PITFALLS IN THE DIAGNOSIS OF LEPROSY*

By

HERMAN E. HASSELTINE

Medical Director, U. S. Public Health Service

There is no better diagnostic evidence of leprosy than the finding of acid-fast organisms in tissue, tissue juice, or scrapings from a lesion that is covered by *unbroken* skin. If the "scraped incision" technique of Wade (1) is employed and acid-fast organisms are found in a lesion with skin that was unbroken until the intentional incision was made, there is one further step to be taken before making a positive diagnosis. That step is simple. It consists of repeating the process, on the same or another lesion, and carrying the second slide through the usual technique separately from the first. In other words, do not place the *two* smears on *one* slide and stain simultaneously. The reason for this will be shown below in Case 3.

Davison (2) in his paper entitled "Decolorization of *Mycobacterium leprae*" sounds a note of warning as to diagnosis based on atypical, or partially acid-fast organisms found in smears made from open lesions. This same warning should be remembered in examining smears from mucous surfaces or lesions, particularly the nose, where it is possible for any acid-fast organism to find a favorable habitat, temporary or permanent.

We recognize that there are numerous nonpathogenic acid-fast organisms that may gain access to open lesions, or the upper respiratory tract, through dust or other means of spread. *Mycobacterium tuberculosis* may also be found in such lesions, particularly if tuberculosis of the respiratory tract exists. While the presence of *M. tuberculosis* may be proved by animal inoculation, such procedure does not rule out the presence of *M. leprae,* for it is well known that many leprous individuals also suffer from co-existing tuberculosis. Therefore the presence of acid-fast organisms on the nasal mucosa, or in open skin lesions, does not have as great diagnostic significance as in unbroken skin lesions.

In evaluating the bacteriologic evidence for and against leprosy, the observer should consider the following: (1) lesion from which specimen is obtained; (2) technique of obtaining specimen; (3) staining reaction of organisms found; and (4) morphological data on the organisms, including their arrangement one to another and their relation to cells that may be present In the two cases reported by Davison, the absence of bundle arrangement of the organisms and partially acid-fast organisms are noted. Both of these cases recall to memory a like number of cases (not previously reported) that

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have occurred in the author's experience. It is hoped that they may be of value to some one working with the most baffling of all bacterial diseases.

CASE 1: Male, of Portuguese ancestry, in 30-40 decade of life, was under my observation at Honolulu in 1922 for about three months. No history of leprosy in the family could be obtained. His only lesion was a circular ulcer about 2.0 cm. in diameter on the plantar surface of one heel. He stated that he cut the skin of this heel on sharp coral while fishing, and that the wound did not close but developed into the ulcer. The skin covering that heel was void of sensation. No other clinical evidence of leprosy was present. The floor of the ulcer was covered by a collection of sand, cellular debris, and a pyoid discharge which was removed.

Scrapings from the floor of the ulcer were made and subjected to acid-fast staining. The smear showed myriads of acid-fast organisms, but the "bundle arrangement" usually seen in leprosy was absent. The appearance of the slide suggested that obtained by making a heavy smear from a culture of an acid-fast organism. Smears were made on several days and acid-fasts were found in all, but the bundle arrangement of organisms was absent (smears made from pus from ulcers of a case of confirmed leprosy showed the acid-fast organisms in typical bundle arrangement).

Because of the lack of the usual arrangement of the organism in bundles or packets, diagnostic decision was reserved. After a few days, it was decided to remove the ulcer surgically, which was done by slicing off the skin and soft tissue of the heel below the floor of the ulcer. This left an open lesion approximately 5.0 cm. in diameter and approximately circular in shape. After the patient had worn a dressing for a few days, further scrapings were made, but no acid-fast organisms were found after surgical removal of the ulcer. The large open lesion rapidly grew new skin until the ulcer reached its original size. There it remained stationary for nearly two months and then closed quite rapidly. During this period, the patient was kept in the observation pavilion of Kalihi Hospital and was seen daily. At no time were any signs or symptoms suggestive of leprosy observed except the permanent anesthesia of the affected heel.

Believing that a diagnosis of leprosy was not warranted, I presented the patient before a board of three experienced physicians of Honolulu, convened by the authorities to consider the parole of leprous patients. I informed the board that this was a case for diagnosis rather than for parole. The board unanimously agreed that they would not make a diagnosis of leprosy in the case presented.

The patient was released from observation and returned to his home. He was seen occasionally during the succeeding year; no recurrence of the ulcer had taken place, and he remained in good health.

In 1933, when other duty took the author to Honolulu, inquiry was made of the matron of Kalihi Hospital, who had been on duty continuously since 1918, as to the patient's subsequent history. The matron stated that the man had never returned to the hospital for observation or advice.

CASE 2: Male, American Negro, about 45 years old, a veteran of World War I. Examined in 1940 at U. S. Veterans Facility at Alexandria, Louisiana. Patient stated

that his trouble was of about twenty years' duration. At a glance it was evident that the distribution of skin lesions was not suggestive of leprosy. On the back and legs and particularly in the groins and peroneal regions were numerous rough elevated skin lesions, some of them decidedly hardened suggesting excessive keratin deposits. On the legs, these deposits could be removed, and after removal, it was found that the underlying skin showed no loss of sensation.

The hospital technicians had taken smears from some of the lesions and had found acid-fast organisms tending to occur in long chains rather than the typical "bundle arrangement" of leprosy. Their staining was rather light. In preparing smears from the lesions, using Wade's "scraped incision" method, it was noted that in one lesion a rather caseous sebaceous material was obtained from small sacs contained in the lesion. In this smear, but not in the others, partially acid-fast streptobacilli were found. However, these organisms did not prove acid-fast when subjected to the staining technique in use at the National Leprosarium at Carville.

Since the presence of leprosy was still in doubt, a portion of an affected area in the left scapular region was removed for biopsy. This was sectioned by Dr. S. H. Black, at that time pathologist at the National Leprosarium, who made a tentative diagnosis of keratosis follicularis (Darier's disease). At a later date, sections of this biopsy specimen were submitted to Dr. Fred Weidman of Philadelphia, who confirmed the diagnosis of Darier's disease.

This case resembles the second case reported by Davison in that partially acid-fast organisms clouded the diagnostic picture in a skin condition proved to be non-leprous. It also should warn us to beware of smears which include sebaceous material. The staff of the U. S. Veterans Facility is to be commended for wisely refraining from voicing any of their suspicions until the case could be seen by some one familiar with leprosy.

It cannot be too strongly emphasized that, particularly in the United States, a physician who suspects that a case may be leprous, should avoid making any remarks about such suspicion until he has had a qualified specialist see the case in consultation. Because of the widespread unwarranted fear of leprosy and equally widespread erroneous beliefs, a vast amount of harm may be done to the patient if it becomes generally known in the community that he is suffering from a condition even suspected as being leprous.

In this connection the following rule, followed by the author since 1939, is suggested to those who may be called upon to examine a suspected leprous patient. "*Do not make a diagnosis of leprosy on a single positive smear. Make a second smear and carry through the staining procedure in a separate operation. The second slide must be positive before a diagnosis of leprosy is warranted.*" This additional requirement resulted from an experience (case 3) at the National Leprosarium at Carville, Louisiana.

CASE 3: Female, age 11, single, schoolgirl. Patient was sent to Carville in 1939 on a diagnosis of leprosy made by a well-known leprologist on a positive finding in a smear. (It should be stated that the leprologist did not prepare or stain the smear.) The patient had numerous skin lesions but none showed any disturbance of sensation. The lesion from which the original smear had been made still showed evidence of the recent use of the "scraped incision" technique. At Carville, however, we were unable to obtain a positive finding from that lesion or from any other on the patient's body.

The patient was returned to the place from which she came, and, although repeated attempts were made, no positive smears could be obtained by any one. All this happened within a period of approximately one week.

At a later date the original smear on which the diagnosis of leprosy was based was exhibited to the writer, and in a portion of the smear were what appeared to be acid-fast organisms indistinguishable from *M. leprae*. The fact that subsequent repeated attempts to obtain such organisms were uniformly unsuccessful suggests that some error occurred somewhere, possibly from: (a) use of a previously used slide that may have had acid-fasts thereon; (b) precipitated stain simulating acid-fast bacilli; (c) partially acid-fast organisms or insufficient decolorization in staining; (d) artefacts of unknown origin.

As far as is known, this girl has not developed leprosy in the four years following the above episode.

Regardless of everything else, if a second positive smear cannot be obtained from a suspected case of leprosy on the same day or within a few days thereafter, we should withhold a diagnosis of leprosy when that diagnosis is based solely on bacterioscopic evidence.

References

(1) Wade, H. W. The bacteriological examination in leprosy. Leprosy Rev. **6** (1935) 54-60.

(2) Davison, A. R. Decolorization of *Mycobacterium leprae*. Internat. J. Leprosy. **11** (1943) 49-51.