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C O C C I D I O I D O M Y C O S I S

KERN COUNTY

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SESSION ON FUNGUS INFECTIONS,

SIXTH PACIFIC SCIENCE CONGRESS

of the

Pacific Science Association

August 2, 1939

Reprint from Kern County Department
of Public Health, Annual Report for the
Fiscal Year July 1, 1938 to June 30, 1939.

COCCIDIOIDOMYCOSIS, KERN COUNTY

The first case of coccidioidomycosis to be recognized and reported in Kern County occurred in 1901, in a 19-year-old man, a canner, who had resided in Kern County only 12 days prior to onset of illness. He developed infection in the lungs which became generalized and resulted in death four months later from a basilar meningitis.

Two hundred and fifty-six cases of coccidioidomycosis have been reported in Kern County, since this first case was recognized, more than one-third of the total cases reported in the State of California.

In the first 10-year period, 1901-1910, there were only four cases reported, all of which were of the granuloma type and all died. In the next 10-year period, 1911-1920, there were 13 cases reported, all of the granuloma type and 10 died. From 1921 to 1930, there were 59 cases, of which 56 developed the granuloma type and 33 died; since 1931 there have been 170 cases reported, 111 of the non-granuloma type and 69 of the granuloma type and 35 have died.*

Coccidioidomycosis More Prevalent Than Tuberculosis

Coccidioidomycosis is much more prevalent in Kern County than is tuberculosis, as indicated by the results of the tuberculin and coccidioidin skin tests on over 3,000 Kern County school children.

Among over 2,200 elementary school children tuberculin and coccidioidin skin tested** in the Kern County schools, 55 per cent reacted positively to the coccidioidin skin test as compared to 18 per cent reacting positively to the tuberculin test; among over 900 high school children tuberculin and coccidioidin skin tested in the Kern County schools, 68 per cent reacted positively to coccidioidin, as compared to 31 per cent reacting positively to tuberculin.

* See attached page for table showing the number of cases of coccidioidomycosis, according to type, reported in Kern County by 10-year periods since 1901.

** The tuberculin skin tests were done by Dr. Emerson C. Savage, Director of Tuberculosis Control Work in Kern County, and his staff.

The coccidioidin skin tests were done by Dr. C. E. Smith, Stanford University, and the staff of the Kern County Department of Public Health.

Apparently fewer cases of coccidioidomycosis develop the late, destructive lesions, than in tuberculosis and there are fewer deaths. The total deaths from coccidioidomycosis for the entire 38-year period are less than those from tuberculosis in one year.

The average number of cases and deaths from tuberculosis reported in Kern County per year for the past three-year period, 1936-1938, is 174 cases and 88 deaths as compared to an average of 37 cases with 7 deaths from coccidioidomycosis. Two times as many cases as deaths from tuberculosis were reported as compared to more than five times as many cases as deaths being reported from coccidioidomycosis.

"San Joaquin Fever"

Among the reported cases of coccidioidomycosis since the disease was made reportable, 7 per cent of the cases with onset in 1928, 8 per cent of the cases with onset in 1929, 9 per cent of the cases with onset in 1934, 22 per cent of the cases with onset in 1936, 47 per cent of the cases with onset in 1937, and 63 per cent of the cases with onset in 1938, showed the manifestation of erythema nodosum, popularly called "San Joaquin fever" or "desert fever."

Erythema nodosum is not of common occurrence outside the San Joaquin Valley; it occurs in about 1 in 1,000 cases in dermatological practice.

The frequency of the occurrence of erythema nodosum in Kern County attracts very early the attention of physicians coming to practice in the county for the first time.

On August 1, 1934, I joined the staff of the Kern County Department of Public Health. On August 6, 1934, Mrs. F. H., a 45-year-old white woman, a fruit picker from one of the large ranches, was admitted to the isolation ward of the Kern General Hospital with symptoms of pneumonia and temperature of 104.6. Five days later she developed a most unusual rash.

In my experience as house officer on the communicable disease ward of the San Francisco Hospital, I had never seen anything like this rash. I requested

Dr. Joe Smith, Health Officer and Superintendent of the Kern General Hospital, to see Mrs. F. H. He explained that this was a case of "San Joaquin fever" which was of common occurrence in Kern County; that the etiology of the disease was not known, but that the rash was believed to be an allergic one.

Up to this time I had not heard of the disease "San Joaquin fever"; nor did I find any report of it in medical literature.

In a recent course in parasitology at the Johns Hopkins School of Hygiene and Public Health I had been impressed with the summer pneumonias in the south due to ascaris lumbricoides infections, and also with the fact that some persons were allergic to the ascaris lumbricoides. It occurred to me that this unusual rash might be a manifestation of an ascaris lumbricoides infection. I asked Mrs. F. H. to bring a stool specimen within six weeks to two months, as I did on the other cases of "San Joaquin fever" which came to my attention in the succeeding months. However, all stool specimens examined in these cases were negative for ascaris lumbricoides.

On October 24, 1934, B. M., a 26-year-old Filipino man, who had been working as a dish washer in Delano, was taken ill with a chest cold, fever and slight cough and on November 1, 1934, developed erythema nodosum, multiple raised, red, tender areas from 6 mm. to $1\frac{1}{2}$ cm. to 2 cm. in diameter, on the legs.

He was sent to the Kern General Hospital on November 14, 1934, by a Delano physician. The summary of this patient's hospital record stated: "Entry diagnosis: rheumatic fever. Discharge diagnosis: rheumatic fever. Treatment: rest and salicylates. Course: rapid improvement." The temperature was normal for 12 days before the patient was discharged from the hospital on December 6, 1934.

Six weeks later on January 16, 1935, the guinea pig which had been inoculated with sputum from B. M. was autopsied and found positive for the coccidioides fungus by direct smear and culture on Sabourraud's media, the report of which was sent to my desk because the disease was a reportable one. The history of this case was so similar to the cases of "San Joaquin fever" I had been observing, that

it started me thinking of the possibility of a relationship between "San Joaquin fever" and coccidioides fungus disease.

When Dr. E. C. Dickson, Professor of Public Health and Preventive Medicine, Stanford University, visited the Kern County Department of Public Health in January, 1936, I showed him this case history, as well as others, and described typical cases of "San Joaquin fever," which were so common in Kern County.

I asked him if he thought there might not be a relationship between "San Joaquin fever" and the disease due to the coccidioides fungus. He was immediately interested, as he recalled that their one laboratory case, Dr. C., had developed an unexplained erythema nodosum early in the course of his illness.

Annual Report, Fiscal Year, 1935-1936

In the Annual Report of the Kern County Department of Public Health for the fiscal year, 1935-1936, "San Joaquin fever" as a separate entity was reported as follows: "Incomplete reports showed more than a score of cases of a hitherto unpublished disease popularly called 'San Joaquin' or desert fever,' which is characterized by early symptoms of broncho-pneumonia followed in a week or ten days by raised, reddened, tender 'bumps' or nodules on the legs, arms and sometimes on the chest, neck and face; this rash is sometimes diagnosed as 'erythema nodosum.' An x-ray of the lungs in these cases usually reveals parenchymal and hilar lymph node involvement and sometimes pleurisy or pleurisy with effusion or interlobar empyema. An x-ray diagnosis of the chest findings in these cases is frequently 'tuberculosis.' However there is usually complete recovery as shown by the x-ray a few months later.

"Research studies are being carried on by the County Health Department and the staff of the Kern General Hospital to determine the relationship, if any, of the coccidioides fungus disease to 'San Joaquin fever.' The coccidioidin test in all cases of 'San Joaquin fever' so far tested with the Kessel coccidioidin symptoms to develop the sensitivity skin test reaction. By the time the post-primary erythema nodosum has developed in the "San Joaquin fever type." the

coccidioidin skin test usually gives a good positive reaction.

Results of Skin Tests, According to Length of Residence in the County

Among the Kern county school children coccidioidin skin tested in the past year, the results of the skin tests, according to length of residence in the county, showed 17 per cent reacting positively among those who had lived in the county less than one year, as compared to 41 per cent reacting positively among those who had lived in the county one to four years; 53 per cent reacting positively who had resided in the county five to nine years; and 77 per cent reacting positively who had resided in the county ten years and over.

The results of the coccidioidin skin tests according to age groups showed 35 per cent reacting positively in the 5-9 year age groups; 54 per cent reacting positively in the 10-14 year age group; and 69 per cent reacting positively in the group 15 years of age and over.

Distribution of Cases According to Age, Sex, Race, Place and Season

In studying the distribution of the cases of coccidioidomycosis as to age, sex, race, place and occupation, in the past 38-year period, it is to be observed that the age group 25-44, about one-third of the total population of the county, gave 56 per cent of the total cases and 63 per cent of the deaths. Men gave about twice as many cases and three times as many deaths as women. In the last few years, more of the non-granuloma, non-fatal type of the disease has been reported; more of these cases are reported in women than in men. However, men still give 81 per cent of the deaths from coccidioidomycosis.

The Negro and Filipino races, only about 3 per cent of the total population in the county, gave 30 per cent of the total cases and 43 per cent of the deaths from coccidioidomycosis; whereas, the white population, about 87 per cent of the total population gave only 57 per cent of the cases and 36.5 per cent of the deaths.

Four townships, largely agricultural areas in the Delano, Shafter, Wasco, Arvin and Kern Lake districts, having about one-third of the total population in

the county, gave 65 per cent of the cases and 82 per cent of the deaths from coccidioidomycosis.

Fifty per cent of the cases occurred in fruit, cotton, farm and other agricultural workers. Seventeen per cent of the cases occurred in housewives and 15 per cent in preschool and school children. Eighty-five per cent of the total deaths from coccidioidomycosis occurred in these three occupational groups.

As to the seasonal distribution of the disease about 40 per cent of the cases were reported as having had their onset during the first six months of the year, as compared to 60 per cent reported as having had their onset in the latter six months' period of the year.

Conclusion

Although coccidioidomycosis is more prevalent in Kern County than is tuberculosis fewer cases of coccidioidomycosis develop the progressive, fatal type of the disease; more deaths from tuberculosis are reported in Kern County in one year than from coccidioidomycosis in the entire 38-year period since the first case was reported.

In the last three-year period, 1936-1938, there have been nearly three times as many cases reported per death from coccidioidomycosis as from tuberculosis; the ratio of cases per death for coccidioidomycosis was 5.6 as compared to 1.9 for tuberculosis.

Table 1, Appendix - Showing the Number of Suspected and the Proven Cases of Coccidioidomycosis, Reported in Kern County, According to Type (Primary, Post-Primary Erythema Nodosum, and the Late or Granuloma Type of the Disease), by Succeeding Ten-Year Periods Since 1901.*

Year	Susp.	Prim.	Post-Prim.	Late	Deaths	Year	Susp.	Prim.	Post-Prim.	Late	Deaths
1901	0	0	0	1	1	1921	0	0	0	0	0
1902	0	0	0	0	0	1922	0	0	0	0	0
1903	0	0	0	0	0	1923	0	0	0	1	0
1904	0	0	0	0	0	1924	0	0	0	4	3
1905	0	0	0	1	1	1925	0	0	0	4	2
1906	0	0	0	0	0	1926	0	0	0	8	5
1907	0	0	0	1	1	1927	0	0	0	10	4
1908	0	0	0	0	0	1928	0	2	1	11	9
1909	0	0	0	1	1	1929	0	0	1	12	8
1910	0	0	0	0	0	1930	0	1	0	6	2
Total	0	0	0	4	4	Total	0	3	2	56	33

Year	Susp.	Prim.	Post-Prim.	Late	Deaths	Year	Susp.	Prim.	Post-Prim.	Late	Deaths
1911	0	0	0	2	1	1931	0	0	0	3	0
1912	0	0	0	1	1	1932	0	1	0	8	3
1913	0	0	0	2	1	1933	8	13	0	12	5
1914	0	0	0	1	1	1934	6	4	1	8	5
1915	0	0	0	2	2	1935	12	2	0	3	2
1916	0	0	0	1	1	1936	40	4	5	14	8
1917	0	0	0	0	0	1937	76	4	9	6	3
1918	0	0	0	0	0	1938	118	12	44	14	9
1919	0	0	0	2	2	1939**	41	1	11	1	0
1920	0	0	0	2	1	Total	301	41	70	69	35
Total	0	0	0	13	10						

*The cases are given by year of onset. The deaths are related to the cases.
 **Incomplete reports.