro	61	1	5	0	0										67
Quintana Roo	14	1	0	0	0										15
San Luis Potosí	47	0	0	1	0						1				49
Sinaloa	92	5	2	0	0		1							4	104
Sonora	85	7	0	0	0									1	93
Tabasco	74	9	1	0	0										84
Tamaulipas	8	0	0	0	0										8
Tlaxcala	40	0	0	0	0										40
Veracruz	154	0	0	0	0										154
Yucatán	94	31	194	47	3								1	3	373
Zacatecas	415	1	9	1	0										426
STATE NOT IDENTIFIED	262	11	25	1	2	1							1		303
TOTAL	3,940	189	288	58	7	4	12	0	0	1	5	1	4	16	4,525

Source: Dirección General De Epidemiología y Campañas Sanitarias S.S.A. México D. F., México.

Fig. 1 CASES OF RABIES IN WILD AND DOMESTIC ANIMALS BY YEAR, UNITED STATES, 1953 - 1976

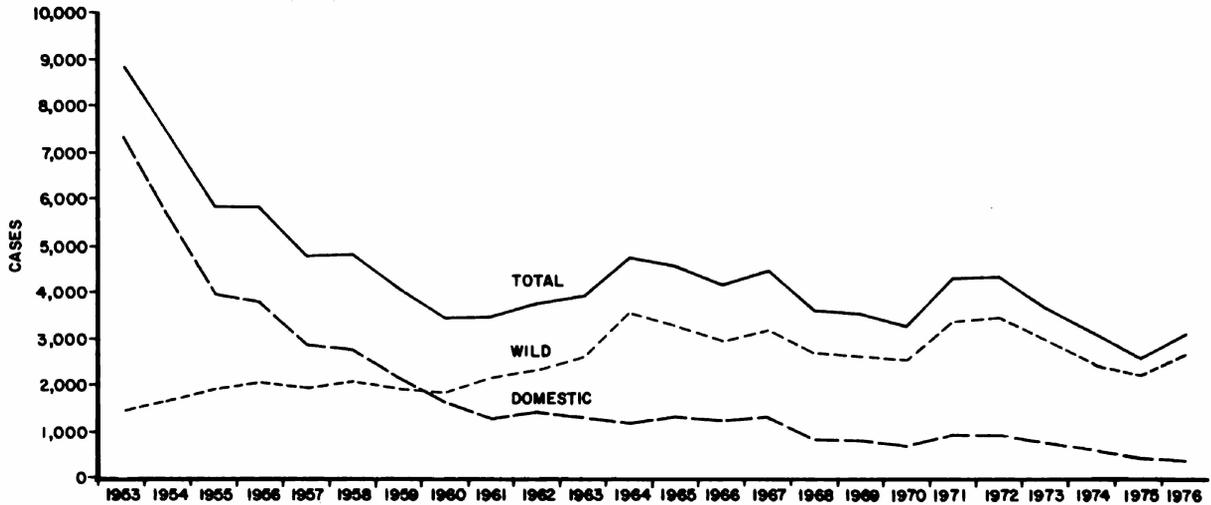


Fig. 2 CONFIRMED RABIES CASES, BY STATE, UNITED STATES, 1976



Fig. 3 CASES OF RABIES IN WILDLIFE HOSTS, UNITED STATES, 1953-1976

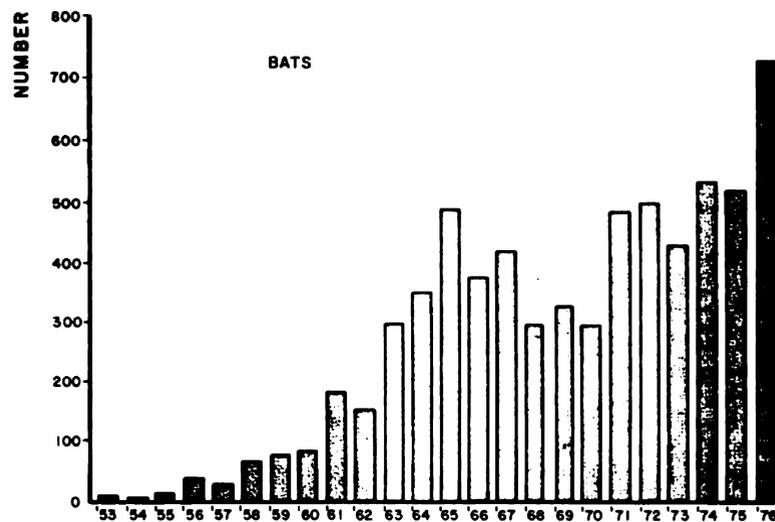
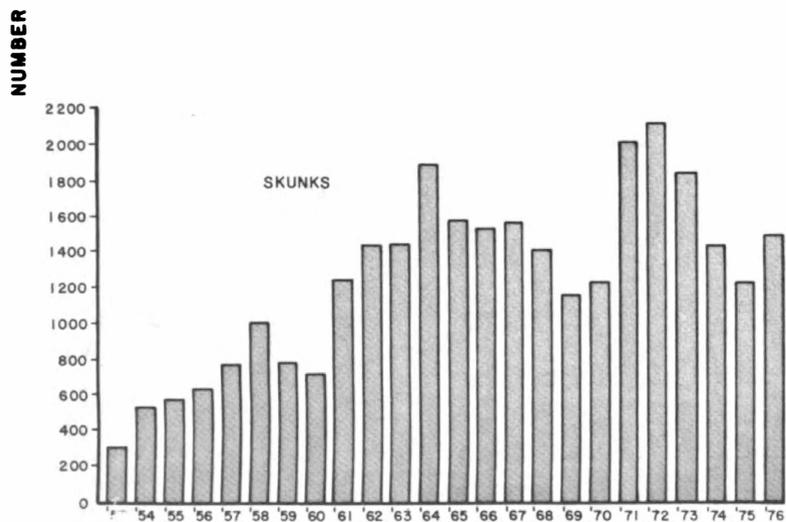
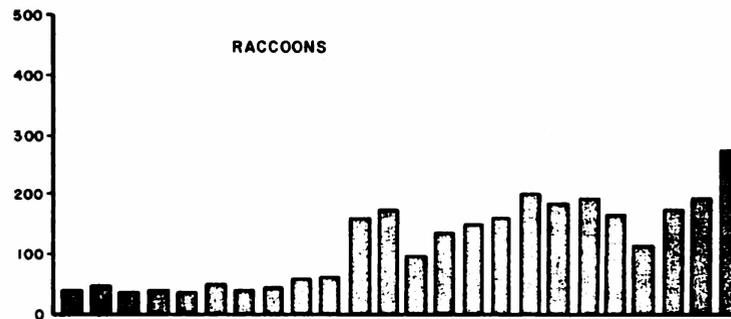
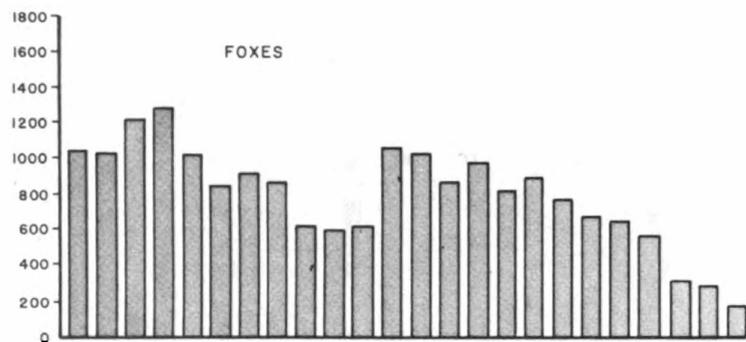


Fig. 4 REPORTED HUMAN RABIES CASES, UNITED STATES, 1950-1976

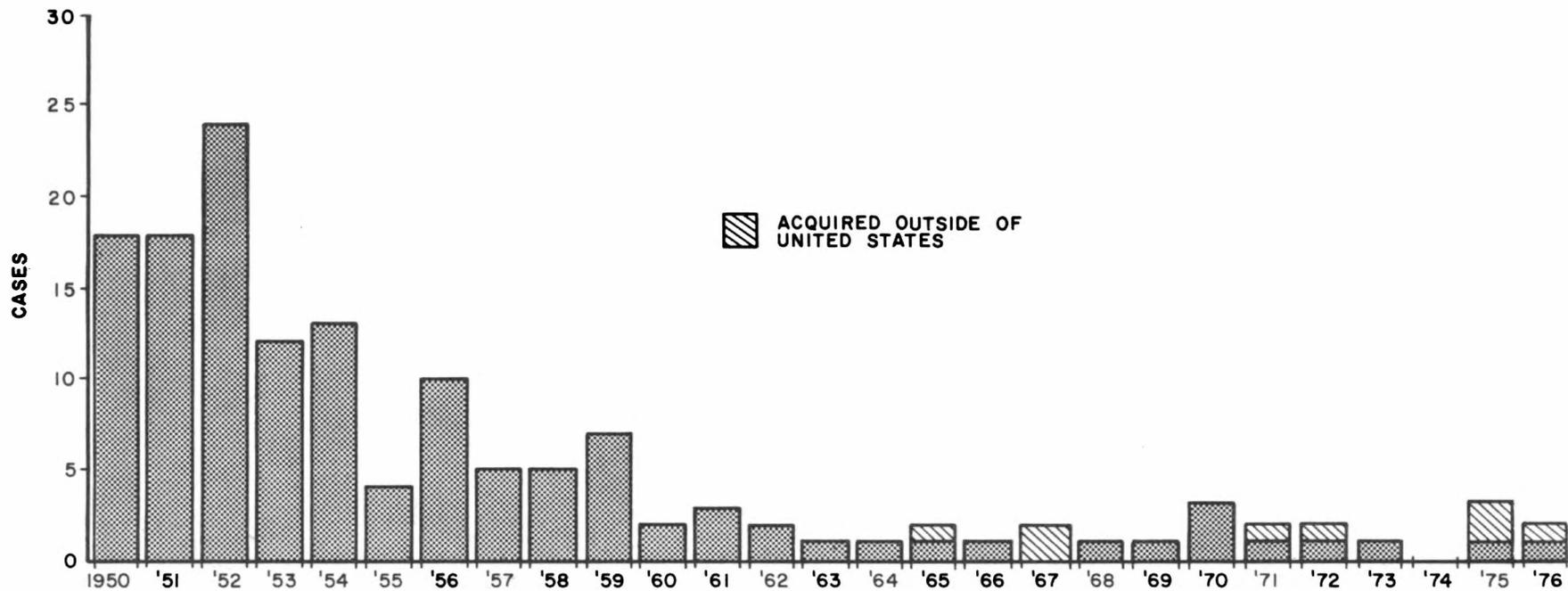


Fig. 5 COUNTIES REPORTING ANIMAL RABIES, 1976

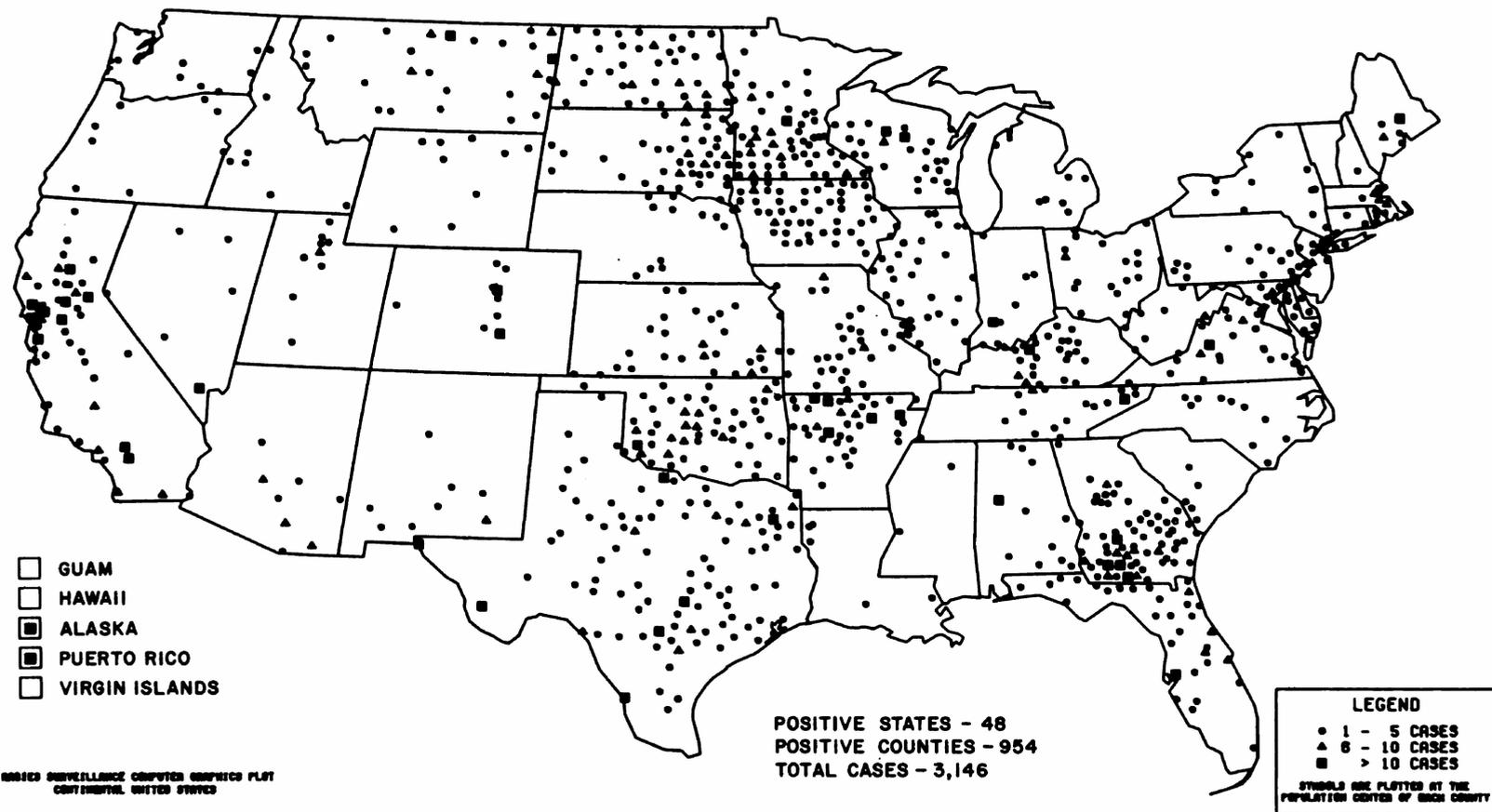
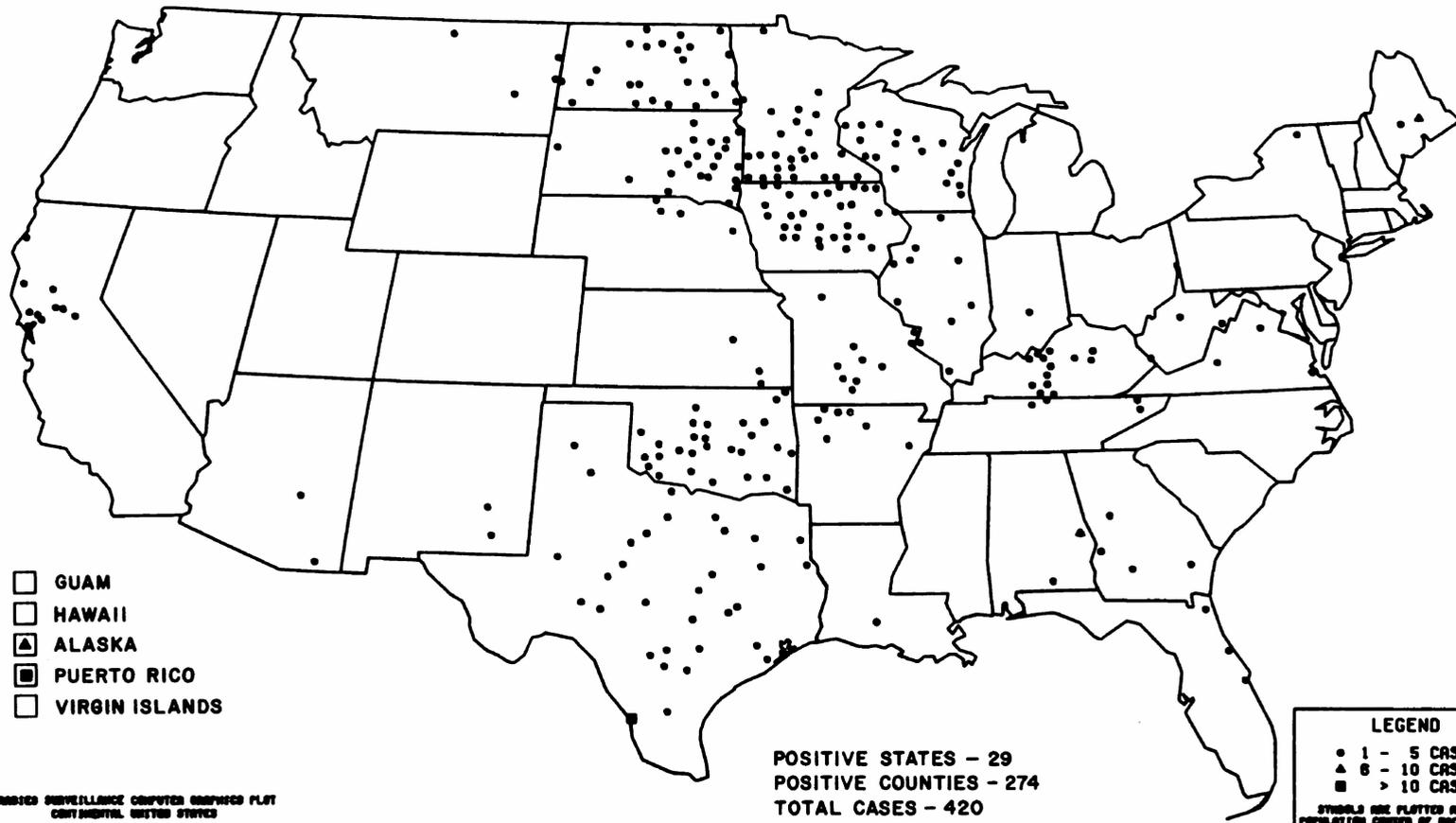


Fig. 6 COUNTIES REPORTING DOMESTIC ANIMAL RABIES, 1976



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Fig.7 COUNTIES REPORTING DOG RABIES, 1976

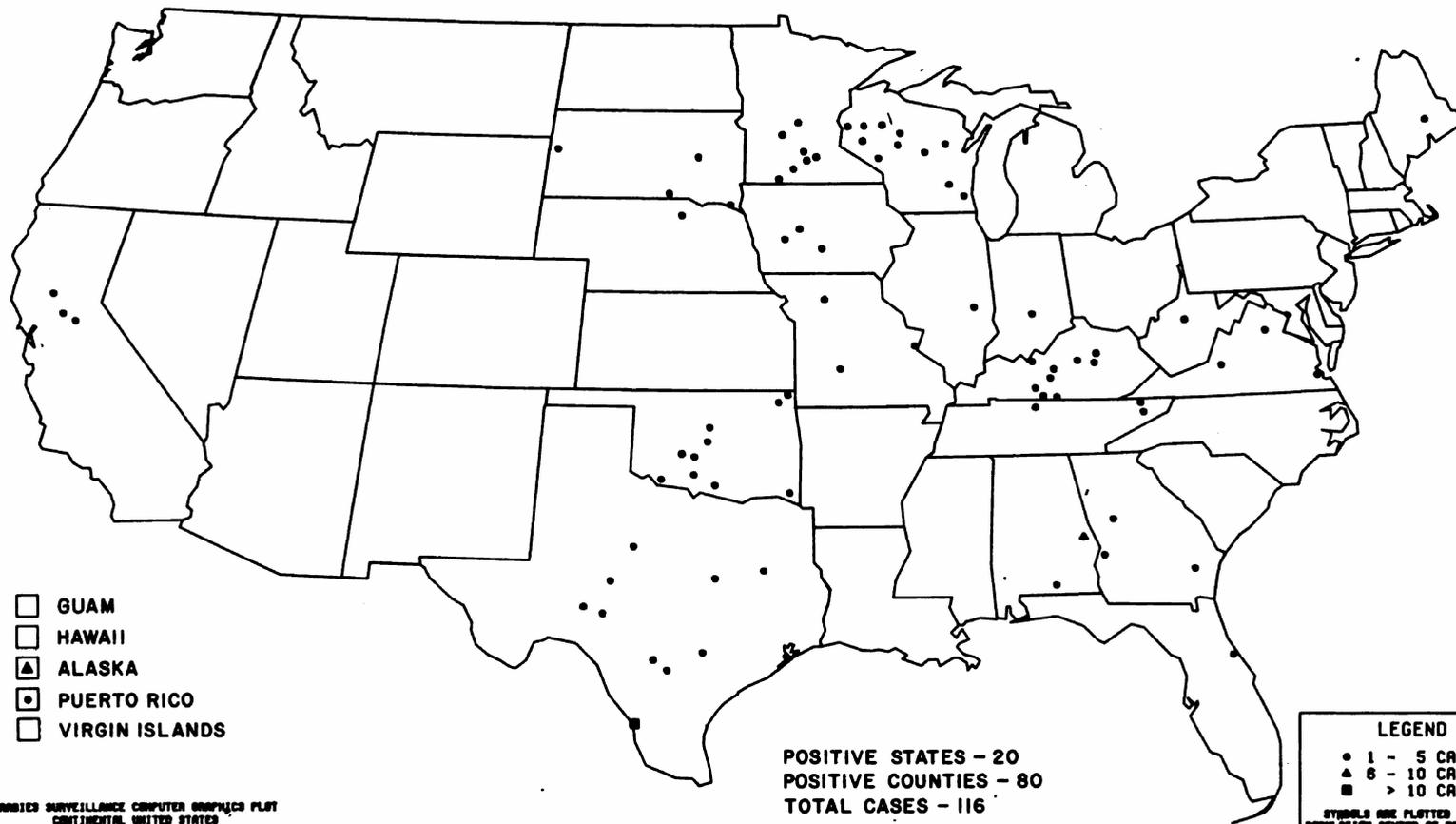


Fig. 8 COUNTIES REPORTING CAT RABIES, 1976

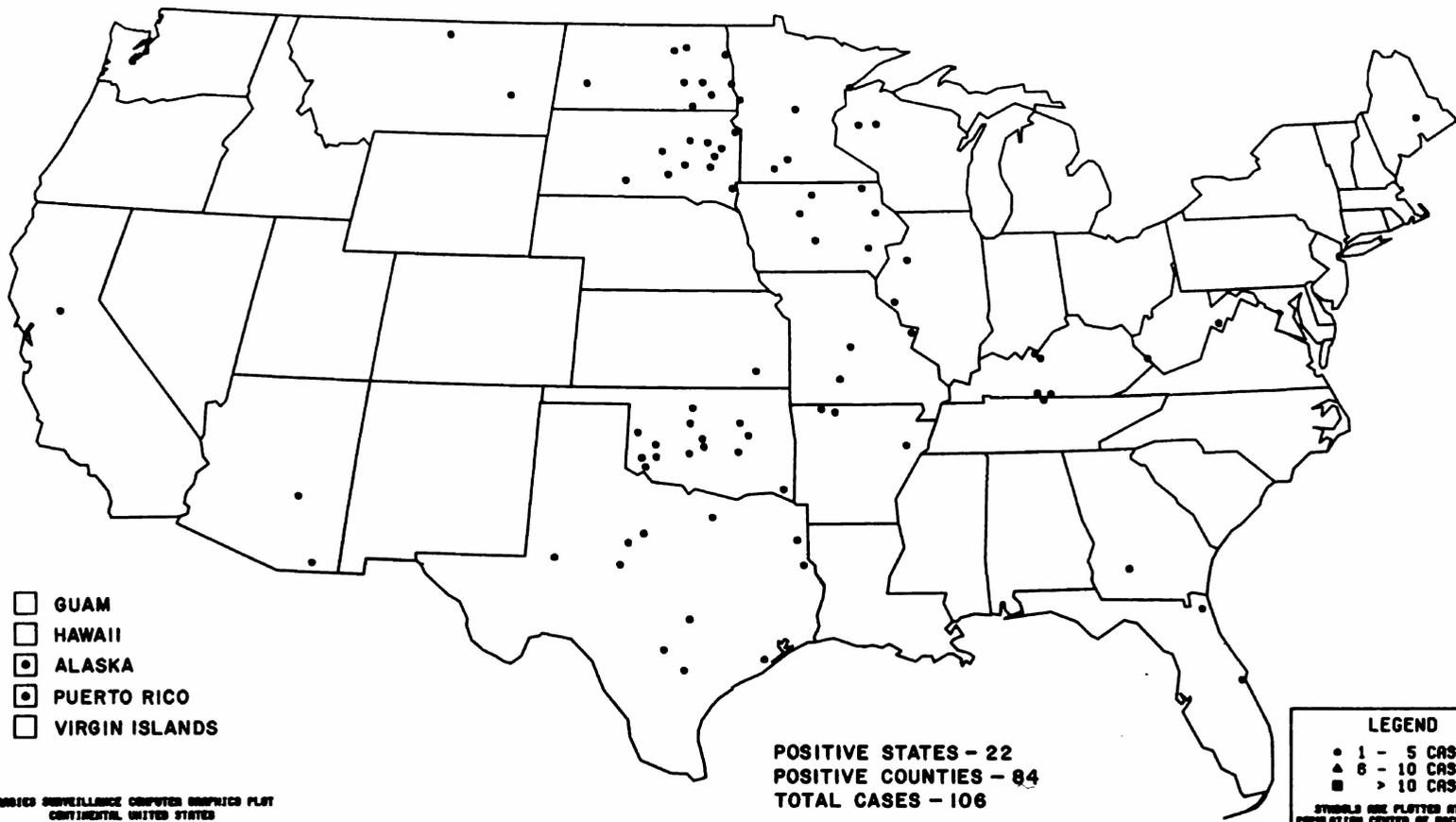
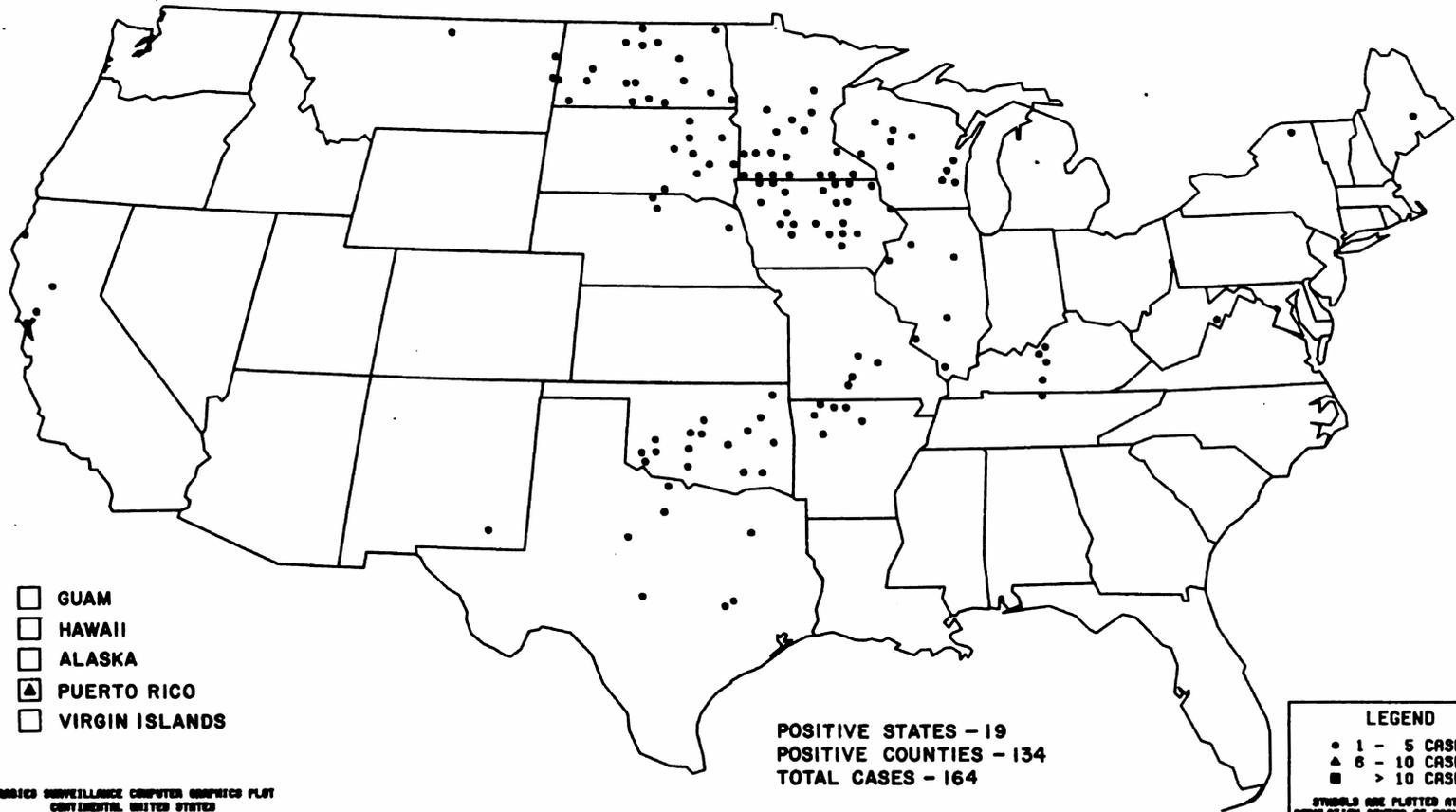


Fig. 9 COUNTIES REPORTING CATTLE RABIES, 1976



- ☐ GUAM
- ☐ HAWAII
- ☐ ALASKA
- ▲ PUERTO RICO
- ☐ VIRGIN ISLANDS

USDCS SURVEILLANCE COMPUTER GRAPHICS PLAT
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Fig. 10 COUNTIES REPORTING WILD ANIMAL RABIES, 1976

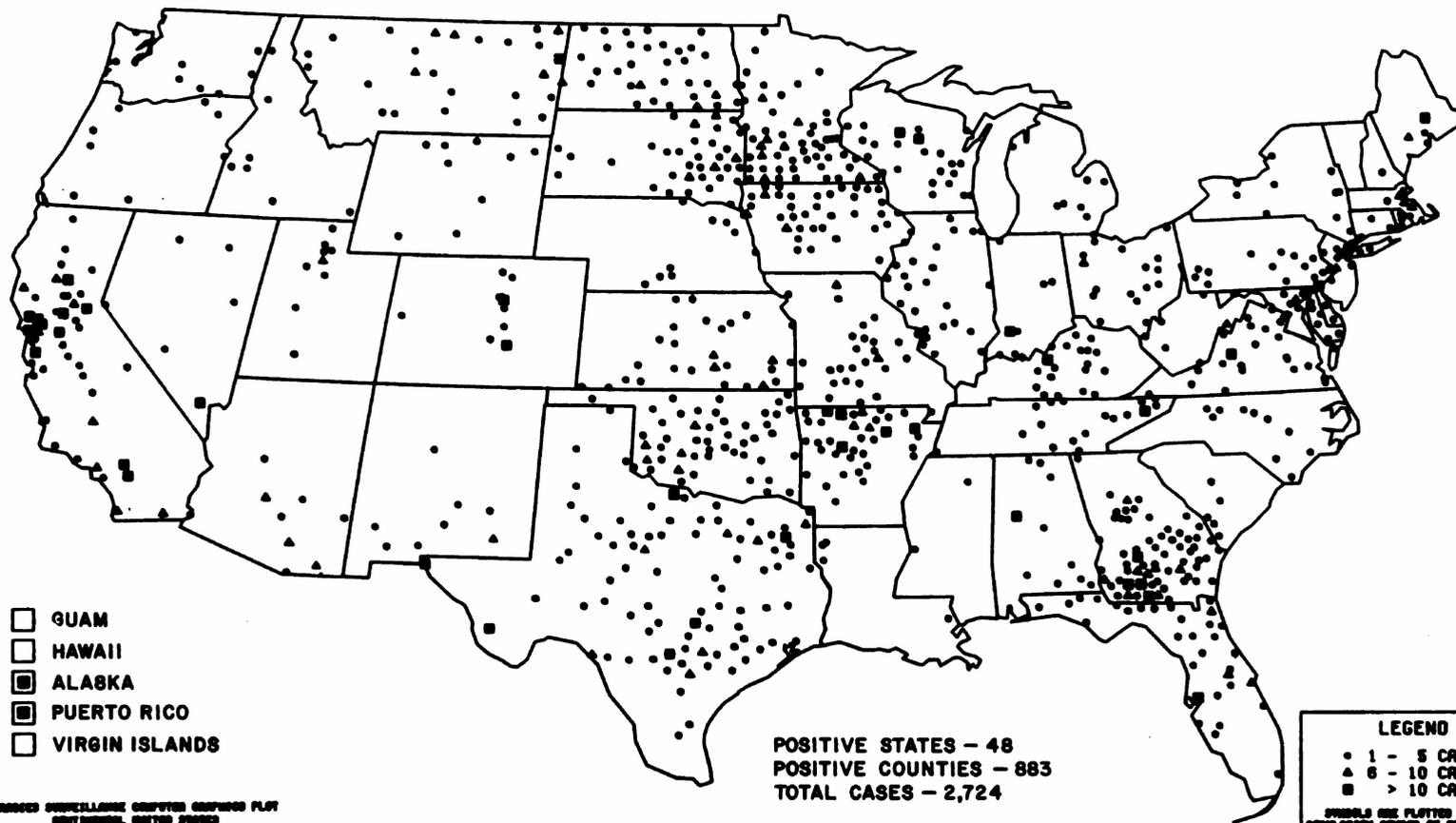


Fig. 11 COUNTIES REPORTING SKUNK RABIES, 1976

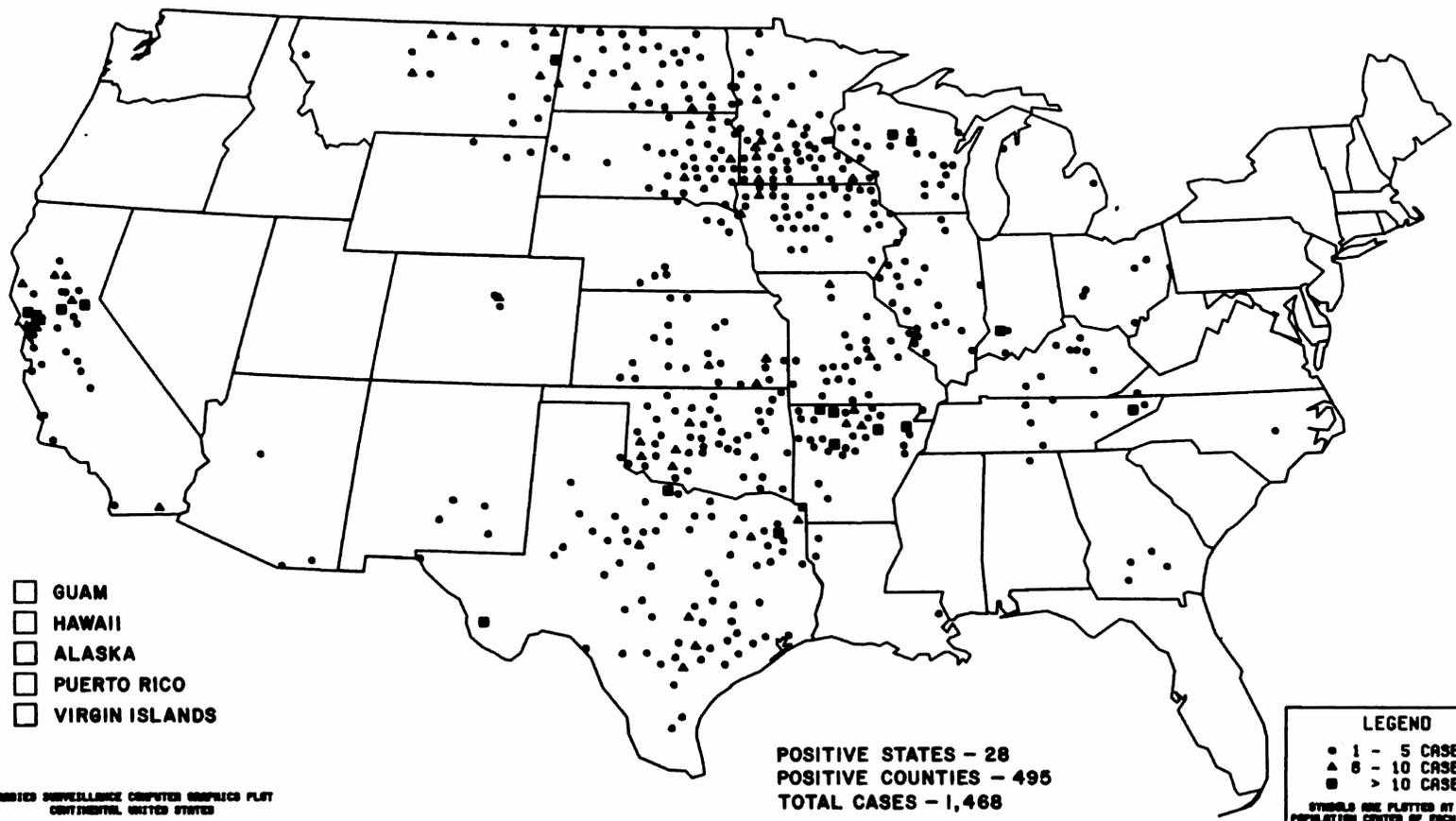


Fig. 12 COUNTIES REPORTING FOX RABIES, 1976

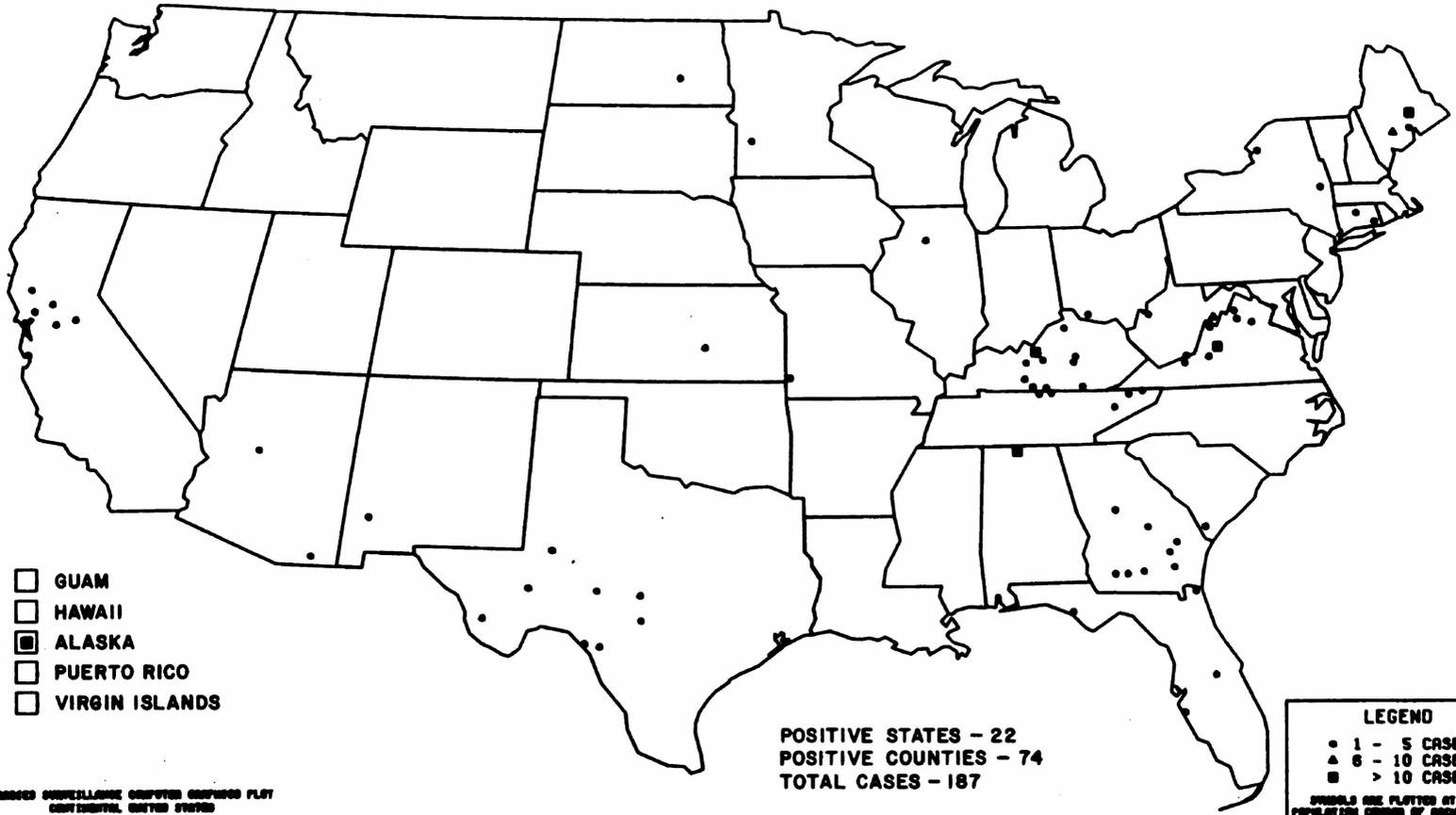
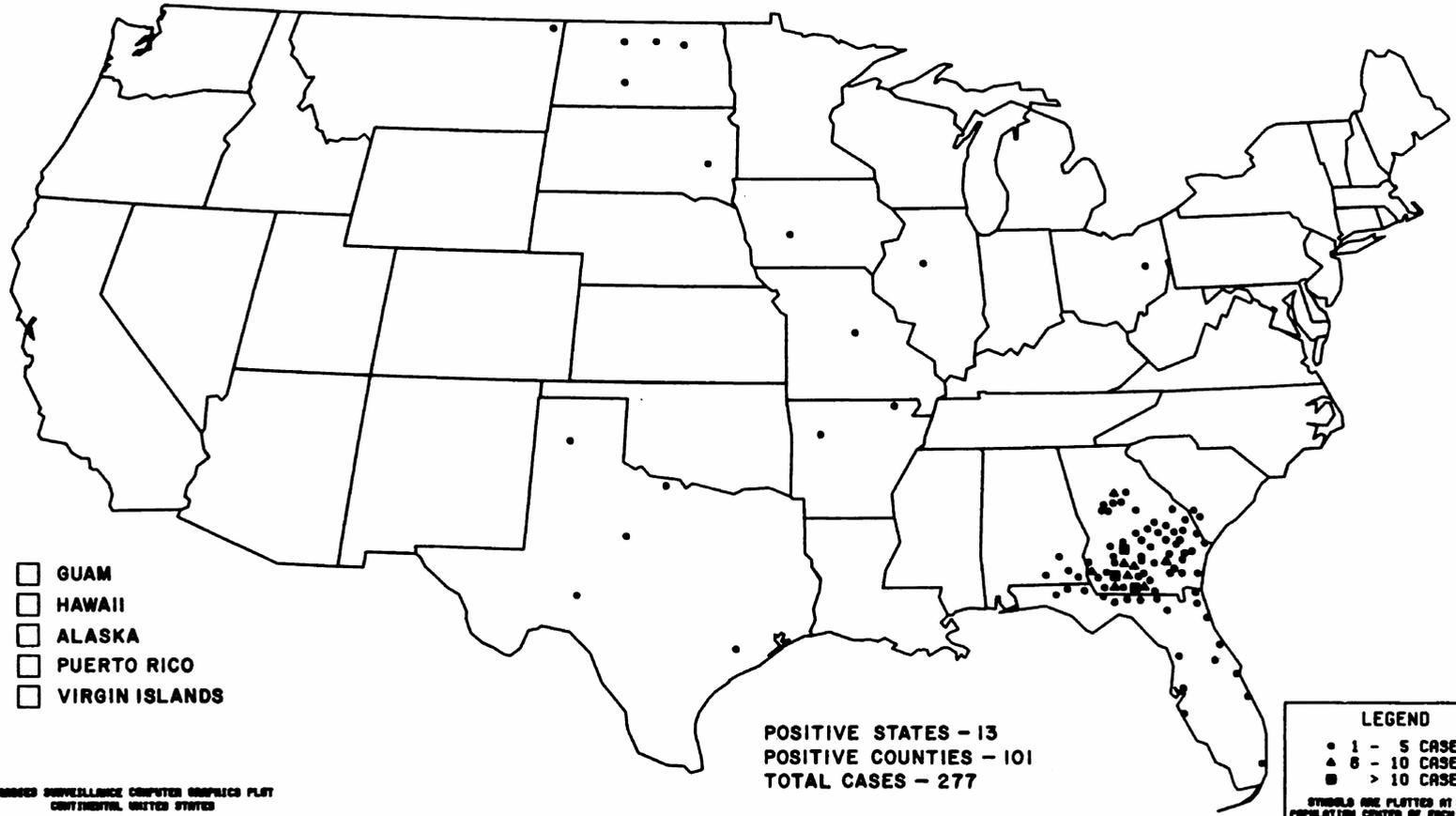


Fig. 13 COUNTIES REPORTING RACCOON RABIES, 1976



- ☐ GUAM
- ☐ HAWAII
- ☐ ALASKA
- ☐ PUERTO RICO
- ☐ VIRGIN ISLANDS

POSITIVE STATES - 13
 POSITIVE COUNTIES - 101
 TOTAL CASES - 277

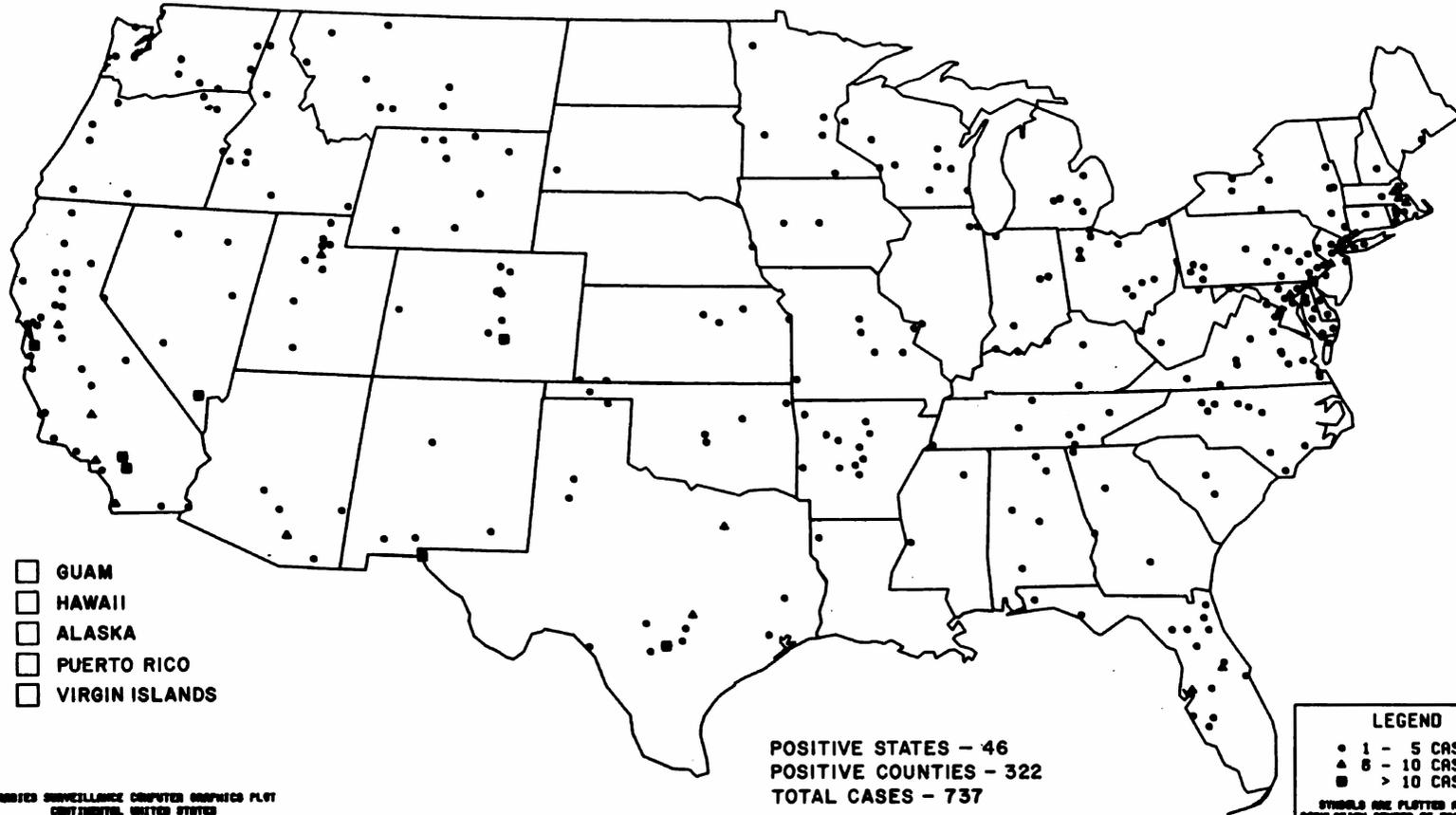
LEGEND

- 1 - 5 CASES
- ▲ 6 - 10 CASES
- > 10 CASES

SYMBOLS ARE PLOTTED AT THE POPULATION CENTER OF EACH COUNTY

BRIDGES SURVEILLANCE COMPUTER GRAPHICS PLOT
 CONTINENTAL UNITED STATES

Fig. 14 COUNTIES REPORTING BAT RABIES, 1976



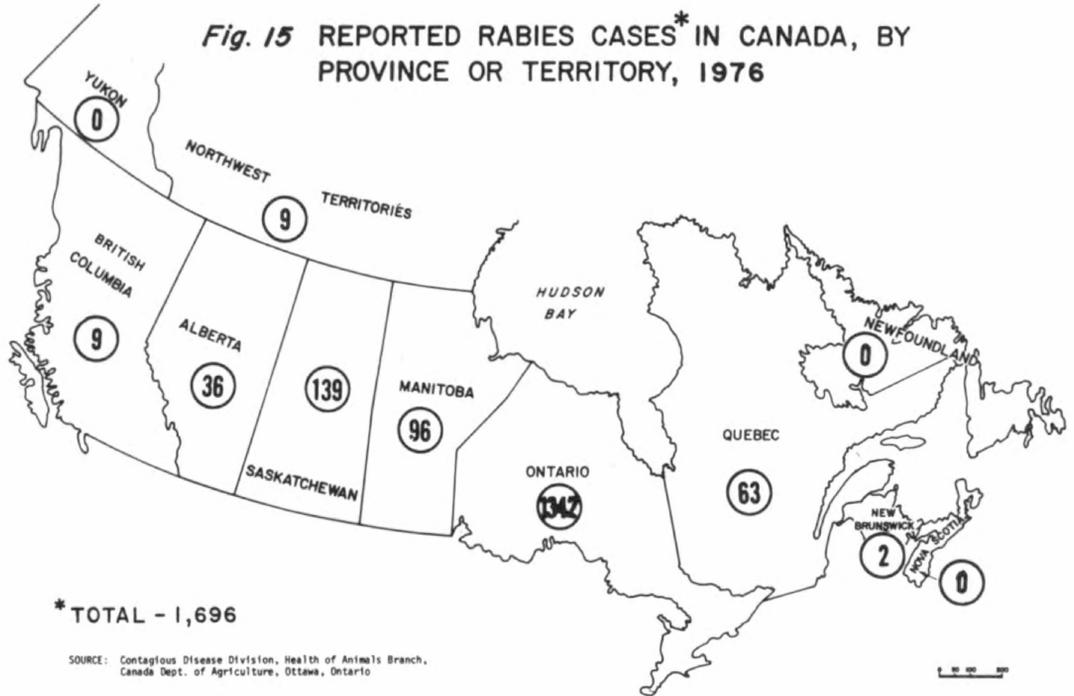


Fig. 16 REPORTED RABIES CASES* IN MEXICO, BY STATE, 1976



STATE EPIDEMIOLOGISTS AND STATE PUBLIC HEALTH VETERINARIANS

Key to all disease surveillance activities are the State Epidemiologists, who are responsible for collecting, interpreting, and transmitting data and epidemiologic information from their individual states. Their contributions to this report are gratefully acknowledged. In addition, valuable contributions to zoonosis surveillance reports are made by State Public Health Veterinarians.

<u>STATE</u>	<u>STATE EPIDEMIOLOGIST</u>	<u>STATE PUBLIC HEALTH VETERINARIAN</u>
Alabama	Frederick S Wolf, MD	
Alaska	John Starr, MD	
Arizona	Jon M Counts, DrPH, Acting	Philip M Hotchkiss, DVM
Arkansas	Paul C White, Jr, MD	Harvie R Ellis, DVM
California	James Chin, MD	George L Humphrey, DVM
Colorado	Thomas M Vernon, Jr, MD	John K Emerson, DVM
Connecticut	John N Lewis, MD	
Delaware	Ernest S Tierkel, VMD*	Ernest S Tierkel, VMD*
District of Columbia	Martin E Levy, MD	George Banks, DVM
Florida	R Michael Yeller, MD	Juan A Tomas, DVM
Georgia	John E McCroan, PhD	R Keith Sikes, DVM
Hawaii	Ned H Wiebenga, MD	John M Gooch, DVM
Idaho	John A Mather, MD	
Illinois	Byron J Francis, MD	Russell J Martin, DVM
Indiana	Richard D Telle, MD	I Dale Richardson, DVM
Iowa	Laverne A Wintermeyer, MD	Russell W Currier, DVM
Kansas	Donald E Wilcox, MD	George A Mullen, DVM
Kentucky	Calixto Hernandez, MD	Joseph W Skaggs, DVM
Louisiana	Charles T Caraway, DVM*	Charles T Caraway, DVM*
Maine	William S Nersesian, MD, Acting	
Maryland	Kathleen H Acree, MDCM	Kenneth L Crawford, DVM
Massachusetts	Nicholas J Fiumara, MD	Victor P LaBranche, DVM
Michigan	Norman S Hayner, MD	Donald B Coohon, DVM
Minnesota	Ellen Z Fifer, MD	
Mississippi	Durward L Blakey, MD	
Missouri	H Denny Donnell, Jr, MD	William F Raithel, DVM
Montana	Martin D Skinner, MD	James W Glosser, DVM
Nebraska	Paul A Stoesz, MD	
Nevada	William M Edwards, MD	
New Hampshire	Vladas Kaupas, MD	
New Jersey	Ronald Altman, MD	Robert F Goldsboro, DVM
New Mexico	Jonathan M Mann, MD	O J Rollag, DVM
New York State	Donald O Lyman, MD	Melvin K Abelseth, DVM
New York City	John S Marr, MD	
North Carolina	Martin P Hines, DVM	John I Freeman, DVM
North Dakota	Kenneth Mosser	
Ohio	Thomas J Halpin, MD	Jack H Russell, DVM
Oklahoma	Patrick M Morgan, DVM, DrPH*	Patrick M Morgan, DVM, DrPH*
Oregon	John A Googins, MD	
Pennsylvania	William E Parkin, DVM	Ernest J Witte, VMD
Puerto Rico	Henry Negron, MD	
Rhode Island	Gerald A Faich, MD	Thomas J Grennan, Jr, DVM
South Carolina	Richard L Parker, DVM*	Richard L Parker, DVM*
South Dakota	James D Corning, BA, Acting	
Tennessee	Robert H Hutcheson, Jr, MD	Luther E Fredrickson, DVM
Texas	Charles R Webb, Jr, MD	A B Rich, DVM
Utah	Taira Fukushima, MD	F James Schoenfeld, DVM
Vermont	Richard L Vogt, MD, Acting	
Virginia	Grayson B Miller, Jr, MD	
Washington	Jack Allard, PhD	
West Virginia	William L Cooke, MD	
Wisconsin	H Grant Skinner, MD	Wayne H Thompson, DVM
Wyoming	Herman S Parish, MD	Norman R Swanson, DVM

*Dual assignment

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