

CURRENT LITERATURE

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General and Historical

Kalisch, Philip A. Lepers, anachronisms, and the progressives: a study in stigma. *Louisiana Studies* 12 (1973) 489-531.

A discussion concerning the little understood and much stigmatized medical disorder, Hansen's disease, or more commonly, leprosy. This paper focuses on the historical and sociological perspectives of this disease in the United States from 1889-1920. Initially, an overview of the centuries-old background of leprosy is presented as a reference for the understanding of the physical and emotional isolation of leprosy patients. Demographic material and other statistical data follow the migration and development of leprosy in the United States. Excerpts from the contemporary literature and law of the times, along with individual experiences and case histories acutely point out the ostracism to which leprosy patients were subject in this country, as opposed to other communicable diseases. Parallels are drawn between the primitive treatment and community isolation of leprosy patients in other supposedly "less developed" countries and that of the United States. Negative opinions among the medical community did little to abate the exclusion of those afflicted with leprosy from free social interaction. The debate among government officials regarding the necessity of a national leprosarium and the suggestion of placement in isolated areas such as Cedar Key, Florida, with the subsequent uproar among residents of these areas did not improve the status of leprosy patients. Fear, ignorance, tradition, and religious interpretation seem to have been the base on which the modern treatment of leprosy patients was built.—Author's Summary

✓ **Torsuev, N. A. and Gusakov, N. I.** Manuscript works of 18th century physicians on leprosy and syphilis. *Vestn. Dermatol. Venerol.* 48 (1974) 65-66. (In Russian)

We discovered some unpublished documents in the Central State Historical Archives in Leningrad which supplement the already known facts on the history of leprosy and syphilis in Russia.

Scientific works, in manuscript form, appeared very long ago, most probably in the 16th century when the first printing house was established. Secular and medical books began appearing in Russia only after the introduction of the practice of secular printing in 1708.

The manuscript works of Russian physicians were not published because of conditions created in the Medical College by foreigners.

B. N. Palkin (1953) discovered 914 manuscript works of Russian physicians in the scientific archives of the Medical Soviet of the Home Affairs Ministry which were written before 1800. He found 1,144 manuscripts of physicians' works, including those beginning in the 19th century. "The richest scientific inheritance of Russian medical men is still in the archives. It needs further investigations by specialists of different scientific medical branches." (B. N. Palkin, 1953).

We were interested in works on leprosy and syphilis. Y. I. Milenushkhin (1949) stated that leprosy was studied "during 80 years" but in reality it was fully studied up to the end of the 18th century (D. F. Reshetillo, 1904; N. A. Torsuev, 1951).

Leprosy was first mentioned among many epidemic diseases in Russia in the 15th century. It was described under the name "the black disease" or the "Crimea disease," which appeared in 1462 near the Caspian Sea. Gmelin described, in the middle of the 18th century, a case of leprosy denying its identity with syphilis. The first manuscript work on leprosy in the 18th century was written in German on cases of leprosy in the Astrakhan region in 1786. P. S. Simontovsky studied leprosy in Uralsk, Fedor Stri-

nevsky described in 1797 some leprosy cases in the Tambov region, and Pavel Zimovitch wrote about cases in the Astrakhan region.

The Russian physicians' works on leprosy are well grounded, logically accounted for and contain scientific conclusions. For example, the physician Y. T. Sandul-Sturdza submitted for approval to the Medical College a dissertation entitled "On the Crimea People's Disease—To Have the Right to Become a Doctor, Written by the Son of His Motherland Yakov Timofeevitch Sturdza in

the Town of Saint Peter on the Twenty-Third of October 1792." The author described the symptoms of leprosy in this dissertation and prophylactic measures.

There are many imprinted works of Russian physicians in the archives of the Medical College on different questions of venerology. They described the epidemiology, symptoms, treatment and prophylactic measures in Russia during that time.—(Translated from Russian)

Clinical Sciences

Almeida Goncalves, J. C. and Custodio, J. Treatment of Mitsuda-negative leprosy patients with transfusions of whole blood from Mitsuda-positive donors. *Lepr. Rev.* **46** (1975) 15-20.

Two lepromatous and one borderline patient improved following transfusions of whole blood from selected donors whose Mitsuda reactions were positive. Two of the patients had received no previous antileprosy therapy and remained untreated during the study. The third patient was drug-resistant. Improvement was preceded by febrile episodes, "benign reactions," which are described.—Authors' Summary [*It is recalled that in 1940 similar claims were made from Pretoria, South Africa (IJL 8: 380) following multiple transfusions in seven patients. Curiously, minutes of a two-day conference on leprosy (IJL 12: 105-113) four years later, also in Pretoria, made no further mention of these studies.—Editor*]

Antia, Noshir H. The scope of plastic surgery in leprosy: a ten year progress report. *Clin. Plast. Surg.* **1** (1974) 69-82.

The correction of the deformities of leprosy during the past two decades has provided a new dimension not only to the treatment of leprosy but also to the control of the disease, which carried the fearful stigma of the deformities so typical of this disease. Fortunately for the reconstructive plastic surgeon, the deformities of leprosy follow a definite pattern. Hence, it has been possible to evolve standardized procedures for their correction which can be undertaken in any district hospital or leprosarium by a doctor trained in this type of work.

The deformities of leprosy are chiefly of

the face and extremities. While the deformities of the extremities are mainly the result of damage to the nerves resulting in motor and sensory loss, the deformities of the face are the result of direct damage to the tissue by lepromatous disease. The only exception to the latter is facial paralysis, which is the result of nerve damage and is seen in the tuberculoid type of disease.

Leprosy surgery is often undertaken by doctors who work in leprosaria. Hence, all the procedures evolved for correction of these deformities have been simplified and may be undertaken by any medical practitioner who has received about six months training in this specialty. In fact, all operations described have been practiced by the author in conditions prevailing in the usual sanatoria for leprosy patients.... One of the major handicaps often mentioned is the nonavailability of general anesthesia under leprosarium conditions, but all surgical procedures, not only for the face, but also for the hands and feet can be and are routinely performed under local anesthesia.

One point requires emphasis: the reconstructive plastic surgeon working in a leprosarium must be capable of undertaking surgery for all deformities of leprosy... and no distinction can be made between plastic and orthopedic procedures.—(From author's introduction)

Charosky, Claudio B. and Brusco, Carlos M. Las artropatías de los enfermos de lepra enfocadas como artropatías de Charcot. [Arthropathies of leprosy patients considered as arthropathies of Charcot.] *Leprosologia* **18** (1973) 280-285. (In Spanish)

The concept of neuropathic arthropathy

is discussed according to the type of neurologic involvement. Each kind of neurologic deficit is related to the different clinical situations commonly seen in the limbs.

The name of "proprioceptive arthropathies" is proposed for Charcot joints because it is felt that this allows for better understanding of the pathogenesis of the disease. Three clinical stages with corresponding histopathologic data are described.—(*Adapted from English summary*)

✓ **El Amile, Abdellatif.** Diabète cortisonique et diabète en Dermatologie et en Léprologie. [Cortisone diabetes and diabetes in dermatology and leprosy.] *Maroc Med.* **54** (1974) 294-302. (In French)

Twenty-four percent of all skin patients and 9% of leprosy patients receive corticosteroid therapy. Such therapy may cause a simple glycosuria or a true hyperglycemia. Simple glycosuria is more frequent in leprosy patients than in patients in the general dermatological service. Hyperglycemia occurs with equal frequency (3%) in both categories of patients. The long periods of corticosteroid therapy sometimes required for leprosy patients is a factor in the development of hyperglycemia. Strict control of all leprosy patients receiving corticosteroids is important. However, the use of these drugs should not be neglected where they are essential for the management of the patient. A stimulated [provocative] glucose tolerance test is recommended in selected patients. The prevalence of diabetes mellitus (noncorticosteroid) in general dermatological and leprosy patients is nearly identical (1.5%).—(*Adapted from French conclusion by Dr. Wayne M. Meyers*)

✓ **Haye, C., Merklen, P., Dufier, J.-L., and Guyot-Sionnest, M.** A propos d'un cas d'épisclérite nodulaire lepréuse. [A case of nodular episcleritis due to leprosy.] *Arch. Ophthalmol. (Paris)* **34** (1974) 707-710. (In French)

The authors report a case of nodular episcleritis due to leprosy, the favorable evolution makes this case atypical.—English Summary.

✓ **Huskisson, E. C.** Arthritis as a sign of another disease. *Cur. Med. Res. Opin.* **2** (1974) 510-514.

Patients with apparently straightforward

and sometimes mild joint pain may have a serious underlying condition whose correct recognition is important to their future well being. Confronted with so many cases of rheumatoid or osteoarthritis, however, there is a danger that other diagnoses may be overlooked. The author reviews these types of disease infections (including lepromatous leprosy), malignant diseases and metabolic disorders, which should be taken into consideration in patients presenting with arthritic symptoms.—Author's Summary

✓ **Lodha, S. C., Bomb, B. S., Singh, S. V. and Sharma, N. L.** A comparative study of liver function tests in various types of leprosy. *J. Assoc. Physicians India* **22** (1974) 653-657.

A battery of liver function tests were carried out in fifty cases of various types of leprosy and the results were statistically evaluated. Patients with tuberculoid leprosy had only minor, statistically insignificant changes in most of the parameters studied. In contrast, indeterminate and lepromatous leprosy patients had statistically significant derangement in the majority of liver function tests. There was no change in the values of various liver function tests except serum transaminases after three months of sulfone therapy.

On comparing the results of this study among various types of leprosy, there was significantly more derangement of hepatic functions in lepromatous type as compared to tuberculoid type. There was statistically significant difference between lepromatous and indeterminate leprosy and indeterminate and tuberculoid leprosy, regarding only SGPT and serum bilirubin respectively. Thus, indeterminate leprosy is intermediate between tuberculoid and lepromatous leprosy with respect to hepatic dysfunction.—(*Adapted from authors' summary*) [*Presumably the term "indeterminate" as used here is equivalent to the generally used designations of "dimorphous" and "borderline."*—Editor]

✓ **Lucca, E. J. De.** Cruzamento de bracos e dedos em Hansenianos. [Hand clasping and arm folding in leprosy patients.] *Rev. Paul. Med.* **83** (1974) 278-281. (In Portuguese)

The mannerisms of hand clasping and arm folding are probably dependent on genetic

factors. Although no simple Mendelian mechanism could explain the findings, some related factors were found on the frequencies of the types of hand clasping and arm folding. The data obtained among patients at two tuberculosis hospitals seemed to show that the main general findings observed in healthy individuals from different populations holds true for tuberculosis patients. The data presented here refer to 540 patients at one hospital for leprosy in Bauru City, Sao Paulo (Sanatorio Almores). The results are presented with a calculation of the frequencies of the types of hand clasping and arm folding according to sex, age and ethnic group of the individuals under investigation.—(Adapted from English summary)

✓ **Maillard, G. F. and Chamay, A.** Chirurgie plastique du visage lépreux. [Plastic surgery of the face in leprosy.] *Rev. Med. Suisse Romande* **94** (1974) 729-740. (In French)

The social rehabilitation of leprosy patients without active disease is a major problem. In endemic countries there is an aversion to the patient because of easily recognized stigmata. Only plastic and reconstructive surgery can remove these deformities. After the active disease has been arrested by the leprologist, the destiny of the patient in society may be markedly improved, by appropriate surgery.—Authors' Conclusion.

✓ **Mensher, John H.** Corneal nerves. *Survey Ophthalmol.* **19** (1974) 1-18.

This review ties together information concerning corneal nerves: normal and abnormal anatomy; pathologic reactions of degeneration and regeneration; corneal sensitivity, modalities involved and the testing methods employed; and, finally, disease entities in which corneal nerves or innervation are involved or affected such as: leprosy, Refsum's syndrome, pheochromocytoma, neurofibromatosis, keratoconus, posterior polymorphous dystrophy and ichthyosis.—(From author's introduction)

✓ **Meyer-Rohn, Johannes.** Unspezifisch positive Reaktionen im FTA-Test. [Non-specific positive reaction in FTA test.] *Hautarzt* **25** (1974) 528-529. (In German)

Accumulative results on nonspecific positive reaction in the FTA test in visceral

erythematodes, diabetes, hepatic disorders, tuberculosis, leprosy and pregnancy are considered. In such false-positive cases the author recommends repeating the test and the TPI (Nelson) test for accurate diagnosis of syphilis.

The description of the nonspecific positive reaction in leprosy was as follows. In 1968 the author and associates compared the result by classic serum reaction and 200 FTA tests in 518 leprosy patient sera and the following data were obtained: 120 leprosy patient sera shows positive FTA test; 379 were positive with classic serum reaction; 70 showed FTA test alone and 69 showed positive classic test alone. Among these cases, neither the anamnesis of syphilis nor the cause of biologic false-positive was disclosed although the rate of syphilis is high among Ethiopians on whom the study was conducted.—(Adapted from German summary and section on leprosy)

✓ **Miranda, R. N. and Cunha de Paula, B. S.** Cytobacteriology of lepromatous leprosy in reaction. *Publ. Cent. Est. Leprol.* **14** (1974) 15-20.

The administration of potassium iodate to the lepromatous leprosy patient when properly dosed, provokes artificial acuteness, favors the growing of germs and their liberation from the cells of the reticuloendothelial system which is their natural habitat.

These bacilli after entering the bloodstream and tissues, are themselves in major part encompassed and phagocytosed by the polymorphonuclear leukocytes which in this case are found in the inflamed tissues and present themselves in increased numbers in the bloodstream. From this phagocytosis may result either the destruction of the bacterium or the destruction of the cell, there occurring in the latter case a new discharging of bacilli which will be again phagocytosed.

So, depending on whether there be greater bacterial destruction or greater cell destruction, effects respectively beneficial or harmful may be observed; a great temporary improvement of the disease or its worsening that can lead to death.

We interpret the leprotic reaction periods as being the disease itself, which is usually chronic and which presents acute reaction periods, a fact not unique in human medi-

cine for it is also observed in other pathologic entities such as malaria, tuberculosis, brucellosis, etc.

The morphologic alterations of *M. leprae* observed in the course of our experience, such as cocci, short rods, coccothrix or filaments, show in our opinion, stages of growth or the increase of the vitality of the bacterium and not the decreasing of its vitality by leprostatic therapeutics or duration of the disease.—(*Adapted from authors' conclusions*)

Noe, Joel M. and Barber, Joan. Chronic leg ulceration in a patient with leprosy. *West. J. Med.* **121** (1974) 430-432.

While there are a reputed fifteen million cases of leprosy in the world today, the diagnosis is often missed in the United States. We recently saw a case of leprosy in a 45-year-old Cuban immigrant who presented with chronic leg ulcers.

In the differential diagnosis of chronic leg ulceration a combination of 1) travel in or history of living in an endemic area and 2) a peripheral nerve lesion with or without associated anesthetic areas, and 3) suggestive skin lesions in the distribution of the involved nerve, should make one suspicious of leprosy.

We have presented this unusual case as a reminder to the practicing clinician that leprosy still exists in the United States and continues to evade diagnosis. We would like to emphasize that culturing bacterial pathogens found superficially may not be sufficient and that skin and nerve biopsy may be necessary to make the correct diagnosis of leprosy. It is a treatable infectious disease that will only be discovered if suspected and looked for on a biopsy.—(*Adapted from article, pp 430, 432*)

Palande, Dinkar D. The ulnar nerve in the lower arm in dimorphous leprosy. Some observations. *Lepr. India* **46** (1974) 1-6.

The appearance, to the naked eye, of the ulnar nerve of the elbow in 17 cases of dimorphous leprosy is described and correlated with biopsy findings in 8 cases. Surgery was done to relieve pain in all these cases with complete relief of nerve pain in same. Early surgery to prevent irreversible nerve damage and to aid nerve recovery is advocated.—*Author's Summary*

Ranney, Donald A. Principles of lumbrical replacement in leprosy hand surgery. *Indian J. Orthop.* **5** (1973) 4-13.

While operations have been devised for surgical correction of deformities due to leprosy, the overall results by average surgeons on average cases fall short of the ideal. This is particularly true in hand surgery, including operations for lumbrical replacement.

Consequently, a detailed study of carefully selected cases was personally performed to determine possible reasons for lack of success. The study included 29 cases of pure ulnar paralysis without any thumb weakness, i.e., removal of a sublimis tendon was not required to restore thumb action. These had been corrected surgically by performing an extensor-flexor many-tailed operation. Failure to completely eliminate skin contractures when present was found to be a primary cause of poor results. Stiffness or ankylosis of proximal interphalangeal joints and dorsal expansion defects invariably jeopardize the success of the operation. In barely more than one third (10 of 29 cases) a good result was obtained, but in cases in which there was no skin contracture, no joint problem, and no extensor expansion disruption, six of ten cases had excellent results. Incorrect tension adjustment, poorly applied plaster of Paris splints at the time of operation, and repeated postoperative trauma accounted for less than ideal results in this preoperatively ideal group.—*Author's Summary*

Ranney, Donald A. The hand in leprosy. *Hand* **5** (1973) 1-8.

Leprosy is a disease which can be cured and it is hoped that one day it will be eradicated. As long as it continues to exist deformities will occur. Much can be done to correct these deformities when the paralysis is established and the disease has been brought under control. All skin and joint contractures should be eliminated before attempting tendon transfers. Reconstructive surgery for leprosy deformities is always challenging and under the right conditions it can be very rewarding. But as always, prevention is better than the cure.—*Author's Conclusion*

Ranney, Donald A. The mechanism of arch reversal in the surgically corrected claw hand. *Hand* 6 (1974) 266-272.

Arch reversal occurs in the mobile hand following a good correction of the intrinsic minus deformity and is due to part of the action of extensor digiti minimi being transferred from the metacarpophalangeal joint to the mobile ulnar two carpometacarpal joints. If the mobility of these joints is not restricted by an active transfer, or by increased tension on the medial two tails in relation to the others when correcting the clawing, there will be recurrent clawing of the ring and little finger. In selected cases, the added benefits of an active transfer to protract the fifth metacarpal (using extensor digiti minimi) are a five-finger pinch and a cosmetically more acceptable hand. In those cases in which the additional surgery is not justified, the ulnar carpometacarpal joints can and should be stabilized in extension, thus reversing the transverse metacarpal arch, by applying sufficient tension to the ring and little finger lumbrical grafts. This, with other measures will help prevent recurrent clawing in these two fingers.—Author's Summary

Rosenthal, M. Der Transferfaktor und seine therapeutische Anwendung. [Transfer factor and its therapeutic use.] *Schweiz. Med. Wochenschr.* 104 (1974) 1509-1506. (In German)

Transfer factor prepared from blood leukocytes is neither an antigen, an antibody, nor a fully developed nucleic acid. It is of marked therapeutic value in various disease states where the pathogenetic mechanism is impaired cellular immunity. Transfer factor initiates recovery of the immune system leading to a clinical improvement in the majority of cases. For the congenital combined immune deficiency syndromes, especially those where impaired cell-mediated immunity plays the main role, transfer factor therapy should be considered. Wiskott-Aldrich syndrome affords an excellent example of such a condition. Other possible indications for transfer factor therapy are acquired diseases where an impaired cellular immunity can be demonstrated, such as some malignancies, sarcoidosis, progressive tuberculosis, lepromatous leprosy, disseminated fungi, and virus infections. First reports in the world literature are highly encouraging. However, more studies are required in order to evaluate this as yet experimental therapy.—English Summary

Chemotherapy

Bergel, Meny. Actividad cancerígena de la diaminodifenilsulfona (DDS). [Carcinogenicity of diaminodiphenyl sulfone (DDS).] *Publ. Cent. Est. Leprol.* 13 (1973) 30-41. (In Spanish)

The carcinogenicity of DDS administered in a concentration of 0.3% in the diet of Wistar white male rats over a period of two years is described. This incidence of neoplasia amounted to almost 100% of the animals, in contrast with no occurrence of malignancies in control animals. The tumors produced were of high malignancy, found in the retroperitoneum, mesentery, intestines, spleen, thyroid and liver; and being histopathologically diagnosed as fibrosarcomas, reticulosarcomas, adenocarcinomas, fibroangiomas and angiomas. These experimental data are correlated with the incidence of cancer in leprosy patients receiving sulfones. Considerations are presented relating to the probable mechanism of carcinogenic action of

sulfones as related to the biologic antioxidant activity of these substances.—(Adapted from English summary)

Dharmendra. Infectivity of "open" cases of leprosy under treatment. *Lepr. India* 46 (1974) 188-191.

There is no conclusive evidence to justify any change in our existing criteria of non-infectivity of open cases under treatment. On the other hand, there are cogent reasons against affecting a change in the criteria. In the author's opinion it would be wise to stick to old criteria based on bacteriological negativity (BI zero) of multiple skin smears, and maintained at examinations repeated over three consecutive months. After that the patient should be examined every six months to ensure that he continues to be negative. The period of this six month checkup will vary according to the type and past severity of the disease, and on the period for which

the patient had remained positive prior to becoming negative.—Author's Conclusions (*From Trop. Dis. Bull.*)

Murty, G. Krishna. Clinical toxicity study of *Semecarpus anacardium* Linn. f. *Indian J. Exp. Biol.* **12** (1974) 444-446.

S. anacardium was administered to 266 cases in three formulations: Amrit Bhallatak to 186 cases, RB 3 to 48 cases, and Garsin to 32 cases. The dose of *S. anacardium* in Amrit Bhallatak, which contains the aqueous extract of the whole nut, the pericarp and the cotyledons, was 10 gm/day; that of RB 3, which contains only the cotyledons, was 3.6 gm/day; and that of Garsin, which contains the extract of the cotyledons, was 2.4 gm/day. No toxicity or side effects were observed. The therapeutic value of *S. anacardium* in arthropathies, atopic dermatitis, leucoderma, leprosy, hypothyroidism, oligospermia and azospermia and its value as an oral contraceptive have been studied. The most significant effect was on the ovaries and testes, the drug probably acting via the hypophysis.—Author's Summary

Takizawa, Hideo. Studies of the clinical course and prognosis of Hansen's disease during chemotherapy. 1. Mode of decrease of Bacterial Index in lepromatous leprosy. *Lepro* **43** (1974) 275-283. (In Japanese)

The skin lesions in lepromatous leprosy during chemotherapy showed distinct improvement several years before acid-fast bacilli disappeared from the lesions. Consequently an indicator called "bacterial clearance time" (BCT) was chosen to represent the clinical course and prognosis of each case of lepromatous leprosy. BCT is the period of time from start of treatment until

skin smears from the skin lesions become negative. Negativity of bacilli is defined here as negative skin smears over a 12 month period with no clinical evidence of activity.

This study concerns 56 patients diagnosed as having lepromatous leprosy in our clinic between 1952 and 1964, whose records were relatively complete and who were followed for more than five years. Additionally, 123 lepromatous patients admitted to Tama-Zenshoi Leprosarium in Tokyo between 1957 and 1963 were studied to determine if different results from these two institutions could be observed.

There was no significant difference in the BCT distribution of lepromatous cases in the two institutions. The cumulative ogive of BCT showed the sigmoid curve. A BCT of 4.5 and 7.5 years can be roughly regarded as inflexion points of this sigmoid curve. The following three groups were defined in relation to the above inflexion points:

- 1) Rapid decrease group
(RA group) BCT \leq 4.5 (years)
- 2) Standard decrease group
(ST group) 4.5 < BCT \leq 7.5
- 3) Slow decrease group
(SL group) 7.5 < BCT

Four-and-a-half to 7.5 years of chemotherapy were necessary to gain bacterial negativity in standard lepromatous leprosy. In the RA group some cases had acute infiltration reaction (Tajiri) in their clinical course. Other cases in this group had a history of previous treatment or showed near lepromatous leprosy. The skin lesions in the RA group were of the localized type and not so extensive. One of the main causes in the SL group was irregular treatment due to ENL or other reasons.—(*Adapted from English summary*)

Immuno-Pathology

Batista, S. M., Mayrink, W., Costa, C. A., Chiari, E. and Pereira, A. A. S. Estudo de antígenos hemaglutinantes no diagnóstico sorológico da doença de Chagas. [Study of hemagglutinating antigens in the serodiagnosis of Chagas' disease.] *Rev. Inst. Med. Trop. Sao Paulo* **16** (1974) 317-323. (In Portuguese)

The authors present the results of hemagglutination tests for the indirect diagnosis of Chagas' disease. Results obtained with anti-

gens purified by alcohol-ether, acetone-butanol and with known protein contents were compared to those obtained with *T. cruzi* culture forms lysed in distilled water without further treatment. Serum samples were obtained from individuals with chronic Chagas' disease and positive xenodiagnosis. It was observed that the alcohol-ether treatment lowered the sensitivity of the antigen, and that the ratio between protein contents and agglutinating activity was variable and

depended upon the antigen used. No cross specificity was observed with the antigen studied, in cases of kala-azar, leprosy and pulmonary tuberculosis. Of the 32 cases of mucocutaneous leishmaniasis studied, only two—which also exhibited positive complement fixation test for Chagas' disease—yielded positive reactions, suggesting a double infection.—English Summary

Bernard, Juan C. Estudio anatomopatológico de las lesiones vasculares del lepromatoso. [Anatomic and pathologic study of vascular lesions in lepromatous leprosy.] *Leprologia* **18** (1973) 239-267. (In Spanish)

Vascular lesions in lepromatous patients are very frequent and very important because they influence the different physiopathologic problems in leprosy.

In 200 biopsies studied, we showed that chronic vasculitis was more frequent than the acute. The infiltrates and granular vasculitis were in the small and medium sized vessels. Chronic proliferative vasculitis was most frequent in large vessels.

Acute necrotizing, hemorrhagic and thrombotic vasculitis was found in small vessels and in reactional leprosy patients.

In autopsies, we found amyloid vasculitis of blood vessels to be the most frequent vascular manifestation and we observed necrotizing vasculitis in the adrenal gland, kidney and liver.—(Adapted from English summary)

Bopp, Clovis and Bakos, Lucio. The histoid variety of lepromatous leprosy. *Arch. Dermatol. Forsch.* **252** (1975) 1-10.

Three cases of the so-called "histoid variety" of lepromatous leprosy are reported. This variety has definite clinical features associated with characteristic histologic and bacteriologic findings.

Some of the features presented by our patients are similar to those described originally by Wade, especially the resistance to treatment. Considering the discrepancies existing among the authors who have studied the subject, our opinion is that further studies should be done in order to elucidate the controversial points.—Authors' Summary

Dasgupta, A., Mehra, N. K., Ghei, S. K. and Vaidya, M. C. Histocompatibility antigens (HL-A) in leprosy. *Tissue Antigens* **5** (1975) 85-87.

HL-A antigens of 70 leprosy patients and 40 normal healthy individuals were determined by the standard microlymphocytotoxicity test. Both lepromatous and nonlepromatous leprosy patients were tested for the presence of 11 HL-A antigens, and the frequency of each specificity was compared with that in a normal population of the same ethnic group. Although the statistical significance of HL-A8 specificity was found to be marginal in lepromatous leprosy patients, when using ordinary 2×2 statistics, there did seem to be a decreased frequency of HL-A9 among the nonlepromatous type. Other antigens tested did not reveal any significant differences between the two groups of subjects.—Authors' Summary

Dastur, D. K., Ramamohan, Y. and Dabholkar, A. S. Some neuropathologic and cellular aspects of leprosy. *Prog. Drug Res.* **18** (1974) 53-75.

In the first part of this presentation, our brief review of the peripheral neuropathology of leprosy, approximately covering the century from the 1860's to the 1960's, has informed us of the significance of the involvement of the peripheral nervous system in all types of leprosy. In particular, we learned that intradermal innervation seems essential for the ingress of *Mycobacterium leprae*, and that the Schwann cell plays a pivotal role in the extension of the leprosy infection along the length of the nerve especially, though not exclusively, centripetally. Thus by the middle of the last decade, it was clear even on light microscopic evidence that leprosy was primarily a neurological disorder, and the most frequent peripheral nerve disease in the world.

The ultrastructural observations being conducted at our laboratory during the past four years have confirmed the significant role of the Schwann cell as the repository of *M. leprae* and for the "Schwannian relay" of these organisms, a feature of importance in the neural pathogenesis of leprosy. The much greater bacillation of the Schwann cell of unmyelinated fibers, and the proliferation of this cell including occasional formation of interdigitating processes, were features facilitating its pathogenetic role. Axonal type of degeneration was noted, confirming earlier teased fiber preparations.

This current study has also stressed the

importance of the perineurium in the possible movement of bacilli across nerve bundles, and perhaps in the protection of the intrafunicular parenchymal elements. It has impressed us that three cells with a basement membrane, *viz.* the Schwannian, perineurial, and the endothelial cell, are parasitized preferentially, the fibroblasts rarely showing bacilli. The early and severe increase of endoneurial collagen in both types of leprosy nerves, confirming light microscopic changes, appears capable of strangulating the delicate nonmyelinated fibers and disorganizing funicular architecture.

The organelles in the above mentioned cells of the nerve and in the lepra cells of skin lesions are specially amenable to EMscopic histochemical enquiries. Among other things, leprosy provides a model for the study of lysosomes. Either intact lysosomes or granular material, possibly lysosomal, were seen in the various bacillated cells of lepromatous tissue, but especially in the lepra cells. Here clear phagolysosomes containing bacilli, mainly in a degenerating (*i.e.*, crumpled or fragmented) form, were seen either in empty space or along with granular or homogenous osmiophilic material. The degeneration of bacilli noticed in untreated lepromatous patients was noteworthy, and pointed to some host-tissue reaction even in this condition of shattered immunity. Lysosomal enzymes appeared responsible for this, as is partly confirmed by our histochemical study of the acid-phosphatase (AcPh) reaction. AcPh was detected in all the above mentioned bacillated cells in lepromatous leprosy, and in the large mononuclear cells in nerves and lesions of tuberculoid leprosy. Schwann cells of normal nerves showed almost no AcPh activity.—(Adapted from authors' summary) [*"Shattered immunity" implies the previous presence of immunity and this seems not to have been proven to be the case in lepromatous leprosy.*—Editor]

✓ **Escobar-Gutierrez, Alejandro and Gorodezky, Clara.** Distribución de algunos antígenos HL-A en México. Estudios en población general (mestiza e indígena), atópicos y leprosy. [Distribution of some HL-A antigens in Mexico. Studies in general (Mestizo and Indian), atopic and leprosy populations.] *Rev. Invest. Salud Publica* 34 (1974) 161-168. (In Spanish)

Lymphocytes from 200 normal, unrelated adults from the Mestizo population of Mexico, and 172 individuals of the Indian population were tested for the presence of seven HL-A antigens using cytotoxic antisera. The results showed a different pattern between the Mestizo and the Indian population particularly for HL-A2, HL-A5 and HL-A8. Among the Indian groups there were also differences that are in relation with their ethnical origin. In addition, the lymphocytes from 100 atopics and 50 leprosy patients were tested for the same antigens, and the results were compared with those from the general population. The atopics showed a significant excess for HL-A7 and, taken as a whole, the distribution of HL-A antigens in this group was more similar to the Caucasian component of the Mestizo population than to the Indians. In the case of leprosy the results were significantly low for HL-A2 and HL-A3, but many of the samples from the leprosy patients had an abnormal behavior, with low vitality making its classification difficult.—English Summary

✓ **Gorodezky, C., Amezcua, M. E. and Salazar-Mallen, M.** Quantitation of IgE in Mexicans. *Allergo. Immunopath.* 2 (1974) 321-324.

IgE serum levels were determined in three groups of individuals from the Mexican population; the first one was formed by 25 healthy people and had a mean value of 229 U/ml, with a range of 0 to 530 U/ml (confidence limits 95.45%); the second group was constituted of 29 patients who had attended the outpatient department of the General Hospital of Mexico City for causes other than parasitosis or allergies, in these patients the mean was 686 U/ml with a range of 71 to 1301 U/ml (confidence limits 95.45%). This elevated mean could be the result of poor socio-economic conditions causing intestinal parasitization maintained in a sub-clinical state.

The third group was formed by eight samples from patients with nodular lepromatous leprosy. Only one showed a high IgE value, but the small number of samples does not allow interpretation of this isolated finding.—Authors' Summary

✓ **Gupta, M. C., Kumar, S. and Tyagi, S. P.** Reappraisal of functional and structural changes in the liver in leprosy. *J. Assoc. Physicians India* 22(1974) 13-18.

Functional and liver biopsy studies in 40 cases of leprosy comprising 13 cases of lepromatous, 21 tuberculoid, and 6 dimorphous types have been presented. Granulomata in the liver were found to be present in all types of leprosy. Histologically, they were typical of each type and corresponded very much to the skin lesions. The functional derangement has been noted in only lepromatous cases.

Repeated functional and morphologic studies have not shown any improvement after sulfone therapy. On the other hand, liver changes in lepromatous leprosy persisted even when the skin lesions had improved; suggesting that bacilli take longer to be eliminated from the liver and may be a cause of reactivation of the disease.

The importance of histologic study of the liver in leprosy is emphasized.—(Adapted from authors' summary)

indicator of the disease processes. In addition, it is suggested that the depression of some of the hydrogen peroxide-generating oxidases, peroxidase and catalase, may contribute to the low state of the host defense mechanism.—Authors' Summary

✓ **Job, C. K.** The immunological spectrum in leprosy and its significance. *Indian J. Pathol. Bacteriol.* **17** (1974) 75-78.

The clinical picture of leprosy is a spectrum ranging from a localized lesion in skin or nerve as in tuberculoid leprosy, to a generalized disease involving almost the entire skin and most of the peripheral nerves as in lepromatous leprosy. The borderline leprosy presents a variety of lesions with features of both lepromatous and tuberculoid patterns in a varying degree. By using lepromin and lymphoblastic transformation tests it has been demonstrated that there is an intense cell-mediated immune process at the tuberculoid end, a complete loss of cell-mediated immunity at the lepromatous end, and a spectrum of immunologic responses between the two polar types. This confirms that the clinical manifestation reflects the place a patient occupies in the immunologic spectrum of leprosy.—Author's Abstract

✓ **Johny, K. V., Karat, A. B. A., Rao, P. S. S. and Date, A.** Glomerulonephritis in leprosy—A percutaneous renal biopsy study. *Lepr. Rev.* **46** (1975) 29-37.

Thirty-five patients with lepromatous or borderline leprosy selected at random were investigated for evidence of renal disease. Renal functional impairment was detected in nearly two-thirds of the patients and histologic lesions were present in 46%. Twenty-three percent of the cases showed a proliferative type of glomerulonephritis, mesangial sclerosis without significant hypercellularity was seen in 11%, and amyloidosis was present in 6%. One patient had interstitial nephritis.—Authors' Summary

✓ **Kapoor, K. K. and Gupta, S. C.** Serum cholesterol and alkaline phosphatase in different types of leprosy. *Lepr. India* **46** (1974) 152-156.

Serum cholesterol was found to be significantly decreased in all types of leprosy. No correlation between the decreased levels of serum cholesterol and severity of the disease

✓ **Hokama, Y., Kimura, L. H., Kobara, T. Y., Ferreira, S. M., Su, D. W. P., Torikawa, C. and Oishi, N.** Variation in peroxisomal enzyme levels of peripheral leukocytes of cancer, leprosy and tuberculosis patients. *Cancer Res.* **34** (1974) 2784-2789.

Peripheral leukocytes of human cancer patients showed significant depression of L- α -hydroxy acid oxidase ($p < 0.01$ to < 0.001) and peroxidase ($p < 0.10$ to < 0.01). The peroxisomal-related enzymatic activities of lepromatous leprosy patients tended to resemble those of cancer patients. On the other hand, values of tuberculoid leprosy and tuberculosis patients' leukocytic enzymes tended to be similar to normal leukocytic values. However, some enzymes (catalase and D-amino acid oxidase) occasionally showed elevated levels. Severest depression of peroxisomal enzymatic activities is shown in leukocytes of leukemia patients. This may be attributable to the nature of the leukocytic population at the time of diagnosis. During remission following therapy, return to normal levels of the enzymatic activity of the leukocytes of leukemia patients has been observed. The variation in the peroxisomal-related enzyme levels appears to reflect the nature of the kinds of leukocytes in peripheral blood and thus the status of the disease. L- α -hydroxy acid oxidase and the azide-insensitive peroxidase appeared to be most affected; thus their measurement may serve as a useful in-

was observed. Serum alkaline phosphatase was found to be within normal limits in different types of leprosy. The value in patients with tuberculoid type of leprosy were similar to those among normal healthy control subjects. In all other types of leprosy the values were found to be on the higher side of normal range. This slight increase from the mean normal value was statistically significant in sera from patients with dimorphous, lepromatous and lepra reaction.—(From Trop. Dis. Bull.)

✓ **Koley, S. K., Das, P. K. and Ghosh, S.** Observations on liver biopsies in tuberculoid cases with a single lesion. *Indian J. Dermatol.* **20** (1974) 17-21.

Liver biopsies from 16 cases of tuberculoid leprosy, all with a single skin lesion, do not show any change in the liver histopathologically. It is suggested that the skin lesions were the result of direct skin infection and not after a stage of bacilleemia.—Authors' Summary

✓ **Languillon, J., Rucher, H. and Sarrat, H.** A propos d'un cas de lèpre lépromateuse nodulaire à cellules fusiformes. Aspect "Histoid" de Wade. [With respect to a case of nodular lepromatous leprosy with fusiform cells. From Wade's point of view on the histoid variety of lepromatous leprosy.] *Bull. Soc. Med. Afr. Noire Lang. Fr.* **19** (1974) 206-209. (In French)

The authors report a Senegalese case of an unusual form of lepromatous leprosy described in 1963 by Wade under the title of "Histoid Variety of Lepromatous Leprosy." This variety generally appears at the time of a relapse of a patient who has been treated for several years with pure sulfone. This was the case in their observations, but it may appear suddenly as a primary lesion of leprosy.

It is characterized by the appearance of cutaneous or subcutaneous nodules and by the presence, under pathologic examination, of a dermofibromous aspect with "turbulent" cellular groups consisting of fusiform cells heavily overrun by acid-resistant bacilli usually colored and grouped in bundles inside the cell.

This form of leprosy, which we call "nodular lepromatous leprosy with fusiform cells," is considered by Rodriguez as the

evolution of a leprosy of which *Mycobacterium leprae* are "mutant" becoming resistant to pure sulfone.—English Summary

✓ **Sainani, G. S. and Rao, K. V. Narayan.** Renal changes in leprosy. *J. Assoc. Physicians India* **22** (1974) 659-664.

The present study, consisting of 66 leprosy patients, was carried out at the Medical College Hospital, Nagpur over a period of time from August 1970 to September 1971. Only those cases who agreed to kidney biopsy were included in the present study. Of 66 cases subjected to renal biopsy, kidney tissue could only be obtained in 60 cases. Of these 60 cases, 56 were of the lepromatous type in the advanced stages of the disease, and 4 were of the tuberculoid type. The ages varied from 25 to 70 years with an average of 46 years. Except for one case, all remaining 59 cases had a disease duration of six years and above—the maximum duration being 30 years.

Renal histopathologic changes observed in the present study were as follows: chronic pyelonephritis (9), interstitial nephritis (6), acute poststreptococcal glomerulonephritis (8), leproma (1), amyloidosis (1), arteriosclerotic changes (5), nephrosclerosis (2), nonspecific histopathologic changes (16), and normal histology (9).

Abnormal urinary findings were encountered in a majority of cases showing histopathologic abnormalities. Total serum proteins and albumin-globulin ratio were normal. Barring a few cases, blood urea was normal.

It can be concluded that in lepromatous leprosy renal involvement in the form of inflammatory lesions and nonspecific changes in glomeruli and tubules are common. Occurrence of amyloidosis and leproma are rare.—(Adapted from authors' summary)

✓ **Sampaio, L. A. Jr.** Study of a leproma in acute reaction. *Publ. Cent. Est. Leprol.* **14** (1974) 24-26.

Though the phagocytic capacity of the cells of the reticuloendothelial system does not include the endothelial cells of the capillaries and blood vessels, the present case shows the existence of such capacity in a specific way in the acute reaction of leprosy. Endothelial proliferation going as far as reaching obstruction is a dominant phenom-

enon in leprotic reaction. Reactional participation of the mesenchyma also occurs at vascular levels. The phenomena of angeitis of hypersensitivity in the present cases were only identified by the presence of hemorrhage. Bacillary phagocytosis by polymorphonuclear leukocytes is a dominant rule. The presence of free bacilli in the lumen of vessels confirms the presence of bacillemia during the lepromatous leprosy reaction.—(*Adapted from conclusions*)

✓ **Sen, K. N., Mital, H. S., Gupta, S. C., Mishra, D. N. and Singh, Ranbir.** Electrophoretic pattern of serum proteins in leprosy. *J. Assoc. Physicians India* **22** (1974) 381-384.

The following conclusions were drawn from the present study of electrophoretic pattern of serum proteins in 120 patients having leprosy, which included 30 cases of tuberculoid (Group A), 20 of dimorphous (Group B), 50 of lepromatous type (Group C), and 20 of lepra reaction (Group D).

1. A progressive rise in total serum proteins and total globulins was observed from group A to D.

2. Albumin fraction was decreased in all types of leprosy, except the tuberculoid variety.

3. Alpha-2 and beta globulins were increased in all types of leprosy whereas alpha-1 and gamma fractions were elevated in all except the tuberculoid variety. The latter (Group A) had nearly normal values of alpha-1 and gamma globulins.

4. Group D (reactional lepromatous) showed the highest values of total proteins, beta, gamma and total globulins.

Leprosy is one of the common tropical diseases, resulting in dysproteinemia with alteration of serum albumin and globulin fractions. Various workers have undertaken the study of electrophoresis of serum proteins in different types of leprosy. Their results are at variance. Most workers are in agreement about hyperproteinemia and hypergammabulinemia in lepromatous leprosy. These changes become more marked during the phase of reaction. Tuberculoid leprosy shows little change, if any. The present study was undertaken to analyze the electrophoretic pattern of serum proteins in different types of leprosy.—(*Adapted from authors' summary*)

✓ **Shionuma, Einosuke and Sakurai, Hoosaku.**

Histopathologic studies of Gasserian ganglia in leprosy with special reference to leprosy bacilli in other organs. *Lepro* **43** (1974) 288-283. (In Japanese)

Histopathologic studies of the semilunar (Gasserian) ganglia were conducted on a series of 25 cases of leprosy (5 with tuberculoid and 20 with the lepromatous type.) The tissue specimens examined were bilateral in every case, and detailed microscopic examinations were made in 14 cases; the results leading to the following conclusions:

1. Proliferation of the interstitial connective tissue was evident in the ganglia with focal round cell infiltration in both tuberculoid and lepromatous cases.

2. In lepromatous patients the nerve cells were noted as showing vacuolar degeneration as well as atrophy or enlargement with deformity, necrosis, or loss of nuclei. Such alterations of nerve cells were scarcely demonstrable in tuberculoid cases.

3. Leprosy bacilli were consistently demonstrable within the ganglion cells in the majority of lepromatous cases, whereas in tuberculoid cases such a finding was almost nonexistent.

4. Axonal hypertrophy and swelling or destruction of nerve fibers were noted with a fair degree of frequency in both types of the disease.

5. Various organs and tissues other than Gasserian ganglia were also examined microscopically to compare the prevalence of leprosy bacilli. These viscera included the liver, spleen, adrenals and testes as well as the skin and peripheral nerves. No bacilli were found in any of the organs examined in the five tuberculoid cases. The organisms were demonstrated in the ganglion cells in practically all 12 cases of lepromatous type showing no significant absorption of cutaneous lesions of nodular infiltration. Leprosy bacilli were also found in other viscera in many of these cases. Of the remaining eight cases of this type, with complete absorption of leprosy infiltration and nodules in the skin, four were noted to have no evidence of leprosy bacilli in any of the viscera examined while the organisms were still demonstrable in both the peripheral nerves and ganglion cells of two other cases.—(*Adapted from English summary*)

✓ **Yamada, Mizuho and Fujimoto, Fumio.** Lymphocyte transformation by Mitsuda's antigen and PHA. *Jap. J. Dermatol.* **84** (1974) 293-295. (In Japanese)

The differences in lymphocyte transformation in response to Mitsuda's antigen and PHA in four leprosy patients and six controls were studied.

The cultured lymphocytes utilized were derived from the peripheral blood of leprosy patients consisting of two lepromatous and two borderline lepromatous cases, and controls consisting of one alopecia areata, two latent syphilis, one Kimura's disease, and two normals.

The transformations by Mitsuda's antigen were not detected in the leprosy cases, whereas among the controls 1% to 3% of the cells transformed except in Kimura's disease. The transformation by PHA was also as low as 12% to 21% in the leprosy cases.—(Translated and adapted from Japanese)

✓ **Yasuhira, Kimio.** Pathology of leprosy in comparison with tuberculosis. *Bull. Chest Dis. Res. Inst. Kyoto Univ.* **7** (1974) 117-125. (In Japanese)

The analogy of leprosy and tuberculosis has been indicated bacteriologically, histopathologically and immunologically. The intention of this presentation is to indicate the immunopathologic analogy of these two diseases. Our achievement with tuberculosis has been the analysis of the components of *Mycobacterium tuberculosis* and the biologic activities of these components in order to understand the mechanism of tuberculosis by experimental pathologic methods. Consequently the author attempts to present the pathology of leprosy in comparison with that of tuberculosis.

This article also includes subtitles of classification of leprosy, sarcoidosis and Kveim reaction, skin reaction against *M. tuberculosis* wax D, the formation of tubercle and components of mycobacterium, types of experimental tuberculosis and its immunopathologic background, and the pathology of leprosy and its immunology. [This was a special lecture presented at the 21st anniversary of the Japanese Leprosy Association West Provincial Convention.]—(Translated from Japanese summary)

Microbiology

✓ **Ambrose, E. J., Antia, N. H. and Khanolkar, S. R.** Uptake of radioactive DOPA by *M. leprae*. *Nature* **249** (1974) 854-855.

Biopsy specimens from untreated patients with bacilliferous leprosy were homogenized and drops of the suspension added to a smear of warm agar on coverslips and incubated for various periods up to 48 hours in the presence of 5 $\mu\text{Ci ml}^{-1}$ of ^3H -DOPA. An autoradiograph shows bacilli labeled with radioactive DOPA. Granular bacilli were unlabeled. With the use of scintillation counting, preliminary experiments measuring uptake of ^3H -thymidine by *M. leprae* by this method have also led to promising results, which the authors conclude may indicate the rate of multiplication of *M. leprae*.—C. S. Goodwin (*From Trop. Dis. Bull.*)

✓ **Ishaque, M. and Kato, Laszlo.** Occurrence of *c*-type cytochrome in *Mycobacterium lepraemurium*. *Can. J. Biochem.* **52** (1974) 991-996.

The existence of *c*-type cytochrome in *M. lepraemurium* was examined. The dithionite-treated cell-free extracts exhibited absorption peaks of cytochromes *a+a₃* and *b*, whereas the alpha band of *c*-type cytochrome at 552 nm was obscured by the large absorption peak of cytochrome *b* at 560 nm. The addition of NADH, NADPH, or succinate to cell-free extracts caused the reduction of *b*- and *c*-type cytochromes to nearly the same extent and thus the difference spectra displayed distinct separate peaks of *b*- and *c*-type cytochromes at 562 and 552 nm, respectively. The cell-free extracts treated with ascorbate showed absorption bands of cytochrome types *c* and *a+a₃*, whereas the addition of succinate to a system preinhibited by antimycin A revealed the absorption bands of cytochrome *b* only. The absorption spectrum of the pyridine hemochromogens of *M. lepraemurium* was similar to that of mammalian cytochrome *c*. The results clearly indicated that, in addition

to cytochromes of the $a + a_3$ and b type, c -type cytochrome is also present in *M. lepraemurium*.—Authors' Abstract

✓ **Matsuo, Yoshiyasu.** Effect of sodium hydroxide and trypsin on the viability of *M. leprae*. Hiroshima J. Med. Sci. **23** (1974) 19-23.

The effect of sodium hydroxide and tryp-

sin on the viability of *M. leprae* was investigated by means of the mouse foot pad technic. The viability of *M. leprae* was not affected by exposing them to 0.05% trypsin solution for 60 minutes at 37°C but was considerably reduced with 0.5% solution. Effect of sodium hydroxide was moderate for 30 minutes at 37°C but significant at 60 minutes.—(Adapted from author's summary)

Experimental Infections

✓ **Closs, Otto and Haugen, Olav A.** Experimental murine leprosy. 3. Early local reaction to *Mycobacterium lepraemurium* in C3H and C57/BL mice. Acta Pathol. Microbiol. Scand. [A] **83** (1975) 51-58.

M. lepraemurium was injected subcutaneously into two inbred strains of mice, C3H and C57/BL, in order to study the local reaction at various time intervals. Within six hours an acute inflammatory reaction developed at the site of injection. In the course of the following days it was replaced by a mononuclear infiltrate. The influx of mononuclear cells appeared to be somewhat greater in C57/BL than in C3H mice. Apart from this, little difference was observed between the two strains until at four weeks when a vigorous granulomatous reaction developed in the C57/BL strain. This reaction apparently arrested further local spread of the infection. The histological appearance of the infiltrate indicated that a delayed hypersensitivity reaction was taking place. No signs of such reaction were observed in the C3H strain.—Authors' Summary

A limited spread of the infection occurred early in both strains, but apparently multiplication of the microorganisms was very restricted in C57/BL mice; progressive, disseminated growth of the bacilli was observed in the C3H strain only. In C57/BL mice the granulomatous reaction, developing four weeks after inoculation and leading to abscess formation, ulceration and scar formation, apparently inhibited both local multiplication and further spread of the bacilli. In C3H mice no host reaction was detected and the bacilli appeared to grow unrestrictedly. In some C57/BL animals, decrease in host resistance occurred during the infection, causing reactivation of the local lesion and an apparently rapid proliferation of bacilli. Observations regarding the lesions in superinfected animals indicated that a systemic immune reaction develops in the C57/BL strain about four weeks after inoculation, whereas this does not occur in the C3H strain.—Authors' Summary

✓ **Closs, Otto and Haugen, Olav A.** Experimental murine leprosy. 4. The gross appearance and microscopic features of the local infiltrate after subcutaneous inoculation of C3H and C57/BL mice with *Mycobacterium lepraemurium*. Acta Pathol. Microbiol. Scand. [A] **83** (1975) 59-68.

Mice of the inbred strains C57/BL and C3H were inoculated subcutaneously on the thorax with *M. lepraemurium*. In C57/BL mice a firm, raised, sharply defined nodular infiltrate developed four weeks afterwards; while in the C3H strain the infection produced a soft, flattened infiltrate with ill-defined margins, which did not become palpable until ten weeks after inoculation.

✓ **Desikan, K. V.** Fate of *M. leprae* inoculated into foot pads of mice. Lepr. India **47** (1975) 9-14.

During the first three months after inoculation of mice with *M. leprae* harvest of the foot pads did not reveal any bacilli. The fate of bacilli during this period is not understood. A study has been conducted to assess the bacillary population in the foot pads during this period. It has been found that the number of bacilli drops to less than half the original number in 24 hours. After 72 hours, only 20% of the bacilli are recoverable. At the end of eight weeks, harvests from the foot pads are practically negative for acid-fast bacilli. The possible causes of this steep drop are discussed.—Author's Summary

✓ **Kwapinski, J. B. G. and Kwapinski, E. H.** Pathobiologic relationships between *M. leprae* and its primitive host. *Bull. WHO* 50 (1974) 473-474.

Newborn snakes were injected with 10^2 to 10^4 live or heated *M. leprae*. Death occurred in five to six weeks. On autopsy, the snakes injected with live microorganisms showed pathologic changes, and numerous acid-fast bacteria were found in some organs. Material was also transferred from an experimentally infected snake to a group of normal newborn snakes, causing their death in three weeks. Extracts in phosphate buffered saline, prepared from the tissues of infected snakes, were found to react with anti-*M. leprae* and anti-*M. lepraemurium* rabbit antisera. No immunodiffusion reactions were elicited by extracts from the organs of control snakes.—Authors' Summary (*From Trop. Dis. Bull.*)

✓ **Matsuo, Yoshiyasu.** Morphological changes of *M. leprae* grown in mouse foot pads. *Hiroshima J. Med. Sci.* 23 (1974) 25-31.

Morphological changes of *M. leprae* grown in the mouse foot pads were studied during the logarithmic phase of multiplication. The sources of *M. leprae* were patients with lepromatous leprosy and infected with mouse foot pads. Increases in the number of bacteria were not necessarily accompanied by simultaneous increases in proportion of the organisms of solidly staining forms. Some of the organisms of nonsolid forms stained red deeply. No elongation in the length of organisms was observed in the mouse foot pad system, and, on the contrary, there was a marked decrease in the length when clinical materials were inoculated.—Author's Summary

✓ **Munoz Rivas, G.** Micobacteriáceas ambientales en armadillos colombianos. [Environmental mycobacteria in armadillos in Colombia.] *Rev. Invest. Salud Publica* 33 (1973) 61-66. (In Spanish, English summary)

Mycobacteria were cultivated from the mesenteric glands of 30 of 35 dissected healthy armadillos (*Dasypus novemcinctus* and *D. sabanicola*). These animals carried ticks (*Amblyomma cayennense*) and, out of six lots of those studied, five presented a positive mycobacterial culture. Artificially

inoculated armadillos were also studied: three were inoculated with leproma material from hamsters which had been injected with *M. leprae*, three with murine leprosy, and four with human leprosy. In one of those inoculated by mouth with murine leprosy the mesenteric glands became enlarged with the presence of acid alcohol fast bacteria which, when inoculated in mice, produced murine leprosy. Three of those inoculated with human leprosy were positive and one negative.

Armadillos feed on coleopteran larvae, earthworms and acari mixed with soil and they remain in, and drink, stagnant water containing algae. Saprophytic mycobacteria could be isolated from almost all these foods. Environmental mycobacteria can occur together with *M. leprae* and *M. lepraemurium*.—E. Agius (*Adapted from Trop. Dis. Bull.*)

✓ **Narayanan, E., Shankara Manja, K., Bedi, B. M. S., Kirchheimer, W. F. and Balasubrahmanyam, M.** Experimental transmission of leprosy to animals: A preliminary note on attempts to transmit leprosy to the Indian pangolin (*Manis crassicaudata* Geoffroy). *Lepr. India* 46 (1974) 135-139.

The need to investigate the Indian animals susceptible to leprosy is mentioned and brief descriptions of pangolins in general and the Indian pangolin, in particular, are given. Methods of handling, data on temperature, and measurements of the pangolin are given. Methods used for inoculating the pangolin with the leprosy bacilli are briefly described and the need to continue the experiments with more animals is discussed.—Authors' Abstract

✓ **Ogawa, Tatsuji.** Studies on murine leprosy bacillus. X. Studies on an atypical mycobacteria isolated from experimental murine leprosy mice. *Kitasato Arch. Exp. Med.* 47 (1974) 37-46.

Between September 1968 and October 1971, 11 isolated strains (1.8%) of 612 specimens by selective culture from spleen, liver, lungs, kidneys, and local sites of mice infected with the Hawaiian strain of murine leprosy bacillus were found to be atypical mycobacteria.

Similarly, between May 1971 and April 1973, three isolated strains of 306 specimens from mice infected with Keishicho strain of

murine leprosy bacillus were determined to be atypical mycobacteria.

Seven of 11 strains isolated from the Hawaiian strain-infected mice were tested for susceptibility to antituberculosis drugs. All showed a decreased susceptibility to these drugs. In addition, ddN strain mice were inoculated intravenously with 0.1 mg of the respective strains. Autopsies were performed three times during the subsequent one to six month period following injection and changes in number of organisms infecting the spleen and lungs observed. Within three months of injection, four of the strains had completely disappeared while the remaining three were present even at six months post-infection.—(Adapted from author's summary)

✓ **Ogawa, Tatsuji, and Hiraki, Minako.** Studies on murine leprosy bacillus. XI. The effects of simultaneous inoculation into mice of murine leprosy bacillus and atypical mycobacteria on growth of the organisms. *Kitasato Arch. of Exp. Med.* **47** (1974) 47-52.

One tenth mg doses of the following mixed inocula were administered intravenously to three groups of ten mice each: Group I, injection of Hawaiian strain alone; Group II, injection of atypical mycobacteria alone; Group III, simultaneous injection of Hawaiian strain and atypical mycobacteria. Four times during the 3 to 7.5 months post-injection two to four mice from each group were sacrificed and the organs examined for gross pathologic lesions. Spleen, liver, lungs, and kidneys were subjected to isolation culture for Hawaiian strain (Group I), for atypical mycobacteria (Group II), and for both (Group III). The effect of the atypical mycobacteria on the Hawaiian strain was investigated by comparing Groups I and III. Similarly, the effect of the Hawaiian strain on the atypical mycobacteria was determined by comparison of the culture results obtained from Groups II and III. As a result, it was found that the atypical mycobacteria tend to exert an inhibitory effect on the growth of the Hawaiian strain in spleen and liver, but no clear effects were observable in lungs and kidneys. On the other hand, the Hawaiian strain initially stimulated growth of the atypical mycobacteria in the spleen. With time, however, inhibition became ap-

parent. There were no definite trends observed in the liver, lungs and kidneys.—
Authors' Summary

✓ **Ogawa, Tatsuji, and Hiraki, Minako.** Studies on murine leprosy bacillus. XII. Reproduction of the disease in mice using small doses of the 13th subculture of the supposed Hawaiian strain of *M. lepraemurium*. *Lepro* **43** (1974) 241-249. (In Japanese)

As reported previously, an attempt to produce the disease in mice with the supposed Hawaiian strain was repeated four times with each test giving positive results. In the present study, with the aim of determining the minimum infecting dose, a similar animal experiment was performed with the use of much smaller doses of bacilli.

The animals, ddN strain, were injected with three different doses of the 13th subculture (10^{-4} , 10^{-5} and 10^{-6} mg of bacilli) either subcutaneously or intravenously, and killed at intervals between 7 to 11.5 months after inoculation. The macroscopic appearance of the organs was noted. Smears of spleen, liver, lungs, kidneys, superficial lymph nodes and local lesions were stained by Ziehl-Neelsen's method and rated for the number of acid-fast bacilli as well as for number of globi. In some instances histopathologic examination was also performed. All specimens removed were submitted to cultural recovery.

The experiment showed that the injection of the bacillus in each dose, whether subcutaneously or intravenously administered, produced the disease which was characterized by such positive findings as macroscopic and microscopic involvement, increase in acid-fast bacilli, appearance of globi, and recovery on tissue culture. The characteristics of the re-isolated bacilli were almost the same as those of the bacilli injected originally.

It must be conceded that reproduction of the disease was successful even with the smallest dose (10^{-6} mg) of bacilli. The infection progressed slowly and the extent of disease was more pronounced in animals inoculated intravenously than in those subcutaneously inoculated. Finally, a word must be said about the decontaminating agent. In this study 4% sodium hydroxide was used, for the first time, for treating some of the

specimens. The result indicates that this stronger decontamination method is also available for the isolation of murine leprosy bacilli from pathologic materials.—(Adapted from English summary)

✓ **Saito, Hajime and Matsuo, Yoshiyasu.** Characterization of *Mycobacterium lepraemurium* cultured in NC-5 medium. Hiroshima J. Med. Sci. **23** (1974) 77-81.

It appears that in the NC-5 medium, which was created by Nakamura, the growth of *M. lepraemurium* is certainly advanced, but as far as our studies are concerned the growth of *M. lepraemurium* is not sufficient. The *M. lepraemurium* cultured in the medium seems to be different from the established mycobacterium species with regard to the properties of the cultured cells. However, further studies should be performed on this point.—Authors' Summary

✓ **Tsvetkova, G. M., Yushchenko, A. A. and Mokheisen, A. M.** The pathomorphology

of the skin and viscera of mice in experimental infection with *M. leprae*, the CDVI strains. Vestn. Dermatol. Venerol. **8** (1974) 35-38. (In Russian, English summary)

The pathomorphology of the skin and viscera of mice inoculated with different strains of *M. leprae* obtained and cultivated at the leprology department of the Central Dermato-Venerology Institute (CDVI) was studied. When mice were inoculated into the right inguinal area (five series of tests), in all cases (100%) there was specific inflammation of the soft tissues at the inoculation site with great amounts of *M. leprae* in leprous infiltrates. Leprous granulomas with leprous cells were also found in regional lymph nodes as well as in the livers of mice containing *M. leprae*. Morphologic examinations confirm the fact of an experimental leprosy model having been obtained which is suitable for practical purposes.—English Summary

Epidemiology and Prevention

✓ **Andersen, J. G.** A three-year leprosy control program in Tamil Nadu (India). Dan. Med. Bull. **21** (1974) 256. (Letter)

This refers to the article appearing in Dan. Med. Bull. **20** (1973) 198-203, by Malchow-Møller (see abstr. in IJL **42** [1974] 357) entitled "A Three-Year Leprosy Control Program in Tamil Nadu (India)."

As one of the instigators of the MED-STUDEDEC projects it has been interesting and gratifying to read this article, showing that this rather unorthodox attempt at channeling medical students into active work and research in the problems of the developing world, has indeed not been quite such a hopeless venture as some people suggested at its inception.

I would like to comment on the disability recording as used in the project under report.

The WHO classification of physical disabilities in leprosy was introduced in order to permit a simple, quick and reliable method of recording physical disabilities by auxiliary staff. It may be used in a more detailed form, using a larger number of code

numbers, but this has little practical value, since such a system presupposes an active cooperation of highly qualified staff, who are usually far too busy with more urgent problems to pay attention to this detail. Essentially it is intended to show the gradual worsening of the disability grading under proper care.

In its simple form each of the major areas of physical disabilities is allocated a number, ranging from 0 to 3. Specifically for the extremities the numbers from 0 to 3 indicate that "presenting anesthesia" is the main factor in the further development of disabilities. For the hands and feet it is impossible for a number to revert to a lower reading, unless successful surgical intervention has been done. Successful treatment of ophthalmological complications frequently leads to a reevaluation of disability grading.

The total disability grading is presented as a six digit number, showing the status quo of the patient. Normally the figures are given in the order: right eye, left eye, right hand, left hand, right foot, left foot. E.g., 102313 would indicate the following situation: right

eye suffers from corneal/conjunctival anesthesia, left eye is normal, right hand suffers from mobile clawing of fingers and/or mobile thumb paralysis (median paralysis), left hand suffers from gross absorption of digits of paralysis with contractures or radial paralysis, right foot suffers from plantar anesthesia with no ulceration, left foot suffers from gross shortening or skeletal disfigurement.

It should be clearly understood that this six digit number cannot be added or averaged into a single figure, indicating the disability of the patient as such. E.g., a man with total blindness of both eyes would in such case be recorded as having the same disability grading as a man with uncomplicated anesthesia of eyes, both hands and both feet. This is obviously ridiculous.

It would be very interesting to hear if colleagues in our sister disciplines, plastic surgery, orthopedic surgery, hand surgery, physical medicine, neurology, etc., could find any use for this system, and how they would react to it.—(Adapted from author's letter)

Reply: I am very grateful for the comments made by Dr. Andersen. When using a disability index (DI) for leprosy patients, it is important to distinguish between control programs comprising thousands of patients and other projects with smaller groups of patients, e.g., patients selected for corrective surgery. As also mentioned by Dr. Andersen, the DI applied in a control program must be simple so that the assessments can easily be performed by the auxiliary staff. More detailed information can be determined when necessary, for instance in examinations of patients who have undergone special treatment (surgery, physiotherapy).

Since it is not the intention in a mass campaign or a control program to give a detailed description of each individual case, I find it justified to give the DI as an average value for the disabilities recorded in a patient and also to determine the "average disability-score value" for all disabled patients. This is of course not a satisfactory or relevant description of the individual patient, but it can provide an overall picture of the intensity of disabilities, and it is also a fairly good parameter to allow comparisons of the severity of disabilities in groups of leprosy patients in different areas of the same country—or in different countries.—A. Malchow-Møller

✓ **Chaudhury, D. S., Naik, K. G. and Chaudhury, M.** Borderline leprosy in Zambia. *Med. J. Zambia* 9 (1975) 78-84.

The relatively high prevalence of borderline leprosy in Zambia has been noted. Different subtypes have been detailed and the basic histopathologic features elucidated. The biologic defense mechanism of tissue resistance (cell-mediated immunity) in the borderline type is partial, unstable and equivocal. The different varieties of reactions in the borderline type and the need for effective treatment and follow-up are emphasized.—Authors' Summary

✓ **Nebout, Max.** Bilan de huit ans d'autotraitement des lépreux du secteur n°3 de Moundou (Tchad). [Results of eight years of self-treatment by leprosy patients from the third sector, Moundou (Tchad).] *Bull. Soc. Pathol. Exot.* 67 (1974) 484-494. (In French, English summary)

The author sums up eight years of self-treatment for leprosy patients in sector number 3 of the endemic disease department in the three prefectures situated in the south of Tchad Republic (total population 700,000).

The initiation of self-treatment in 1965 for 17,000 leprosy patients in sector 3 by way of motorized tours twice a year, gave satisfactory results and proved to be a very valuable method of treatment and controlling leprosy in countries where sanitary conditions are poor.

Due to research and the hospitalization of contagious patients which was systematically carried out, a noticeable decrease of the disease was apparent. Total contamination index (ICT 0/0) went from 3.1 in 1965 down to 0.83 in 1972. New morbidity index (IMN 0/0) went from 0.14 in 1965 down to 0.011 which is altogether a rather satisfactory result: these are among the best indices obtained in the world in the control of leprosy.—(Adapted from English summary)

✓ **Pennec, J.** Le traitement actuel de la lèpre au pavillon de Malte de l'hôpital Saint-Louis. [Current treatment of leprosy in the Malta Pavilion of the Hospital Saint-Louis.] *Ann. Med. Interne (Paris)* 125 (1974) 561-564. (In French)

Indigenous cases of leprosy continue to decrease in France; 13 new patients during the period 1923 to 1932, and only 5 be-

tween 1963 and 1972. However, the total number of new leprosy patients seen at Saint-Louis Hospital keeps increasing: 26 in 1964, 44 in 1969, 51 in 1971, and 54 in 1973. The majority of these patients are immigrants from endemic areas of leprosy and the majority reside in metropolitan Paris. These brief but important epidemiologic data are followed by an extensive discussion of the chemotherapy of leprosy and reactional states. Sulfones are used routinely, and where possible high maintenance doses are recommended. Lamprene, rifampicin and sulfonamides are employed in appropriate patients. Diphenylthiourea (CIBA 1906) has been withdrawn from the French market. There are no references.—W. M. Meyers

✓ **Rose, Harold D.** Leprosy in Vietnam returnees. *JAMA* **230** (1974) 1388. (Letter to Editor)

The first case of leprosy contracted by a US serviceman while on active duty in Vietnam was recently reported by F. E. Medford (*IJL* **42** [1974] 491). He stated that the AFIP was aware of another case, but no details were available. Those details are briefly presented herein.

"A 26-year-old man was seen at the VA Hospital in Wood, Wis., in December 1971, complaining of an eruption on the right upper arm, forearm, and left lumbar area, of one year's duration. There was an associated numbness and lack of sensation in these areas.

The patient was a native of Wisconsin. He had served in the armed forces from June 1966 to June 1968, and spent 12 months in Vietnam. He stated that he had been in close contact with the Vietnamese.

Pertinent physical findings were limited to the skin lesions and extremities. On the ulnar side of the right arm, there were two circinate areas measuring 4 × 7 cm in diameter. A similar 3 × 3 cm area was present in the ulnar aspect of the right forearm. Over the left flank there was a 4 × 7 cm oblong lesion. All of the skin lesions had an erythematous perimeter and were insensitive to touch, heat, and cold. The right ulnar nerve was palpably enlarged. Biopsy specimens were taken from each site in December 1971. Biopsy of the lesion on the right arm did not require the use of local anesthesia.

All biopsy specimens were reviewed by the AFIP and the diagnosis of tuberculoid leprosy was confirmed. The patient was referred to his private physician who contacted the leprosarium in Carville, La. and made arrangements for appropriate therapy."

The available evidence indicates that this patient also contracted tuberculoid leprosy while on active duty in Vietnam. The disease may appear as long as ten years after individuals leave the endemic area.—(From *JAMA*)

✓ **Widmer, Elmer A.** The epidemiology of leprosy with emphasis on a proposed zoonosis model for its transmission. *Med. Arts Sci.* **28** (1974) 31-39.

The bacillus *M. leprae* is generally accepted as the causative agent for leprosy. Two clinical types of leprosy are recognized—lepromatous and tuberculoid.

As far as is known, the only source of human infection is a human being disseminating viable bacilli from his tissues, for no extra-human reservoir has yet been found. Recent work with biting arthropods suggests another portal of entry.

The epidemiologic and experimental evidence for a zoonosis model was investigated, but essentially no scientific evidence was found to support this type of a model. A multicausal model seems preferable at this time.—Author's Summary

✓ **World Health Statist. Rep.** **27** (1974) 750-752. Leprosy.

Monthly and annual figures for the numbers of cases of leprosy reported to WHO in 1973 and 1974 are given for more than 60 countries. Those for 1974, and in some instances for 1973, are incomplete. In Africa, the highest figures for 1973 were reported by Chad (1,298 cases), Mali (2,798), and Senegal (1,705). In Central America, Cuba reported 266 cases and Surinam 151 cases. In Asia, the highest 1973 totals were in Sri Lanka (749), Philippines (615), and West Malaysia (318). In Europe, the Netherlands reported 50 cases, Portugal, 35, Spain 26, and France 14. Other European countries reported a few cases; there is no report from the U.K. The US reported 135 cases in 1973.—F. I. C. Apter (From *Trop. Dis. Bull.*)

Rehabilitation

Wennen, E. C. M. Ignorance or common sense? Findings related to yaws and leprosy mass treatment programs in Nigeria. *Int. J. Health Educ.* 17 (1974) 208-216.

Impressed by failure of a section of the rural population to take advantage of facilities available for treatment of yaws and leprosy, the author presented a questionnaire to 104 students, aged about 18 years (average) in their last two years at a village training college. In addition, the students were asked to make suggestions about improving the health of the local village people. The replies received are carefully analyzed and commented on. Due recognition is given to the fact that these students were not a representative sample of village opinion but clearly there is considerable value in their replies. In the case of yaws, treatment was

thought to be harmful, or at least ineffective by the majority. With regard to leprosy two questions were asked: a) what do people think about leprosy treatment, and b) why do some patients avoid attending for treatment. Forty-six percent said that leprosy treatment was thought to be ineffective, and the majority ascribed reasons for nonattendance to shame or fear. For the improvement of village health, 219 proposals were received, mostly relating to health education and improvement in sanitation, personal hygiene and nutrition.

[This modest paper deserves to be read in the original by all who are interested in the problem of communication with people whose cultural background seems to obstruct medical care.]—D. M. Mackay (*From Trop. Dis. Bull.*)

Other Mycobacterial Diseases and Related Entities

Adams, Dolph O. The structure of mononuclear phagocytes differentiating *in vivo*. The effect of *Mycobacterium tuberculosis*. *Am J. Pathol.* 80 (1975) 101-113.

The development and resolution of granulomas induced by *Mycobacterium tuberculosis* were sequentially traced by correlated light and electron microscopy. The scattered, immature monocytes initially composing the lesions evolved by orderly steps into coalescent, well developed macrophages and ultimately into swirling nests of highly complex epithelioid cells. These ultrastructural changes represent differentiation *in vivo* of the mononuclear phagocytes. The number of mycobacteria present then waned markedly, and the epithelioid granulomas developed into foreign body granulomas and finally into simple chronic inflammation. Concomitantly, the epithelioid cells evolved into macrophages and ultimately into immature, monocyte-like forms. These observations suggest that the development of a granuloma represents differentiation *in vivo* of the constituent mononuclear phagocytes in response to an evoking stimulus. From comparisons with previous studies, mononuclear differentiation *in vivo* appears to have a fixed pattern and a markedly alterable pace. The observations also suggest a

previously undescribed fate for mononuclear phagocytes in developing granulomas. As the granuloma-evoking agent is destroyed, the highly differentiated mononuclear phagocytes change into less mature forms.—Author's Summary

Navalkar, R. G. and Warwick, R. P. Effect of variation in growth temperature on the biochemical activity and antigens of *Mycobacterium marinum*. *Zentralbl. Bakt. Microbiol.* [Orig. A] 226 (1974) 97-104.

M. marinum, a low temperature-requiring organism, showed alterations in enzyme synthesis and decrease in the number of antigenic constituents when it was subjected to growth at a higher temperature. This appeared to be a phenotypic rather than genotypic alteration as confirmed by reversal studies.

It is suggested that the changes noticed may be purely incidental with no possible significance in host-parasite interaction, although it is likely that they may have some bearing on the infection process.—Authors' Abstract

Reggiardo, Zulema and Middlebrook, Gardner. Serologically active glycolipid families from *Mycobacterium bovis* BCG. 1.

Extraction, purification and immunologic studies. *Am. J. Epidemiol.* **100** (1974) 469-476.

Glycolipids were extracted from mycobacteria with methanol and chloroform and purified by silicic acid chromatography. These glycolipids were studied for their serologic activity by direct and indirect (Coomb's) passive hemagglutination, and by inhibition methods. Three families of serologically active glycolipids called A, B and C, plus cardiolipin, were isolated. The B and C families of glycolipids were reactive with sera from BCG immunized rabbits and also with sera from patients with tuberculosis and leprosy; the A family was reactive only with the human sera. None of the serologically active glycolipids was able to protect rabbits against tuberculosis.—Authors' Abstract

Reggiardo, Zulema and Middlebrook, Gardner. Serologically active glycolipid families from *Mycobacterium bovis* BCG. 2. Serologic studies on human sera. *Am. J. Epidemiol.* **100** (1974) 477-486.

Serologic tests with serologically active

glycolipids from *Mycobacterium bovis* BCG were investigated for their possible use in the diagnosis of mycobacterioses. The results were positive with 95% of sera from patients with far advanced and moderately advanced tuberculosis, 80% of sera from patients with newly diagnosed tuberculosis, and 75% of patients with atypical mycobacterial diseases. "False" positive serologic reactions were obtained from 4% or less. Furthermore, 39% of sera from recent tuberculin converters were positive compared with only 9% of sera from unselected PPD positive individuals.—Authors' Abstract

Schiefer, B., Gee, B. R. and Ward, G. E. A disease resembling feline leprosy in Western Canada. *J. Am. Vet. Med. Assoc.* **165** (1974) 1085-1087.

Acid-fast bacteria in large numbers were found in cutaneous granulomas of seven cats from the provinces of British Columbia and Alberta, Canada. Attempts to culture the agents failed. The lesions resembled feline leprosy, as previously described in New Zealand, Australia and Britain.—Authors' Summary