

That 1874 was the year of *publication* by Hansen of his discovery of the leprosy bacillus is certain. Therefore that year, in the pre-dawn of the age of bacteriology, nearly a decade before Koch discovered the bacillus of tuberculosis, is the recognized date of the discovery according to modern practice.

Whatever may have been said to the contrary, the report in which an apparently reluctant account of his observations of the bacilli were made was a special one submitted to the Norwegian Medical Society, which in 1871 had given him a grant for leprosy research. The report was published in the periodical of that society, the *Norsk Magazin f. Laegevidenskaben*,¹ as a special supplementary issue—special in that it was independently paginated as if it were a supplement, although it appeared as one (No. 9) of the year's issue. It is a long report, most of its 141 pages devoted to the evidence for the contagiousity of the disease; the short section concerning his observation of the bacillus is, in the translation published in *THE JOURNAL*,² less than 3 pages long.

In that part Hansen described what he saw in the brown bodies from fresh preparations of lepromas, or in specimens preserved for a day or two in a weak acid solution, in which latter case the bacilli were slightly colored. This excerpt ends most cautiously:

Since the results of the examinations are still uncertain and I intend to continue the research, I did not want at this time to mention in reports the details of my records. Many things are still lacking for the direct demonstration of specificity for leprosy, but I also thought I should give in this report an account of my examinations, which I had intended to do.

¹HANSEN, G. A. Undersøgelser angående Spedalskhedens Årsager. [Investigations concerning the etiology of leprosy.] *Norsk Mag. f. Laegevidenskaben* **4** (1874), No. 9, 1-88 and I-LIII.

²HANSEN, G. A. Spedalskhedens årsager. [Causes of leprosy.] *Norsk Magazin f. Laegev.* **4** (1874) No. 9, 76-79, reprinted (in English), *Internat. J. Leprosy* **23** (1955) 307-309.

In a footnote in this part of the report Hansen said that he had demonstrated "some of these things" to Carter, of Bombay, who visited Bergen in 1873, but—curiously—he spoke only of the brown bodies. The fact that Carter himself had seen them in his work, Hansen regarded as corroboration of his view that these brown elements were a "property" of leprosy, but he did not yet dare to regard them as specific. However, according to a quotation³ from Carter's report of his observations in Norway,⁴ he said that Hansen had shown him "the minute organisms (a species of *Bacterium*) which are present in living leprosy matter taken from the interior of a 'tubercle'" which point to the parasitic nature of the disease.

In 1875 Hansen published a condensation of the 1874 report in a British periodical,⁵ but it is concerned almost entirely with the matter of contagiosity; only on the last page is the discovery of the bacillus mentioned, briefly and—as usual—cautiously.

While leprosy may be thus indirectly proved to be a specific disease by demonstrating its contagiousness, it would, of course, be the best if a direct proof could be given. I will briefly mention what seems to indicate that such proof is, perhaps, attainable. There are to be found in every leprosy tubercle extirpated from a living individual—and I have examined a great number of them—small staff-like bodies, much resembling bacteria, lying within the cells. . . . It is worthy of notice, however, that the large brown elements found in all leprosy proliferations in advanced stages . . . bear a striking likeness to bacteria in certain states of development.

Hansen had good reasons for being cautious about his findings. He was young, and without standing as a scientist; bacteria as the cause of any such chronic disease had never been recognized; Jacob Henle's conditions for identification of a pathogen had not been met; and, finally, his chief Danielssen would not be convinced of the significance of his bacilli.

Emphasis was laid on the "brownish yellow bodies," and they still remained of interest to him twenty years later.⁶ An early description of these bodies, as quoted⁷ from an article published by Bull and Hansen in 1873,⁸ is of interest, particularly since they no longer are to be seen.

The elements in the softened part [of the old leprosy] are almost exclusively brown and brownish yellow bodies of extremely different form and size. [They are to be found

³VOGELSANG, TH. M. The Hansen-Neisser controversy, 1870-1880. *Internat. J. Leprosy* **31** (1963) 74-80.

⁴CARTER, H. V. Report on Leprosy and Leper-asylums in Norway. Presented to the Secretary of State for India in Council, November 1873. London, Her Majesty's Stationery Office, 1874.

⁵HANSEN, G. A. On the etiology of leprosy. *British Foreign Medicochir. Rev.* **55** (1875) 459-489.

⁶HANSEN, G. A. and LOOFT, C. Die Lepra von Klinischen und Pathologisch-Anatomischen Standpunkte. Cassel, Verlag Th. G. Fisher & Co., 1894, 48 pp. (p. 15) Translation (by N. Walker): Leprosy in its Clinical and Pathological Aspects. Bristol, John Wright & Co. 1895, 163 pp. (p. 31).

⁷[J.A.M.A.] Hansen (1841-1921)—lifetime student of leprosy. *J. American Med. Assoc.* **184** (1963) 890-891 (editorial).

⁸BULL, O. B. and HANSEN, G. A. The Leprosy Diseases of the Eye. Christiania, Albert Cammermeyer, 1873, 27 pp.

in cutaneous nodules, the affected parts of the eye, the spleen, liver, lymphatic glands, testicles, and nerves. They are a result of regressive metamorphosis of the elements. Not seldom there occur also large Myeloplague-like cells, with contents of even or patchy brown color. Like other regressive elements the contents of these cells cannot be colored with carmine.

These brown bodies were not a discovery of Hansen's although one might think they were. Danielssen, in his persistent autopsy work, had observed them long before, so regularly in advanced cases that he regarded them as specific for leprosy. They are mentioned as "cellules" in the book of Danielssen and Boeck,⁹ and are pictured in their atlas. It is related¹⁰ that when Virchow visited Bergen in 1859 he discouraged the idea that they were special to leprosy, holding that they merely represented fatty degenerations of cells. Danielssen bowed to that opinion—much to his later regret.

As for the time of Hansen's first *observation* of the bacilli, there has until now been such uncertainty, for some of which Hansen himself was responsible. The evidence is examined in some detail.

Hansen began leprosy work under Danielssen in 1868, and on his return from a year's study abroad in 1871 he received a grant from the Norwegian Medical Society to further his research. That, then, is the earliest date he could have observed the bacilli, but he evidently said nothing about any such finding in any of the six papers published before his 1874 report;¹¹ he only told of the brown bodies. And yet he wrote in his book with Looft⁶ that it was in 1871 that the bacillus was discovered.

With a higher power, one sees in the fluid of the preparation [sections or teased preparations of fresh nodules] small straight rods, which are not destroyed by addition of potash. These are the lepra bacilli, and thus they were first discovered in the year 1871.

And yet Lie, who had been Hansen's assistant and succeeded him, wrote much later¹² that the observations published in 1874 had been made in the previous year, and that consequently Hansen himself had maintained that the discovery of the bacillus must be reckoned as from 1873. However, it appears that toward the last, Hansen said in his memoirs¹³ that he could not remember when the first observation had been made.

In this connection Melsom,¹⁴ the last of the special leprosy officers of Norway, who was uncertain about the time in question, told of a letter written by Hansen to Butler in the United States in which he stated that the 1874 report was finished in 1872, and also mentioned

⁹DANIELSSEN, D. C. and BOECK, W. Om Spedalskhed. Christiania, 1847. De la Spédalskhed, ou Éléphantiasis des Grecs. Paris, J. B. Balliere, 1848, 535 pp.

¹⁰ROKSTAD, I. Address delivered at the inauguration of the Armauer Hansen Memorial Room, February 12, 1962. Internat. J. Leprosy **32** (1964) 64-70.

¹¹See the full list of Hansen's publications in the appendix of Reference No. 3.

¹²LIE, H. P. Armauer Hansen and the leprosy bacillus. Internat. J. Leprosy **2** (1934) 473-478 (editorial).

¹³HANSEN, G. A. Livserindringer og Betragtninger. [Memories and Reflections.] Christiania, Aschehough, 1910, 142 pp.

¹⁴MELSON, R. Personal communication, cited by Fite and Wade (Ref. No. 20).

1870 or 1871. That letter, it is said, was published by Butler¹⁵ in a book which is not available to the writer.

Vogelsang³ once said that although the time of observation was uncertain, the usual assumption was that it was 1873, and elsewhere¹⁶ he came out definitely for that year, saying that:

If we accredit the work to the time it was done rather than the time of publication of the report, 1873 is the year in which G. H. Armauer Hansen discovered the leprosy bacillus.

That way of reckoning is, of course, not done in modern practice; it is the year of publication that counts, and not the time of first observation.

What appears to be a definite answer to the question now comes from an unexpected source, namely a popular book on leprosy by Patrick Feeny,¹⁷ *The Fight Against Leprosy* (reviewed in this issue). In it there is given what purports to be the actual date—February 28, 1873—of the first observation that the brown bodies were masses of individual rods, and even the name of the patient concerned. Certain other cases in the same period are also cited.

This information, it turns out, was obtained from the English version of an article published in three languages by Hansen in 1880¹⁸ after the appearance of Neisser's 1879 report,¹⁹ the other languages being Norwegian and German. Its avowed purpose was in part to assert his priority regarding the discovery of the bacillus, and in part to supply details that were lacking in the 1874 report. Vogelsang has said (Letter to the Editor in this issue), that all three versions are identical, but, as will be seen, that is not entirely so.

The 1880 article presents, again with expressed reluctance as yet to publish further on the subject, and after relating studies made on the blood for anything significant, "a few of memoranda I made during that time" of work on tubercles. Then follow detailed records of the day-to-day findings in 10 lesion specimens from 7 patients. It is not specifically stated the notes were of his *first* pertinent observations of the small, rod-shaped bodies in the larger brown ones, but at any rate the year concerned seems definitely settled by Hansen's statement, in the discussion, that:

From the notes of my investigations in 1873 every one will be easily able to see that I had good reasons for supposing that bacteria appear in leprosy products, but also that I, supported alone by these investigations, could not propound a theory on this subject,

¹⁵BUTLER, C. S. *Syphilis sive Morbus Humanus: A Rationalization of Yaws So-Called for Scientists and Laymen Interested in the Damage to Man from Venereal Diseases*. Brooklyn, N. Y., published privately, 1936, pp. 137.

¹⁶VOGELSANG, TH. M. Discovery of leprosy bacillus. *J. American Med. Assoc.* **184** (1963) 145-146 (correspondence).

¹⁷FEENY, P. *The Fight Against Leprosy*. London, Elek Books, Ltd.; Toronto, The Reyerson Press, 1964, 191 pp., 25s, \$4.00 (See p. 65.)

¹⁸HANSEN, G. A. The bacillus of leprosy. *Quart. J. Microscop. Sci.* **20** (1890) 92-102; *also*, *Bacillus leprae*. *Nord Med. Archiv.* **12** (1880) No. 3, 1-10 and *Virchow's Archiv.* **79** (1880) 32-42.

¹⁹NEISSER, A. Zur Aetiologie der Leprosy. *Breslau ärztl. Ztschr.* **1** (1879) 200-202, 214-215.

and still more decide whether these bacteria really were the virus which, introduced into the system, produced the disease.

And so, five years after the publication of the first report on the subject, Hansen still felt reluctance about publishing further on it, and was no more definite than before regarding the significance of his observations. He told briefly of further work done (a few inoculations of rabbits, observation of the effects of osmic acid on the bacilli in a few instances, and the usually unsuccessful attempts to use methyl violet in staining), but said of the one successful methyl violet preparation made that it afforded confirmation of his earlier supposition that the large brown bodies "are nothing else than either masses of zooglea or collections of bacilli which are enclosed in cells."

All this would seem to confirm the suggestion of Fite and Wade²⁰—vigorously contested by Vogelsang³—that Hansen had not pursued the study very vigorously. The work cited seems meager indeed for that of an active investigator carried on during a five-year period (1874-1879). Presumably it was done when other duties permitted. However, Vogelsang³ quotes an addendum to the 1880 report—one that was not included in the English version—in which Hansen said:

Since writing this, I have also succeeded in staining the bacilli in sections from nodules fixed in absolute alcohol, using a more drastic staining method as advised by Dr. Koch. The bacilli are present in all parts of the sections, at times singly, but frequently in groups, corresponding to their position in the cells.

This line of work, with tissue sections, had previously been overlooked. Evidently Hansen had been more active than has seemed to be the case.

—H. W. WADE

²⁰FITE, G. L. and WADE, H. W. The contribution of Neisser to the establishment of the Hansen bacillus as the etiologic agent of leprosy, and the so-called Hansen-Neisser controversy. *Internat. J. Leprosy* **23** (1955) 418-428.