

COCCIDIOIDOMYCOSIS IN LOS ANGELES COUNTY

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BETWEEN 1957 and 1968, an average of 51 cases of coccidioidomycosis per year were reported in Los Angeles County. Although not widely recognized, there is ample evidence of endemic foci of *Coccidioides immitis* within the county (1-3). One cannot presume, however, that all reported cases within Los Angeles County are contracted there. Geographically, the area is also accessible from well-known endemic regions within California, the Southwestern States, and Mexico. Therefore, accurate residence and travel histories are required to determine the probable site of exposure. The investigation reported here was undertaken to delineate the probable sites of exposure to *C. immitis* for cases reported to the County of Los Angeles Health Department in 1968. In addition, previously reported cases of *C. immitis* infection acquired in Los Angeles County are reviewed.

Methods

A total of 62 health department case records were available for cases of *C. immitis* infection reported in 1968. Attempts were made to contact every patient to obtain complete travel and residence histories. All 62 case records were analyzed in terms of general epidemiologic data (race, fatality rates, and sex). Of the 62 cases, 28 were eliminated from travel and residence analysis for one or more of the following reasons: (a) inability to trace the patient, (b) in-

complete data in the records, or (c) inability of the patient to recall or rule out possible travel in the 3 weeks prior to onset of symptoms. Of the remaining 34 cases, the following criteria were used to ascertain probable site of exposure to *C. immitis*.

1. Patients with acute symptomatic coccidioidomycosis were considered to have been infected in the county if they specifically denied having traveled during the 7 to 28 days before onset. This span is the generally accepted range of incubation periods for coccidioidomycosis (4). Similarly, patients with acute symptoms and a history of travel to other endemic areas within the incubation period were counted as having been exposed outside the county.

2. Chronic cases, usually evidenced by cavitary lesions on X-ray with or without symptoms, were deemed noncounty cases if the patients had ever resided in other endemic areas. This would probably result in a slight underestimate of disease acquired in the county.

Results

Of the 62 patients reported, 49 were men and 13 were women; 40 were white, three were Negro, 19 were Mexican-American. Five deaths due to disseminated coccidioidomycosis with meningitis were recorded. Two persons who died were white and three were Mexican-American, with case fatality rates by ethnic group of 5 percent and 16 percent, respectively. Expressed as death rates per 100,000 population, the ratios are 0.035 for white and 0.41 for Mexican-American residents of the county. These figures are consistent with previous observations that the risk of dissemination and death is greater for Mexican-American than white populations (4).

Of the 34 patients with complete travel and residence data, 18 were considered to have been

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infected outside the county, according to the criteria outlined. The specific sites of exposure of these 18 persons were as follows:

San Joaquin Valley-----	8
Phoenix, Ariz.-----	3
Mexico -----	3
Mojave region, Calif.-----	1
Paso Robles, Calif.-----	1
Shark's Tooth Mountain (Kern County, Calif.) -	1
Between Los Angeles and San Francisco (auto trip) -----	1

Sixteen patients were judged to have been exposed within Los Angeles County. Brief epidemiologic data are shown in the table. Fifteen had a history of an acute febrile respiratory illness, with or without skin rash; the one case of primary cutaneous coccidioidomycosis is described under "Discussion." Diagnosis was confirmed for seven patients by direct culture of *C. immitis*. For the remaining nine patients, the diagnosis was based on clinical evaluation combined with X-ray, complement fixation tests, and skin test findings. In all 16 cases the onset of acute illness was abrupt; therefore, a reasonably accurate history of negative travel, pertaining to the 7 to 28 days before onset, was obtainable.

The probable sites of exposure for the 16 patients are plotted on the map. Half the cases originated in the Saugus area, in the sparsely populated, nonurban region of Los Angeles County. All but one of the others were in the San Fernando Valley or its surrounding foothills.

Discussion

Case 11 represents a probable instance of primary cutaneous coccidioidomycosis:

Y.K., a 32-year-old white woman, lacerated her right shin when she fell from a motorcycle to the dusty shoulder of the road. This occurred on November 10, 1968, in Chatsworth (see map). The wound was sutured, but within 4 days it appeared to be infected and it was opened. Exudate obtained at this time was positive for *C. immitis*. The wound healed slowly over an 8-week period. Skin test (coccidioidin, 1:100) and complement fixation were negative 5 weeks after the injury. The woman's chest X-rays were normal, and she had no respiratory symptoms at any time.

Primary cutaneous coccidioidomycosis has been reported only a few times—in laboratory personnel (5) and in naturally occurring cir-

Presumed sites of exposure to *Coccidioides immitis* within Los Angeles County

Site	Number of cases	Number with history of dust exposure
Saugus-----	8	8
Lancaster-----	1	0
Chatsworth-----	1	1
Canoga Park-----	1	1
Sunland-----	3	1
Hollywood Hills-----	1	1
Sun Valley-----	1	1

¹ Case of primary cutaneous coccidioidomycosis (see case report in text).

cumstances (6, 7). The case report presented here is unique in that the skin test was negative; however, isolation of the organism under the described circumstances makes this a probable case of primary cutaneous coccidioidomycosis.

The geographic distribution of *C. immitis* in the Southwestern States has been well documented (8). During the 1940's the San Joaquin Valley was demonstrated to be an area of high endemicity (4). In 1950, Kritzer and associates described the first well-documented outbreak of clinical coccidioidomycosis within Los Angeles County (3). This occurred in a forestry camp for juvenile probationers in the Saugus area (see map). Since then, several similar outbreaks in the same area have come to the attention of the County of Los Angeles Health Department. The most recent outbreak occurred in June 1968 and included cases 1-5 in the present study. Other outbreaks have been documented in the San Fernando Valley region (1,9).

To supplement data from the recognized outbreaks within Los Angeles County, coccidioidin skin test surveys would be helpful in defining the overall risk of exposure. Some data are available from skin testing programs in high schools; these pinpoint focal regions of endemicity within the county. One study reported in 1950 (2) revealed that the reaction rates in Canoga Park and Saugus high schools were three to eight times higher than in a school located in central Los Angeles. In 1963, the Tuberculosis and Health Association of Los Angeles County reported reaction rates of 7 to 10 percent in the Lancaster-Palmdale region (10). Interestingly, similar rates were found for

South Pasadena, in the San Gabriel Valley. These data were not corrected for previous residence in other endemic areas.

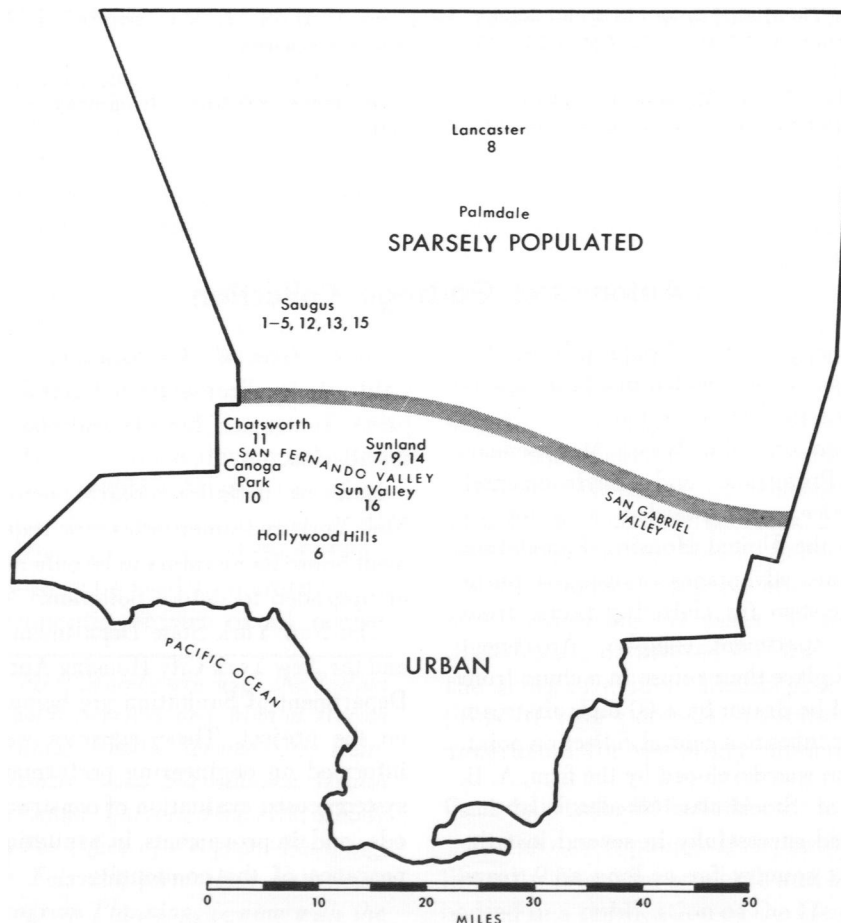
The presumed sites of exposure to *C. immitis* described here are in areas reported previously as suspected endemic foci. All seven sites are either well beyond or on the fringe of urban Los Angeles County (see map). Such areas would be more likely to have open fields, empty lots, and unpaved roads.

In addition to this hospitable topography, the weather conditions in these areas are conducive to the survival of spores of *Coccidioides* (8)—a low yearly average rainfall, a short rainy season, a prolonged, hot and dry summer, and mild winter temperatures. These conditions prevail in all the suspected endemic areas of the county. The apparently nonendemic coastal and central portions of the county have similar conditions

with two important differences: (a) summer temperatures which are 5°–15° cooler than the areas described and (b) more moisture-producing fog with higher relative humidity readings during the summer months, according to the Los Angeles Weather Bureau.

One unexplained observation is the seeming lack of clinical coccidioidomycosis in the San Gabriel Valley. As noted before, skin test surveys have indicated an infection rate similar to other endemic areas within the county, yet no previous outbreaks or cases in the present study were described there. This may be fortuitous, since the number of cases in the present study is rather small. Also, this review includes only clinical cases. Undoubtedly there are larger numbers of asymptomatic or undiagnosed cases, some of which probably occur in the San Gabriel Valley. The weather conditions in the San

Exposure to *Coccidioides immitis*, Los Angeles County, 1968



NOTE: The numbers shown under the sites of exposure are case numbers.

Gabriel Valley seem just as ideal for infection as the San Fernando Valley, according to data from the Los Angeles Weather Bureau.

Conclusion

This report re-emphasizes the fact that the San Joaquin Valley is not the only area in California where risk of exposure to *C. immitis* exists. Los Angeles County's 7 million inhabitants and thousands of tourists can become infected yearly within the county's borders. Recent and past experience indicates that certain areas of the county are endemic foci for *C. immitis*. These areas include the San Fernando Valley and the sparsely populated northern and western regions of the county.

REFERENCES

- (1) Cowper, H. H., and Emmett, J.: Coccidioidomycosis in San Fernando Valley. Calif Med 79: 97, August 1953.
- (2) Kessel, J. F., Biddle, M., Tucker, H. A., and Yeaman, A.: The distribution of coccidioidomycosis in southern California. Calif Med 73: 317, October 1950.
- (3) Kritzer, M. D., Biddle, M., and Kessel, J. F.: An outbreak of primary pulmonary coccidioido-

mycosis in Los Angeles County. Calif Ann Int Med 33: 960, October 1950.

- (4) Fiese, M. D.: Coccidioidomycosis. Charles C Thomas, Springfield, Ill., 1958.
- (5) Goodman, D. H., and Scharbrum, B.: Primary cutaneous coccidioidomycosis. Ann Int Med 59: 84, July 1963.
- (6) Levan, N. D., and Huntington, R. W.: Primary cutaneous coccidioidomycosis in agricultural workers. Arch Derm (Chicago) 92: 215, February 1965.
- (7) Winn, W. A.: Primary cutaneous coccidioidomycosis. Arch Derm (Chicago) 92: 221 February 1965.
- (8) Maddy, K.: The geographic distribution of *Coccidioides immitis* and possible ecological implications. Arizona Med 15: 178, July 1958.
- (9) Cowper, H. H.: A coccidioidomycosis outbreak in Canoga Park, San Fernando Valley. Los Angeles County Index, week ending April 24, 1965.
- (10) Masters, J. B., Harader, F. R., and Gaines, R. S.: Coccidioidin skin sensitivity among high school students in Los Angeles County. Transactions of the Ninth Annual Coccidioidomycosis Conference, Tuberculosis and Health Association of California. Los Angeles, 1964, p. 9.

Tearsheet Requests

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Automated Garbage Collection

Collection of garbage and other solid wastes is about to become automated in a large apartment complex in New York City.

The Bureau of Solid Waste Management Consumer Protection and Environmental Health Service, has awarded a grant of \$568,000 to the United Housing Foundation to demonstrate advantages of using a pneumatic pipe system for collecting refuse from a high-rise apartment complex. Apartment dwellers will place their refuse in a chute from which it will be drawn by a 60 mph airstream in pneumatic tubes to a central collection point.

The system was developed by the firm, A. B. Centralsug of Stockholm, Sweden, and has been operated successfully in several installations in that country for as long as 9 years.

Aero-jet General Corporation, El Monte, Calif., under license from Centralsug, is the prime contractor for the equipment and its installation.

New air pollution control regulations in New York and other cities now require apartment house incinerators to be either eliminated or upgraded to reduce pollution.

The New York State Department of Health and the New York City Housing Authority and Department of Sanitation are being consulted on the project. These agencies will be kept informed on engineering performance of the system, costs, evaluation of construction methods, and improvements in sanitation and appearance of the community.