

CURRENT LITERATURE

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Clinical Sciences

Andersen, Johs G. Below knee amputation. *Lepr. Rev.* 47 (1976) 51-55.

In the management of severely damaged feet in leprosy patients amputations still play an important role. Probabilities are high that they will continue to do so for many years to come. Most leprosy patients who need that kind of surgery come under the care of medical officers with little or no training in sophisticated orthopedic surgery. Unfortunately the traditional techniques for below knee amputation are fairly difficult to perform adequately. A less than perfect result makes it difficult to fit a prosthesis. The high risk of complications with traditional techniques, and the scarcity of prosthetic services, constitute a real need for a simple operation with a high percentage of good results.

Recently a new method has been advocated. It aims at simplifying the surgical technic, at avoiding the grave risk of ischemic necrosis of the anterior skin flap over the cut end of the tibia, and at rendering a more suitable stump for a patellar tendon weight bearing prosthesis. The author has used this technic consistently for several years. The results have been extremely encouraging. It is suggested that its adoption as a routine method would benefit the surgeon, the prosthetist, and the patients alike. —Author's Abstract

Antia, N. H., Vankani, B. and Pandya, N. J. Surgical decompression of the ulnar nerve in leprosy neuritis. *Lepr. India* 48 (1976) 362-370.

1. The main cause of deformities in leprosy is due to the involvement of the peripheral nerves. Hence, any attempt to favorably arrest or alter the progress of nerve damage must be studied carefully.

2. Combined extraneural and intraneural decompression without jeopardizing the vas-

cular supply in the early cases gave satisfactory results in 41 ulnar nerve decompressions undertaken in this study.

3. Sensory as well as motor recovery was obtained. However, sensory recovery was more significant in all, and also in each patient with motor recovery.

4. The recovery was better in patients seeking treatment within six months of the onset of the symptoms.

5. The patients with the tuberculoid type responded better to the nerve release.

6. A funicular biopsy is a feasible and practical method not only to confirm the diagnosis but also to histologically classify the disease and provides a guide to the type of damage to the nerve.—Authors' Conclusions

Carayon, A. Gamme lésionnelle des névrites hanséiennes. (État actuel des acquisitions récentes et des orientations thérapeutiques.) [The pathological range of neuritis in leprosy. (A survey of recent advances and of trends in treatment.)] *Med Trop.* 36 (1976) 41-61. (In French)

The author reviews the recent contributions made by clinicians, histopathologists and immunologists to the elucidation of the various patterns of nerve damage in leprosy, and attempts to correlate the different findings with the pathologic features of various types of leprosy. He asserts that biopsy specimens taken from mixed nerve trunks, especially at sites of maximal damage, would show changes in structure (and hence, in function) much more obviously related to the type of leprosy, its stage of advancement and its state of clinical activity, than a biopsy taken from a small superficial sensory nerve.

The concordance in the cases of tuberculoid and borderline leprosy is now generally accepted, but further investigation is needed in the case of multi-bacillary forms of leprosy.

rosy, and the neuritides occurring in *erythema nodosum leprosum* and secondary autoimmune phenomena. He makes the point that, in the acute forms of neuritis, intrafascicular edema and multiple small vascular lesions may predominate and these are frequently reversible with anti-inflammatory treatment or surgical decompression.

His studies emphasize the role of mechanical constriction of nerves in fibrotendinous or fibro-osseous canals and the damage that results from unrelieved constriction and traumatic elongation of the nerve trunks in this situation. In conclusion, he pleads for further unprejudiced observation of early and reversible impairment of peripheral nerve function, so that the incubus of permanent nerve damage may be relieved.—S. G. Browne (*From Trop. Dis. Bull.*)

Discamps, G., Languillon, J. and Saint-Andre, P. La biopsie ganglionnaire dans le diagnostic de la forme de lèpre. [The biopsy of lymph nodes in the diagnosis of various types of leprosy.] *Med. Trop.* **36** (1976) 62–68. (In French)

This biopsy study of supratrochlear and other lymph nodes (numbers unspecified) in relation to the immunologic spectrum of leprosy follows closely the study of Turk and Waters (*Trop. Dis. Bull.* **68** [1971] abstr. 2270). The immunologic spectrum is reflected in the histology of the lymph nodes, which in turn parallels to a considerable extent the histology of the skin lesions. The examination of lymph nodes is recommended as a useful adjunct for the diagnosis and classification of leprosy.

Lymph nodes from patients of the lepromatous type who had received a nonspecific immunologic stimulus (*Neisseria perflava* or BCG) showed hyperplasia of the follicular centers and, apparently, a dissolution of the acid-fast bacilli in some cases. In others there were signs of a tuberculoid transformation with well-differentiated epithelioid cells and an occasional Langhans giant cell. [This original observation ought to be substantiated in a more detailed and factual account.] —D. S. Ridley (*From Trop. Dis. Bull.*)

El-Shemy, S., El-Hefnawi, H., Abdel-Fattah, A., El-Okbi, M. and Farid, A. Testicular and epididymal involvement in leprosy patients, with special reference to gynecoma-

mastia. *Int. J. Dermatol.* **15** (1976) 52–58.

Sixty-six male patients with leprosy were studied. Only those with the lepromatous type developed testicular and epididymal changes. Nine of the 38 patients showed decreased sexual function, and 7 developed gynecomastia. These changes were believed to be due to the altered gonadal state.—Authors' Abstract

Ellis, B. P. B. and Thomas, J. E. P. First lesion sites in leprosy. *Cent. Afr. J. Med.* **22** (1976) 96–97.

The series comprised 1,523 patients: 828 were tuberculoid, 135 dimorphous, and 560 lepromatous. The distribution of first skin lesions is shown on a chart. It will be seen that 35.3% of lesions would be hidden by clothing if the patient was not stripped for the examination.

Of the 1,523 patients, 484 (31.1%) claimed first symptoms other than, or appearing before, skin lesions. These are summarized in the chart below.

First Symptoms Other Than Skin Lesions

	Hands/Arms %	Feet/Legs %
Paresthesia	38.4	19.3
Blisters	17.9	7.2
Anesthesia	4.8	1.5
Ulcers	4.7	6.2
Total	65.8	34.2

—(*Excerpted from authors' article*)

Fritsch, E., Hamilton, J. and James, J. H. Repair of the dorsal apparatus of the finger. *Hand* **8** (1976) 22–31.

This paper describes a simple method of assessing the constituent features of flexion deformities of the proximal interphalangeal joints in Hansen's disease, and a simple operation to correct the anterior displacement of the lateral band and the associated contractures.—Authors' Summary

Griffiths, W. A. D. and Dutz, W. Repeated tissue sampling with a dental broach. A trial in cutaneous leishmaniasis. *Br. J. Dermatol.* **93** (1975) 43–45.

A simple and almost painless technic for repeated sampling of dermal infiltrates with

a dendritic broach was used in the diagnosis of cutaneous leishmaniasis. This technic can be used to advantage to obtain organisms and cells underneath crusted lesions and to evaluate not only the number of organisms but also the cell pattern at different depths of the lesion. It can be used repeatedly on the same lesions without appreciably disturbing the natural progress of the disease and is therefore well suited to monitor the *in vivo* effects of therapeutic agents on organisms. Its use in 21 cases of cutaneous leishmaniasis and one case of cutaneous leprosy is described.—Authors' Summary

Hoppe, J. E. and Stuttgen, G. Der Stellenwert von Hauttesten mit Gewebeextrakten insbesondere bei Lepra und Sarkoidose. [The diagnostic value of skin tests with tissue extracts, especially in leprosy and sarcoidosis.] *Immun. Infekt.* 3 (1975) 36-47. (In German)

The immunologic aspects of leprosy (India, Germany) and sarcoidosis are presented under consideration of cutaneous reaction to lepromin and Kveim extracts. Patients with leprosy, ENL, sarcoidosis and different dermatoses have been tested with lepromin, Kveim antigen and tuberculin. The specificity of the results has been discussed. Patients with tuberculoid leprosy did not react on Kveim test, but patients with sarcoidosis can give positive reaction on lepromin. Patients with ENL without clinical signs of sarcoidosis are Kveim negative, and a positive lepromin test is an exception.

The positive Kveim test is bound to a histologic examination. The positive lepromin test in nonleprosy endemic countries should be interpreted also by histologic examination. Granulomatous dermatoses can show positive lepromin tests, but the histologic picture is different from the lepromin reaction in tuberculoid leprosy. The positive reactions on tissue extracts are not combined with positive immunofluorescent results. Intracutaneous injection of leprosy bacilli in lepromin extract can be presented days to weeks after intracutaneous application in biopsies.—Authors' English Summary

Ishihara, Shigenori. A case report on leproma in the tongue. *Lepro* 44 (1975) 199-201. (In Japanese)

A male patient aged 75 had complained of paresthesia on both soles about ten years ago. He noticed nodules on earlobes bilaterally, and swelling of the face in 1970. He had not been registered as a leprosy case but had been treated for heart disease until October 1973.

At that time he was diagnosed as having lepromatous leprosy and was admitted to the National Suruga Leprosarium. The patient had remarkable lepromatous lesions in the oral cavity, uvula, soft and hard palate and tongue, together with skin lesions.

One of the lepromas of the tongue, 3 mm × 4 mm in size, was surgically removed and studied histopathologically. The mucous membrane was thinner than usual without rete pegs. Submucous tissues were occupied by masses of leprosy infiltration, without "free zone." The leprosy infiltration invaded the muscle tissue of the tongue. Numerous acid-fast bacilli were detected in the leproma.

While being treated for over one year with DDS, the lepromas of the tongue disappeared clinically and the sense of taste was also gradually recovered.—(Adapted from author's English summary)

Maillard, G. F. and Chamay, A. The surgical treatment of lagophthalmos in leprosy patients. *Chirurg. Plastica* 3 (1975) 113-123.

Lagophthalmos threatens the leprosy patient's eye with keratitis and subsequent blindness. This major surgical problem can be approached in several ways. Various techniques are presented. These include static operations (lateral tarsorrhaphy, medial tarsorrhaphy and canthoplasty, blepharoplasty of Kuhnt-Szymanowski) as well as dynamic operations (such as Gillies' temporalis transfer, with its modifications, and the palpebral encirclement with silicone thread of Arion).—Authors' Summary

Mendes, E., Levy, L. H., and Ulhoa Cintra, A. B. Kveim test in patients suspected of sarcoidosis and in leprosy patients in a geographic area not yet investigated. *Allergol. Immunopathol.* 4 (1976) 45-50.

The Kveim test was studied in a geographic area (Sao Paulo, Brazil) which had not yet been investigated; leprosy patients were also tested. A total of 147 patients from a general hospital who had had the possibility of sar-

coidosis, as a differential diagnosis, were tested with a Kveim suspension. Another group of 13 patients with clinical and histologic diagnosis of leprosy (10 with tuberculoid leprosy lepromin positive, and 3 with indeterminate leprosy) was also tested with Kveim suspension.

Sixteen Kveim tests (10%) with sarcoid granulomatous reaction revealed histologically were considered positive. Three patients with sarcoidosis for more than three years gave negative Kveim test. Four patients with positive Kveim test had lymphosarcoma, Crohn's disease, lung fibrosis and concurrent tuberculosis infection, respectively. Nine positive Kveim tests (5.6%) were coincident with sarcoidosis. Thirteen leprosy patients (10 tuberculoid) gave negative Kveim tests.—Authors' Summary

Pandya, S. S. The blink reflex in leprosy. *Neurol. India* **23** (1975) 129-134.

In leprosy no predictable clinico-electrical correlations have emerged either in the tuberculoid or lepromatous patients, and normal reflexes have been obtained even from palpably infiltrated nerves. This reduces the sensitivity and value of this method (recording of the blink reflex) as a means for electrophysiologic evaluation of the trigeminal nerve in leprosy. In the present study an attempt is made to assess the trigeminal nerve in patients with different types of leprosy using an indirect method employing the blink reflex.—(Excerpted from author's article)

Rendall, J. R. and McDougall, A. C. Reddening of the upper central incisors associated with periapical granuloma in lepromatous leprosy. *Br. J. Oral Surg.* **13** (1976) 271-277.

Four years after starting treatment for lepromatous leprosy in England a male Pakistani aged 26 was found to have red discoloration of the upper central incisor teeth. A radiograph suggested periapical abscess on the right with haziness in a corresponding area on the left. Right apicectomy was performed with removal of a solid mass attached to the apex, sections revealing a lepromatous infiltrate with acid-fast fragments of *Mycobacterium leprae* in the cytoplasm of foamy macrophages. Clinical and archeological evidence for the frequent involvement of

these teeth in lepromatous leprosy is reviewed. The upper incisor area is relatively cool, a factor which may be of critical importance for the lodgement and multiplication of this bacillus, as it is in other body sites in lepromatous leprosy.—Authors' Summary

Samuel, I., Samuel, D. R. and Godal, T. Hepatitis associated antigen (HAA) in leprosy. *Ethiop. Med. J.* **12** (1974) 175-178.

A total of 140 leprosy patients selected from the outpatient department of ALERT, Addis Ababa, were tested for hepatitis-associated antigen (HAA) in their blood. Eleven or 8% of these patients were positive for HAA. The prevalence of HAA in leprosy patients was not significantly higher than in the normal population. Our studies did not show any increase in the prevalence of HAA in lepromatous cases as compared to tuberculoid cases.—Authors' Summary

Sehgal, V. N. The significance of the local sweat response in assessing the progress of leprosy. *Br. J. Dermatol.* **94** (1976) 615-618.

Serial observations on cutaneous sensation and on sweat response in hypopigmented flat patches of 29 patients with tuberculoid and 5 with dimorphous leprosy on dapsone therapy were studied over two years. Sensation was determined by routine methods, while sweat stimulation was done by intradermal injection of 0.1 ml (0.025 mg) of carbachol (carbaminoylecholine). There was significant improvement in sensation and considerable augmentation of sweat response in the final as compared to the initial tests. The difference in sweat response was statistically significant, suggesting the value of this simple procedure in assessing the progress of leprosy.—Author's Summary

Sena, P. G. Aspectos neurológicos e eletromiográficos da Hanseníase. [Neurological and electromyographic aspects of leprosy. Study of 100 cases.] *Arq. Neuropsiquiatr.* **34** (1976) 1-17. (In Portuguese)

By the neurological, electromyographic, anatomo-pathological and bacterioscopic examinations of 100 patients with leprosy the following conclusions have been drawn.

There was a high incidence of reflex ab-

normalities. The proprioceptive reflexes were abnormal in 64.5% and the superficial reflexes in 70.8% of the cases. According to the topography of the segments examined, the deep reflexes showed the following abnormal values: 25.3% in the cephalic segment, 69.1% in the upper limbs, and 74.5% in the lower limbs. Of the 2,289 reflexes investigated, abnormalities were found in 773 superficial reflexes (70.8%), while in relation to the proprioceptive reflexes the figures rose to 901 (64.5%). In the early stages of the infirmity, the reflexes were normal in 41.2% of the cases examined, and in all stages of evolution of the disease those numbers were always high. Also in the first stage, whose average duration was of 4.9 years, several alternations were noted, although there was a predominance of brisk reflexes (25.1%) over diminished reflexes (17%), followed by hyperactive (8.6%) and absent reflexes (8%). In the final stage of the infirmity there was a decrease of normal reflexes in contrast to absent and decreased reflexes, whose rates increased to 32.7% and 30.6%, respectively. The disappearance of hyperactive reflexes and the clear decrease of brisk reflexes should also be noted.

There was a high percentage of patients (31%) who suffered aggression of the eighth nerve, 17 of which (54.8%) were found to suffer from neural deafness. The values related to hearing deficit were rarely in accordance with the histopathologic and bacteriologic positive results. The indexes of abnormalities found out in the examination of the fifth and of the seventh nerve (7% and 5% respectively) were much lower in relation to the eighth nerve. These results are in contradiction with the ones stated in the literature.

In some of the patients, hyperesthesia of the skin of the plantar region prognosticated the appearance of the infirmity. Among the objective changes, anesthesia of superficial sensibilities combined with deep hyperesthesia and anesthesia of superficial sensibilities with abolition of profound sensibilities were rarely observed. No case was found with exclusive alterations of deep sensibilities.

Peripheral motor neuron lesions demonstrable by electromyography were observed in 82 patients (82%). The electric silence and the giant polyphasic potentials were the most frequently noted abnormalities. In a small number of cases pseudomyotonic al-

terations were registered. Among the patients with indicative signs of recent denervation, 50% presented negative bacteriologic results. There was predominance of electromyographic abnormalities in the Virchowian forms. In relation to the nerves investigated, there was greater injury of the ulnar, by comparison with the median and the deep peroneal nerves. The study of the average speed of conduction of motor fibers in the median, ulnar, and deep peroneal nerves gave the following results: 53.6, 48.1, and 50.3 meters per second, respectively. The averages of the distal and proximal latencies of the median nerve were 3.8 and 8.4 m/sec; in the ulnar nerve, 3.0 and 9.2 m/sec; in the deep peroneal nerve, 4.4 and 11.6 m/sec.—*Author's English Summary*

Shwe, T., Thein, M. and Mint, S. Prevalence of pulmonary tuberculosis in patients with leprosy. *Burma Med. J.* **21** (1975) 39-44.

The authors quote figures showing the high incidence of pulmonary tuberculosis among leprosy patients being treated in leprosaria in various parts of the world, figures which suggest that persons suffering from leprosy have an increased susceptibility to tuberculosis. This investigation, designed to establish if there is any justification for such a hypothesis, was confined to leprosy outpatients attending clinics at Rangoon General Hospital, and 603 patients aged between 20 and 40 years were studied (301 tuberculoid and 302 lepromatous). Seven patients with radiological evidence of pulmonary tuberculosis were found in the tuberculoid group (2.3%), and eight in the lepromatous group (2.6%), figures which compare favorably with those from Burma as a whole among adults of similar age-grouping (2.6-3.6%). Two important conclusions can be drawn from this study: firstly, that figures giving the incidence of pulmonary tuberculosis among inpatients in leprosaria bear no relation to the situation in that particular region or the country as a whole; secondly, that patients suffering from the lepromatous type of leprosy are no more susceptible to tuberculosis than are those suffering from the tuberculoid type.—*W. H. Jopling (From Trop. Dis. Bull.)*

Takizawa, H., Adachi, S., Matsumoto, K. and Kakitani, T. Follow-up study of the

patients with Hansen's disease in Kyoto Prefecture. *Lepro* 44 (1975) 193-198. (In Japanese)

Fifty-five of 64 outpatients with Hansen's disease in Kyoto Prefecture could be followed up (eleven cases were dead, two cases were readmitted to leprosaria). Their ages ranged from 28 to 88 years (mean 54.3).

About 61% were over 50 years old.

Eight of 30 lepromatous or borderline cases (26.7%) experienced relapse. The period of time from bacterial negativity to relapse was 3 to 13 years. Some patient problems and control problems of Hansen's disease in Japan are discussed briefly.—(*Adapted from authors' English summary*)

Chemotherapy

Havel, A. and Rosenfeld, M. Die Bedeutung von 4,4-Diamino-Diphenylsulphon in Kombination mit Isoniazid und Rifampicin *in vitro*. [*In vitro* study of the effects of 4,4-diaminodiphenylsulfone in combination with isoniazid and rifampicin.] *Prax. Pneumol.* 29 (1975) 459-465. (In German)

In the course of a study to develop an efficacious antimycobacterial drug combination for the simultaneous treatment of leprosy and tuberculosis, 125 combinations of isoniazid, rifampicin and 4,4-diaminodiphenylsulfone (DDS) in varying concentrations were tested *in vitro* for their antimycobacterial activity. Eighty-three combinations produced complete inhibition of growth. In 29 of these DDS was indispensable for completely suppressing growth of a bacterial population of 3.3×10^6 , i.e., the combination of the two drugs, isoniazid-cum-rifampicin, did not succeed in fully inhibiting the inoculum. DDS alone, even in concentrations of 16 mcg/ml had no, or hardly any, effects *in vitro* on *M. tuberculosis*. The findings show that the properties of an *in vitro* tested agent may differ according to whether it is tested by itself or in combination with other agents.—Authors' English Summary

Levy, Louis. Bactericidal action of dapsone against *Mycobacterium leprae* in mice. *Antimicrob. Agents Chemother.* 9 (1976) 614-617.

Dapsone incorporated into the mouse chow in a concentration of 0.1 g/100 g of diet, was administered for one week to mice in which *M. leprae* had multiplied to the level of 10^6 organisms/foot pad. *M. leprae* were harvested from these and also from control mice, diluted serially and inoculated into additional mice. The organisms recovered from untreated mice multiplied in passage with a

mean doubling time of 12.2 days, and 35% or more of the inoculated organisms were viable, i.e., capable of infecting mice. Growth curves of *M. leprae* recovered from dapsone treated animals lagged behind those of organisms from control animals by an average of 78 days, equivalent to 98.8% killing. Foot-by-foot harvests showed that only 0.2% of the *M. leprae* recovered from treated mice were viable, suggesting that treatment of mice with dapsone had been accompanied by killing of 99.4% of the viable *M. leprae*.—Author's Summary

Martinez, D. and Zaias, N. Levamisole as adjunct to dapsone in leprosy. *Lancet* ii (1976) 209-210. (Correspondence)

Patients with nodular lepromatous or nodular dimorphic leprosy took part in this trial. Lesions were graded from four (nodule) to zero (totally flat macule). All 12 patients who completed the trial were clinical grade 4+ at the start. All were receiving dapsone or ace-dapsone. Six of the twelve received, in addition, levamisole 150 mg every two weeks, and six received a placebo pill. After six months, the six patients who had been on levamisole had lesions graded 1+ or 0. Of the six who were taking the placebo, four had 3+ lesions, and two had 0, similar to the results to be expected from dapsone alone. The prevalence of reactions was studied in six patients, all with 4+ reactions before the trial. In the three on levamisole plus dapsone there was a gradual decrease of intensity to zero or \pm over the six months, whereas the three on placebo plus dapsone continued to have reactions (3+ or 4+). When levamisole was withdrawn at the end of six months one patient's reactions increased again.—F. I. C. Apted (*Adapted from Trop. Dis. Bull.*)

Shepard, C. C., Ellard, G. A., Levy, L., Opro-molla, D. V. A., Pattyn, S. R., Peters, J. H., Rees, R. J. W. and Waters, M. F. R. Experimental chemotherapy in leprosy. Bull. WHO 53 (1976) 425-433.

The Memorandum reviews the considerable progress that has been made in research on the chemotherapy of leprosy during the last 10-15 years, as a result of which it is now possible to study the same topics in leprosy as are studied in other bacterial diseases. Thus, drugs have been screened in mice for

their activity against *Mycobacterium leprae*. Those that have been found to have the greatest activity against *M. leprae* at acceptable dosages—dapsone, rifampicin, and clofazimine—have been characterized in terms of the minimal effective dosage and rate of bacterial kill. Similarly, their pharmacokinetics in man and in certain animals have been defined. The theoretical basis for drug trials in leprosy patients is discussed in terms of the number of viable and the number of dead *M. leprae* that remain at various stages of therapy.—Authors' Abstract

Immuno-Pathology

Abe, M., Izumi, S., Saito, T. and Mathur, S. K. Early serodiagnosis of leprosy by indirect immunofluorescence. Lepr. India 48 (1976) 272-276.

A method of fluorescent leprosy antibody absorption (FLA-ABS) test is described. This test is so sensitive that 81.8% of tuberculoid leprosy cases gave positive reaction even in early stage of the disease. More than 50% of indeterminate and contact cases were also positive in this test. The positive percentages as well as antibody titers increased with the clinical spectrum of leprosy, from TT to LL, the latter being the highest. Using absorbed and diluted serum from a known lepromatous patient, enumeration of *M. leprae* in skin smears showed a good coincidence with the Bacterial Index expressed by the Ridley scale. Therefore, the FLA-ABS test will be useful for early serodiagnosis of leprosy not only by the detection of antibodies but also by the identification of *M. leprae*.

Serum from the immunologic spectrum of leprosy is diluted 1:10 in phosphate buffered saline (PBS) containing 0.2 mg/ml each of cardiolipin, lecithin and purified polysaccharide from *M. tuberculosis* to remove cross-reacting antibodies. Further dilutions of the adsorbed serum to 1:40, 160, 640, etc., were made in PBS containing 0.2 mg/ml each of cardiolipin and lecithin, and 1 mg/ml of bovine albumin.

Centrifuge-separated *M. leprae* in saline (100-150 million/ml) in the amount of one platinum loopful of suspension is spread within a one centimeter diameter circle on a glass slide. This is air dried, rinsed in CCl_4 for 10

minutes at room temperature and then digested with 0.1% trypsin in Tris-HCl buffer, pH 8.0 at 37°C for one hour. Rinse for 15 minutes in PBS (pH 7.4).

A drop of diluted serum is spread over the bacterial smear and the slide incubated in a moist chamber at 37°C for one hour, then rinsed in PBS. Antihuman gamma globulin rabbit antibody, conjugated with fluorescein isothiocyanate (FITC), is diluted to 1:40 in PBS and a drop of this antibody preparation is spread over the bacterial smear. The slide is again incubated in a moist chamber at 37°C for one hour or at 4°C overnight. After rinsing in PBS the smear is then dried and mounted in carbonate buffered glycerol (pH 9.5).

The intensity of fluorescence at $\times 600$ utilizing a BV filter system is recorded as \pm to 4+ as compared to a reference serum attached to a fluorescent treponemal antibody absorption reagent. Fluorescence of 2+ or more of isolated bacilli as caused by 1:40 or higher serum dilution is accepted as positive. The antibody titer is expressed by x in 10×4^x , the maximum dilution of serum giving a positive reaction.—(Adapted and expanded from authors' summary)

Agarwal, D. P., Srivastava, L. M. and Goedde, H. W. Status of humoral immunity in various genetic and nongenetic diseases. Hoppe Zeylers Z. Physiol. Chem. 356 (1975) 217.

The leprosy sera and healthy control sera were collected from several villages in Ethiopia. Higher levels of IgA, IgM and IgG

were found in lepromatous leprosy compared to healthy controls, whereas in tuberculoid leprosy only IgM and IgG were increased. Borderline cases showed an increase in IgG concentration only. In an effort to establish the role played by genetic and nongenetic factors, immunoglobulin profiles in selected families where one or more members were suffering from leprosy are being studied, and different aspects of these results will be discussed.—(Adapted from authors' abstract)

Balakrishnan, S. Biochemical aspects of reactional states in leprosy. *Lepr. India* **48** (1976) 406-412.

Sequential biochemical investigations conducted in cases of lepromatous leprosy in the reactive as well as subsided phases indicated elevated serum levels of mucoproteins and sialic acids and skin levels of hydroxyproline and hexosamine in the reactive phase of lepromatous leprosy. Elevation of the urinary excretion of hydroxyproline and certain other amino acids was also noticed during lepra reaction. Enhancement of serum levels of aldolase, creatine-phospho-kinase, lactic dehydrogenase and transaminases was observed in the reactive phase of lepromatous leprosy. These findings taken as a whole suggest a generalized tissue breakdown in lepra reaction.—Author's Summary

Barnetson, R. StC., Barnetson, A., Pearson, J. M. H. and Kronvall, G. Does nonspecific T lymphocyte stimulation of B lymphocytes occur during reversal reaction in borderline leprosy? *Scand. J. Immunol.* **5** (1976) 287-291.

Serum immunoglobulins G, A, and M were estimated in 14 patients with borderline cases of leprosy at commencement of treatment and subsequently when they developed "reversal reaction." There was a significant increase in all immunoglobulin levels during the reaction, with a subsequent fall; the post-reaction values for IgG and IgA were below the base line figures. Additional investigations in six patients indicated that the rise was a nonspecific one, not brought about by an increase in antimycobacterial antibodies. It seems likely that the rise in immunoglobulins during reaction is due to nonspecific T lymphocyte stimulation of B lymphocytes.—Authors' Abstract

Barnetson, R. StC., Bjune, G. and Duncan, M. E. Evidence for a soluble lymphocyte factor in the transplacental transmission of T lymphocyte responses to *Mycobacterium leprae*. *Nature* **260** (1976) 150-151.

This study provides evidence that when mothers are sensitized to *M. leprae* this sensitization is transmitted to the fetus. The sensitization seems to be specific, as there was no significant difference between the responses of the two neonatal groups when BCG or PPD were used as antigens.

For transmission of this sensitization, there are three main possibilities. The first is transplacental passage of antigen. In our study, this seems unlikely as the mothers showed no signs of leprosy, or other mycobacterial disease. The second possibility is transplacental passage of maternal lymphocytes. It is still debatable whether maternal lymphocytes enter the fetal circulation, so if they do cross the placenta it must be in very small numbers. In view of the high neonatal LTT responses, recruitment of neonatal lymphocytes by maternal lymphocytes would again seem improbable. Third, there could be transplacental passage of a soluble lymphocyte factor. It seems most likely that such a factor was responsible for the fetal lymphocyte sensitization we have demonstrated. The nature of this lymphocyte factor remains unclear.—(Excerpted from text)

Bedi, B. M. S., Harris, E. B., Narayanan, E. and Kirchheimer, W. F. Delayed hypersensitivity tests with *Mycobacterium leprae* purified protein derivative. *Lepr. India* **48** (1976) 8-18.

Skin tests were conducted on 3 lepromatous, 3 dimorphous, and 6 tuberculoid leprosy patients, and 3 others not suffering from leprosy, with lepromin, purified protein derivative from *M. leprae* of armadillo origin and tuberculin. Results show that a delayed hypersensitivity reaction could be produced with PPD in 72 hours on all Mitsuda positive cases, with one anomalous exception, without cross reaction to tuberculin. The results were promising from the point of view of substituting lepromin with PPD in usual tests.—Authors' Summary

Boddingius, J. Ultrastructural changes in blood vessels of peripheral nerves in lep-

rosy neuropathy. *Acta Neuropathol. (Berl.)* 35 (1976) 159-181.

Radial or superficial peroneal nerve biopsies of six patients with tuberculoid or borderline-tuberculoid leprosy and six control nerve biopsies were examined by electron microscopy.

Endoneurial blood vessels showed histopathology in all the leprosy patients. Changes, in particular, involved the basement membrane in postcapillary venules and venules. Multilayered parallel basement membranes, with collagen and ground substance, formed a thick coat ("hyaline zone") around the vessels. It is suggested that the zone inhibits passage of nutrients and metabolites and thus contributes to, or is the main cause, of the local destruction of (unmyelinated) nerve fibers and the lack of nerve fiber regeneration observed in this type of leprosy. The perivascular zone, presumably, is produced by pericytes in response to defects in the "blood-nerve barrier" of endoneurial vessels. In granulomata of leprosy skin lesions, a perivascular zone was not present.

The endothelium of endoneurial vessels, in affected nerves, generally was normal. Occasionally, however, gaps and fenestrations were seen and there were histological indications that leakage of blood plasma had occurred through the gaps and through the basement membrane of the endothelium.

Occlusion of endoneurial vessels was found only in the oldest patient and the degeneration of nerve fibers generally observed thus is considered not to be caused by ischemia.

Histopathology in epi- and perineurial vessels was definitely less pronounced than in endoneurial vessels.—Author's Summary

Bopp, C., Bernardi, C. and Bakos, L. Variedade históide de hanseníase lepromatosa. [Histoid variety of lepromatous leprosy.] *Med. Cut. I.L.A.* 3 (1975) 29-36. (In Portuguese)

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 studied the subject, our opinion is that further studies should be done in order to elucidate the controversial points.—Authors' English Summary

Brochard, C., Languillon, J., Saimot, G., Geniteau, M., Coulaud, J. P. and Payet, M. Intérêt de la recherche des cryoglobulines dans la lèpre. [Value of the detection of cryoglobulins in leprosy.] *Med. Trop.* 36 (1976) 69-79. (In French)

The authors investigated the presence of cryoglobulins in a series of 274 patients in Senegal. The proportion of patients with cryoglobulins in their sera varied from 65% in those with lepromatous leprosy to 15% in those with the tuberculoid form. In three of seven patients with borderline lepromatous leprosy, cryoglobulins were present, but in none out of seven with borderline tuberculoid leprosy. In patients with multibacillary forms of leprosy passing through an episode of *erythema nodosum leprosum*, cryoglobulinemia reached 84%.

A useful indication of the potential polarity of indeterminate forms of leprosy was provided by the investigation of the presence of cryoglobulin. In the majority of patients in whom the globulin was found, the eventual evolution towards a multibacillary form of leprosy was in accord with the initial finding.

The authors also investigated the titers of complement present in the sera, utilizing macrophage receptors and ¹²⁵I tagged C1q; the results will be published shortly.—S. G. Browne (*Adapted from Trop. Dis. Bull.*)

Chen, T. S. N., Drutz, D. J. and Whelan, G. E. Hepatic granulomas in leprosy. Their relation to bacteremia. *Arch. Pathol. Lab. Med.* 100 (1976) 182-185.

A clinicopathologic study of liver disease was conducted on 28 patients with leprosy who lived in Taiwan. None of the patients exhibited symptoms or signs of liver disease. Hepatic granulomas were found in 21 patients. Histologically, the infiltrates were epithelioid, foam cell, and histiocytic in type. Hepatic dysfunction was absent, except for mild sulfobromophthalein elevations in the severely infected cases. Hepatic granulomas correlated with the cutaneous reactions in lepromatous leprosy, but the association was

poor for other stages of disease. Hepatic involvement varied with the severity of cutaneous infection and with the frequency and intensity of bacteremia. An estimated 1,000 to 10,000 acid-fast bacilli/ml of blood was required to generate the hepatic infiltrates.—Authors' Abstract

Convit, J., Pinardi, M. E., Avila, J. L. and Aranzazu, N. Specificity of the 48-hour reaction to Mitsuda antigen. Use of a soluble antigen from human and armadillo lepromin. *Bull. WHO* 52 (1975) 187-191.

Two antigens were tested and compared in relation to the 48-hour Fernandez reaction. They were obtained from standard human and from standard armadillo lepromin. All the tests were negative in patients with lepromatous leprosy and highly positive in those with tuberculoid leprosy and in lepromin-positive contacts. There was total agreement in all tests done with the two types of antigen. The antigenic component has the following basic properties: it precipitates with 80% saturated ammonium sulfate; it is not destroyed by autoclaving or by treatment with 0.4% phenol; it is nondialysable; and it is destroyed by treatment with trypsin.—Authors' Summary

Carayon, A., Languillon, J., Giraudeau, P., Camain, R. and Maydat, L. Névrites micro-angiopathiques d'origine auto-immune probable après migrations inverses dans la zone borderline du spectre de la lèpre. [Micro-angiopathic neuritides, probably of auto-immune origin and following immunologic changes in the borderline zone of the leprosy spectrum.] *Med. Trop.* 36 (1976) 16-33. (In French)

The authors break important new ground in these studies of the multi-factorial etiology of nerve damage in leprosy. Clinical observations, histopathologic examination of tissue removed at biopsy, direct inspection of nerves exposed at operation, and evaluation of medical and surgical decompression of constricted nerves lead them to suggest that an important factor in nerve damage in leprosy lies in the occurrence of multiple minute vascular lesions. These are attributed essentially to changes in the immunologic status of the patient and, particularly, to a down-grading following a reversal reaction.

The resulting vasoconstriction leads to localized edema in the nerve. The breakdown of the myelin in the nerve sheaths releases products that provoke auto-immune reactions on the one hand and a Guillain-Barré type of allergic neuritis on the other.

Anti-inflammatory treatment by systemic corticosteroids associated with specific leprostatics (like clofazimine) is advocated, with surgical decompression where indicated.

[It is hoped that the authors will supplement these studies with the demonstration of the immune complexes, antigens and antibodies that their elegant suggestions require.]—S. G. Browne (*From Trop. Dis. Bull.*)

Contelier, L. Observations on bone changes in a case of leprosy. *Ann. Soc. Belg. Med. Trop.* 55 (1975) 359-371. (In French)

After having recalled the first observations which showed three types of morphological changes in leprosy bones; destructions without repairing reconstruction, new elaborations without former destruction, and complex situations including both bone destruction and reconstruction, the authors describe the conditions for change which intervene in certain diaphyseal deformations caused by peripheral erosion and endosteal reconstruction. They evaluate the quality and rapidity of elaboration of new bone deposits and put forward the hypothesis of a direct correlation between the destructions and the reconstructions under the influences of biomechanical constraints. The role of the vascular constituent is reviewed.—Author's English Summary

Dastur, Darab K. The nervous system in leprosy. In: *Scientific Approaches to Clinical Neurology*, eds., the late Shy, G. M. and colleagues, New York: Lea & Febiger, 1976, in press.

Pathologic studies on large and cutaneous nerves in the limbs have revealed the difference in the reactions and modes of damage to nerves in tuberculoid and lepromatous processes. In the former type of disease the nerve is infiltrated and disorganized by a typical tuberculoid exudate which can totally destroy the parenchyma and produce irregular fibrous scarring. In the lepromatous nerves the profuse infection of the Schwann

cells results in "metabolic" damage to the myelin, with slow degeneration of the axon and fibrosis; intra- and interfunicular inflammation is generally less. The intraneural progression of the infection seems to stop short where the Schwann cells cease to exist, at the level of the posterior root ganglion, the capsule cells of its large sensory neurons appearing to be the most proximal outpost of *M. leprae*. This parasitization of Schwann cells by *M. leprae* appears unique in neurology, and lepromatous leprosy emerges as a classical disorder of the Schwann cell. The axon damage is severe and often commensurate with that of myelin in tuberculoid nerves, but less severe than myelin loss in nerves of lepromatous cases. Axonal type of degeneration appears to occur in tuberculoid leprosy almost invariably and in lepromatous leprosy frequently, segmental demyelination being infrequent. Swelling, thickening and tenderness of large and small nerves result from these histopathologic changes and constitute an important diagnostic sign in leprosy.—(Excerpted from author's summary)

Diaz Almeida, J. G., Torres, G. and Abreu, A. Deficiencia de glucosa 6-fosfato-dehidrogenasa en el enfermo de lepra. Informe preliminar. [Glucose 6-phosphate dehydrogenase deficiency in leprosy. A preliminary report.] Rev. Cub. Med. **14** (1975) 687-691. (In Spanish)

For the first time in Cuba a preliminary study on glucose 6-phosphate dehydrogenase (G6PD) deficiency using a modification of the Beutler's method (Kapa's system) in patients from a Havana leprosarium is made for determining the relation between G6PD deficiency and a lower defensive capacity of the organism against *M. leprae*. An enzyme deficiency only in patients with the lepromatous form and in those with backgrounds of repeated acute reactions was found.—(From Trop. Dis. Bull.)

Dyer, Robert and Enna, Carl D. Ultrastructure of keloid: an unusual incident involving lepromatous leprosy. Int. J. Dermatol. **14** (1975) 743-754.

A patient with lepromatous leprosy developed keloids on the dorsum of both arms in response to ulcerations due to acute *erythe-*

ma nodosum leprosum reactions. Electron microscopic examination of the keloidal dermis showed a morphology indicative of increased production of normal collagen fibrils. The greatest cellular changes from normal were in fibroblasts which were enlarged due to increased amounts of rough endoplasmic reticulum and extensive Golgi complexes. Nuclear folds were also evident in these fibroblasts. Some cells, considered to be fibroblasts, were filled with cytoplasmic filaments and contained bizarre shaped nuclei. Mast cells, blood vessels and nerve processes were also present.—Authors' Abstract

Estrada-Parra, S., Perez-Mosqueira, N., Gomez-Vidal, M. and Rojas-Espinosa, O. A serological profile in leprosy. Rev. Lat. Am. Microbiol. **17** (1975) 211-212.

Serological profiles were studied in 54 patients with different types of leprosy and the data compared with those obtained from 30 healthy individuals. The results indicate that the patients' group have increased levels of total proteins, alpha 2 and gamma globulins. All IgG, IgA and IgM immunoglobulins were elevated. The higher values for these serum components were found in the group of patients with nodular lepromatous leprosy. However, C4 seemed to be in lower concentration within the patients' group. Patients with ENL showed higher incidence of soluble immune complexes. Twenty percent of the patients were positive for the C-reactive protein test. Most of the patients (80%) were under treatment at the time of the study.—Authors' Abstract

Kondo, Eiko and Kanai, Koomi. A suggested role of a host-parasite lipid complex in mycobacterial infection. Jap. J. Med. Sci. Biol. **29** (1976) 199-210.

On the basis of our previous observations and related literatures, we assumed that cholesterol esters of host origin and phthiocerol dimycocerosate of bacterial origin are located as a lipid mixture around the periphery of pathogenic mycobacteria growing *in vivo*, probably within the phagocytic vacuole of macrophages.

To examine the role of such a postulated lipid complex in mycobacterial infection, a model experiment was made in which tubercle bacilli grown *in vitro* were "coated" with

both lipids and then suspended homogeneously in water to serve as an inoculum to infect mice intravenously. Their fate in mouse tissue was compared with that of untreated control bacilli.

The results indicated that the lipid-"coating" had an infection-promoting effect as revealed by the longer persistence of the treated avirulent bacilli at higher levels of viable counts.

When virulent tubercle bacilli were "coated" with lipid mixture, they became less sensitive to the protective mechanism of BCG-immunized mice.—Authors' Summary

Kondo, Eiko and Kanai, Koomi. Accumulation of cholesterol esters in macrophages incubated with mycobacteria *in vitro*. Jap. J. Med. Sci. Biol. **29** (1976) 123-137.

Macrophages separated from the granulomatous lungs of tuberculous mice had a high amount of cholesterol esters. Resident peritoneal macrophages of normal mice were very low in the ester content. However, when the cells were incubated with mycobacteria in Hanks' solution, the ester content of the mixture increased greatly.

Peritoneal macrophages harvested by induction with casein had a much larger amount of cholesterol esters than unstimulated resident cells. When such stimulated macrophages were incubated alone in Hanks' solution, the ester content went down probably due to hydrolysis into free form. This reduction was markedly inhibited by incubation with mycobacteria.

These observations at a macrophage level presented a cytological explanation for our previous findings that cholesterol ester content increased in the mouse lungs with the development of granulomatous lesions.—Authors' Summary

Miguez Alonso, Avelino. Estados reacionais da lepra. [Reactional states of leprosy.] Med. Cut. I.L.A. **3** (1975) 199-208. (In Portuguese)

Reactional leprosy is studied according to its clinical forms.

A. Lepromatous: a) Acute lepromatization: encroaching and invasive nature; the patients become more and more lepromatous; bad prognosis. b) *Erythema nodosum*: "contusiform dermatitis"; variable prognosis

not as bad as in the preceding case; allergic nature and its evolution is usually detained and therapeutics are efficient. c) Erythema multiform. d) Lucio's phenomenon: vascular lesions and consequently necrosis as a complication of the "erythema necroticans" (beautiful leprosy).

B. Tuberculoid: Reactional tuberculoid is the only one in this benign type, the Mitsuda test must always be positive and prognosis consequently is good.

C. Dimorphous or Borderline whose Mitsuda test is mostly negative, sometimes positive, but not stable. The lesions may stimulate the tuberculoid leprids but they invade mucous membranes, are impregnated by pigmentation, may present Unna's band, and other characteristics of the lepromatous type. Are associated with fever, asthenia and emaciation. Prognosis is not very good because of the possibility of lepromatization, according to its tendency. Evolution slower and frequent relapses. There are also nodular lesions.—(Adapted from English summary)

Miranda, R. N. Confirmation *in vitro* of *Mycobacterium leprae* phagocytosis by polymorphonuclears. Pub. Cent. Estud. Leprol. **15** (1975) 70-72.

The phagocytosis of *M. leprae* by polymorphonuclear leucocytes of the sick person himself—during the acute exacerbation of lepromatous leprosy—is a finding that reveals a real activity of the lepromatous human organism in order to fight against and to destroy the leprosy bacillus. Its *in vitro* reproduction by means of both a sick person's white blood cells and by a normal person's white blood cells, which were recently obtained in our laboratories, can open a large field of research.—(Adapted from author's summary)

Padma, M. N., Premanath, M. and Desikan, K. V. Bacillemia in reactive states of leprosy. Lepr. India **48** (1976) 413-418.

Thirty-five cases of lepromatous and near-lepromatous leprosy in reaction have been investigated for the presence of acid-fast bacilli in the blood at the height of the reaction as well as at its subsidence. Only three cases exhibited bacillemia during reaction. It is, therefore, unlikely that dissemination of the disease is accentuated during reaction

as is commonly believed. Further, the immune complexes demonstrated to be circulating during reaction are possibly formed by bacillary products and not by whole or fragmented bacilli.—(Adapted from authors' summary)

Yamada, Mizuho and Fujimoto, Fumio.

Lymphocyte transformation using Mitsuda antigen (lepromin). *J. Dermatol.* **2** (1975) 175-178.

A lymphocyte transformation test was performed adding Mitsuda antigen (lepro-

min) to the lymphocyte culture from the peripheral blood of four leprosy patients (2 borderline lepromatous and 2 lepromatous), and six control persons (1 Kimura disease patient, 1 kerion celsi patient, 2 latent syphilis patients, and 2 normal controls—doctors). All four leprosy patients showed negative results, while 1% to 3% blast cells were observed in five of the control cases; the one case with Kimura disease showed a negative result. Only 12% to 21% blast cells stimulated by PHA were observed in lepromatous patients.—Authors' Abstract

Microbiology

Chatterjee, B. R. A nonacid-fast coccoid precursor—possible cultivable phase of *Mycobacterium leprae*. *Lepr. India* **48** (1976) 398-405.

A nonacid-fast coccoid organism isolated from human leproma, skin and nasal smears of leprosy patients shows a tendency to revert to an acid-fast mycobacterial form during test tube passages. One of these coccoid isolates gave strong DOPA oxidase activity. There is also preliminary evidence of mycobacterial conversion from these coccoids in intraperitoneally inoculated mice. The possibility that these nonacid-fast coccoids could be a cultivable precursor phase of *M. leprae* has been raised and discussed.—Author's Summary

Desikan, K. V. Correlation of morphology with viability of *Mycobacterium leprae*. *Lepr. India* **48** (1976) 391-397.

A concept has been developed in recent years that the evenly-stained "solid" bacilli are living and the "non-solid" forms are degenerate and dead. This communication presents the findings in experimental mice inoculated with material containing 1% to 10% solid evenly-stained *M. leprae* and also with material containing 0% solid organisms. There was multiplication of the bacilli in both groups. Quantitatively, the yield was also not significantly different. These findings do not support the belief that the non-solid bacilli are necessarily dead. The non-solid bacilli were further classified on the basis of their morphology to the following

forms: a) short but evenly stained; b) indented; c) beaded; d) dumb-bell shaped; e) coccoid; and f) fragmented. Material without solid bacilli, but containing different proportions of the above types of morphological forms are nonliving. It appears, therefore, that the recognition of the living status of *M. leprae* by its morphology is highly equivocal and subject to error.—(Adapted from author's summary)

Endo, Hiroko. Studies on the substance purified from proteose peptone which stimulates the growth and elongation of an acid-fast bacillus strain isolated from a mouse leprous lesion. *Lepro* **44** (1975) 221-229. (In Japanese)

It is well known that there are not a few strains of acid-fast bacilli which develop visible growth on ordinary culture media, during attempts to cultivate leprosy bacilli, and most of these are merely regarded as contaminants. *Mycobacterium* KNBE strain, which was isolated by T. Nakayama from a subcutaneous nodular lesion in a murine leprous mouse, however, was suspected of being a variant of the causative agent.

The author studied the biologic characteristics of this strain and found that its growth and elongation were accelerated by some kinds of peptone.

Based on the speculation that this strain might have some metabolic relationship to murine leprosy bacilli, and with the ultimate aim of cultivating leprosy bacilli, the growth factor was isolated from a proteose peptone

which had been proven to show the above mentioned activities.

This substance was estimated to possess a covalent bond with L-methionyl-L-leucine and Cu ion. It was also demonstrated that a synthetic L-methionyl-L-leucine preparation had a similar effect on the strain.

From these results it is concluded that the specific effects of the substance obtained from a proteose peptone depends on L-methionyl-L-leucine.—(Adapted from author's English summary)

Garrido Neves, R. and Matos Almeida, M. J. Estudo do tropismo do *Mycobacterium leprae* para as células névicas. [Study of tropism of *M. leprae* for nevus cells.] Med. Cut. I.L.A. 2 (1974) 221-226. (In Portuguese)

The nevus cells are noted to be receptive to *M. leprae* in contrast to the cells of the epidermis and surrounding areas.

The bacillus shows a preference for the middle and deep region, which is in agreement with the histogenetic theories which attribute their neural origin to the nevocyte.

The indifference of the nevus cell to the microorganism as Bertellotti has already concluded, seems to be the factor responsible for the long duration of the bacillus in its cytoplasm.

M. leprae has demonstrated tropism towards the nevus cells, which we believe is due to its neural origin since it does not seem to us to be as pronounced as for the nervous filets.—(Adapted from authors' English summary)

Harada, K., Gidoh, S. and Tsutsumi, S. Staining mycobacteria with carbol-fuchsin: properties of solutions prepared with different samples of basic fuchsin. Microscopica Acta 78 (1976) 21-27.

Acid-fast staining of mycobacteria in the form of beadings is obtained by means of a carbol-fuchsin solution (Ziehl-Neelsen stain) prepared from pararosaniline or from certain kinds of basic fuchsin. After such acid-fast stains, the intensity of the bacilli's coloring was rather poor and unstable, so that some bacilli lost their acid-fast stain.

In contrast, an acid-fast staining of mycobacteria in rod form results by using a carbol-fuchsin prepared from rosaniline or

from other basic fuchsin including new fuchsin.

The spectrophotometric and thin-layer chromatographic data indicate that the main component of those basic fuchsin showing beady staining may be pararosaniline, whereas the main ingredient of basic fuchsin with staining the bacteria in rod form may be its higher homologues. Neither chloride nor acetate of the fuchsin could affect the appearance and number of stained bacilli.

The commercially available "basic fuchsin" is either the chloride or acetate of pure pararosaniline or consists of variable mixtures of it with higher homologues. Consequently, only a basic fuchsin which has an absorption maximum at $\lambda \geq 552$ nm could be employed for the acid-fast stain of mycobacteria in a stable manner. Pararosaniline included some basic fuchsin, composed mainly from pararosaniline, and should not be selected for the preparation of the carbol-fuchsin formula.—Authors' Summary

Hirata, Tsunehiko. Cell-biological study on the acid-fast organisms isolated and cultivated from leprosy patients. I. Isolation frequency and biological properties of the organisms. Lepro 44 (1975) 214-220. (In Japanese)

The observations reported here concern microbiologic studies on the cultivable acid-fast organisms from leprosy material. Most materials were washed repeatedly in sterile saline solution and aqueous solution containing 8.0% NaOH, inoculated onto an egg yolk medium and incubated at 33°C for 3-5 weeks. The colony of cultivated organisms was grey or orange-yellow.

The isolation frequency of cultivated acid-fast organisms was 0%, 17.4%, 25.0%, 28.6% and 90.0% in cases of earlobe leproma, subcutaneous leproma, nasal mucosa, nasal crusta and nasal washings, respectively.

The biologic properties of the organisms were not much different from those of atypical mycobacteria. However, the organisms showed remarkable morphologic changes during cultivation, especially in their elongation, cytoplasmic granulation and other phenomena, which were not common with other mycobacteria.—(Adapted from author's English summary)

Hirata, Tsunehiko. Effect of antibiotics on the capsular structure of *M. lepraemur-*

rium. Lepro **44** (1975) 209-213. (In Japanese)

The effect of INH and DDS on the capsular structure of *M. lepraemurium* was studied at the light and electron microscopic level. Neither drug had an effect on the capsular structure. However, the bacilli proved to be susceptible to INH but not to DDS. The cytoplasm of *M. lepraemurium* subjected to INH was collapsed and vacuolated. —(Adapted from author's English summary)

Kondo, Eiko and Kanai, Koomi. An attempt to cultivate mycobacteria in simple synthetic liquid medium containing lecithin-cholesterol liposomes. Jap. J. Med. Sci. Biol. **29** (1976) 109-121.

An attempt was made to cultivate mycobacteria in a simple synthetic liquid medium containing lecithin-cholesterol liposomes. This lipid complex showed a marked growth-promoting effect on the submerged growth of *M. tuberculosis* and *M. bovis*. The role of lecithin as nutrient was suggested. The bacillary growth in such an environment retained good viability, strong acid-fastness, and high virulence in mice. An avirulent strain of tubercle bacilli, H37Ra, did not respond to lecithin-cholesterol liposomes unlike the parent virulent strain, H37Rv. However, this was not a general rule for virulence, as a highly virulent strain of *M. bovis* (Ravenel) and an attenuated strain (BCG) both grew well in the presence of liposomes.

Lipid analysis showed that cholesterol in the liposome medium was esterified to some extent during the bacterial growth. It was discussed that the culture in the liposome-containing medium may present an experimental model for the study of interaction between mycobacteria and the macrophage membrane.—Authors' Summary

Marks, J. A system for the examination of tubercle bacilli and other mycobacteria. Tubercle **57** (1976) 207-225.

Methods are described for the examination of mycobacteria cultured from clinical specimens. In the "screening" procedure used for new isolates tubercle bacilli are nonpigmented, do not grow at 25°C and are sensitive to *p*-nitrobenzoic acid as well as normally to antituberculosis drugs. Classification is extended when necessary by the

use of four tests—temperature requirements, pigmentation, oxygen preference and Tween hydrolysis. These define 15 species or groups meeting the needs of clinical bacteriology. Drug sensitivity tests are described which relate the end-points of titrations to the modal response of normal wild strains of *M. tuberculosis*. They are used not only as a guide to chemotherapy but also to support and amplify classification.—Author's Summary

Mori, Tatsuo. Growth factor of *Mycobacterium lepraemurium*. Jap. J. Bacteriol. **30** (1975) 207. (In Japanese)

Success of the culture of *M. lepraemurium* to Ogawa's 1% egg yolk medium made the study of growth factors possible. However, it does not grow by the inoculation of a small amount of pellicles. The growth factors on the inoculation of a large amount of the pellicles were studied.

Methods

1. At the general convention of the Japanese Leprosy Association last year, Ozaki reported that positive or negative growth of the bacilli on egg yolk or whole egg media depends on the pH of these. A follow-up study of the above was performed.

2. To determine the basic medium to examine the growth factors the following media were made to observe the growth of *M. lepraemurium*: a) 1% Ogawa's medium with egg yolk defatted by petroleum ether or acetone; b) 1% Ogawa's medium supplemented with butanol extract of egg yolk and hemin and solidified by the addition of agar; c) 1% Ogawa's medium added with agar and protein other than egg yolk, such as milk, soybean powder (Hausu-hon-tofu: commercial name), horse serum with pH at 6.1; d) egg white and 1% Ogawa's medium with the adjustment of the pH to 6.1 and hemin added, dried extract of yeast, petroleum ether extract from the butanol extract of egg yolk or acetone extract or its residue from the residue due to the former process or acetoacetic acid extract from the butanol extract residue of egg yolk.

Results

1. Whole egg, CaCl ₂ ,	
pH 6.3	50 tubes (+++)
Whole egg, HCl, pH 6.2	54 tubes (+++),
	2 tubes (±)

Egg yolk, pH 6.1	231 tubes (+++), 2 tubes (±)
2. a) Petroleum ether extraction residue of egg yolk	22 tubes (+++)
Acetone extract residue of egg yolk	40 tubes (+++)
b) Butanol extract of egg yolk plus agar	20 tubes (-)
c) Milk and agar, pH 6.2	21 tubes (++)
No increase of the volume of colony	
Soybean plus agar	50 tubes (±)
No increase of the volume of colony	
Horse serum plus agar, pH 6.2	16 tubes (-)
Horse serum, agar, yeast extract and hemin, pH 6.2	19 tubes (±)
No increase of the volume of colony	
Horse serum, agar, biotin plus hemin	18 tubes (+)
d) Egg white adjusted to pH 6.1 by CaCl ₂ and HCl, added with hemin ..	40 tubes (++)
Egg white adjusted to pH 6.1 by HCl with CaCl ₂	200 tubes (+)
No increase of the volume of colony	
Egg white adjusted to pH 6.1 with HCl, added with yeast extract	200 tubes (+)
No increase of the volume of colony	

The media having the addition of the organic solvents residues from egg yolk failed to show growth. Since butanol extract from egg yolk plus agar did not support the growth of the *M. lepraemurium*, the addition of protein seemed to be necessary. When protein other than egg yolk was utilized, adjustment to the suitable pH for the growth of *M. lepraemurium* was required. The suitable condition is the egg white plus 1% Ogawa's medium. The addition of the component of egg yolk to the above makes the survey of growth factors possible.

Discussion

The media without protein failed to show growth of the bacilli. The natures of the required protein were not studied completely by the present study. It is essential to keep the media to pH 6.1 to 6.3, however, there might be some substance to support the

growth of the bacilli in the lipids of egg yolk. It might suggest the lack of some growth factor in horse serum or in milk which helps *M. lepraemurium* to grow a little but not as strongly as egg yolk.—E. Matsuo (*Adapted and translated from Japanese article*)

Prabhakaran, K., Harris, E. B. and Kirchheimer, W. F. The binding of ¹⁴C-labeled DOPA by *Mycobacterium leprae* in vitro. Microbios Letters 2 (1976) 95-100.

We demonstrated earlier that, among mycobacteria, *o*-diphenoloxidase is a unique metabolic property of leprosy bacilli and that the organisms possess specific receptor sites for the uptake of tritium-labeled DOPA. The data presented in this report show that ¹⁴C-DOPA is bound more efficiently than ³H-DOPA by intact *Mycobacterium leprae* and by a particulate fraction prepared by disrupting the bacterial cells. ¹⁴C-DOPA was not bound by a cultivable mycobacterium and by several vertebrate cell lines which do not contain *o*-diphenoloxidase. Cultured melanoma cells, which oxidize DOPA to quinone, readily assimilated the labeled compound. The uptake of DOPA by the bacilli and the melanoma cells was inhibited by the copper chelator diethyldithiocarbamate. When the *o*-diphenoloxidase of *M. leprae* and the melanocytes was released by detergent-treatment after incubating the cells with ¹⁴C-DOPA, the substrate was bound to the enzyme, suggesting that binding is not a nonspecific uptake of the diphenol.—Authors' Abstract

Saito, H., Kiyotani, K. and Yamaoka, K. Classification of *Mycobacterium lepraemurium*. Jap. J. Bacteriol. 30 (1975) 72. (In Japanese)

Biological and biochemical natures of *M. lepraemurium* in comparison with those of other slow-growing mycobacteria were studied. *M. tuberculosis*, *M. kansasii*, *M. marinum*, *M. gordonae*, *M. avium*, *M. intracellulare*, *M. xenopi*, *M. ulcerans*, *M. gastri*, and *M. nonchromogenicum* were cultivated for two to four weeks on 1% Ogawa's egg yolk medium with 1% hemin. The appearances of their colonies, their coloration (in the dark and after exposure to light), suitable growth temperatures (30°, 37°, 42° and 45°C), growth on Ogawa's medium, 0.5% nicotina-

mide, 0.5% desoxycholate, 0.03% pyronine, 0.1% nitrous salt, 3% NaCl, 10 and 20 $\mu\text{g/ml}$ sodium azide, 250 and 500 $\mu\text{g/ml}$ PABA, 5 and 10 FAH, 125, 250 and 500 $\mu\text{g/ml}$ hydroxylamine, 250, 500 and 1000 $\mu\text{g/ml}$ salicylate, 5 μg hemin, iron uptake, neutral red reaction, niacin test, reduction of nitrite, hydrolysis of Tween 80, acid phosphatase, arylsulfatase, catalase (the heights of the bubble layers, less than 10 mm and more than 20 mm), 68°C catalase, propylenediamine, pitressin and cadaverine catalysis, Boenicke's ten kinds of amidases, totaling 51 natures were studied. Similar values according to Anderson's classification from Sneath were obtained and the similarity of *M. lepraemurium* to other known mycobacteria was studied.

Characteristics of *M. lepraemurium*. R type, nonchromogenic, slow-growing, positive growth at 30° and 37°C, no growth at 42°C and 45°C, positive neutral red tests, negative iron uptake, negative growth on 1% Ogawa's medium, no growth on the media containing nicotinamide, desoxycholate, sulfite, sodium chloride, 20 μg sodium azide, 500 μg PABA, hydroxylamine, salicylate, positive growth on the media containing pyronine, 250 μg PABA, and FAH. Negative niacin test, reduction of nitrite, arylsulfatase, hydrolysis of Tween, acid phosphatase, 70°C acid phosphatase, pitressin oxidase, cadaverine oxidase, propylenediamine oxidase, catalase with lower bubble height of 10 mm, 68°C catalase. Positive nicotine amidase and pyridine amidase in the amidase series of Boenicke.

Differences between *M. lepraemurium* and known nonchromogenic mycobacteria.

Difference from *M. tuberculosis*: *M. lepraemurium* is resistant to 250 mg PABA, negative growth on Ogawa's 1% medium and negative uricase.

Difference Between Group III Pathogenic Mycobacteria: *M. lepraemurium* is R-type and does not grow on 1% Ogawa's medium and does not have 68°C catalase.

Difference Between Group III Nonpathogenic Mycobacteria: *M. lepraemurium* is R-type, does not grow on 1% Ogawa's medium and salicylate containing medium, does not show Tween hydrolysis, acid phosphatase, and arylsulfatase reactions.

Similarity of *M. lepraemurium* to known slow-growing mycobacteria. Similarity indices of *M. lepraemurium* to known slow-growing mycobacteria are low. The highest correlation is with *M. tuberculosis* and was 65%.

According to the present study, *M. lepraemurium* cultured by Dr. Ogawa of Kitasato Institute seemed to belong to an independent class which has not been described previously.—E. Matsuo (*Adapted and translated from Japanese article*)

Yoshii, Z. and Nakamura, M. Scanning electron microscopy on the partial swellings of *Mycobacterium lepraemurium* which appeared during cultivation in a cell-free liquid NC-5 medium. *Kurume Med. J.* 23 (1976) 29-39.

Partial swellings of cell bodies of *Mycobacterium lepraemurium* cultivated in the NC-5 medium were observed with a scanning electron microscope. Shapes, sizes, locations, dividing and budding forms of the partial swellings were described. The partial swelling was regarded as the growing phase of a stage in the life history or life cycle of *Mycobacterium lepraemurium*. Similarity of the swelling to a bacterial spore was also noticed, however, further investigation is required for the determination of its microbial significance.—(*From Trop Dis. Bull.*)

Experimental Infections

Balentine, J. D., Chang, S. C. and Issar, S. L. Infection of armadillos with *Mycobacterium leprae*. Ultrastructural studies of peripheral nerve. *Arch. Path. Lab. Med.* 100 (1976) 175-181.

Peripheral nerves of armadillos were studied 16 to 30 months after intradermal or intravenous inoculation with *Mycobacterium*

leprae. Numerous bacilli were found within macrophages, Schwann cells, and perineurial cells; endothelial cells, pericytes, and fibroblasts were involved as well. The bacilli were characteristically contained in membrane-limited vacuoles that were interpreted as being phagosomes. Some of the phagosomes contained granular, membranous, and vesicular debris considered to be bacillary

degradation products, suggesting that lysosomal activity was present within the phagosomes. Multivesicular bodies, a few of which contained bacilli, were abundant in macrophages and perineurial cells. An unusual proliferation of irregular tubulovesicular profiles was noted, especially in Schwann and perineurial cell cytoplasm, surrounding and within phagosomes containing bacilli. The pattern of cellular involvement of neural structures with *M. leprae* was similar to that observed in lepromatous leprosy neuritis in humans.—(From Trop. Dis. Bull.)

Burchfield, H. P., Storrs, E. E., Walsh, G. P. and Vidrine, M. F. Improved caging for nine-banded armadillos. Lab. Anim. Sci. **26** (1976) 234-236.

Impact resistant polyethylene cages were evaluated in these laboratories as replacements for plywood boxes for housing nine-banded armadillos. They were found to be less expensive, easier to sanitize, and to require less than one-third as much floor space per animal as the boxes. This innovation has made it practical to house large numbers of armadillos economically and conveniently in almost any animal facility. The initial cage cost including modifications is approximately \$15 per animal.—Authors' Summary

Closs, Otto. Experimental murine leprosy: induction of immunity and immune paralysis to *Mycobacterium lepraemurium* in C57BL mice. Infect. Immun. **12** (1975) 706-713.

Two series of reinfection experiments were carried out using C57BL mice. In the first series, the mice were inoculated with *M. lepraemurium* (MLM) in one hind foot pad and reinoculated in the contralateral foot pad two or four weeks later. Compared with normal mice of the same strain, the mice reinoculated after four weeks showed an increased local reaction to the bacilli and the bacilli did not multiply at the injection site. The responses of mice reinoculated after two weeks were intermediate to those of the other two groups. In the second series, a systemic infection was established by intraperi-

toneal inoculation of either a large or small dose of MLM. Twenty-two weeks later the mice were reinoculated in one of the hind foot pads. Upon reinoculation, mice receiving the small intraperitoneal dose reacted more strongly than normal mice to MLM, whereas mice receiving the large dose were unable to mount any local reaction to the mycobacterium. The experiments have shown that the local reaction which develops in the C57BL strain of mice approximately four weeks after subcutaneous injection of MLM is accompanied by the onset of systemic immunity. Such systemic immunity lasted for more than 20 weeks after intraperitoneal injection of a small dose of bacilli, but was completely abolished during the course of a heavy systemic MLM infection.—Author's Summary

Taverne, J., Reichlin, M., Turk, J. L. and Rees, R. J. W. Detection of immune complexes in mice infected with *Mycobacterium lepraemurium*. Clin. Exp. Immunol. **24** (1976) 157-167.

A specific binding test was used to detect immune complexes containing antigens of *M. lepraemurium* in the serum and tissues of infected mice. Complexes were precipitated by antiserum against immunoglobulin, free antigen removed by washing, and the presence of bound antigen demonstrated by measurement of uptake of radioactively-labeled specific antibody by the precipitate. Tests were done both with ¹²⁵I-labeled IgG from rabbit antiserum against *M. lepraemurium* and with ¹²⁵I-labeled Fab prepared from an immune precipitate. Out of 79 serum samples taken monthly up to the fifth month after infection, only 3 were positive (one at two months and two at three months).

Kidneys taken from infected mice were also examined for immune complexes. Although deposits of IgM and sometimes of IgG were observed by immunofluorescence in glomeruli of normal mice, deposits of IgG were more frequent later on in infected mice. Nevertheless, binding tests done on acid eluates were positive in only 1 out of 53 infected mice.—Authors' Summary

Rehabilitation

Nursing Mirror 142 (1976) 48-59.

This specialty journal of nursing published in London includes the four following articles on leprosy: S. G. Browne, "The Nurse's Job in Leprosy"; J. Ledger, "Nursing Care in Leprosy"; J. M. Watson, "The Physiotherapist's Contribution"; and E. S. Wilson, "Occupational Therapy."

Tipping, J. R. Fighting the stigma—the role of mass education. *Nursing Mirror* **142** (1976) 60-61.

In developing countries where people are becoming literate, pamphlets are very popular. These of course cost money to produce, but can be printed on fairly cheap paper if they are for free distribution. They are usually read and then taken home to be shared with family and friends. Only those with a higher standard of living will be willing to purchase booklets. There is a need for low priced textbooks on leprosy.

It is difficult to evaluate the impact of posters and advertisements, but any form of

advertising brings a reminder to people about leprosy and helps to break down barriers.

A portable exhibition can be a very valuable way of spreading teaching about leprosy, particularly if contrasting pictures of patients before and after treatment are shown. An exhibition needs attendants to teach and answer questions, to examine those people who request it and advise regarding treatment if necessary. Many places are suitable for exhibitions, particularly agricultural fairs, religious festivals, schools, colleges, hospitals, and medical schools. Exhibitions take time to prepare and to maintain, but are well worth the effort as an effective educational medium.

In parts of India it is traditionally through the medium of song that much of history and legend is passed on from one generation to another. Many people will make up songs by putting slogans to well-known indigenous tunes. This can be a great help in the leprosy education program too.—(*Excerpted from author's article*)

Other Mycobacterial Diseases and Related Entities

Nassau, Eugene and Nelstrop, Ann E. Specific tubercle antigen. *Tubercle* **57** (1976) 197-201.

Identification and isolation of the specific antigen of *M. tuberculosis* with the aid of an antiserum against the antigen antibody complex prepared by Goudie's method from the serum of tuberculous patients is described. The position of the specific antigen on the

disc electrophoresis column comprising four protein bands has been identified and separated. The antibody has been identified as IgG. More sophisticated techniques should enable the isolation of the specific antigen in practical amounts. The availability of such an antigen should greatly advance the serological diagnosis of tuberculosis.—Authors' Summary

Social Reaction

De Sincay, B. Attitudes envers la lèpre et son traitement dans une communauté éthiopienne. [Attitudes towards leprosy and its treatment in an Ethiopian community.] *Ann. Soc. Belg. Med. Trop.* **55** (1975) 313-320. (In French)

The author analyzes the responses obtained by oral interrogation (through an interpreter) of a group of 100 patients who presented themselves for diagnosis of leprosy

at the Princess Zenebe Work Hospital in Addis Ababa during March and April, 1974.

No fewer than 29 had been divorced by the healthy partner because of their disease, either because of inability to provide the necessities of life (10), or because of fear or shame (10), or because the sick partner wanted to leave the conjugal home in order to seek treatment in Addis Ababa. In general, leprosy entailed a lowering of economic and social standards, and rejection by rela-

tives and friends.

Six patients had been discharged from work. The real motives of 17 patients who declared that they came to Addis to seek treatment may have been a desire to hide their sickness or to leave their homes. Apparently, 25 patients who were married when they came to Addis experienced no rejection on the part of their partners.

The author is uncertain concerning the awareness of the patients of the true nature of their disease, and cites the criteria for diagnosis popularly held, such as obvious deformity of hands and feet. A majority of those interviewed (58) had had no previous contact with Western medicine: traditional healers and Coptic priests or other religious

leaders had fulfilled the role of diagnostician and therapist, the prescriptions consisting of natural "remedies," such as burning, the application of leaves, the drinking of infusions, and the like.

Other factors causing people to postpone seeking medical advice were the demands of their job (usually farming), poverty, and fear of traveling alone. Women (31) seemed so tied to their domestic duties that they neglected their personal health. Town-dwellers were less reluctant than country folk to come to a hospital, and those with obvious tuberculoid lesions were more ready to present themselves than those with the potentially more serious forms of leprosy.—S. G. Browne (*Adapted from Trop. Dis. Bull.*)

Epidemiology and Prevention

Barton, R. P. E. Importance of nasal lesions in early lepromatous leprosy. *Ann. R. Coll. Surg. Engl.* **57** (1975) 309-312.

There are some 20 million people in the world with leprosy. In the lepromatous form of the illness the nose becomes infected very early in the disease process. The nasal discharge which occurs is heavily bacillated and is the most potent source of exit of *Mycobacterium leprae* from the body. The necessity for early diagnosis and treatment of leprosy in the absence of an effective vaccine is discussed and the pathologic changes that occur in the nose are outlined. The roles which the leprologist and the rhinologist are able to play are mentioned.—Author's Summary

Bedi, B. M. S., Narayanan, E., Sreevatsa, Kirchheimer, W. F. and Balasubrahmanyan, M. Dispersal of *Mycobacterium leprae* by leprosy patients while breathing. *Ann. Indian Acad. Med. Sci.* **12** (1976) 1-5.

Microscope slides were exposed to nasal and oral breaths of lepromatous leprosy patients to determine the dispersal of acid-fast bacilli in the exhaled air during breathing. The slides were then stained and examined for acid-fast bacilli (AFB) and the results compared with the Bacterial Index, Morphologic Index and bacteremia of the patients.

AFB could be demonstrated in the breaths of patients and were more frequent in the oral and nasal breaths of patients with a high Bacterial Index. Of the 59 persons having a Bacterial Index of 4+ to 6+, oral breath was positive in 10% and nasal breath in 15.4%. Except for two instances all positive nasal and oral breath cases had positive nasal swap smears. It is reasonable to assume that the AFB present in the nasal and oral breaths is *M. leprae* in view of their origin from clinically and bacteriologically diagnosed lepromatous leprosy cases having no other mycobacterial infections. The morphologic appearance of the bacilli and the relationship between the incidence of bacilli in breath and the patients skin slit further supports this assumption.—Authors' Abstract

Bogaert Diaz, H., Torres, A. M. G. and Martinez, D. Evaluación del programa de control de la lepra en la República Dominicana durante el año 1973. [Evaluation of the leprosy control program in the Dominican Republic in 1973.] *Rev. Dom. Dermatol.* **8** (1974) 90-103. (In Spanish)

An evaluation was conducted in 1973 of the leprosy control program in the Dominican Republic. New cases diagnosed totaled 380, which raised the total number of active cases to 2,557 with 90.4% under control. The statistical breakdown is as follows: 48.4%

were male, 51.6% female, 332 or 14.3% were under 14 years of age, and 85.7% were over 14 years of age; and the control contacts were 56%.—(*Adapted from authors' English summary*)

Cap, J. A. and Mulatu, B. La lèpre en Éthiopie: situation actuelle. [Leprosy in Ethiopia.] *Med. Trop.* 36 (1976) 11-15. (In French)

The estimated number of leprosy sufferers in Ethiopia is between 128,000 and 135,000, of whom about 59,000 are registered. In a population of 24 million, the prevalence rate varies from 0.1 to 7.0 per thousand, or an overall rate of 2.5 per thousand. Most of the registered patients live in the central, hilly areas, but the higher prevalence rate in these districts may be a reflection of such factors as population density, activity of case-finding teams and the provision of more adequate facilities for treatment. Where prevalence is low, treatment is given at general dispensaries (1 for 28,000 persons in some areas; 1 for 220,000 persons in others); a special leprosy service is organized in areas where the prevalence is high, each trained medical auxiliary being responsible for the treatment of leprosy patients from three to five centers.—S. G. Browne (*From Trop. Dis. Bull.*)

Escobedo Valdes, E. Avaliação do programa de vigilância epidemiológica da lepra na fronteira norte do México. [Evaluation of the program for epidemiologic surveillance of leprosy along the northern border of Mexico.] *Bol. Of. Sanit. Panam.* 80 (1976) 23-31. (In Spanish)

Mexico's Ministry of Health and Welfare has been conducting a program for epidemiologic surveillance of leprosy along the country's northern border since 1969. The aims of the program are: to detect new cases, treat and follow up patients, trace contacts and survivors, train personnel, provide health education, and to exchange information with United States health authorities.

Leprosy has been reported in all the Mexican states sharing a common border with the United States. During 1973-1974, 277 cases were detected in the border area, representing 18.5% of the 1,498 cases detected in all of Mexico over the same period.

The California State Public Health Department provides Mexico with regular reports of leprosy cases diagnosed in patients of Mexican descent. According to data supplied by the patients themselves, 38% of them had the disease when they entered the United States, and 62% acquired it after their arrival. This information helps the Mexican health authorities to identify foci of the disease and to regain contact with patients who have abandoned treatment.

With a view to intensifying its work in this area, the Mexican Ministry of Health and Welfare plans to establish a mobile service devoted specifically to the promotion, supervision, and evaluation of these activities being carried out in Northern Baja, California and the states of Chihuahua and Coahuila. The service will also train and advise nonspecialized personnel who will be participating in leprosy control.—Author's English Summary

Guimaraes, Cid. Perspectivas da participação dos hospitais gerais na assistência aos doentes de Hanseníase. [Participation of general hospitals in the care of patients with Hansen's disease.] *Rev. Saude Publica* 9 (1975) 401-407. (In Portuguese)

A historical synthesis shows that the hospital has turned its attention towards the curative aspects of medicine. Diagnosis and therapeutic progress have contributed much towards this in particular. The lazarets and their later version, the isolation hospitals, contributed, until very recently, in separating the general hospitals from Hansen's disease. The medical school hospitals of Sao Paulo have been the exception. The importance of educating the medical and administrative staff, the patients of the hospital, as well as the general public is stressed as being the only way of integrating assistance to the patients with Hansen's disease in the general hospitals within a short period. A systematic approach is proposed as the solution, as Hansen's disease should be considered as a normal component of the general health program. The advantages of including the Hansen's disease patient in the general hospital clientele in order to treat him as any other patient are also pointed out.—(*Adapted from English summary*)

Jaramillo, A. O. and De la Cruz M., R. La lepra en Costa Rica. [Leprosy in Costa

Rica.] *Acta Med. Costarric.* **18** (1975) 151-207.

The first person with leprosy recorded in Costa Rica was the child of a Spanish family in about 1734. By 1883 there were 32 leprosy patients in a lazarette. Sulfone therapy was introduced in 1945 and the first cure was recorded in 1947. The Department for the Control of Leprosy was created in 1948. Active prophylaxis was initiated in 1952 with the compilation of a register of contacts. From 1954, cutaneous lymph was collected for diagnosis from persons living with patients. In 1962 a specialist was appointed to conduct a dermato-neurological examination of all contacts. A "new program for the control of leprosy in Costa Rica" was created in 1974 which prohibited the internment of patients in the leprosy sanatorium and decreed that they should be treated in general hospitals. A rehabilitation program was also initiated. By 1974 there were 518 registered cases, and their geographic distribution is recorded, but it is estimated that there are probably some 1,300 cases. The spread of the disease is to be controlled by dermatologic examination of all suspects and groups of persons at risk. Persons living with a patient must be examined dermato-neurologically once a year for five years; presently there are 3,282 contacts under observation. Chemoprophylaxis is appropriate for juveniles living in close contact with a patient in the lepromatous or dimorphic stage. Leprosy patients should generally be treated in outpatient clinics and should be examined dermato-neurologically and bacteriologically twice a year in the case of those with lepromatous or dimorphic lesions, and once a year in tuberculoid and indeterminate cases.—Ann Grant (*From Trop. Dis. Bull.*)

Krajewski, Stanislaw. Leprosy in the Libyan Arab Republic. *Przegl. Dermatol.* **62** (1975) 433-436.

Despite the great progress made in medicine, leprosy still continues to exist in Libya and in all North Africa. The uncertain nature of medical statistics in Libya makes it difficult to assess the exact number of cases of leprosy, but in the author's opinion the number approximates to 4,000 (2% of population).

Nearly every nonitching dermatosis in

Libya must be suspected as leprosy.

The endemic section of the Department of Social Diseases of the Ministry of Health in Libya is responsible for the treatment and eradication of leprosy. There are two leprosy hospitals, one at Bir Usta Milad near Tripoli and another at El-Marj in Cyrenaica. These two hospitals have 182 beds between them. The total number of registered cases of leprosy in Libya is approximately 500. On the average patients are hospitalized for 8 to 16 months. After discharge they are treated as outpatients in leprosaria, in dermatological dispensaries, or by the nearest doctor if the patient happens to live in a remote area. Because of resistance to treatment, a patient sometimes requires more than 16 months of hospitalization. The positive results of microscopic examination indicate that the patient is contagious and must remain hospitalized.

From time to time the Ministry of Health organizes meetings between dermatologists and leprologists in order to coordinate antileprotic action.—(*Adapted from author's English summary*)

Louvet, M. and Saint-Andre, P. Evaluation of the control of leprosy in West Africa. *Med. Armees* **3** (1975) 829-834. (In French)

Eighteen years ago, an antileprous campaign was started in West Africa by General Richet (M. C.). We can affirm that it has been efficient. The organization is based upon the service called "Grandes endémies" (mostly Army medical officers, or male nurses trained at Marchoux Institute), which assumes the mass treatment of sick people and early detection.

Leprous enemy remains important with a prevalence of 1.5% in the six concerned states. But these official statistics do not correspond to reality as we have proved by declaring cured 65% of those among the sick people. However, the present organization is efficient and it should be maintained, but the registers should be brought up to date (including deceased, disappeared, and cured people). We remain rather optimistic and are proud of this campaign which has been belittled by others. Anyway, the actual leprosy prevalence is no doubt overvalued for more than 50% and we hope that necessary rectifications will appear in the 1976 statistics.—(*Adapted from English summary*).

Saikawa, Kazuo. Several problems of leprosy outpatient treatment in Okinawa. *Lep-ro* **44** (1975) 202-208. (In Japanese)

Leprosy outpatient treatment in Okinawa was started in 1962 and since then many patients in the field, including new patients and escapees from leprosaria, have received treatment in leprosy outpatient departments. Moreover, early diagnosis of leprosy, early treatment, follow up of discharged patients, and contact tracing for households have been strongly performed for 13 years in O.P.D. The recent improvement of leprosy epidemiologic status in Okinawa is the result of this leprosy control policy based on outpatient treatment.

The following points should be emphasized in order to expand the leprosy control program in Okinawa: 1) The major problem in outpatient care is ensuring regularity of treatment and priority should be given to follow up of lepromatous and borderline leprosy patients; 2) More relapsed cases of lepromatous and borderline leprosy than

tuberculoid and indeterminate leprosy have been observed; 3) To prevent relapse, priority should be given to follow up of lepromatous and borderline leprosy patients who have been discharged from leprosaria.—*(Adapted from author's English summary)*

Sehgal, V. N., Rege, V. L. and Kharangate, V. N. Epidemiologic and clinical pattern of leprosy in Goa. *Lepr. India* **48** (1976) 382-390.

A review of 1,053 leprosy patients revealed its prevalence in the hospital population as 2.4 per thousand. The commonly affected age group was 20-39 years of age in both sexes; males predominating over females in 1.8:1. The frequency sequence of clinical types of leprosy was tuberculoid, borderline, neuritic and lepromatous. Most of the patients reported the disease within the course of two years of their awareness of the disease. The clinical features were classical and type specific.—*(Adapted from authors' summary)*