I. Interpretive Chronology of Leprosy Concept and Practice

This chronological presentation of developments in concepts and practices relating to leprosy is not intended to be comprehensive, nor is it an attempt to assign priorities for these developments. It is an attempt, at this centennial point in time, to provide a simple, readily comprehensible overview of the flow of development and change related to this disease. As time passes those who become interested in the problems of leprosy face an ever-expanding problem of familiarizing themselves with that which has transpired in the past, especially as related to areas of endeavor other than their particular field of expertise. One recalls with some nostalgia the remark attributed to Armauer Hansen in 1901 to the effect that “there is already too much literature on leprosy.”

When this chronology was first initiated, it seemed fairly simple but as its construction progressed it became evermore complex and time-consuming till finally publication deadline and the pressure of other Festskrift preparations necessitated an end to its expansion.

Some 18,000 references to work in leprosy were at hand, but the publications to which they relate are in many instances not readily available or obtainable only with great effort. Just when some notion was traced to its root it appeared that somewhere in the past another individual had a similar notion. This is exemplified by the chronicled 1893 dietary thesis of Hutchinson regarding the consumption of decayed fish as being generative of leprosy and the subsequent finding that Bernhard de Gordon (1285-1307) had a similar idea. Of course, each such earlier reference requires some evaluation of its basis and seriousness, for fish consumption, for example, has been held in the folklore of many societies for unknown lengths of time as being etiogenic of leprosy, as is noted in the etymology of the term “cucubay” for leprosy as used in Guyana.

Many references given to the pre-Christian period will be disputed by some as not being provable reference to leprosy per se, as is often stated to be the case with Biblical references to leprosy. This unsettled point will not be argued here. They are noted in this chronology as leprosy, the point not being settled, for those who may wish to consider the problem themselves and because it has not been proven that leprosy was not included in the society encompassed by the given designation.

With these, and other unnoted limitations, this chronology is nevertheless presented as a quick reference point for the flow of many concepts and experiences that have played a role in the development of the present vantage point. Where feasible, while still attempting to avoid cumbersomeness and pretensions to historical judgement of priority, the concepts are referenced. Where possible, the references used for older literature are to publication, reprint or abstracts in the International Journal of Leprosy (IJL) that will give a quick lead to the original and other related references.

Olaf K. Skinsnes, M.D., Ph.D., AIL Leprosy Atelier, Department of Pathology, School of Medicine, University of Hawaii, Honolulu, Hawaii.
Pre-Century of Progress

- c. 1500: Rigveda Samhita (India) mentions kushtha (a term covering leprosy as well as some other skin afflictions).
- c. 1300-1000: Ebers Papyrus and Brugsch Papyrus (Egypt) mention of leprosy under term Uchedu.
- c. 1000: Susrutas Ayurvedas by Hanvala of India, described leprosy.
- c. 880: Rigveda Samhita (India) mentions kushtha (a term covering leprosy as well as some other skin afflictions).
- c. 600: Treaty forced on Arpad of Syria by Ashur-nirari of Assyria stipulated that the god Sin would clothe violators of the treaty with leprosy. (Olmstead, History of Assyria, 1923, p.172.)
- 576: King Azariah (Uzziah) of Israel became a victim of leprosy (tsaraath). His duties thereafter being discharged by his son. The disease was contracted as punishment for sin of assuming priestly functions. (The Bible, II Kings 15: 1-7; II Chron. 26: 1-23.)
- 6th century: Sushruta Samhita (India) clear description of leprosy. Under terms "Vat-Hakta" and "Vatasonita" there is characterized hyposthesia, anesthesia, formation and deformities. Under designation kushtha there were two kinds of skin lesions. In one the prominent symptoms and signs were local anaesthesia and deformities. In the other the features were ulceration, falling off of fingers and sinking of the nose. (Dharmendra, Notes on Leprosy, 1967; IJL 15 [1947] 424-430.) If the affliction affected the fat particularly there would be lameness of the hands, inability to walk, decay of limbs, spreading of wounds from one part of the body to another. In marrow and bones there would be collapse or decay of nose, redness of eyes, maggots forming in the wounds, voice choked. If present in the akroshas (sperm) of the father and in the menstrual blood of the mother, the leprosy would be transferred to both the offspring. Kushtha is the worst of all diseases and one who dies due to that is again attacked by it in the future birth. Kushtha is also contagious like fever, consumption, ophthalmia and the epidemic diseases by constant contact, breathing together, eating together, lying or sitting together, clothes, garments and ointments. The expansion of kushtha from skin to the remaining elements of the body is compared with the gradual expansion of the roots of a tree in the earth. (Jolly, J. Indian Med. [1951] pp 142-144.)
- 221: Disciple of Confucius presumed to have leprosy.

2 This is included as a type reference for the many other Old Testament Biblical references.
5th century Herodotus wrote of Persia: "...and whosoever of the men of the city has leprosy or whiteness of the skin, he does not come into a city nor mingle with the other Persians: ... but a stranger who is taken by these diseases in many regions they drive out of the country altogether."

C. 480 Leprosy introduced to Greece, following conquest by Darius and by Xerxes.

345 Leprosy described by Aristotle.

C. 300 Septuagint (Greek) translation of Hebrew Bible, Old Testament, rendered tuberculosis as lepra.

C. 97-54 Lucretius in De Natura Rerum wrote:

"High up the Nile midst Egypt's central plain
Springs the dread leprosy, and there alone."

B.C.——O———A.D.

C. 4 B.C., Jesus Christ, in practice and teaching, indicated that persons with leprosy are not outcasts before God but equally the recipients of His grace.

C. 62 Leprosy possibly introduced to Europe by Roman soldiers of Pompey withdrawn from legions in the East.

C. 150 Hua T'o, prominent Chinese surgeon: "The symptoms of leprosy may first appear on the skin but the poison is actually stored in the internal organs. The skin is first numb without sensation, gradually red spots appear on it, then it is swollen and ulcerated without any pus. And later the disease develops to such an extent that the eyebrows fall, the eyes may become blind, the lips deformed and the voice hoarse. The patient may also experience ringing in his ears and the soles of his feet develop rotted holes; his finger joints may become dislocated and the bridge of his nose flattened."

100-900 India, Ayurveda Susruta and Bhagvat described a tubarit oil (believed to be a hydrocarpus oil) in treatment of leprosy.

C. 150 Areteaus (Greek)—first comprehensive clinical description of leprosy in Europe; Leontine facies noted. "The disease is also called Leo on account of the resemblance of the eyebrows—and Satyrasis from the redness of the cheeks, and the irresistible and shameless impulse ad coitum." Did not record anesthesia as characteristic. (Adams; Extant Works of Areteaus, the Cappadocian, 1856, pp 368-372).

180 Galen wrote of leprosy in Germany.

281-341 Ko Hung (China): 'The first symptom of lai-ping (leprosy) is numbness of the skin or a sensation of worms creeping.'

5th-6th centuries Leprosy brought to Spain by Roman troops.

610 Chao's Pathology (China) included a long account of the etiology and symptoms of leprosy in detail; loss of sensation, absence of sweating, loss of hair and eyebrows, perforating ulcers, distorted ears and fingers, disfigured face, blared eyes, hoarse and raucous voice, nasal deformity, etc.

625 or 636 First leprosy hospital in England at Nottingham (Blyth Leper Hospital).

625-1798 Leprosy endemic in Great Britain.
Skinsnes; Notes from the History of Leprosy

640 Sun Sun-mu (China), devoted a chapter to leprosy in his "Thousand Golden Remedies," Vol. 23. Said he had treated over 600 cases, the cures being about one in ten. Insisted that treatment must be continued for a long time. Treatment included dietary measures and the use of dried, powdered turpentine prepared from pine wood.

720-759 Oldest known Swiss leprosarium at Convent in St. Gallen, and in 751 at Mocton.

757 Pepin (France), issued a decree making marriage of those with leprosy illegal and the disease a reason for divorce.

758-760 Empress Komyo (Japan), provides care for leprosy victims.

758 Empress Komyo founded, in Nara, the first leprosy hospital in Japan.

833 Reime-Gige, Japanese law commentary, regarded leprosy as contagious from man to man.

982 Ishinhô, oldest Japanese medical book in existence declared that "leprosy is a communicable disease transmitted directly from man to man."

1000-1400 Leprosy epidemic in Europe (peak), following dissemination during the Crusades.

1067 First leprosarium in Spain, at Palencia, established by the Cid.

12th-13th centuries Leprosy first known in Iceland.

1235 St. Elizabeth (1207-31), patron saint of those with leprosy, canonized four years after her death at age 24. Daughter of King of Hungary, wed in political marriage at age 14 to Louis, Landgrave of Thuringia; sublimated herself in service to those with leprosy.

1246 Franciscan monk, Bartholomaeus Angelicus, recognized contagious nature of leprosy, believed that it was hereditary, and also that it was induced by eating hot food, pepper, garlic and the meat of diseased hogs. (Marti-Bañez, Epic of Medicine, 1959, p 135.)

1285-1312 Philip IV ("Philip the Fair"), King of France. Suggested that all persons with leprosy be gathered together and burned, and that the practice continue until the disease was eradicated.

1383 All cagots (gafo, capots, cacques, cacous—all terms derived from Spanish gafa, gafofo from gaf of Latin, meaning "hook, claw") defined as leprosy by Guy de Chauliac.

1396 All cagots (France) required to wear a "Sign of infamie."

1400-1415 St. Jørgens Hospital founded in Bergen, Norway.

1454-1462 Pope Innocent VIII, suppressed the Knights of St. Lazarus as an order. They had been devoted to the service of those with leprosy and many of their order had leprosy. At one time the Order of St. Lazarus required that only a person with leprosy could be elected as Grand Master.

1595 Pen Tsao Kang Mu ("The Great Herbal," China) by Li Shi-chan notes lu-bra-cô (probably H. anthelmintica) as an effective leprosy treatment. Imported from Siam.

16th century Leprosy spread from Portugal to Brazil.

16th-18th centuries Leprosy spread from Spain to Colombia, Equador, Cuba, Mexico, and southern United States.

Leprosy spread from Africa to Santo Domingo, Cartagena, Jamaica, parts of South America and southern United States.
Louis XIII of France forbade the marriage of persons with leprosy to anyone.

Chaulmoogra seeds used in treatment of leprosy in Japan (IJL 1: 161).

Chinese medical classic "Golden Mirror of Medicine" recognized contagious nature of leprosy, citing causes as infection by contact with those having leprosy, unclean privies, houses, bedding, etc.

Japanese treatise on syphilis and leprosy published by Katakara Genshin, Tokio, notes "that some cases are absolutely incurable; it is useless to attempt to cure a patient whose eyes have a yellow hue, whose fingernails have no white crescents at the bottom, whose hands are wholly anesthetic, whose palm or sole bleeds, whose eyeballs are ulcerated, whose penis is putrified, whose hands or feet are clawed, whose skin is spotted with black, whose fingers have melted off leaving frog-foot shaped ends, whose body hairs fall off, whose nose is gone, whose bones are poisoned and putrified . . . men who contact the disease after their fortieth year, people with very enucleated bodies." (Ashmead, JAMA 22 [1894] 605-608.)

Leprosy spread from Norway to Minnesota, U.S.A., and from France to Canada.

First reference to leprosy in Hawaii.

Tertiary syphilis (Radesyge) and leprosy differentiated (Hjorts, Norsk Mag. Lægevidensk).

Atlas Colorée de Spedalskhed, Danielsen and Boeck and Om Spedalskhed (Virchow called this the beginning of the biologic knowledge of leprosy). Danielsen, however, regarded leprosy as a "hereditary dyscrasia sanguinis."

1844, 1856, Danielsen made repeated efforts to transmit leprosy by inoculation of himself and nine volunteers with leprosy material without success.

1848 Danish government, influenced by the noncontagionist views of Danielsen and Boeck, closed the four extant leprosy hospitals in Iceland. Hospitals rebuilt in 1897.

1852 Diffuse leprosy of Lucio and Latapi described by Lucio. (Franken, Diffuse Leprosy of Lucio and Latapi, 1963).

1854 Chaulmoogra oil introduced to Western medicine for the treatment of leprosy (Monat).

1855 Successful use of chaulmoogra oil in China (Holson).

1857 Successful use of chaulmoogra oil in Bengal (Monat).

"Syphilisation" of leprosy reported as failing to alter or modify general features of leprosy (Danielsen, Syphilisationen, Bergen).

Rudolf Virchow visited Bergen and Danielsen demonstrated the "brown bodies" he regarded as characteristic of leprosy and which are now regarded as conglomerations of leprosy bacilli, "globi." Virchow discounted the notion of some casual relationship, regarding the nodules as clumps of degenerated fat, much to Danielsen's later regret. (IJL 28 [1900] 328-329.)

1863 Jonathan Hutchinson postulated that leprosy was "Fishater's gout" dependent on consumption of badly preserved or decomposed fish. He was echoing the concept of Bernhard de Gordon, a teacher at Montpellier (1285-1307), who said: "Comedere loc et pisces cadum mensa inducit Lepram."
Viechow described the "lepra cell," holding the vacuoles to be due to hydroptic degeneration. (IJL 21: 372-272; 22: 71-79 and 205-217.)

1865 First leprosy in New Hebrides.

1869- Obremski observed the spiral *Borrelia recurrentis* in the blood of a patient with relapsing fever, and reproduced the disease in man by the injection of infected blood. (IJL 33 [1865] 905-907.)

1868- Prof. G. and Cagnina, inoculated themselves and eight volunteers with leprosy material without causing leprosy.

Century of Progress in Understanding

1873 Gerhard Armauer Hansen discovered *M. lepra* ("Bacillus lepra"): published findings in 1874. (IJL 23: 307-309.)

"The discovery of the specific bacillus of leprosy by Hansen raised many a (cherished) hypothesis, and reduced to the status of secondary causes many etiological factors to which previously a preponderant role had been attributed."

"Nevertheless, a number of leprologists did not at first appreciate the significance of this decisive discovery. The authority of Danielsen and Boeck, who attributed leprosy to multiple and disparate origins, remained great, and Hansen had much to overcome to obtain recognition of the specific agent. Neisser in Germany (1889), Brocq (1885), Leblon (1886) and Ernest Besnier (1887) in France, contributed to the triumph of the idea of contagion." (Jeandrin, *La Lèpre*, 1934, p. 213.)

Father Damien de Veuster took up residence with leprosy patients on Molokai, Hawaii.


1875 Death of C. W. Boeck.

1878 First leprosy in New Caledonia.

1879 Neisser, applying staining methods of Weigert and Koch to leprosy material, found bacilli most beautifully with fuchsin and gentian violet to be abundantly present in skin, liver, spleen, testes, lymph nodes and cornea. (IJL 23 [1865] 415-428.) Regarded the vacuoles of lepra cells as due to fatty degeneration.


1884 Arning (Hawaii), inoculated convicted murdered Kenau (with his permission) with a freshly excised leproma. Leproma sutured to belly of supinator radioulongus muscle of right forearm. Twenty-five months later, October 1886, Kenau showed nodular leprosy all over body.

1886 Culicidian theory of leprosy transmission advocated by Beboeuf. Strongly supported by Adolphe Latz, 1913.

1887 Dorsal root ganglia invasion by acid-fast bacilli noted. (Sudakewitch. *Beitr. Path. Anat. 2*: 129.)

1889 Death of Father Damien.

1892 Ziferino Falcao (Portugal), at International Congress of Dermatology, held that in most cases "the first symptom of leprosy is rhinitis. . . . Not seldom, the perforations of the septum may con-
constitute for a very long time, the sole symptom." Found Hansen's bacillus in rubblings from septal mucosa. As a consequence the concept of leprosy transmission through the nasal mucosa became widespread.

1894 Death of D. C. Danielsen.

1897 First International Leprosy Congress, Berlin. Recognized skin and nasal discharge of bacilli, contagiousness of leprosy; and recommended control by segregation of patients having leprosy.
First leprosy in Fiji.
Postulate, based on histopathologic studies, that leprosy infections spreads from skin by way of sensory nerves to large nerves of extremities, whereas previously Arning and Unna had postulated skin lesion formation as being secondary to primary affection of the nervous system. (Gerlack and Dehio; Translated in Leprosy in India 24 [1952] 78-83.)


1900 Publication of Lepra initiated (ceased 1915). (Edward L. Ehlers, ed.)

1903 Murine leprosy described (Stefansky. Centralbl. f. Bakteriol. 33: 348-457.)

1906 American Committee of the Leprosy Mission (London) established. Name changed to American Leprosy Mission, 1917, and independently incorporated.
Calion Leprosy Colony inaugurated by Victor G. Heiser.

1907 Japan enacted legislation for the erection of interprovincial leprosy colonies in several locations.

1908

1909 First leprosy in Australia.

1909 Second International Leprosy Congress, Bergen. Reaffirmed recommendation for control by isolation and segregation; recommended removal of children from leprosy parents as soon as possible; recognized probable hematogenous dissemination of leprosy.
Successful cultivation of M. leprae in symbiosis with other bacteria and amoeba reported. (Clegg, M. T., Philippine J. Sci. 1: 77-141.)

1912 Death of Gerhard Armauer Hansen (February 12).

1912-1929 Acute leprosy epidemic in epidemiologically virgin population of Nauru, a Pacific island west of the Gilbert Islands. Within 17 years of the first case 35% of the population had leprosy. (IJL 2 [1912] 309-328; 20 [1952] 1-24.)

1916 Mouritz reported having made inoculation attempts in 15 kokaus (assistants or helpers at leprosarium) with leprosy material without producing leprosy. Reported also having made over 100 at-
tempts to create, without success, fresh leprosy lesions in mild nodular (lepromatous) leprosy cases by inoculation of leprosy material. Vigorously espoused probability of contagion by alimentary tract through contaminated food and drink and reported experimental infection of one rat and one cat by this route. Advocated bacillary “instinct of location” for skin and neural localization. Concluded that mosquitoes could not be leprosy vector on basis that all races in Hawaii were not equally attacked by leprosy. (*Path of the Destroyer.*)


1918 Lipid nature of lepra cell vacuoles demonstrated. (Cedercreutz, Finska Lak. sällsk IIId 60: 1; Mitsuda IJL 4 [1936] 491-508.)

Lepromin reaction described by Hayashi (IJL 21 [1933] 370; and by Mitsuda in 1919 (IJL 21 [1933] 347).

1923 Lepra cell origin from histocytes and like cells of the system described by Aschoff as “reticulo-endothelial” demonstrated (G. Herxheimer).

Third International Leprosy Congress, Strasbourg.

Founding of British Empire Leprosy Relief Association (B.E.L. B.A.). Name changed to LEPRA (1963). One aim was to modify compulsory segregation so as to prevent its causing wholesale hiding of the early cases of leprosy. (IJL 10 [1942] 87-95.)

1925 Fordyce and Wise discarded theory of leprosy spread by acarus, the fly, the louse, the mosquito or other sucking insect; essentially similar reasons to those of Mouritz in 1916.


1926 *Lepra bulalorum* (water buffalo), first described (Kok and Roselli); studied by Lobel (1934). (IJL 4 [1936] 79-96).

Chinese Mission to Lepers founded.


1928 Leonard Wood Memorial Foundation incorporated.

1929 Leprosy Review, publication begun.

1930 *Leprosy Review*, publication by British Empire Leprosy Relief Association begun.

La Lepros, publication begun by the Leprosy Prevention Society (Japan). Japan leprosy legislation extended to provide segregation throughout the country.

1931 International Leprosy Association established (IJL 1 [1933] 94-108).

Establishment of the Leprosy Prevention Society in Japan.

Histamine test proposed as differential test between lepromatous lesions and nonlepromatous macules (Rodriguez and Plantilla. IJL 1 [1933] 49-52b.)
Monkey infection by *M. leprae* reported. (Soule and McKinley, Amer. J. Trop. Med. 12: 1-36, 441-452; IJL 32: 201-206, 33: 104-105, 361-362). This claim will typify the many which have been offered, none of which are generally accepted and none of which methods are in general laboratory use.

1932-1939

Widely noted chemical fractionation studies on presumed *M. leprae* from a great number of in vitro bacillary cultures which evidently were not the leprosy bacillus. (Anderson, R. J. *et al.*, referenced in: Anderson, C. G. *Bacteriological Chemistry*, 1946, pp 574-584; Long, E. R. *The Chemistry and Chemotherapy of Tuberculosis*, 1939, pp 418-443.)

1933


Hypothesis advanced that “granularity” of *M. leprae* results from degeneration and disintegration of bacilli. (Hoffman, IJL 1 [1933] 149-158.)

1934

Recognition and delineation of tuberculoid immunologic pole of leprosy on histopathologic basis. (Wade, IJL 2 7-36; 279-292; 293-300.)

1936

Father Damien's remains moved from Hawaii to his native Belgium (IJL 4: 527). Minimal leprosy incubation period said to be three months. (Tisseul, IJL 4: 256.) Absence of significant central nervous system involvement in leprosy established. (Ermakova, IJL 4: 325.)

Concept proposed that lepra reaction is beneficial because it impedes the progress of the disease and improved the skin lesions. (Schujman, S. *Revue brésilère Leprologique*, 4 [1936] 129.) General disagreement with the hypothesis expressed in a “Correspondence Symposium” ([IJL 25 [1957] 403-403; 26 [1958] 160-162].)

1937


1938

Fourth International Leprosy Congress, Cairo, Egypt. Classification accepted as *L. a., N, a* and LN, or “mixed”; with various subclassifications.

*Colocasia antiquorum* claimed to be etiologic factor in leprosy through saprotoxin destruction of adrenal cortex resulting in reduced resistance to inoculum (Oberdoeffe, Trans. Far East Assoc. Med.)

Possible value of BCG for prevention of leprosy suggested by Fernandez (Rev. Argent. Dermatol. 23: 425)

1940

Early lepromin reaction defined. (Fernandez, IJL 8: 1-14.)

Diphtheria antitoxin or toxoid tried in leprosy treatment (Collier & McKean).

1942


The *Star* begins publication. Produced by patients at U.S.P.H.S. Hospital, Carville, Louisiana.

1943


1947

Diaminodiphenyl sulfone (DDS) introduced as treatment for leprosy (Cochrane).
Disparate cell reaction to *M. leprae* (tissue culture) in tuberculoid and lepromatous leprosy noted. (Hanks. IJL 15: 31-64.)

High leprosy prevalence in cast villages compared to low or absent prevalence in nearby, related outcast villages (India). Cited as evidence against insect transmission and in favor of human contact transmission in leprosy. (Cochrane. *Practical Textbook of Leprosy*, pp 15-16.)

1948

Fifth International Leprosy Congress, Havana, Cuba. Leprosy classification accepted as polar "Tuberculoid" and "Lepromatous" types with "Intermediate" lying between and "Indeterminate" for early unclassified types. Use of the term "leper" proscribed. BCG vaccination for leprosy advocated (Chaussinand. IJL 16: 431-438).

1949

Light microscopy observed granularity of *M. leprae* under sulfone therapy suggested as evidence of their degeneration and death. (Lowe & Smith. IJL 17: 185; Cochrane. Leprosy Rev. 20: 59.)

1950

Barclay Index (BI) introduced. (Muir. Lep. India 22: 43-45.)

1951


1952

Korean War. British troops accused of participation in germ warfare by "planting lepers" behind enemy lines (Hong Kong, South China Morning Post, July 5, 1952).


1953

Sixth International Leprosy Congress kept Havana classification with some additional subclassifications but changed "Intermediate" to a third "polar", definitely defined "Dimorphous" type. "Dimorphous" soon came to be synonymous with "Intermediate" and "Borderline."

International Leprosy Conference, the Leprosy Mission and American Leprosy Missions, Lucknow, India (November 7-10). Hypothesis advanced that leprosy is the result of trace element deficiency and therefore is a symptom and not a disease. (Gay, L. P. The Star 13: 7-10.)

Damiel-Dutton Award established. Stanley Stein first recipient.

Granularity and degenerative changes in *M. leprae* under sulfone therapy noted and suggested as evidence of loss of bacterial vitality. (Malattà & Jonquieres. IJL 21: 323-329.)


1954

Lepra-like infection reported in frogs. (Machicas & La Pfica. Lab. Invest. 3: 219-227.)

1955

1956
Postulated predilection of *M. leprae* for sites of low temperature.
(Binaford, Publ. Hlth. Rep., Wash. 21: 905.)

1958
Immunologic dichotomy of leprosy (effective immunologic response but absence of humoral antibody response in tuberculoid; absence of effective immunologic response but presence of humoral antibody response in lepromatous leprosy) noted. (Lowe. Leprosy Rev. 26: 15-24.)

1958
Postulated predilection of *M. leprae* for sites of low temperature.
(Binaford, Publ. Hlth. Rep., Wash. 21: 905.)

1958
Documentation that 3% of children developing leprosy in a leprosarium healed spontaneously. (Lara & Nolasco. IJL 24: 245-263.)

1960
Immunologic dichotomy of leprosy (effective immunologic response but absence of humoral antibody response in tuberculoid; absence of effective immunologic response but presence of humoral antibody response in lepromatous leprosy) noted. (Lowe. Leprosy Rev. 26: 15-24.)

1960
Postulated predilection of *M. leprae* for sites of low temperature.
(Binaford, Publ. Hlth. Rep., Wash. 21: 905.)

1956
Documented 1956-1960
Diphenylthiourea (Ciba 1906) therapy introduced (Davey).

1960

1958

1959

1960
Reported heavy infection of young hybrid black mice with *M. leprae* (Chatterjee, K. R. Trans. VII Int. Congress, 67-73). Has not been confirmed.

1960

1960
Mouse foot pad infection with *M. leprae* established. Opened possibilities of study of *M. leprae* and drug screening. (Shepard. J. Exper. Med. 112: 445-454.)

1960
Immunoinfectional differences between virgin and leprosy endemic societies noted. (Leker. Leprosy Rev. 31: 241-259.)

1960
Electron microscopic differences in macrophage ultrastructure in tuberculoid and lepromatous leprosy delineated with description of "opaque bodies" later (see 1965) related to "dense bodies" of Brieger and Allen and lysosomes of DeDaver. (Nishida. IJL 28: 357-379.)

1960
Controlled BCG trial for leprosy prophylaxis begun in Uganda. Treatment of acute neuritis with injection of hyalase and cortisone advocated. (Thangarat and Thangaraj. Leprosy Rev. 31: 295.)

1960's
Value of chemoprophylaxis in leprosy demonstrated (Dharmendra, Noordeen, Wardkar).

1961
Presence and significance of *M. leprae* capsule noted. (Hanks. IJL 29: 74-83, 84-87, 175-178, 179-182.)
Retrosp ective study of 907 Caucasian missionaries living in leprosy endemic areas of Africa revealed 12 instances of contracting leprosy, giving a prevalence rate of 13.2 per 1000 persons. (Gray and Driesbach. IJL 29: 270-280.)

Symposium on Research in Leprosy, Leonard Wood Memorial and Johns Hopkins University (May 8-10).

Good correlation of histopathology and clinical leprosy types. (Cochrane. Ciba Symposium 9: 238-247.)

Radiologic studies demonstrated vascular alterations in extremities associated with nerve paralysis and produced classification of multiple factors in development of bone deformity. (Paterson. IJL 29: 393-442; Lechat. 30 [1962] 125-137; Job. 31 [1963] 36-33.)

Hypothesis advanced that leprosy bacillus enters body through stomach or lungs and is carried to the sensory nerves by the blood. (Weddell and Palmer. Leprosy Rev. 34 [1963] 57-61, 54-56; The Star 22 [1963] No. 3, p 12; IJL 31 [1963] 375.)

Proposed use of solid staining versus granular bacillary forms as an index of therapeutic effectiveness to be known as the "Morphologic Index." (Waters and Rees. IJL 30: 266-277.) See also 1953, 1958.

Controlled BCG trial for leprosy prophylaxis begun in E. New Guinea.


Eighth International Leprosy Congress, Rio de Janeiro, Brazil. Rifamycins introduced in leprosy treatment. (Opromolla. IJL 31: 552.)

"Dense bodies" ("cytosomes") in Virchow cell cytoplasm related to lysosomes of DeDuve and possible role in digestion of M. leprae suggested. (Brieger and Allen. Ciba Foundation, The Pathogenesis of Leprosy.)

Hypothesis advanced that tuberculoid reaction is essentially that of delayed hypersensitivity while erythema nodosum leprosum is essentially a humoral antigen-antibody reaction. (Skinsnes. In: Leprosy in Theory and Practice. Cochrane and Davey, Eds. 1964, pp 156-182.)

Controlled BCG trial for leprosy prophylaxis begun in Burma (WHO).

Pathologic basis for leprosy opprobrium postulated. (Skinsnes. Leprosy Rev. 35: 175-181.)


Variant macrophage response to M. leprae and M. lepraemurium in guinea pigs (epithelioid cell transformation) and rats (foam cell transformation) reported to be similar to variant response respectively in tuberculoid and lepromatous leprosy and to be associated with feeble lipase, alkaline and acid phosphatase activity, sluggish lysing of bacilli and lipid storage in the foam cell type of reaction. (Hadler. Leprosy Rev. 36 [1965] 171-181.)

U.S.-Japan Cooperative Medical Science Program including a Leprosy Panel, inaugurated.

Conference on Research Problems in Leprosy, Leonard Wood Memorial and Armed Forces Institute of Pathology (IJL 33, No. 3, part 2).
Clofazimine (B663) anti-inflammatory reaction reported (Browne, Leprosy Rev. 36:9).

1966 Formation of ELEP (contraction of "Europe Leprosy"), the European Coordination Committee of the Anti-Leprosy Association, of which the members are:
   a) Aide Aux Leprêux, Enamais-Suisse (Switzerland)
   b) Amici dei Leprosi (Italy)
   c) Les Amis du Père Damien (Belgium)
   d) Comité Exécutif International pour l'Assistance aux Lépreux (Ordre de Malte)
   e) Cizzzam Savas ve Anartr Nina Dernegi (Turkey)
   f) Deutsches Aussätzigen-Hilfswerk (Federal Republic of Germany)
   g) Evangelische Ausszahilfe (Federal Republic of Germany)
   h) Association des Fouandions Follereux (France)
   i) Fondation Raoul Follereau (Luxembourg)
   j) Foundation Père Damien (Belgium)
   k) Hartdeg Stifting (Federal Republic of Germany)
   l) The Leprosy Mission (United Kingdom)
   m) The Order of Charity (United Kingdom)
   n) I Thia Haris (Greece)

Enhanced susceptibility of thymectomized and irradiated mice to infection with Mycobacterium leprae. (Rees, R. J. W. Nature 221: 657-658.)


   "Chemical isolation" of contagious leprosy shown to be effective. (Worth. IJL 36: 296-302.)

Progressive loss of infectiousness for mouse foot pads of M. leprae from DDS treated patients, with total loss of infectiousness demonstrated after 90-100 days. (Shepard, et al. Amer. J. Trop. Med. 17: 769-775.)

Immunologic spectrum of leprosy formulated in analogy to immunologic pattern of certain mycotic and protozoal diseases as well as tuberculosis. Noted that "Yersin" type tuberculosis and systemic fungal and protozoal infection may represent "lepromatoid" disease, analogous immunologically to lepromatous leprosy. Leprosy is therefore noted as a broader based immunopathologic disease model than other infectious granulomata. (Skinner. Ann. N.Y. Acad. Sci. 154, Art. 1: 19-31.)


1969 After 22 years of legally supported substitution of term "Hansen's Disease" for leprosy, Hawaii deemed the change harmful rather
than helpful and officially returned to use of the designation "leprosy." (Gould. IJL 37: 194-196.)


1971 Chemotherapy effectiveness of DADDS (Acetazolamide) long-acting sulfone demonstrated. (Sloan, et al. IJL 40: 40-52.)

M. leprae infection established in thymectomized, irradiated, bone marrow shielded mice. (Binford, et al. IJL 40: [1972] 99-100.)

M. leprae growth in Lewis rats enhanced by thymectomy and anti-thymocytic serum administration. (Fieldsteel and McIntosh. IJL 40 [1972] 95-99.)

Nine-handed armadillo reported to sustain widespread lepromatous infection with M. leprae. (Kirchheimer and Storrs. IJL 39: 693-702.)

M. leprae reported to grow in cell-free environment by use of cell-impermeable diffusion chambers placed in mouse peritoneum. (Rightsel and Wpygl, Infect. and Immunity, 3: 127-132.)

M. leprae shown to vary genetically into "fast" growing strains (less than 25 days replication time) and "slow" growing strains (more than 30 days replication time) with continuous spectrum between. No significant differences related to geographical source of bacilli. (Shepard and McRae. Infect. and Immunity 3: 121-126; Abstract. IJL 40 [1972] 337.)

Lymphocytes of leprosy patients, particularly lepromatous, defective with respect to capacity to induce lymphocyte transfer reaction in lepromatous recipients. (Han et al. IJL 39: 715-717.)

Lepromatous lymphocytes limited in capacity to produce lymphotoxin in response to specific antigen, lepromin, and nonspecific agent, phytohemagglutinin. (Han et al. IJL 39: 719-725.)

Prolonged survival of skin allografts in leprosy patients, particularly lepromatous leprosy. (IJL 39: 1-6.)


Lepromatous lymph node paracortical areas infiltrated with undifferentiated macrophages, failing to eliminate M. leprae. In tuberculoid paracortical areas infiltrated with epithelioid macrophages and well populated with lymphocytes and immunoblasts. (Turk and Vaters, Clin. Exp. Immunol. 8: 363-370.)

Significance recognized of circulatory change attendant on nerve injury in pathogenesis of leprosis bone resorption. (Skinnnes, et al. IJL 40: pp 375-388.)


Morphologic evidence of probable extracellular existence and perhaps growth of M. leprae in armadillo. (Kirchheimer, et al. IJL 40: 232.)

1973 Bone marrow (B) lymphocytes reported increased and thymic lymphocytes (T) decreased in lepromatous leprosy. (Cajl Pozzobon et al. New Eng. J. Med. 288: 1033, Dwyer et al. Ibid 288: 1038.)