

CURRENT LITERATURE

This department carries selected abstracts of articles, published in current medical journals, dealing with leprosy and other mycobacterial diseases. Abstracts are supplied by members of the Editorial Board and Contributing Editors, or are reproduced, with permission, from other abstracting journals.

Clinical Course

Lara, C. B. Leprosy in children. General considerations: initial and early stages. *Philippine J. Leprosy* 1 (1966) 22-57.

See Editorial by C. B. Lara, *Internat. J. Leprosy* 35 (1967) 510-512.

Carboni, E. A., Poëx, A., Borello, E. and Sigal, S. Lesiones orales en 100 enfermos de lepra. [Oral lesions in 100 leprosy patients.] *Leprológia* 11 (1966) 73-74.

In 72 lepromatous, 16 tuberculoid, 9 indeterminate and 3 dimorphous (borderline) patients lepromata were found in only 2 of the lepromatous group. Scarring of the uvula and soft palate was observed in 3 more of the same type. This gives a figure of 5% for oral lesions, as compared with the 22% given by Nemirowsky in 1938. The conclusion is that the percentage of oral lesions in the present era is lower than it was in previous decades.—E. D. L. JONQUIÈRES

Ishihara, S., Hagiwara, S., Fukuda, T. and Yamamoto, M. The five years observation on bacterial index of leprosy patients. *La Lepro* 36 (1967) 149-157. (In Japanese, English summary)

During the last five years the authors have observed the bacterial index of 264 lepromatous patients within 3 month intervals. The improvement in average bacterial index of patients generally depends upon their initial value before chemotherapy, although the degree of the reduction varies considerably from patient to patient. A decreasing curve of bacterial index was observed on treatment of the new patients with DDS. Patients who had been noted for the relapse of skin lesions in spite of various kinds of treatment, showed slight or no

improvement of the bacterial index during the last five years. Of the patients who had continued bacteriologically negative during the 5 years, about 3% may be detected as positive in the fifth year. Among those who have continued bacteriologically negative for 4 years scarcely any relapses of skin lesions are seen.—[From authors' abstract]

Crawford, C. L. Neurological lesions in leprosy. *Leprosy Rev.* 39 (1968) 9-13.

The author examined 20 patients with neurologic lesions. The patients were predominantly of Hausa origin and all were patients of the Zaria Leprosy Settlement, Nigeria. The author summarizes his findings as follows: The clinical features of a purely sensory form of polyneuritis in leprosy patients are described. These include a selective involvement of superficial sensory modalities with anhydrosis, but without other autonomic involvement. This polyneuritis may occur separately or be associated with the more well known mononeuritis or mononeuritis complex. Other types of sensory polyneuritis and congenital sensory neuropathies are compared and a peripheral and superficial neurologic localization is postulated. The abrupt onset of sensory loss and the simultaneous involvement of all 4 limbs is illustrated by 2 case history reports.—N.D. FRASER

Tilak, C. T. Acute epididymo-orchitis in lepromatous leprosy. *Leprosy Rev.* 39 (1968) 31-36.

Three photographs and four photomicrographs illustrate the author's article, in which details are given on 4 patients suffering from acute epididymo-orchitis in reactional states in advanced lepromatous lep-

rosy. The author suggests that "future studies of the testis in leprosy should include the study of the epididymis as well, irrespective of types," since, according to H. W. Wade, "the occurrence of such lesions is not well documented in the literature."—N. D. FRASER

Hines, H. L. and Acker, D. W. Lepromatous leprosy: case presentation and discussion. *Military Med.* 133 (1968) 146-153.

A 21-year-old white male, born in California, who had lived in Hawaii, Guam, Yap and Rota, and subsequently entered the U.S. Air Force, gave a history of a "stuffy nose," first noted some months prior to his military service. Subsequently a spreading bullous disorder of the fingers developed, from which blisters and granulating ulcers developed. Biopsy revealed a subcutaneous granulomatous reaction with numerous acid-fast bacilli. Correlation of the clinical picture and histologic findings established the diagnosis of active lepromatous leprosy.—E. R. LONG

Donner, R. S. and Shively, J. A. The "Lucio phenomenon" in diffuse leprosy. *Ann. Intern. Med.* 67 (1967) 831-836.

The authors describe the development of the Lucio phenomenon in a patient with diffuse leprosy after amputation of a leg for soft tissue sarcoma. This rare but distinctive phenomenon occurred after the development of bacterial infection in the stump. The relation of Lucio phenomenon, an acute necrotizing vasculitis, and a unique state of hypersensitivity, and the difficulties of diagnosing lepra reaction in patients with lepromatous leprosy, are discussed.—[From authors' summary]

Wilkinson, F. F., Gago, J. and Santabaya, E. Xantelasma y lepra. [Xanthelasma and leprosy.] *Leprológia II* (1966) 78-79.

In 230 leprosy patients at the Sanatorio Sommer, 16 cases of xanthelasma were found (6.95%). A theoretic estimation gives only 0.50% of xanthelasma in dermatologic and ophthalmologic patients (without leprosy) under 60 years of age. The 230 leprosy patients selected were under that

age for a reasonable comparison. It is concluded that some factor in leprosy, not yet clear, is responsible for the difference.—E. D. L. JONQUIÈRES

Ramasoota, T., Johnson, W. C. and Graham, J. H. Cutaneous sarcoidosis and tuberculoid leprosy. *Arch. Dermat.* 96 (1967) 259-268.

The study presents observations of biopsies from 47 patients with cutaneous sarcoidosis and 45 patients with tuberculoid leprosy. Epidermal changes showing parakeratosis, liquefaction degeneration, and glycogen occur more frequently in sarcoidosis. Nerve invasion is seen only in tuberculoid leprosy. Infiltration of arrectores pilorum muscles frequently occurs in tuberculoid leprosy and is rare in sarcoidosis. Fibrinoid degeneration within tubercles is common in sarcoidosis and absent in tuberculoid leprosy. Attachment of tubercles to the epidermis, sharp margination of the tubercles, and naked-appearing tubercles are seen more frequently in sarcoidosis than in tuberculoid leprosy. Elongate-shaped tubercles and lymphocytes within, and forming a mantle about, tubercles are prominent and seen more frequently in tuberculoid leprosy. Cutaneous sarcoidosis and tuberculoid leprosy show similar microscopic features, but distinction can be made on the basis of critical histopathologic and histochemical evaluation.—AUTHORS' SUMMARY

Cahill, K., El Mofty, A. M. and Kawaguchi, T. P. Primary cutaneous aspergillosis. *Arch. Dermat.* 96 (1967) 545-547.

A 42-year-old Egyptian man was hospitalized for over a decade with a mistaken diagnosis of lepromatous leprosy. *Aspergillus niger* was isolated from diffuse skin lesions, and the patient responded to nystatin therapy. This is one of the few reports of disseminated primary cutaneous aspergillosis. It emphasizes the need to consider cutaneous mycotic infections in the differential diagnosis of lepromatous leprosy.—AUTHORS' SUMMARY

Jose, F. A., Jr. Mental health problems in leprosy. *Philippine J. Leprosy I* (1966) 15-21.

In the course of leprosy control it is essential that leprosy workers be aware of the possibility of mental and behavioral changes in leprosy patients, and be prepared to handle patients with these changes, and prevent their recurrence. Since the mental attitudes of patients depend on community reaction to the disease, it is necessary to change this attitude through intensive health education. Informing the patient of his illness must be gradual and cautious, and include the patient's family. He must be assured that he can recover without disfigurement. Admis-

sion to a sanatorium will usually remove the feeling of ostracism. Care must be taken of his dependents' welfare. Emotional and social adjustment must be maintained. Inside the sanatorium arrangements for education, culture and recreation must be provided. Measures must be taken against depression, e.g., by suitable occupational therapy. Treatment for mental health must continue after discharge from the sanatorium, and every patient must be made to feel that he has a useful place and responsibility in society.—E. R. LONG

Chemotherapy

Shepard, C. C., Tolentino, J. G. and McRae, D. H. The therapeutic effect of 4,4'-diacetyldiaminodiphenyl sulfone (DADDS) in leprosy. *American J. Trop. Med. & Hyg.* 17 (1968) 192-201.

Previous work in mice had shown *M. leprae* to be sensitive to remarkably low levels of DDS. A series of repository sulfones was then tried and found to be effective when given every 60 days. One of the repository compounds was 4,4'-diacetyldiaminodiphenyl sulfone (DADDS) the antibacterial effect of which presumably depends upon the slow enzymatic release of DDS or the monoacetylated derivative. DADDS for human beings is a suspension in benzyl benzoate and castor oil and is administered as an intramuscular injection into the buttocks. The present study was a test of its efficacy in human lepromatous leprosy. It was given in a dosage of 225 mgm. every 77 days to a group of 10 patients, who were matched with a concurrent group of 10 patients given oral DDS in a dose approximating 100 mgm/day. The length of the study was 48 weeks. Two chief criteria of therapeutic response were employed: reduction in the ratio of solidly staining bacilli in skin smears and reduction in number of *M. leprae* in nasal washings. Both are measures of the reduction in viability of bacilli. By both measurements

DADDS was as active as DDS. The clinical response and changes in histopathology were not significant in the two groups. There were 2 deaths in the patients receiving DADDS, but the evidence was that they were not connected with drug toxicity. ENL was present in both groups, and although severe reactions were more frequent in the DDS group the difference did not attain statistical significance. "Free" sulfone in blood was measured every 4 weeks to monitor the drug intake. The levels were usually in the expected range; discrepancies were not associated with altered therapeutic response. Urinary sulfone excretion was measured. From the DADDS patients the total output averaged 1.65 mgm./day in terms of DDS. It was estimated that this amounted to a release from the drug deposit of 2.4 mgm. DDS/day. Such release would be expected to give a blood and tissue concentration of about 0.06 μ gm. "free" DDS/ml., which would be a low multiple of the 0.02 μ gm./ml. estimated to be the minimal inhibitory concentration of DDS for *M. leprae*. Further trials of the drug appear indicated. The potential value of a drug such as DADDS is pointed out; the infrequent but certain administration of drug could greatly simplify therapeutic or prophylactic coverage in areas where medical conditions are difficult.—(From authors' summary)

Hastings, R. C. and Trautman, J. R. B.663 in lepromatous leprosy. Effect in erythema nodosum leprosum. *Leprosy Rev.* **39** (1968) 3-7.

Six patients with active lepromatous leprosy associated with established erythema nodosum leprosum reactions, all requiring regular corticosteroid therapy, were selected for a trial of treatment with B.663. Another group, selected by matching with the B.663 group, was given regular antileprosy treatment with intramuscular Solapson B.P. (Sulphetrone). Clinical data, mean dosages of Solapson and B.663, and mean daily steroid requirements are listed in detail in three tables. B. 663 was found to be associated with significantly less severe ENL than Solapson, and Solapson resulted in more severe ENL than was observed when no regular antileprosy therapy was given. B.663 seemed to benefit established ENL reactions *per se*, and to be definitely superior to the sulfones in this respect.—N. D. FRASER

Hathaway, J. C. Lepromatous leprosy treated with N'-acetyl-sulphamethoxy-pyridazine. *Leprosy Rev.* **39** (1968) 49-50.

Fourteen patients with lepromatous leprosy were treated at the Hale Mohalu Hospital, Hawaii, with N-acetylsulfamethoxy-pyridazine. All 14 were heavy lepromatous patients who had not responded to sulfones or had been intolerant to them. Twelve of them showed no clinical improvement and had been in almost continuous progressive leprosy reaction; it was decided, therefore, to discontinue treatment after 15 months. One other patient improved gradually and in about 6 months was clinically arrested. The remaining patient became almost clinically quiescent in about 5 months, but was not entirely clear after a year's treatment. It would appear that the use of N-acetylsulfamethoxy-pyridazine has very little effect on severe sulfone-resistant lepromatous leprosy.—N. D. FRASER

Consigli, C. A., González Becerra, W., Castoldi, F., Camponovo, P. and Vazquez, C. A. Tratamiento de la lepra con sulfametoxipiridazina. [Treatment of lep-

rosy with sulfamethoxy-pyridazine (Lederkyn).] *Leprológia* **11** (1966) 88-89.

Results with sulfamethoxy-pyridazine in 6 lepromatous patients were described. Tablets of 500 mgm. and a suspension of 250 mgm./ml., given intramuscularly were used. The regimen was 1 tablet a day or 500 mgm. intramuscularly every other day. Follow-up was from 12 to 17 months. No lepra reaction was induced in any patient. Clinical improvement was recorded in 5 patients. Both morphologic and number indices were reduced in all patients. Smears were negative in 2 of them at the end of experiment. Injection seemed superior to the oral route.—E. D. L. JONQUIÈRES

Baccaredda-Boy, A., Bertamino, R. and Farris, G. La Kelfizina nella terapia della lepra. [Kelfizine therapy of leprosy.] *Dermatol. Internat.* **6** (1967) 109-111.

Kelfizine (sulfamethoxy-pyridazine) has a favorable effect on leprosy clinically and bacteriologically with a low degree of toxicity. In only one case did a lepra reaction force discontinuance of use of the drug.—AUTHORS' SUMMARY

Ramanujam, K. Sulforthomidine (Ro 4-4373) in the treatment of lepromatous leprosy. *Leprosy in India* **39** (1967) 95-99.

Seventeen cases of active lepromatous leprosy, comprising 14 adults and 3 children, were treated with sulforthomidine in doses of 0.5 gm. once a week for periods from 21 to 81 weeks. The results of assessment in 16 of these cases under treatment for 42 weeks were not encouraging. Complications, such as acute exacerbation of the disease and neuritis, occurred in 11 of these 16 cases. A fall in the total white cell count was noted in one case.—AUTHOR'S SUMMARY

Reyes-Javier, P. Calcium phenyl-butazone (Pyrazon) in reactive episodes of leprosy. *Philippine J. Leprosy* **1** (1966) 58-80.

Pyrazon deserves to be placed among the auxiliary methods of treatment in reactive episodes of leprosy. Given at the right time, with the right dose and an ample

period of treatment, it will be of much help in the subsidence of reactions. It can be used safely with specific antileprotic drugs and INH, producing better results. Better results were obtained in reactive tuberculoid leprosy than in borderline and lepromatous types. This probably supports the theory that only the reactions in the tuberculoid form belong to the allergic group. In borderline and lepromatous cases, the softening of infiltration and consequent relief from cutaneous sensibility of heaviness and pressure, the fading of the color of the lesions and the relief from constitutional symptoms, including arthralgias and neuralgias, were enough to cause content, stimulate hope and build up the morale of the patients. Occurrences of erythema nodosum lesions, although mostly mild in character, in a few cases, are still problems to be solved. The few side reactions of epigastric pain and discomfort can be avoided by giving antacids simultaneously, and of edema of the face or extremities by diuretics. Giving phenylbutazone should not create anxiety or fear on the part of the physician as long as proper precautionary measures and careful continuous observations are made.—AUTHOR'S ABSTRACT

Wilkinson, F. F., Gago, J. G. and Santabaya, E. Proteolisis de órganos con complejo vitamínico B en reacción leprotica lepromatosa con predominio ganglionar. [Proteolysate of organs with vitamin B complex in the treatment of lepra reaction with predominance of adenitis.] *Leprológia* 11 (1966) 80-83.

A proteolysate was used, consisting of lysate of liver, spleen, lymphatic glands, lungs, suprarenals, and bone marrow, 687.5 mgm., vitamin B, 6.25 mgm., vitamin B₂, 0.50 mgm., vitamin B₆ 0.25 mgm., nicotinamide, 12.50 mgm., calcium pantothenate, 2.50 mgm., sodium phosphate, 4.17 mgm., and distilled water, 2 ml. Daily injections up to 30 ampoules were given. Thirty patients with lepromatous lepra reaction were treated. Some relief was noted in the reactional adenitis, but the lepra reaction itself was not modified. No controls were used.—E. D. L. JONQUIÈRES

Bergel, M. The effect of prooxidant diets

on some experimental mycobacterial infections. *Leprosy Rev.* 39 (1968) 15-21.

Mice fed prooxidant diets, with cod liver oil or linseed oil, gain weight just as well as those fed with standard diets. Mice fed with prooxidant diets, high in unsaturated fatty acids and low in vitamin E, become more susceptible to infections produced by the inoculation of *M. tuberculosis* Vallee, BCG (Phipps) and *M. fortuitum* Penso. Mice fed prooxidant diets are as resistant to staphylococcal, Friedlander and lipopolysaccharide infections as animals which are fed pellets.—AUTHOR'S ABSTRACT

Ojha, D. and Singh, G. Apamarga (*Achyranthes aspera*) in the treatment of lepromatous leprosy. *Leprosy Rev.* 39 (1968) 23-30.

A controlled clinical trial is reported of Apamarga (*Achyranthes aspera*) in the form of a decoction of the whole plant prepared by the methods described in the classics of Ayurveda, administered orally to a number of patients with the lepromatous type of leprosy for a period of 12 months. Thirty-six advanced, infiltrated and nodular type lepromatous leprosy patients who had had no previous treatment, were selected and included in this trial from the leprosy clinic of S.S. Hospital, Varanasi, India. These patients were assigned equally to different groups at random. The groups were given: (A) a decoction of the whole plant of *Achyranthes aspera*, (B) dapsone, (C) a decoction of the whole plant as well as dapsone. The article is illustrated with a drawing of the plant, and photographs showing progress in three patients; statistical results are set out in four tables, and other details in graphs and bar diagrams. All the patients, irrespective of the group, showed clinical improvement with a definite suggestion that those who received DDS alone made more clinical progress than those who received the decoction alone and the patients on combined therapy made still better clinical progress than those who received the drugs separately. Group A showed no improvement in their BI; indeed most of them showed slight deterioration. Groups B and C showed definite improvement in their BI, C being

better than B. Improvement in general health was observed in all the patients on the decoction, but not in those on DDS alone. The authors drew the following conclusions: (1) the decoction is clinically effective in the treatment of leprosy; (2) it potentiates the antileprosy action of DDS; (3) it prevents reaction in leprosy; (4) it produces no toxic manifestations.—N. D. FRASER

Ojha, D. An indigenous drug "Bhallataka" (*Semecarpus anacardium*) in the treatment of leprosy. *Leprosy in India* 39 (1967) 165-173.

A controlled clinical trial is reported of oil of *Semecarpus anacardium* alone, oil of *Semecarpus anacardium* in combination with DDS therapy, and DDS alone, in the treatment of pure lepromatous leprosy. Twenty untreated and advanced cases

were included and the final analysis was made on 18 cases, studied for 1 year, 6 cases in each group. During the whole treatment period a statistically significant (at the 0.1% level) deterioration was seen in the lesion index (LI) and bacterial index (BI) in the cases on the oil of *Semecarpus anacardium*, but improvement in general health was observed in these cases. On the other hand the cases on DDS alone and on combined treatment, improved clinically and bacteriologically; the improvement in general health, however, was seen only in the cases on combined treatment. It is therefore concluded that oil of *Semecarpus anacardium* would be a useful adjunct to treatment of leprosy. The additive action of this oil may be due to its anthelmintic action, as also possibly to its "Rasayana" action (promoting growth and vitality).—AUTHOR'S SUMMARY

Surgical Treatment and Surgical Specialties

Dastur, D. K. The ulnar and median nerves in leprosy. Electromyographic, operative and pathological aspects. *Leprosy in India* 39 (1967) 107-109.

Sixty muscle biopsy specimens were examined. Multiple muscle biopsies from any one patient permitted comparisons of the varying grades of neurogenic atrophy observed. Otherwise the histologic details of this atrophy were identical to those described earlier (Dastur, *Neurology (Bombay)* 4 (1956) 1-27). Intramuscular neuritis was again observed, although infrequently, as in the earlier study, being detected now in 10 of the 60 muscles examined histologically. It is especially interesting that in 4 cases, acid-fast bacilli were detected in these muscle nerve twigs. This would support the contention suggested earlier by one of us (Dastur, in *Neuropathology*, edited by Minckler, 1964) that the muscle in leprosy although affected mainly and primarily by damage to the motor nerve fibers in the nerve trunk and main branches, may secondarily also be affected by an ac-

tual extension of the leprous neuritis into the small intramuscular nerves. It may be noted that in none of the cases where methylene blue-stained whole mounts of an affected muscle, or in the one case (C/953) where 4 different muscles were examined for combined cholinesterase and motor fiber pattern, were clear motor end plates or sole plates visualized, even when interfascicular nerves, their branches, and, at times, terminal sprays, were observed. This appears to indicate, as reported earlier (Dastur, 1956), that the terminal part of the motor unit is affected most and first in polyneuritic leprosy, in common with other types of peripheral nerve involvement. The sparing of the muscle spindle from infection and of the fusar fibers from atrophy was confirmed, intrafusal exudate and bacilli being encountered only in one unique instance.—AUTHOR'S ABSTRACT

Castoldi, F., Frontera Vaca, J. L., Temporini, A., Ruggieri, F., Ripoll, H., Rosati, A., Muraschick, I., Paci, P. and Aris, D. Estudio histopatológico y tratamiento

quirúrgico de las úlceras de la piel en el mal de Hansen. [Histopathologic study and surgical treatment of skin ulcers in leprosy patients.] *Leprológia* **11** (1966) 95-97.

In 30 leprosy patients with chronic lep-
rotic ulcers, resection of the ulcer was fol-

lowed by skin grafting and other measures. Sclerosis, faulty irrigation, and secondary chronic infection of these leprosy ulcers make classic local treatment ineffective. Surgical removal and grafting as soon as possible are therefore recommended—E. D. L. JONQUIÈRES

Rehabilitation

Karat, S. Preventive rehabilitation in leprosy. Parts 1 & 2. *Leprosy Rev.* **39** (1968) 39-44.

The author develops the thesis that rehabilitation implies an already debilitated patient, and that with the changing pattern of management of leprosy patients it is inevitable that prevention of debilitation should be the primary step. She then deals with the causes of debilitation under 7 heads: anesthesia, paralysis, morbidity, psychologic causes, inadequacies of present pattern of therapy, isolation and segregation of positive patients, and social prejudice and ignorance. In Part 2, entitled *Medical and Surgical Aspects of Preventive Rehabilitation*, she quotes WHO figures indicating that patients with deformities comprise 20 to 25% of the estimated 10 million patients suffering from leprosy, and gives reasons for the view that it would be ideal if patients could return to their own jobs, their families, and social set-up. A program of training to help such patients overcome their disabilities is designated reeducation for resettlement rather than rehabilitation. Under the heading *Medical Management* emphasis is laid on maintenance of the integrity of the function of peripheral nerves. "Early treatment of even minor hand injuries, with splinting, and provision of microcellular rubber for adaption of tools and for footwear for patients with anesthetic feet should be available for every patient." A simple program of ulcer treatment at the Gudiyatham Taluk led to a 65% reduction in the incidence of ulcers within 2 years, and a drop in unemployment from 66 to 9%. To the patient, deformity is leprosy. Lack of such care to prevent and

treat deformities results in loss of confidence in the doctor's ability to "cure" him with DDS. Under *Surgical Management* the author emphasizes the importance of three major principles: (1) Tendon transfers and plastic operations can be carried out only once, and reoperation on a failed procedure rarely gives satisfactory results. (2) It is not useful to do these operations unless the best possible results can be obtained. (3) The surgeon should resist the temptation to adopt the attitude that "something is better than nothing." Inadequate correction and unsatisfactory postoperative reeducation may result in worse function of the hand, after some years, than in its preoperative condition.—N. D. FRASER

Itoh, M. Preventive rehabilitation for leprosy. A new approach to an old problem. *Internat. Rehab.* **19** (1968) 13-14.

Physical rehabilitation for leprosy deals primarily with the sequelae of neural manifestations of the disease. Pre- and postoperative physical and occupational therapy, orthotic and prosthetic appliances, and patient education, are the main areas of concentration. Conventional rehabilitation technics must always be evaluated before application of treatment in order to prevent trauma. Appliances for leprosy patients should never create concentrated pressure on anesthetic skin areas. Self-help devices are important for the prevention of injury. Leprosy patients may be classified in three groups from the point of view of rehabilitation: (1) those with minimal or no disfigurement, disability or social dislocation, (2) those with moderately ad-

vanced disability and deformity that can be corrected by surgery or other measures, and (3) those with irreversible physical and/or social disabilities. The first group has top priority in modern leprosy rehabilitation. The second requires intensive care and extensive medical and paramedical skill, facilities and material. The last group may require custodial institutionalization; generally, however, under modern conditions maintenance treatment may be provided for patients in this group safely at any clinic, health center, hospital or rehabilitation center. The article reviews the general facts on leprosy and its medical treatment, scientific meetings that have been held under various auspices to develop programs of preventive rehabilitation, and the technics of patient and popular education. —E. R. LONG

Fritschi, E. P., Selvapandian, A. J., Koshy, S. and Radhakrishnan, S. R. A survey of the results of residence in an experimental rehabilitation unit for leprosy patients. *Leprosy Rev.* 39 (1968) 45-49.

This contribution to the problem of rehabilitation needs to be studied in the original paper for both the successes and failures it reports. The authors' conclusions are: (1) The teaching of a vocation that involves a deviation from traditional employment of a person is probably not advisable, except with a view to absorption into some protected industry. (2) Self-employment of patients is the obvious ideal. The provision of oxen and plough to a patient from an agricultural background has been found worthwhile, as his services

were in much demand. (3) Poultry keeping and kitchen gardening can be carried on only if land is available. Where land is available the establishment of small cooperative farming communities is recommended. "If the small communities are taught to take advantage of the assistance now available in the form of improved agricultural methods . . . we believe that their rate of productivity will be higher than that of the average village community in spite of the hazards of ulcers and injury which leprosy brings in its wake." —N. D. FRASER

Carnevale, V., Gatti, J. C., Balaña, L. M., Cardama, J. E. and Petri, N. N. Rehabilitación del enfermo de lepra en el hospital general. [Rehabilitation of the leprosy patient in a general hospital.] *Leprológia* 11 (1966) 90-94.

Three eras of attention to leprosy patients in history are noted: (1) segregation, (2) internment, and (3) rehabilitation. It is stressed that rehabilitation finished the labor of preventive and therapeutic medicine, because leprosy will be eradicated when all leprosy patients are rehabilitated in the general hospital. In the Muñiz Hospital of Buenos Aires, 108 patients have been rehabilitated. The authors believe that so-called "chemical isolation" with sulfones and other antileprosy drugs is fully demonstrated and call it "the revolutionary epidemiologic consequence of chemotherapy." They are opposed to internment of patients in special sanatoria, and state that leprosy, as a "disease not different from others," is to be treated in general hospitals. —E. D. L. JONQUIÈRES

Pathology

Nakamura, K. and Maeda, M. Deformity of feet in noninfected healthy mice. *La Lepro* 36 (1967) 158-161. (In Japanese, English summary)

Deformity of feet, e.g., shortening of fingers and absorption of phalanges, was sometimes observed in the hind foot and front foot of mice inoculated in the foot

pad with leprosy bacilli. On the other hand, other kinds of foot deformity were found sometimes in noninfected healthy mice. In the majority the deformity was syndactyly of phalanges, and this was different from the deformity of feet observed in some mice inoculated with leprosy bacilli. This deformity was observed in 1.6% of healthy mice of the dd-strain, and in 0.1%

of healthy mice of the ddN-strain, but no deformities were observed in mice of ICR-, C3H/He- and hybrid offspring of the C3H and ddN-strains. The hereditary factor was investigated by inbreeding of mice with these deformities. Results indicated that mice of the dd-strain have a genetic kind of response that induces the deformity of phalanges.—[From authors' abstract]

Nakamura, K., Maeda, M. and Murayama, K. Deformity of feet in mice inoculated with *M. leprae* in the foot-pad. *La Lepro* 36 (1967) 162-169. (In Japanese, English summary)

Deformity of feet, e.g., shortening of fingers and absorption of phalanges, was observed in 19 (6.5%) of 291 mice of the dd-strain more than 3 months after the subcutaneous inoculation in the foot pad of *M. leprae* from 4 untreated leprosy patients, and from one treated patient. These deformities were observed mainly in the hind foot, but the front foot was also involved in 2 of the mice that showed deformity, although the organisms had been inoculated in the hind foot only. The mice were kept under observation for a period of 2 years, but no deformity other than those noticed during the first 3-6 months could be observed. Histopathologically the degeneration of phalanx-bones, with increase of osteoblasts and periosteal tissue, was observed; there was hardly any inflammatory response to infection. In order to investigate the cause of these deformities, Mitsuda antigen, saline emulsions of human skin, and the skin of some animals, adjuvants, oil, Tween 80, gum arabic, polyethyleneglycol, albumin, casein, dextran, cellulose, mucin and enzymes, were injected subcutaneously into the mouse foot pads. No absorption of the phalanx-bones resulted, and no deformity except necrosis of local tissue from the injection of foreign material. However, swelling of the foot pad at the site of inoculation was observed on injection of *M. lepraemurium*. Inoculation of other mycobacteria into mouse foot pads induced no deformities. Injection of mycobacteria and adjuvant mixtures caused deformity only in the case of *M. fortuitum*, giving rise to abscess formation and absorp-

tion of phalanx-bones. These deformities were different from the findings of feet observed in mice inoculated with *M. leprae*. Among noninoculated control mice living in the same cages as the inoculated deformed mice, no deformities could be observed, a fact indicating that the process was not infective in nature. The above experiments were performed with 5 strains (dd-, ddN-, ICR-, C3H, and hybrid offsprings of C3H- and dd-strain) of mice. Of those, only mice of the dd-strain showed deformities as a result of foot pad inoculation with *M. leprae*. This fact indicates that hereditary factors may be involved in the causation of these deformities. The genetic aspect is now being further investigated by breeding the mice of dd-strain in which the deformity had been observed. These experiments show that the causation of the deformities in the dd-strain of mice is probably a phenomenon specific to *M. leprae*.—[From authors' abstract]

Nakamura, M. Mouse footpad swelling phenomenon by inoculation of mycobacteria. *American Rev. Resp. Dis.* 97 (1968) 24-31.

It has been found that the mouse foot pad became swollen approximately one week after subcutaneous inoculation of some mycobacterial strains. The 100616 strain of nonphotochromogens was extensively studied in this animal model. Some characteristics of the foot pad phenomenon were as follows: (1) the reaction was not a type-specific but a strain-specific phenomenon of mycobacteria; (2) the substance causing this swelling was contained in the cell wall fraction of the bacteria and was relatively thermostable; and (3) it appeared that the mechanism of the reaction might not belong to the delayed-type of tuberculin allergy because there was no relationship between grades of swelling and disease development in mice. —
AUTHOR'S SUMMARY

Paradisi, E. R., de Bonaparte, Y. P. and Morgenfeld, M. C. Blasts in lepromatous leprosy. *Lancet* 1 (1968) 308-309. (*Letter to the Editor*)

Writing from the Angel H. Ruffo Instituto de Oncología, Buenos Aires, Argentina, the authors report a statistical investigation on lymphocyte reactivity to phytohemagglutinin (PHA) in 17 ambulatory patients with lepromatous leprosy, comparing them with 16 patients suffering from malignant lymphomas and with 11 healthy controls. The results, expressed as the percentage of "blast" transformation, were as follows:

Group	No.	% of blasts	P(difference from controls of t test)
Lepromatous leprosy	17	32	> 0.001
Lymphomas	16	33	> 0.001
Controls	11	62	—

The patients with active lepromatous reactions shared a mean transformation-rate of 26%, and those without reactions had a rate of 41%. The small number of cases studied does not permit definitive statistical conclusions. The authors raise a number of questions as to possible implications of these findings, particu-

larly if the diminished reactivity of the lymphocytes is an important factor in the pathogenesis of lepromatous leprosy or merely another consequence of the attack by *M. leprae* on the reticulo-endothelial system.—N. D. FRASER

Gelfand, M. Lymphoma cutis. Report of a case. *Central African J. Med.* 13 (1967) 285-287.

A case is reported of generalized skin lymphoma, in the form of large nodules, in which the gross aspect of the lesions first suggested leprosy. The patient was on DDS therapy until a biopsy established the diagnosis of lymphoma.—E. R. LONG

Serial A. and Enríquez, A. E. Degeneración hialina en neuritis hanseniana lepromatosa. [Hyaline degeneration in lepromatous neuritis.] *Leprológia* 11 (1966) 103-104.

Hyaline degeneration is seen in both lepromatous and tuberculoid leprosy, particularly in nerve trunks, being exceptional in the skin nerves.—E. D. L. JONQUIÈRES

Bacteriology and Immunology

Nakamura, M., Imaizumi, T. and Komai, S. Isolation of *M. lepraemurium* from infected tissues by petroleum ether treatment. *La Lepro* 36 (1967) 137-139. (In Japanese, English summary)

Isolations of *M. lepraemurium* by chloroform and petroleum ether treatments, from mouse foot pads experimentally inoculated with definite numbers of bacilli, in comparison with Shepard's method, were attempted. Among the three methods, an isolation method by petroleum ether was somewhat more effective than others. In addition, the petroleum ether method was advantageous for obtaining live microorganisms from the tissues. Therefore this method might contribute to experiments for isolation of acid-fast bacilli from large amounts of experimental or natural materials from human or animal tissues.—AUTHORS' ABSTRACT

Oiwa, K. A new approach to the cultivation of *Mycobacterium lepraemurium* in metabolically active, cell-free medium. *La Lepro* 36 (1967) 170-174. (In English)

Trial was made of a new method of cultivation of *M. lepraemurium* in which the mycobacteria were adsorbed on silicone-coated microscopic slides, which were placed in a cell-free medium to which freshly prepared host cell filtrate was added. The slides were taken out of the medium after 24 hours, and placed in new medium of the same composition. The procedure was repeated 6 times a week, and growth of the mycobacteria was checked with a magnifying lens, with photography every 4 weeks. In the method the Kumamoto strain of *M. lepraemurium* was injected intratesticularly in mice to furnish in-

fectured tissue for the study. Silicone-treated slides were made by the method of Higashi. The medium used was a phosphate-buffered one containing magnesium sulfate, ferric citrate, asparagine, glutamine, sodium glutamate, casamino acids, succinic acid, glucose, sucrose, yeast extract, cytochrome C and ATP. The host cell filtrate added to this medium was made from young healthy mouse brain that had been homogenized, subjected to freezing and thawing, centrifuged and filtered. In actual practice one drop of trypsinized bacterial suspension from infected tissue was placed on a silicone-treated slide and dried at room temperature, before attempted growth in the medium described. No growth occurred in a number of media used for control. In contrast, growth occurred in the medium described. This was first observed with a magnifying lens at about 20 weeks. Ivory white patches of bacilli visible to the naked eye were seen at 32 weeks. Microscopically numerous groupings of acid-fast bacilli were seen. Animal inoculation is still to be carried out—E. R. LONG

Shepard, C. C. and Saitz, E. W. Lepromin and tuberculin reactivity in adults not exposed to leprosy. *J. Immunol.* **99** (1967) 637-642.

Seventy-three adult male volunteers were skin-tested with lepromin, tuberculin and other antigens. All of them had late (Mitsuda) reactions to lepromin greater than 4 mm. in diameter, and many had strong reactions. Sensitivity to tuberculin had little influence on the size of the lepromin reactions, an indication that in this group lepromin reactivity had not often arisen from exposure to tubercle bacilli or other mycobacteria. Since the subjects of the study were residents of areas of the United States in which leprosy was not endemic, it was unlikely that any had been exposed to leprosy. Thus, although lepromin reactivity was well developed in these men, its origin is unexplained. —[From authors' summary]

Bullock, W. E. Studies of immune mechanisms in leprosy. I. Depression of delayed

allergic response to skin test antigens. *New England J. Med.* **278** (1968) 298-304.

Skin tests of delayed hypersensitivity, performed on 107 patients with leprosy and 30 controls, with 6 protein antigens and the haptene picryl chloride, indicated that leprosy is associated with a generalized depression of the delayed allergic inflammatory response. The depression is of greatest severity in patients with lepromatous leprosy, and is less among tuberculoid patients. Patients were assigned to groups according to time under therapy with diaminodiphenyl sulfone, and the results of skin tests were compared. There was a significant progression toward "normal" reactivity to skin-test antigens in "long-term" as compared with "short-term" treatment groups. This trend was more evident among lepromatous patients; the possible salutary effects of chemotherapy upon skin reactivity were defined less sharply in tuberculoid patients. Attempts to establish primary sensitization to picryl chloride failed in a high percentage of patients with leprosy as compared with controls, regardless of type of disease or stage of convalescence. Factors directly related to the pathologic process itself appear to act, at least in part, as determinants of immunologic reactivity in leprosy.—AUTHOR'S SUMMARY

Kanaar, P. Tissue reactivity to tuberculin and ink in lepromatous leprosy, with respect to the "isopathic phenomenon." *Dermatol. Internat.* **6** (1967) 11-18.

In 7 patients with lepromatous leprosy the histopathologic evolution of reactions to intradermally-injected tuberculin and India ink was studied in a series of biopsy samples obtained after increasing time intervals. Additional observations were made in 14 other patients. No evidence of a specifically-altered tissue reactivity ("isopathic phenomenon"), as described by Sagher *et al.*, could be observed. Lepromatous structures in the tissue obtained by biopsy—if present—could be ascribed to already present lepromatous changes in the normal-looking skin of these patients.—AUTHOR'S SUMMARY

Mayama, A. Studies of erythema nodosum leprosum. 1st report. Immunoelectrophoresis of serum proteins in leprosy. Correlation between the immunoglobulins and the C-reactive protein in leprosy. *La Lepro* 36 (1967) 140-148. (In Japanese, English summary)

One hundred and seventy-one leprosy patients (35 tuberculoid, 8 borderline and 128 lepromatous) were followed, with analysis of the serum proteins, which were analyzed with Scheidegger's microtechnic for immunoelectrophoresis. In most of the tuberculoid cases the levels of serum proteins seemed within normal limits except for 2 cases in reactional stage, in which slightly increased values of α_2 -macroglobulin, γ G- and γ M-immunoglobulins were observed. Remarkable elevations of serum glycoprotein fractions (α_1 -antitrypsin, α_1 -acid glycoprotein, haptoglobin, ceruloplasmin, α_2 -macroglobulin and β -glycoprotein), serum lipoprotein fractions (α_1 - α_2 - and β -lipoprotein), and immunoglobulin fractions were noted in cases of borderline and of lepromatous leprosy. However, a decrease in albumin and transferrin was noted in these cases. The changes became especially noticeable in leprosy reactions. Under such conditions a sharp increase of β_{1c} - and β_{1E} -globulins containing the components C'3 or C'4 of complement was usually observed. In immunoelectrophoretic tracing, the most striking facts were a marked increase of the γ G- and γ M-immunoglobulins, and an exceedingly frequent and prolonged appearance of serum paraproteins in leprosy reactions. Especially, regular interruption of the precipitation line of the γ G-immunoglobulin, itself split into two subfractions: γ G-A and γ G-B were demonstrated in 2 of 8 cases of lepromatous exacerbation. On the other hand, in cases with reactional borderline and 12 of 26 cases with erythema nodosum leprosum, a very fine precipitation line of the γ X-protein (identified by Heremans as C-reactive protein (CRP)) was found parallel to the γ G-immunoglobulin band in the γ -globulin regions, which are absent from normal serum or leprosy serum without reactional stages. Only the CRP-positive sera of leprosy reaction presented this band.

Generally, after the reactive state had subsided, the paraproteins could not be observed, and increased levels of the immunoglobulins returned to pre-reaction levels. The CRP tests in 94 sera with various leprosy types were performed by a capillary precipitation method. The protein was found to be present in 1 of 2 borderline cases, 3 of 45 lepromatous cases without reactional stage, and in 18 of 21 cases of erythema nodosum leprosum, but it was not observed in tuberculoid cases. In lepromatous leprosy with erythema nodosum, the C-reactive protein titer was much higher than those encountered in other leprosy cases. A clear relation was established between the titer of C-reactive protein in the serum and the level of the 19 S γ -globulin in serum fraction components separated by preparative ultracentrifugation in 5 lepromatous patients with erythema nodosum leprosum.—[From author's abstract]

Salazar Mallén, M. and Calderón Manes, S. Presencia en *Mycobacterium lepraemurium* de un antígeno común con *Mycobacterium leprae* y *Nocardia brasiliensis*. [The presence in *Mycobacterium lepraemurium* of a common antigen with *M. leprae* and *Nocardia brasiliensis*.] *Rev. Invest. Salud. Pub. (Mexico)* 27 (1967) 125-128.

Ouchterlony agar plates were arranged with extracts of lepromatous tissue of mice inoculated with *M. lepraemurium* and the group polysaccharide PolyINb from *N. brasiliensis* as antigens, and a lepromatous serum having precipitins for PolyINb. A band of identity was demonstrated between the microbial extracts and PolyINb.—
AUTHORS' SUMMARY

Hauviller, O. A. and Oviedo, C. L. Alergia alimenticia en lepra. [Alimentary allergy in leprosy.] *Leprologia* 11 (1966) 98-99.

Some lepra reactions seem to be initiated or aggravated by foods. This known phenomenon was investigated by the authors by epidermic scarification. When the epidermic test to food was positive, and with exclusion of other positive responses (to fungus, bacteria, etc.), the suppression of

the incriminated food brought about improvement from the lepra reaction.—E. D. L. JONQUIÈRES

Ruge, H. G. S. Treponemal immobilization tests in leprosy. *British J. Venereal Dis.* 43 (1967) 191-196.

Among 420 patients (293 males, 127 females) with lepromatous leprosy from the Philippine Islands, 44 (10.5%) were found to be simultaneously infected with trepone-

matoses. Included were 7 cases of burnt-out yaws with clinical residuals, 2 of latent syphilis, and 35 of burnt-out yaws without clinical manifestations. The investigations were made in 5 consecutive series at intervals of 24 weeks. An average of 1.76 TPI and 4 STS tests (comprising 3 complement fixation tests and 2 flocculation tests) was attained for each patient. Males and females were equally affected.—[From author's summary]

Epidemiology

Lechat, M. F. *Epidémiologie de la lèpre. Aperçu pratique.* [Epidemiology of leprosy. A practical view.] *Acta Leprol. New Series No. 28* (1967) 5-29.

Most of the focusing on leprosy is addressed to specialists. Auxiliary personnel, who constitute an essential element in field campaigns against leprosy, are generally poorly informed on the basic scientific concepts justifying the methods actually in practice in the control of this disease. For this reason the author has tried to set forth in a simple manner, personally adapted to auxiliary personnel, fundamental epidemiologic information on the disease. This focus has been established in order to permit these persons to direct a useful program of health education among populations and community leaders. The prevalence of leprosy is first considered. It is not a rare disease. Statistical data assembled by the WHO and Leonard Wood Memorial are cited. The author stresses the fact that in many countries leprosy is not considered a disease of infrequent occurrence; it seems infrequent only because it is not detected, as indicated by the example of many areas. The history of the disease is noted, with special reference to Europe, the Pacific and the Americas. The actual geographic distribution is reviewed briefly, with emphasis on the fact that leprosy is not a malady limited to tropical countries. The problem of the contagion of leprosy is next considered. The author stresses the fact that the concept of contagion is confused from the

point of view of epidemiology; a series of interrelated factors are concerned, including recognition of an infecting agent, environment, and susceptibility of the host. Leprosy is assuredly transmissible, but many persons exposed to the infection do not contract the disease. An immunologic relationship with tuberculosis is set forth in detail, as well as the utilization of BCG as a prophylactic measure. The possibility of genetic susceptibility or resistance is noted. The difference in risk involved in contact with lepromatous and tuberculoid cases respectively is indicated, with supporting data from studies carried out by Doull and Guinto.—M. F. LECHAT

Leiker, D. L. De ontwikkeling in de lepra-situatie in Nederland tussen 1945 en 1965. [The leprosy situation in the Netherlands, 1945-1965.] *Nedl. Tijdschr. Geneesk.* 111 (1967) 1401-1406.

The total number of leprosy patients resident in the Netherlands during the last 20 years has been estimated at 600. In about 100 cases the diagnosis was never established. About 300 patients still require treatment. Analysis of the data on 450 cases of leprosy in the Netherlands showed that the incidence of new cases among immigrants was highest within 4 years of their immigration. After this the rate fell sharply, until after 6 years new cases were found only sporadically. In nearly all cases the infection had been acquired in the country of origin; a few patients were infected by

relatives in the Netherlands, although only one such case has been established beyond doubt. Endemic leprosy among Dutchmen of Eurasian parentage is declining sharply; among the Amboinese it seems to have disappeared almost completely. Immigrants from the West Indies, however, now are a considerable source of new patients, with a leprosy rate of nearly 1%. Chemotherapy has probably been the main factor in the reduction of endemic leprosy among immigrants. It has caused a rapid percentage increase of deformed bacteria, which are incapable of transmitting the disease. They increase more rapidly than the bacteria eliminated from the body.—AUTHOR'S SUMMARY

Silva, M. S. The struggle against leprosy in Portugal. *Acta Leprol. New Series* No. 28 (1967) 30-61.

A historical sketch is given of leprosy in Portugal. The disease was present when the kingdom was founded; it represented a part of the great endemic of leprosy in Europe in the Middle Ages. Generally isolation in leprosaria was practiced by ruling authorities. In the 16th century the disease appeared to be decreasing, but the prevalence increased again in subsequent centuries. In 1938 the Government instituted new antileprosy measures, with assistance to patients. In 1947 the large leprosarium designated Rovisco Pais Hospital Colony was opened as a center for all antileprosy control work. The services included medical and social assistance for inpatients and patients' children, for whom care was made available in a nursery and preventorium, and sections for dermatology and leprosy consultation, and mobile medical, social and nursing units. The leprosy services are integrated within the Ministry of Health and Assistance. Within the framework an Institute for Leprosy Assistance, in cooperation with a technical Leprosy Council, orients, coordinates and controls the leprosy program. The latter includes diagnosis, therapy, survey and mobile or domiciliary treatment, preventive measures, including

BCG vaccination, research, educational propaganda, and technical training. Approximately 2,700 patients have been or are in residence. Therapy is based on sulfone administration, supplemented by other drugs of recognized value in individual cases. As of 31 December 1966, 2,745 leprosy patients were registered in Portugal; the number included patients from the Azores, Angola, Cabo Verde, Goa, and Mozambique. Male patients slightly exceeded female patients in number. The lepromatous form represented 60 per cent of the cases. The prevalence rate for the population as a whole was 0.318/1,000. The prevalence rate is much higher for overseas provinces than for continental Portugal. Numerous patients with inactive leprosy are still hospitalized for various reasons. About a thousand patients have been discharged from the colony. (*From author's summary*)

Maeda, M. Epidemiological significance of skin reaction to Dharmendra antigen in leprosy survey. *Leprosy in India* 39 (1967) 44-62.

Intracutaneous tests with Dharmendra antigen were made in general surveys in Japan. Inoculation with BCG was found to have more influence than tuberculosis infection in inducing positive conversion of the Dharmendra reaction. Accordingly the role of BCG vaccination and tuberculosis infection must be taken into account in evaluating the findings of a survey with the Dharmendra antigen. *M. leprae* has overlapping antigenicity with that of other mycobacteria. It resembles BCG rather than human type tubercle bacilli in this respect, and BCG vaccination may be more effective than spontaneous tuberculosis as a preventive agent against the onset of leprosy. Reactivity to Dharmendra antigen may be induced by leprosy infection, and positive reaction to this antigen may be the best means of detecting the presence of leprosy in tuberculin-negative cases. Dharmendra antigen reactivity is believed to represent immunity against leprosy. [*From author's abstract*]

Public Health Practice and Prevention

Dharmendra, Noordeen, S. K. and Ramanujam, K. Prophylactic value of DDS against leprosy. A further report. *Leprosy in India* 39 (1967) 100-105.

Investigations of the prophylactic value of DDS against leprosy have been continued (see *Internat. J. Leprosy* 34 (1966) 454-455, abstract). The present report covers findings up to October 1966, i.e., 3.5 years of actual observations. During the entire period of 3.5 years, 60 cases of leprosy, 57 of the nonlepomatous and 3 of the indeterminate type, have been detected in the 632 contacts studied up to October 1966. Of these 60 cases, 41 (including the 3 indeterminates) arose among the 316 contacts in the control group, and 19 among the same number of contacts in the prophylaxis group. This gives an incidence of 13% in the control group, and 6% in the prophylaxis group. The difference in the incidence of the disease in the two groups (6% against 13%) is statistically highly significant ($t = 3.0$, $p < 0.01$). The difference seen in the incidence of the disease in the two groups has been due entirely to the difference seen in this respect in the contacts up to 10 years of age. No difference was observed in the contacts of the age group 11-15; however, the number of contacts in this age group was too small (about 50 in each group) to permit any definite conclusion. The effect of the prophylactic treatment was not evident until 9 months after the start of treatment. It then became evident, and has been maintained throughout the period of observation. Of the 13 cases among the contacts up to 10 years of age, all but 4 occurred in the first year of observation; on the other hand, among contacts of the same age group in the control group, the 33 cases were distributed throughout the period of observation. Thus, the further results obtained since the last interim report have confirmed the earlier finding regarding (1) the protective value of DDS against leprosy, and (2) the need for starting the prophylactic treatment at a very early age in case of intrafamilial contacts. The study was not designed specially

to find out if the prophylactic DDS had any toxic effects on the treated children. However, during the frequent follow-up of the contacts, no obvious signs of toxicity were observed; in particular it may be stated that no drug dermatitis was observed. In 137 of the 316 contacts in the prophylaxis group, DDS treatment has been stopped, as they have completed three years of prophylactic treatment, and their sources have all along been bacteriologically negative. They will now be followed up and periodically examined to see the long-range effect of the prophylactic treatment.—

AUTHORS' ABSTRACT

Wardekar, R. V. DDS prophylaxis against leprosy. *Leprosy in India* 39 (1967) 155-159.

In 1960 a Special Committee of the Indian Council of Medical Research recommended two projects on the prophylactic use of DDS, one under Dharmendra (preliminary survey reported in *Leprosy in India* 37 (1965) 447-467; abstract in *Internat. J. Leprosy* 34 (1966) 454-455), and the other under Wardekar, here reported. The first survey showed the results of DDS prophylaxis for periods ranging from 9 to 20 months, and the second for periods from 21 to 31 months. In the first survey an incidence of leprosy of 2.53/1,000 was found among persons under 25 years of age in the prophylaxis group, and of 4.79/1,000 in the controls. In the second survey, covering 95% of the population examined, an incidence of leprosy of 1.17/1,000 was found in the prophylaxis group and 5.35/1,000 in the controls. The results of the second survey, in contrast to those of the first, were found on calculation to be highly significant. The author concludes that DDS is effective as a prophylactic against leprosy even when used on a mass scale in highly endemic areas. It is considered essential, however, to continue the program for 5 to 7 years more to determine if long-term results are equally encouraging.—

E. R. LONG

Brown, J. A. K., Stone, M. M. and Sutherland, I. BCG vaccination of children against leprosy in Uganda: Results at end of second follow-up. *British Med. J.* 1 (1968) 24-27.

A total of 19,169 children, all contacts or relatives of known leprosy patients, and all free of leprosy lesions, were included in a controlled trial of BCG vaccination against leprosy in Uganda, and have now been followed for an average of 3.5 years; 172 cases of early leprosy lesions have so far developed among them. The great majority of the children were allocated initially by an effectively random process to a BCG-vaccinated and an unvaccinated group; 94% were seen and examined for leprosy during the first round of follow-up visits, and 91.5% during the second, with suitable precautions in both rounds to ensure unbiased assessments. The percentage reduction in leprosy incidence in the BCG-vaccinated group was 87%. The percentage reduction was similar for those with weak degrees of tuberculin sensitivity initially and for those with negative tuberculin reactions, and did not appear to depend upon the age at vaccination. Among those who developed leprosy lesions there was a slight tendency for the untreated lesions to progress, or to come under treatment, less frequently, and to regress more frequently, in the BCG-vaccinated patients than in the corresponding group of unvaccinated patients, but the differences could well be due to chance. The incidence of leprosy in the unvaccinated children varied with their initial sensitivity to tuberculin. Those with negative tuberculin reactions had the highest subsequent incidence of leprosy, those with weak degrees of naturally acquired tuberculin sensitivity the next highest, and those with strong degrees of tuberculin sensitivity the lowest subsequent incidence of leprosy. The findings of the trial to date are consistent with the interpretation that BCG confers substantial protection against early forms of leprosy, that natural tuberculosis infection also confers some protection, but that infection with nontuberculous mycobacteria (other than the leprosy bacillus) confers little or no protection.—AUTHORS' SUMMARY

[Editorial] BCG vaccination against leprosy. *British Med. J.* 1 (1968) 4-5.

This editorial, published in the same journal issue as the article on BCG vaccination noted in the preceding abstract, reviews the history of attempts to vaccinate against leprosy with BCG, and summarizes data in previous articles by Brown and Stone published in *Leprosy Review* in 1963 and the *British Medical Journal* in 1966 (abstracts in *THE JOURNAL* 32 (1964) 90 and 34 (1966) 342). The editorial emphasizes the relation of the development of leprosy in unvaccinated children to their initial tuberculin sensitivity, marked by an inverse relationship between the incidence of leprosy and the degree of natural tuberculin sensitivity. Strong tuberculin sensitivity apparently confers considerable protection, an indication that natural tuberculosis affords some protection against leprosy. The author notes that much is still to be learned of the protective value of BCG vaccination against the more severe forms of leprosy.—E. R. LONG

Karat, A. B. A., Job, C. K., Karat, S., Rao, G. S. and Rao, P. S. S. Domiciliary treatment programme. Absentee survey. *Leprosy in India* 39 (1967) 180-189.

Absenteeism among leprosy patients under treatment is a common and major problem in leprosy control and in domiciliary treatment programs. It is estimated that leprosy cannot be controlled as a public health problem unless there is 80-90% attendance at clinics. A sample survey on the problem was made through the Brahmapuram Center, which serves a population of 8,914 persons in 6 villages. For survey purposes patients with less than 50% clinic attendance were considered "absentees." The survey showed that absentee patients have poor knowledge of the nature of leprosy, and its course, spread, treatment and prevention. Stigma and prejudice in their communities were significant factors affecting their attitude. Refusal to accept the diagnosis of leprosy in its early stages was a principal cause of absenteeism. Motivation toward treatment was weak. In the absence of deformities, patients tended to relate early symptoms to other causes. Relatively

few lepromatous patients were found among the absentees. This is fortunate, as these are the patients most likely to spread the disease. The study brought home emphatically the great need for intensive health education among patients, and for understanding of the serious consequences of lack of treatment.—E. R. LONG

Bhattathiripad, T. N. N. Results of leprosy control measures by the application of S.E.T. method. *Leprosy in India* 39 (1967) 118-127.

Two areas, one imaginary and the other real, have been taken up to find the course the events may take if the so-called S.E.T. work is started in a given area. Both show that the total infectiousness becomes reduced, first rapidly and then very slowly. It takes decades for the infectiousness to reach levels of no real consequence. Even

after 12 years of intensive work in a particular area the incidence rate is not affected to any extent. It is a slow process and decades of dedicated work are necessary to achieve effective control. There is no justification for rushing through the program and no center should be shifted before it has worked there at least for a few decades. No integration must be attempted prematurely, as that will defeat the purpose itself. Leprosy workers will be able to detect cases better and to persuade such cases to take treatment more often than other health staff who have no particular interest in leprosy as such. Frequent change of personnel from one center to the other should be discouraged. Leprosy workers, especially at the peripheral level, must establish intimate contact with the people and the patients and then only will be able to persuade them to cooperate with the scheme.—[From author's abstract]

General and Historical

Møller-Christensen, V. Evidence of leprosy in earlier peoples. Chap. 22 in *Diseases in Antiquity*. Brothwell, D. and Sandison, A. T., Eds. Springfield, Ill., Charles C. Thomas, Publisher, 1967.

The best way to obtain definite evidence of the occurrence of leprosy in people of previous epochs is to look for certain changes characteristic of leprosy in bones of old graveyards. Skull changes are the most characteristic; they include anomalies of pyriform nasal aperture, the anterior nasal spine, and other changes in the bones of the nose, and abnormalities in the maxillary alveolar process and the hard palate. Other more or less pathognomonic changes may be found in the long bones and bones of the hand and feet. The author documents these with abundant reference to his own work and that of others. Most of the archaeological material available for such studies is now in museums and universities. A cranium displaying the characteristics of *facies leprosa* furnishes a good starting point for study. The author submits a table summarizing what has been learned of the

occurrence of leprosy in various early populations through study of 18,576 bony specimens in various institutions. The largest number by far of specimens believed to represent leprosy is from Denmark, in material well worked over by the author and his colleagues. Attention is called to the great rarity of leprosy specimens in mummified material from Egypt and Palestine, a fact of some importance in relation to the frequent descriptions of what has been translated as "leprosy" in biblical accounts. Some of the nonmedical Egyptian papyri describe a disease recorded by the equivalent of *sbh*, which, like *tsara'at*, has been translated into Greek as *lepra*. The author is doubtful as to the identity of either *tsara'at* or *sbh* and leprosy. Notation is made of 9 cases of leprosy in England, the oldest going back to about 600 A.D. and one case of the neolithic period (about 1,000 A.D.) in France.—E. R. LONG

Whitehead, F. L. Leprosy in New Brunswick. The end of an era. *Canadian Med. Assoc. J.* 97 (1967) 1299-1300.

Leprosy first appeared in New Bruns-

wick in 1815. The first known case was that of a French woman, whose mother, a native of Quebec, had 19 children. The two eldest and the sixteenth had leprosy. A number of cases of leprosy were apparently contracted from contact with these cases. The course of infection in the first known case, however, was never determined with certainty. In 1844 a lazaretto on Shelldrake Island had 18 leprosy inmates. A new lazaretto was established in Tracadie in 1849. After 1844, 330 patients were treated at the

Tracadie Leprosarium, 291 of them from New Brunswick. In the years preceding 1948 the basic treatment consisted of administration of esters of chaulmoogra oil. In 1948 treatment with the sulfone drug Dapsone was put into practice. The last patients to enter the leprosarium came in 1937. The discharge of the last surviving patient in 1965 marked the end of an era when leprosy was endemic in New Brunswick.—E. R. LONG

Other Mycobacterial Diseases

Siltzbach, L. E. Sarcoidosis and mycobacteria. *American Rev. Resp. Dis.* 97 (1968) 1-8. (*Editorial*)

Currently there is a shift away from the traditional view of a possible tuberculous etiology of sarcoidosis. At present the problem of sarcoidosis centers more around the increasingly reported instances of the isolation of "atypical" mycobacteria from non-caseating granulomas in patients meeting current criteria for the diagnosis of sarcoidosis. The acid-fast organisms isolated are almost invariably from lungs and lymph nodes, i.e., the two organs most commonly the seat of mycobacterial infections. Relatively rarely have acid-fast bacteria been isolated from the granulomas of ocular, salivary gland, cutaneous, and striated muscle sarcoidosis. The question has been raised if tubercle bacilli and "atypical" mycobacteria found to be associated with sarcoidosis are commonly recognized species or some unusual variants of these mycobacteria. Immunologic studies have failed to clarify the question whether mycobacteria constitute primary inciting agents of sarcoidosis or are evidence of increased vulnerability to such infections in patients who have already acquired sarcoidosis. Also the question has never been answered satisfactorily as to whether sarcoidosis is a single disease or syndrome of many granulomatous disorders. It is now generally accepted that Kveim reactivity represents a specific responsiveness almost limited to sarcoidosis. The basic question remains if patients

with clearly defined sarcoidosis confirmed by tissue biopsy and Kveim test are suffering from a hitherto unknown type of mycobacterial infection in which organisms are difficult to demonstrate.—E. R. LONG

Bates, J. H. A study of pulmonary disease associated with mycobacteria other than *Mycobacterium tuberculosis*: clinical characteristics. XX. A report of the Veterans Administration—Armed Forces Cooperative Study on the Chemotherapy of Tuberculosis. *American Rev. Resp. Dis.* 96 (1967) 1151-1157.

In 1963 the Veterans Administration undertook a prospective study to collect clinical and laboratory information regarding pulmonary mycobacteriosis. The present report contains an analysis of the clinical features observed in 199 patients who had pulmonary infection associated with mycobacteria other than *M. tuberculosis*. There were 121 patients excreting Group I strains, 60 excreting Group III strains, 9 excreting Group IV strains, 2 excreting Group II strains, 3 excreting Group III strains different from other Group III bacilli, and 4 excreting strains that appeared "unique." The patients observed, especially those infected with Group III strains, were generally older than the average veteran. Roentgenographic findings showed that most patients in all categories had moderately or far advanced disease when first diagnosed. The chemotherapy and selection of patients for surgery varied at each

institution. Surgery was performed in 21% of patients with Group I infections and 38% of patients with Group III infections. The risk of surgical complications was acceptably low. Although pulmonary mycobacterioses tend to follow a progressive course of lung involvement, only 6 of 37 deaths that occurred in the two major categories of patients were a result of mycobacterial disease.—AUTHOR'S SUMMARY

Geraci, J. E., Anderson, M. W. and Karlson, A. G. Endocarditis due to a rapidly growing chromogenic mycobacterium. *Proc. Mayo Clin.* 43 (1968) 124-133.

We have reported a patient with endocarditis caused by a rapidly growing chromogenic *Mycobacterium* of Runyon's group IV. The organism was sensitive to streptomycin and the patient was given 1 gm. of this drug daily for 166 consecutive days. He became well and afebrile, and blood cultures were rendered negative for 9 months after cessation of therapy. Then bacteremia and symptomatic relapse occurred; the microorganisms were again found to be sensitive *in vitro* to streptomycin. Thereafter the patient has received 1 gm. of streptomycin three times a week for 1 year (up to November 1967). He remains well and vigorous, with negative blood cultures and without change in cardiac status. Eventual cure of this form of bacterial endocarditis may require prosthetic valve replacement after excision of the infected valve. At this writing the patient has had intermittent active infection for more than 3 years.—AUTHORS' SUMMARY

Could, W. M., McMeekin, D. R. and Bright, R. D. *Mycobacterium marinum* (*balnei*) infection. Report of a case with cutaneous and laryngeal lesions. *Arch. Dermat.* 97 (1968) 159-162.

The cutaneous granuloma caused by *M. marinum* (*balnei*) is generally a localized infection acquired by abrasion of the skin during swimming in contaminated water. It usually runs a benign course, many cases healing by spontaneous resolution in several months. Infrequent reports of such infec-

tions are found in the literature depicting variations from this pattern. The authors have followed a 32-year-old male patient with an unusual infection caused by this organism since June 1962, and report the following variations. The disease, which began as a localized process, progressed to a widespread cutaneous disorder. The duration of the active disease extended over 14 years. Laryngeal granulomas developed during the course of the disease and are believed to represent extracutaneous lesions caused by *M. marinum* (*balnei*) although this was not proved by culture. There was slow improvement following the use of isoniazid (INH) and streptomycin.—E. R. LONG

Schaefer, W. B. Incidence of the serotypes of *Mycobacterium avium* and atypical mycobacteria in human and animal diseases. *American Rev. Resp. Dis.* 97 (1968) 18-23.

Three hundred and one strains of nonphotochromogenic and scotochromogenic atypical mycobacteria isolated from sputum specimens of human patients with bronchopulmonary diseases, 153 similar strains isolated from cervical lymph nodes of children, and 238 strains of nonphotochromogenic mycobacteria isolated from cattle, swine, and birds were identified serologically by their specific agglutination and classified into 20 serotypes. All strains of *M. avium* belonged to two serotypes, I and II. Type II was predominant. The serologic identification of *M. avium* was in accord with the results of the pathogenicity test in the chicken, although nonpathogenic strains of *M. avium* were also found. The frequency of occurrence of *M. avium* serotypes varied with the countries. Fourteen of the 18 serotypes other than *M. avium* were encountered not only in man but also in cattle and swine. Two serotypes accounted for half of all strains isolated from cervical lymph node infections in children. The value of serotyping for the diagnosis of *M. avium* is discussed, and the significance of serotyping for the study of the epidemiology of the atypical mycobacteria is indicated.—AUTHOR'S SUMMARY