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A FIELD STUDY OF LEPROSY IN TALISAY CEBU, PHILIPPINES

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INTRODUCTION

In May, 1936, the field study of leprosy that had been undertaken in the Province of Cebu in 1933 was extended to the municipality of Talisay. It was not possible to include the whole of the municipality, but the area that was chosen is regarded as representative. For comparative purposes, the methods adopted were similar to those that had been used in Cordova (1, 2). The procedures included (*a*) a house-to-house census of the inhabitants, (*b*) a detailed sanitary and sociological survey, (*c*) physical examination of the inhabitants for leprosy and skin diseases, and (*d*) epidemiological investigation of the cases of leprosy. The study was completed in December, 1937.

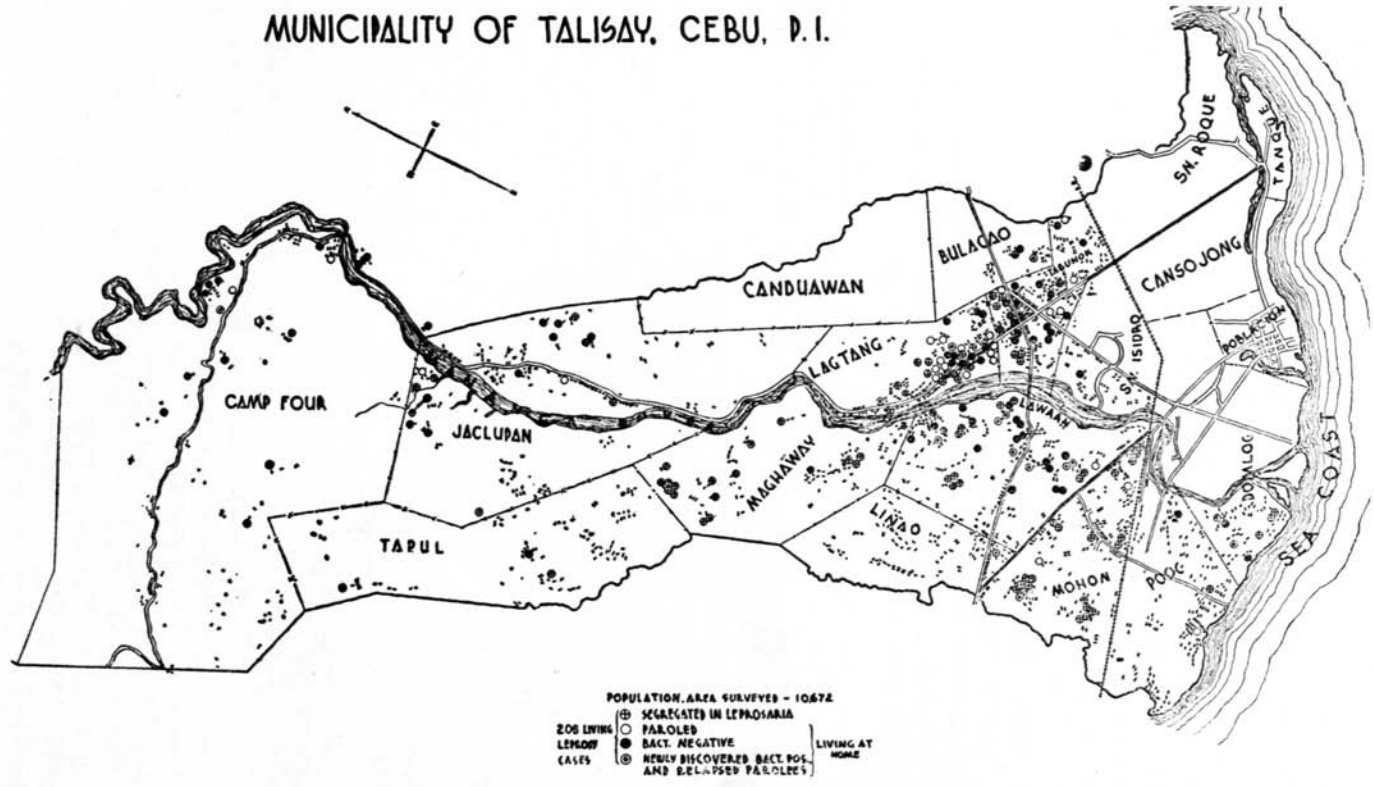
The chief points considered in the present report are the topography of the area, the occupations, diet, and living conditions of the people, and the prevalence of leprosy in its various clinical forms. More detailed statistics relating to the incidence of the disease, and especially to the risk involved in household association, will be published later.

GENERAL CONSIDERATIONS

Location and topography.—Talisay is situated on the eastern side of Cebu island, about 11 kilometers south of the city of Cebu. The municipality occupies the valley of the Mananga River and the adjacent hills and coastal plain. The area is roughly quadrilateral, running inland about 12 kilometers, with a shore line of 6.5 kilometers, but it is narrower in the central portion, as shown by the map (Text-fig. 1). The river becomes a rushing torrent after heavy rains, but during most of the year it is little more than a brook. The mountain sections vary in elevation from 500 feet at Barrio Tapul to 2,620 feet at Hawanay.

Occupations.—In the area of study, (showing details on the map), 56 percent of the males over 15 years of age are engaged in agriculture. In the Cordova survey only 16 percent were found to be so engaged, including maguey retting as an agricultural pursuit. In contrast with the barren, rocky soil of Cordova, the lowland portion of Talisay is as fertile as any district in Cebu; three crops of corn are harvested annually, whereas in Cordova only two scanty crops are obtained.. Likewise, coconut palms are much more abundant, and the sale of copra is consequently a more important source of income. The most profitable crop is sugar cane. The Talisay Sugar Central, which mills the cane of the whole southern half of the island, is located in Barrio Pooc. Fruit trees are more plentiful than in Cordova, including the banana, papaya, mango and jackfruit. A small amount of rice is grown in Mohon and Pooc. There are many *kamungay* trees (*Moringa oleifera* Lam.) and the practice of eating the leaves is extensive. Among the more common vegetables grown are string beans, onions and sweet potatoes. In the mountain barrios the soil is poor but agriculture is practically the only occupation, the chief crops being corn, fruits and vegetables. In the lowlands there is greater diversity of occupation, including driving of tartanillas (horse-drawn vehicles), various business pursuits and labor in the sugar central and in mills and factories in the city of Cebu.

Fishing is the chief occupation in only two barrios included in the study, Pooc and Domlog. Of the total males over 15 years of age in Talisay, only 3 percent can be regarded as fishermen, as compared to 39 percent in Cordova. In Cordova an additional 11 percent are engaged in both agriculture and



TEXT-FIG. 1. Map of Talisay, showing the locations of residences (dots) and of cases of leprosy of various categories. The areas free of such markings are those not included in the survey.

fishing, but only 0.42 percent in Talisay are engaged in both occupations.

Diet and other environmental factors.—Taken as a whole, the inhabitants of Talisay were found to be better off economically than those of Cordova. In the mountain barrios, however, the people live under much poorer conditions than in the lowlands. As indicated above, their diet is more vegetarian in nature, consisting almost exclusively of corn and vegetables, for although there are a few pigs and chickens these are eaten only on festive occasions. Very little fish appears in the diet, and this usually in the dried state. In the lowlands nearly all families have some cash income, the houses are larger and more substantial, and the diet includes fish and meat. In Pooc and Domlog more fresh fish is consumed than elsewhere, and the diet as a whole seems to resemble closely that of the Cordova people.

The availability of fresh water may be of significance and is worthy of special note. As in Cordova, the lowland area of Talisay has numerous shallow wells and several deep driven wells. Recently a small public drinking-water system, utilizing spring water, has been installed and serves some of the inhabitants of the Tabunok, Bulacao and San Isidro barrios. In the mountain barrios the inhabitants depend solely upon small springs, not infrequently located at considerable distances from the houses. As a consequence, it is more difficult for the inhabitants of those communities to maintain bodily cleanliness, and this was very evident at the physical examinations.

In the lowland region somewhat less than 25 percent of the families have privies, for the most part poorly constructed and certainly not fly-proof. In the mountain districts the families have no privies of any sort.

PREVALENCE OF LEPROSY

The enumerated population of the area surveyed was 10,672 persons, which is about two-thirds of the estimated total population of the entire municipality. Of those enumerated, 10,596 were examined (99.3 percent). Of the 74 not examined, 19 had died and 37 had taken permanent residence elsewhere before examination could be made; 9 were temporarily absent from the community and 9 others failed to keep appointments for examination. None of the unexamined persons is suspected of having had leprosy, save one who died during the period of study.

This man is believed to have had the lepromatous form of the disease for several years, but he had avoided examination by the health officials.

Talisay is known to be one of the most highly infected municipalities in the province. Since 1903, 408 cases have been reported from the survey area alone. At the commencement of the present study, there were 143 living lepers officially registered in the area of study, including 84 in segregation. During the survey, 65 others were discovered, raising the total to 208, or 19.5 per thousand of the enumerated inhabitants. This is slightly higher than the incidence for Cordova in 1933, which was found to be 17.2 per thousand. It should be noted that the age distributions of the enumerated populations of the two communities show no significant differences.

Of 65 newly discovered cases, only 11 were positive bacteriologically and therefore should have been under segregation. One additional case, previously registered as an "incipient," was found to have become positive. Twenty-seven persons were discovered to have lesions of suspicious nature and are under observation.

CLINICAL AND BACTERIOLOGICAL FEATURES OF LEPROSY CASES

Bacteriological distribution of cases.—At the conclusion of the survey the known living lepers were classified, according to bacteriological findings, as follows:

I.	Positive for *M. leprae*		
	(*a*) In segregation, at Culion and in the Eversley Childs Treatment Station, Cebu	84	
	(*b*) At home		
	(1) Newly discovered	11	
	(2) Previously closed	1	
	(3) Relapsed paroled	5	
	(4) Escaped from segregation	3	104
II.	Negative for *M. leprae*		
	(1) Paroled, previously positive	26	
	(2) Neural type	78	104
	TOTAL		208

These bacteriological findings, revealing an equal proportion of positives and negatives, conform closely to the corrected findings for Cordova (2) where, of a total of 104 cases, 45 were classified as positives.

Clinical classification of neural cases.—The neural cases found in Talisay corresponded fairly closely with those in Cordova in the relative frequency of macular and polyneuritic subtypes, and also as regards the estimated activity of the lesions. Of 78 cases in Talisay 52, or 67 percent, were classified as macular; for Cordova the corresponding figure was 75 percent. Of the macular cases in Talisay, 42 percent were regarded as clinically active, as compared with 53 percent of 34 cases of this subtype in Cordova. The numbers of each class are given below.

Class	*Talisay*	*Cordova*
I. Macular		
(1) Active tuberculoid	15	18
(2) Active nontuberculoid	7	
(3) Quiescent tuberculoid	3	18
(4) Quiescent nontuberculoid	11	
(5) Residual nontuberculoid	16	8
II. Polyneuritic		
(6) Anesthetic nonmacular	12	11
(7) Trophic	14	
TOTALS	78	55

To appreciate the leprosy problem more accurately, it is important to note the proportion of total patients in a community whose lesions may be considered to be quiescent or arrested at a given time. If the paroled cases be included in this class, the proportion was 36 percent in Cordova in 1933 and 35 percent in Talisay in 1936-37.

Location of first lesions.—Of 76 Cordova patients whose his-

TABLE 1. *Location of first lesions in Talisay cases, 1936-1937.*

Location of first lesion	Examination and history [a]		History only		Total	
	No.	Percent	No.	Percent	No.	Percent
Arm (including hand and elbow)	12	27.3	13	10.9	25	15.3
Leg (including knee and foot)	14	31.8	51	42.9	65	39.9
Thigh (including hip and buttock)	13	29.6	30	25.2	43	26.4
Lumbar region	2	4.5	2	1.7	4	2.5
Back	1	2.3	5	4.2	6	3.7
Chest	0	0	2	1.7	2	1.2
Abdomen	0	0	1	0.8	1	0.6
Face	2	4.5	15	12.6	17	10.4
TOTALS	44	100.0	119	100.0	163	100.0

[a] Cases with single lesions.

tories were considered satisfactory, 14 were reported as having the first lesions on the arm (including hand and elbow), 18 on the leg (including knee and foot) and 32 on the thigh (including hip and buttock). In only 6, or 8 percent, was the first lesion recorded on another part of the body.

In Talisay the findings were similar, as shown in Table 1. Such a distribution of first lesions might be explained satisfactorily by assuming a mechanism other than direct inoculation at the site indicated, although this seems the simplest hypothesis.

REPRESENTATIVE CASES

CASE 1 (927-7596).—P.C., male, aged 50 years. Family history negative. Examination, November 3, 1936: Large, roughly quadrilateral hypopigmented macule on left scapular region, 4 × 3 inches (Fig. 1). Lesion was cauterized many years ago, producing a scar 2 inches in diameter. The macule, which has spread upwards and medially from the old scar, is now an irregular hypopigmented lesion with well defined edges, markedly papular in segments. Scar and macule, except the papulated segments of the border, are anesthetic to pain, touch and temperature. Smears from lesion and nasal septum negative. *Biopsy findings:*[1] Tuberculoid lesion, slight, fairly active, confined to papillary layer. *Diagnosis:* Leprosy, macular, active, minor tuberculoid.

CASE 2 (788-231).—V.J., male, aged 4½ years. Mother is a lepromatous case, discovered in 1936. First examination, October 22, 1936, at the age of 3 years: No suspicious lesion noted. Second examination, January 26, 1938: Distinct hypopigmented macule on lower right cheek, 1 inch in diameter, flat, with well defined edges showing a slight pinkish tinge (Fig. 2). Test for anesthesia unreliable. Third examination, September 19, 1938: Macule on cheek still well defined, now slightly purplish all over, not thickened or papular. Smears from lesion negative. *Diagnosis:* Leprosy, macular, active, probably nontuberculoid.

CASE 3 (729-2699).—J. J., male, aged 20 years. One brother was paroled from Culion but relapsed in 1936; father and two nephews have neural lesions. First examination, June 10, 1936: On the outer surface of the left forearm is a roughly quadrilateral macule measuring about one square inch. The lesion is hypopigmented, with well-defined borders, very slightly raised and papular in some segments. Central portion definitely hypoesthetic to pain and temperature, but touch sense apparently normal. Upper portion shows returning pigmentation. Bacteriological findings negative. Second examination, November 28, 1936: Macule seems exactly as before except that borders are now not raised; apparently quiescent, still hypoesthetic. *Biopsy findings:* Tuberculoid, slight but definite, superficial. *Diagnosis:* Leprosy, macular, quiescent, tuberculoid.

CASE 4 (492-7397).—M.L., male, aged 16 years. Two other cases of leprosy in the family: a sister, formerly positive, now paroled, and a broth-

[1] The histological diagnoses in these case reports, by Dr. H. W. Wade, Culion.

er, who is also a neural case. First examination, October 27, 1930, at the age of 10 years: A pale macule 2 inches in diameter on right knee and adjacent thigh; three small hypopigmented macules on the left buttock, the largest about one-half inch in diameter; three similar smaller lesions on the posterior surface of each thigh. Second examination, October 25, 1936: An extensive macule covers a large part of the back and side of the left thigh (Fig. 3). Anteriorly, another large faint macule extends from middle of right thigh to knee. On left buttock and below right gluteal fold and hip are large irregular macular lesions of varying sizes. These macules all hypopigmented, with flat borders, large segments of which are now vague and ill-defined. No signs of activity. Smears from all macules and nasal septum negative. *Biopsy findings:* Chronic lesion with considerable connective tissue increase superficially and around nerves; apparently retrogressive. *Diagnosis:* Leprosy, macular, quiescent, nontuberculoid.

CASE 5 (680-2263).—R.E., female, aged 31 years. Two brothers have been positive cases; one is paroled, the other recently segregated. Examination, October 24, 1936: Faintly depigmented macule on outer surface of left arm (Fig. 4). Appearance definitely residual, characterized by minute atrophic depressions around the hair follicles. Lower and lateral margins are still outlined by faint hypopigmentation, but the medial borders cannot be recognized. Definite anesthesia to pain, touch and temperature on the upper and inner portion of the macule; rest of lesion only partially anesthetic. Smears from lesions and nasal septum negative. *Biopsy findings:* Residual changes. *Diagnosis:* Leprosy, macular, residual, nontuberculoid.

CASE 6 (697-585).—B.E., male, aged 25 years. Father died in Culion; one brother is a recently discovered positive case; mother has tuberculoid leprosy. Examination, September 20, 1935: Pear-shaped area of complete anesthesia to pain, touch, and temperature over external malleolus, right foot; skin over this area is unchanged in appearance. Right superficial peroneal nerve is definitely enlarged and palpable in its upper portion; right peroneal nerve thickened to the size of a lead pencil. No acid-fast bacilli found. *Biopsy findings* (skin section of the anesthetic area): Slight connective tissue increase only. *Diagnosis:* Leprosy, polyneuritic, anesthetic, nonmacular.

CASE 7 (1219-5962).—I.A., male, aged 52 years. Family history negative. Duration 22 years. Examination, September 24, 1936: All existing lesions are polyneuritic, in the form of contractures and varying degrees of absorption of the fingers of both hands. There is also almost complete absorption of four toes of the right foot, with a trophic ulcer of the plantar surface. Slight atrophy of muscles of right leg. Dorsa of right hand and right foot are anesthetic. Right foot-drop. No macules anywhere on the body. Bacteriological findings negative. *Diagnosis:* Leprosy, trophic, polyneuritic.

SPECIAL EPIDEMIOLOGICAL FEATURES

Geographic distribution of cases.—The 14 political subdivisions within the area of the Talisay survey may be grouped geographically as follows:

Mountain barrios: Camp Four, Hawanay, Tapul, Jaclupan and Maghaway.

Lowland barrios: Lagtang, Tabunok, Bulacao, San Isidro, Lawaan, Linao and Mohon.

Seacoast barrios: Pooc and Dumlog.

The incidence rates for the individual barrios show great variation, as was found to be the case in Cordova. Areas of both high and of low prevalence were found in the mountain, the lowland and the seacoast areas, as is to be seen from Table

TABLE 2. *Incidence of leprosy in the Talisay survey area, by barrios and geographical groups, per 1,000 population.*

Barrio	Population (enumerated)	Negative cases		Positive cases [a]		Total cases	
		No.	Rate	No.	Rate	No.	Rate
Lowland group							
Lagtang	1,054	12	11.4	28	26.6	40	36.0
Lawaan	1,313	20	15.2	20	15.2	40	30.4
Mohon	967	1	1.0	25	25.9	26	26.9
Bulacao	138	1	7.2	2	14.5	3	21.7
Tabunok	1,875	16	8.5	14	7.5	30	16.0
San Isidro	284	1	3.5	0	—	1	3.5
Linao	635	0	—	1	1.6	1	1.6
TOTALS	6,266	51	8.1	90	14.4	141	22.5
Mountain group							
Maghaway	503	4	8.0	14	27.8	18	35.8
Camp Four	782	10	12.8	8	10.2	18	23.0
Jaclupan	1,001	7	7.0	9	9.0	16	16.0
Tapul	514	2	3.9	1	1.9	3	5.8
Hawanay	176	0	—	1	5.7	1	5.7
TOTALS	2,976	23	7.7	33	11.1	56	18.8
Seacoast group							
Pooc	1,125	1	0.9	2	1.8	3	2.7
Dumlog	304	3	9.9	5	16.4	8	26.3
TOTALS	1,429	4	2.8	7	4.9	11	7.7
TOTAL AREA	10,672	78	7.3	130	12.2	208	19.5

[a] Positive cases include those formerly positive but paroled.

2. Much higher average rates, however, were found for the lowland and mountain populations than for those living on the seacoast, but the difference shown by the last is attributable entirely to the low prevalence in one of the two barrios of that group—a condition which remains unexplained.

Some of the differences between areas of the same geographical type are noteworthy. Thus, in the mountainous district, the incidence for barrio Maghaway (elevation 931 feet; population 501) is found to be 35.8 per thousand, while the rate for Tapul (elevation 646 feet; population 512) is

only 5.8. This difference is statistically significant. In the lowland group no less striking differences are seen. Two of the largest barrios, Lagtang (population 1,047) and Tabunok (population 1,864) give rates of 36.0 and 16.0 respectively. Even more conspicuous is the difference between the contiguous barrios of Lawaan (population 1,309) and Linao (population 629), the rates for which are 30.4 and 1.6. These population groups are different in size (more than 2:1), but as may be seen from the map the areas also differ almost as greatly, so that there is an approximate similarity as regards the density of population. Of the two-shore line districts, Pooc has three times as much population as the relatively small surveyed portion of Domlog but has only half as many cases of leprosy.

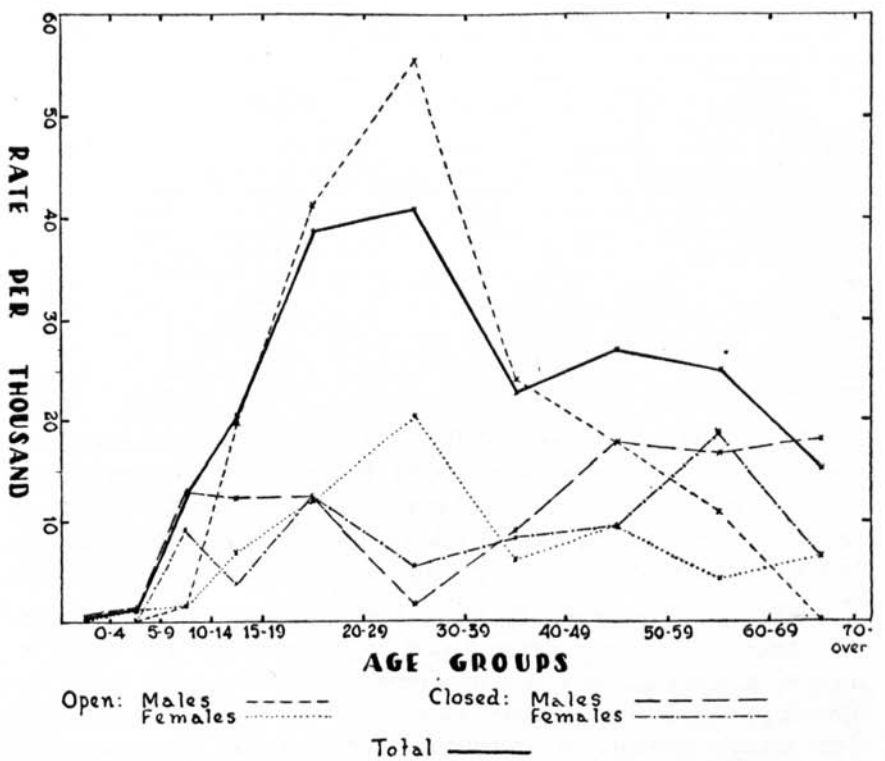
Thus there have been found wide variations in incidence in subdistricts the inhabitants of which live under apparently identical conditions as regards topography, environment and density of population; and their habits, occupations and diet are similarly comparable. Our study has failed so far to account for all of the factors responsible for the marked differences in incidence between barrios in the same geographical regions, or to determine common factors in the different geographical areas that have similarly high degrees of infection. In the case of certain slightly infected barrios, as Tapul, Linao and Hawanay, we have concluded, after carefully tracing the probable sources of infection, that the low incidence seems to be due principally to the fact that few cases had been introduced into them in the past. However, it seems very probable that other factors exist; there should be some explanation to the evident fact that the disease tends to spread in some districts and fails to gain a foothold in others.

Distribution by age and sex.—Data on incidence according to bacteriological type, age and sex are given in detail in Appendix A and represented in Text-fig. 2. In Table 3, the incidence rates are presented by class of case and sex, for certain broad age bands, for Talisay and Cordova.

TABLE 3. *Incidence per 1,000, of different bacteriological classes of cases, by sex and age, Cordova and Talisay.*

Age group (years)	Open or previously open cases (lepromatous)				Closed cases (macular or neural)			
	Cordova		Talisay		Cordova		Talisay	
	Males	Females	Males	Females	Males	Females	Males	Females
0-14	1.6	0	0.4	0.9	2.3	3.1	4.4	2.7
15-49	32.3	9.0	35.7	11.3	13.3	11.1	9.1	8.2
50-over	3.7	0	12.2	7.3	3.7	5.8	19.2	11.7
TOTALS	16.4	4.2	17.9	6.6	7.7	7.1	8.2	6.4

As in Cordova, the total prevalence in Talisay was low under ten years of age, only four cases being recorded. The peak of prevalence was found in the 30-39 years group, a decade later than in Cordova. In both communities there was found an excess of bacteriologically positive or previously positive cases among males. On the other hand closed (macular or neural) cases showed no sex selection.



TEXT-FIG. 2. Graph showing the age and sex distribution of open and closed cases, with total, based on rates per thousand of examined persons.

In the older age groups, lower prevalence rates of open cases were found. This is probably attributable to the relatively higher mortality among patients of this class. Since neural leprosy is considered to have little effect upon duration of life, it was expected that prevalence would be demonstrably higher as age increased, although it is suspected that small macular lesions may disappear. In the Talisay records the rates for both males and females are in accordance with this view. In Cordova, for some unknown reason, neural leprosy was found to be less fre-

quent in the older ages than in younger adult life in both males and females.

Ages at which first lesions were noticed.—From statements of patients and their relatives, supplemented by the case histories of those who had been segregated, an effort was made to ascertain the ages at which lesions had been first noticed. The results of these inquiries are shown in Table 4.

TABLE 4. *Age at onset of leprosy, by age and sex, Talisay, 1936-1937.*

Age group (years)	Male		Female		Total	
	No.	Percent	No.	Percent	No.	Percent
0-4	2	1.4	0	—	2	0.9
5-9	22	16.1	10	14.1	32	15.4
10-14	35	25.6	27	38.0	62	29.8
15-19	29	21.2	10	14.1	39	18.8
20-29	32	23.4	6	8.5	38	18.3
30-39	7	5.1	4	5.6	11	5.3
40-49	6	4.4	8	11.3	14	6.7
50-59	2	1.4	4	5.6	6	2.9
60-69	2	1.4	2	2.8	4	1.9
70-over	0	0	—	—	0	0
TOTALS	137	100.0	71	100.0	208	100.0

It will be noted that in almost two-thirds of the cases (65 percent) the first lesion was stated to have been observed before the twentieth year. In the Cordova survey, the comparable figure was 85 percent. In both communities the peak was found in the 10-14 years age group.

With the possibility in mind that the age at which infection takes place may be a factor in determining the type of disease, a comparison was made of the stated ages of onset for open male and female cases and for those of each sex which were classed as macular or neural. For males, of 94 open cases, 41.4 percent were stated to have had onset before the age of 15 years; and of 43 closed cases, 46.5 percent. For females, 54.3 percent of 36 open cases were stated to have had onset under 15 years of age; and of 35 neural cases, 50 percent. From these figures it does not appear that in either sex or in either of the types of the disease does the age of onset differ materially.

History of household contact.—In the original publication on the Cordova survey it was stated that studies which were being continued would probably show a higher percentage of household contact with antecedent cases than the current investigation had revealed. This proved to be the case, and the pro-

portion giving such a history has since been raised from 26 to 39 percent.

In Talisay, 77 of the 208 cases, or 37 percent, were found to have had household contact with a previous case. Of 19 cases under 15 years of age, 9, or 47 percent, were found to have such a history.

Available data permit a direct approach to the problem of the relative frequency of leprosy in persons exposed in the household and those not so exposed. These data, summarized in Table 5, show a much higher prevalence for those exposed in the household. There is no difference, however, in the prevalence rate for those exposed to closed cases in the household (12.9 per 1,000) and that for those giving a negative history of household exposure (13.7 per 1,000).

TABLE 5. *Incidence of leprosy, Talisay, according to history of household exposure.*

History of exposure	Persons examined	Cases of leprosy	Rate per 1,000
Persons with household contact with open cases	671	67	99.9
Persons with household contact with closed cases	309	4	12.9
Persons with household contact with unexamined cases [a]	66	6	90.9
TOTALS	1,046	77	73.6
Persons without history of household contact	9,552	131	13.7
TOTAL examined (excluding 74 resident not examined)	10,598	208	19.6

[a] Type of primary case not known; patients died before they could be examined by the authorities.

Comparison of "leper" and "nonleper" households.—In our survey a "leper" household is one in which one or more cases of leprosy had developed, or in which a leper had lived for at least one year. The 2,027 families living in the survey area were divisible into 187 "leper" and 1,840 "nonleper" households. The following are the principal data obtained in this comparison.

(1) Overcrowding and frequency of leprosy: In Talisay, as in Cordova, the available sleeping space in each house was measured and an estimate was made of the theoretical requirements of each family, taking age into consideration. The ratio of actual space to the theoretically required space provides a "crowding index" for each household. This was described in a previous publication (1) as follows:

The available sleeping space of each family was measured and recorded. To obtain a roughly equivalent index of crowding for all families, persons of 15 years and over were arbitrarily assigned 1.0 square meters of space, those from 10 to 14 years, 0.7 square meters, those from 5 to 9 years, 0.5 square meters and those under 5 years, 0.2 square meters. Thus, a family consisting of three persons over 15 years, one child 5 to 9 and one infant was regarded as requiring 3.7 square meters; and if the actual available space was 10 square meters the index number (crowding ratio) for the family would be $10/3.7 = 2.7$.

The same tendency was found in Talisay as in Cordova, namely, a greater overcrowding in homes where cases of leprosy existed than in the others. Of the 187 leper families, 55 percent had a "crowding index" of less than 4 as against only 45 percent among nonleper households.

(2) Water supply, excreta disposal, type of house: In spite of careful investigations made for the purpose of detecting differences in the leper and nonleper households with regard to these features, no significant differences were found. Likewise, no dissimilarities between the two groups of families were found as regards personal cleanliness and bodily development of the individuals constituting them.

Of the houses within the survey area, 6 percent are supplied by the recently installed public water system, 20 percent get their water from artesian wells, 48 percent from surface wells, and 25 percent (in the mountain barrios) from springs. No differences were found between leper and nonleper households as regards the source of the water supply. During 1936 and 1937 no water-borne diseases of epidemic proportions occurred within the survey area.

With regard to disposal of excreta, only 16 percent of all the families were found to have toilets, for the most part unsanitary. Nowhere in the mountain districts did any of the population have privies of any sort. A slightly higher proportion of nonleper households (18 percent) were found to use toilets compared to leper houses (12 percent), but this difference is not significant.

In the Cordova survey, since most of the families had no cash income, an attempt was made to determine the economic status of each of them by estimating the probable resources represented by fruit trees, gardens, fishing implements, etc. The results, we became convinced, were highly inaccurate. After the Talisay survey had been completed another method of arriving at a rough, approximate economic index was suggested by Dr. G. M. Saunders. This was based on a classification of the dwellings, grouping them into 4 broad categories—good, fair, poor and very poor—taking into account the structure of the house (wood, bamboo or mixed), cleanliness within and outside of the residence, and crowding. Here again, there were found a slight preponderance of the good and fair dwellings among the nonleper families, but the difference was not important—9 percent as against 7.5 percent among the leper families.

Association with other diseases.—In Talisay, as in Cordova, malaria is not indigenous. Hookworm, however, which is not present in Cordova, is prevalent as a severe infestation in certain parts of Talisay. On the other hand only two cases of yaws, both in late stages, were discovered in Talisay; this disease is highly prevalent in Cordova. No differences between the two localities were noted with respect to other diseases. The frequency of various skin diseases in leper and nonleper households in Talisay revealed no significant differences, as was true also in Cordova.

SUMMARY

1. A field study of leprosy in Talisay, Cebu, was made in 1936 and 1937 along lines similar to those followed in Cordova in 1933. Judging from the number of cases segregated from them, both of these municipalities have had a high incidence of leprosy, at least during the last thirty years.

2. The chief reason for the selection of Talisay for this further survey was its varied topography, which includes mountain, lowland and seacoast areas, in contrast with Cordova which is entirely a low-lying coral island. Talisay also differs markedly from Cordova in that a much higher proportion of its population is engaged in agriculture, a much smaller proportion in fishing.

3. The enumerated population of the area studied was 10,672 persons, of whom 10,598 were examined. At the commencement, 143 living cases were known. Sixty-five new cases were discovered, making a total of 208, or 19.5 per thousand.

4. Only 11 of the newly discovered cases were positive bacteriologically. One additional positive case was found which previously had been examined at the Cebu Skin Dispensary and classes as an "incipient" (macular) case.

5. Of 31 paroled cases living in this area, 5 were found to have relapsed.

6. Marked variations in prevalence were observed in the various barrios of Talisay. Taken as a group, the seacoast barrios had a much lower prevalence than the mountain and lowland groups. No explanation of this is offered, but it should be noted that the difference is entirely attributable to the low prevalence in the larger of the two seacoast barrios.

7. In the age and sex distribution of the cases, the probable dates of onset of the disease, the location of first lesions,

and the proportion of cases with a history of household association with leprous persons, the Talisay statistics show no notable differences from those of Cordova.

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REFERENCES

(1) Doull, J. A., Rodriguez, J. N., Guinto, R. and Plantilla, F. P. A field study of leprosy in Cebu. Internat. Jour. Lep. **4** (1936) 141-170.

(2) Rodriguez, J. N. and Guinto, R. S. Reexamination of cases at Cordova, Cebu Province, P. I. Internat. Jour. Lep. **6** (1938) 285-302.

DESCRIPTION OF PLATE

PLATE 9

FIG. 1. Irregular minor tuberculoid macule on left scapular region of an old man (Case 1). Scar on left lower angle of lesion (large area outlined) resulted from cauterization of the initial lesion 20 years previously, but it continued to spread in an indolent manner. Segments of the irregular, interrupted active border, are papulated at the points marked by the small circles, above, and the leader, below; the latter indicates the biopsy site.

FIG. 2. Distinct hypopigmented, flat, simple macule on the right cheek of a boy 4½ years old (Case 2).

FIG. 3. Extensive multiple hypopigmented macules on the left buttock and back of thighs of a boy 16 years old (Case 4). Sections showed a chronic lesion with connective tissue increase, superficially and around the nerves.

FIG. 4. Residual, faintly hypopigmented and anesthetic macule on outer surface of the right arm (Case 5). Biopsy disclosed only residual changes.

PLATE 9

APPENDIX A

FREQUENCY OF "OPEN" AND "CLOSED" CASES, BY SEX AND AGE
TALISAY, 1936-1937.

Age group	Sex	Population	Cases			Rate per 1,000		
			Open	Closed	Total	Open	Closed	Total
0-4.....	Male.....	853	0	1	1	0	1.2	1.2
	Female.....	806	0	0	0	0	0	0
	Total....	1,659	0	1	1	0	0.6	0.6
5-9.....	Male.....	769	0	1	1	0	1.3	1.3
	Female.....	751	1	0	1	1.3	0	1.3
	Total....	1,520	1	1	2	0.7	0.7	1.3
10-14.....	Male.....	635	1	8	9	1.6	12.6	14.2
	Female.....	634	1	6	7	1.6	9.5	11.0
	Total....	1,269	2	14	16	1.6	11.0	12.6
15-19.....	Male.....	575	10	7	17	17.4	12.2	29.6
	Female.....	575	4	2	6	7.0	3.5	10.4
	Total....	1,150	14	9	23	12.2	7.8	20.0
20-29.....	Male.....	888	37	11	48	41.7	12.4	54.1
	Female.....	964	11	12	23	11.4	12.4	23.8
	Total....	1,852	48	23	71	25.9	12.4	38.3
30-39.....	Male.....	502	28	1	29	55.8	2.0	57.8
	Female.....	543	11	3	14	20.3	5.5	25.8
	Total....	1,045	39	4	43	37.3	3.8	41.2
40-49.....	Male.....	442	11	4	15	24.9	9.0	33.9
	Female.....	479	3	4	7	6.2	8.4	14.7
	Total....	921	14	8	22	15.2	8.7	23.9
50-59.....	Male.....	281	5	5	10	17.8	17.8	35.6
	Female.....	311	3	3	6	9.6	9.6	19.3
	Total....	592	8	8	16	13.5	13.5	27.1
60-69.....	Male.....	180	2	3	5	11.1	16.7	27.8
	Female.....	219	1	4	5	4.6	18.3	22.8
	Total....	399	3	7	10	7.5	17.5	25.0
70-over...	Male.....	112	0	2	2	0	17.9	17.9
	Female.....	153	1	1	2	6.5	6.5	13.1
	Total....	265	1	3	4	3.8	11.3	15.1
TOTALS.	Male.....	5,237	94	43	137	18.0	8.2	26.2
	Female.....	5,435	36	35	71	6.6	6.5	13.1
	Total....	10,672	130	78	208	12.2	7.3	19.5

APPENDIX B

INDICES ADOPTED BY THE SUB-COMMITTEE ON EPIDEMIOLOGY
CAIRO LEPROSY CONGRESS, 1938.

On the basis recommended by the Cairo Congress, the following leprosy indices have been obtained for Talisay. The Cordova figures are also given for comparison.

TALISAY

1. Case-type rate; number of open cases per 100 cases of leprosy:

$$\frac{\text{open cases}}{\text{total cases}} = \frac{104}{208} \times 100 = 50.00 \text{ open cases.}$$

2. Sex rate; number of male lepers per 100 cases of leprosy:

$$\frac{\text{male lepers}}{\text{total cases}} = \frac{137}{208} \times 100 = 65.9 \text{ males.}$$

3. Childhood rate; number of child lepers per 100 cases of leprosy:

$$\frac{\text{under 15 years}}{\text{total cases}} = \frac{19}{208} \times 100 = 9.1 \text{ children.}$$

4. Contact rates;

(a) Number of lepers with familial (household) contact per 100 cases of leprosy:

$$\frac{\text{lepers with familial contact}}{\text{total cases}} = \frac{96}{208} \times 100 = 46.2.$$

(b) Number of lepers with extrafamilial contact per 100 cases of leprosy:

$$\frac{\text{lepers with extrafamilial contact}}{\text{total cases}} = \frac{84}{208} \times 100 = 40.4.$$

(c) Number of lepers with contact unknown per 100 cases of leprosy:

$$\frac{\text{lepers with contact unknown}}{\text{total cases}} = \frac{28}{208} \times 100 = 13.5.$$

5. Incidence rate: 19.5 per 1,000 population.

CORDOVA (1933)

1. Case-type rate: $\frac{47}{106} \times 100 = 44.3$ open cases per 100 lepers.

2. Sex rate: $\frac{72}{106} \times 100 = 67.9$ males per 100 lepers.

3. Childhood rate: $\frac{9}{106} \times 100 = 8.5$ children per 100 lepers.

4. Contact rates:

(a) Familial: $\frac{39}{106} \times 100 = 36.8$ per 100 lepers.

(b) Extrafamilial: $\frac{60}{106} \times 100 = 56.6$ per 100 lepers.

(c) Unknown: $\frac{7}{106} \times 100 = 6.6$ per 100 lepers.

5. Incidence rate: 17.5 per 1,000 population.