

## CURRENT LITERATURE

*It is intended that the current literature shall be dealt with in this department. It is a function of the Contributing Editors to provide abstracts of all articles published in their territories, but when necessary such material from other sources is used when procurable.*

TAKIGAWA, K. [An epidemiologic study of leprosy in Japan.] *Igaku Kenkyu* (Fukuoka) **29** (1959) 1427-1437 (in Japanese; English summary).

The gist of the English summary appended to the paper is as follows: At the beginning of this century, the number of deaths from leprosy amounted to above 2,000 (4.8 per 100,000 persons); it declined gradually to only 13 in 1957 (0.01 per 100,000). However, these figures do not show the actual decline rate of leprosy mortality, because in recent years most of deaths occurring in the leprosaria have been reported as due to the immediate causes of death rather than to leprosy. The number of deaths in leprosaria has not declined in recent years. Male deaths are more than twice the number of female deaths. In the Meiji era the deaths occurred most frequently at ages 20-39, in recent years they are most frequent at ages 30-49. The number of cases reported in 1947-1950 was 600-780 annually, but since 1951 it has declined to 280-490. Leprosy is relatively more numerous in the southwestern regions than in the northwestern parts of the country. The number of cases reported in children under 10 years of age has markedly declined since 1953. The number of patients living in the home amounted to 6,681 in 1930-1933, but it decreased to 1,223 in 1955. On the contrary, the number of cases hospitalized increased remarkably from 1,737 cases in 1925 to 10,319 in 1955. The total number of cases decreased gradually from 30,393 in 1904 to about 15,000 in 1955, most of them adults over 20. Although the incidence is declining, new cases are still occurring.—[From abstract in *Trop. Dis. Bull.* **58** (1961) 458.]

[VIET NAM] *Lèpre*. [Leprosy.] *Rapp. Fonct. Inst. Pasteur Saigon*, 1959, pp. 25-30.

The epidemiologic observations of Litalien, made on 5,280 new patients in the Saigon-Cholon region during the last 12 years showed that: Among new patients, 3 out of 4 are males. Regarding age, 83% are below 15 years. The tuberculoid form is only slightly more frequent (45.5%) than the lepromatous form (42.3%). The tuberculoid form is more frequent among the Vietnamese, while the lepromatous form predominates among the Chinese. The borderline form represents 1.2%. The percentage of the newly detected patients under 25 years of age decreases from year to year, a fact which seems to indicate a regression of the leprosy endemy. Therapeutic trials with sulfamethopyrazine (7522 R.P. or Sultirene) and with diphenylthiourea (Ciba 1906) are under way.—N. BOURCART

RUSSELL, D. A. Leprosy in Papua and New Guinea. *Papua & New Guinea Med. J.* **4** (1960) 49-54.

A preliminary survey shows the prevalence of leprosy to vary from 3.66 to 36.8 per thousand in the different areas. Lepromatous cases are in the minority, varying from 0.21 to 3 per thousand. The infection appears to have spread from the Solomon Islands to New Guinea, and from Netherlands New Guinea to Papua. The control policy fluctuated until in 1952-53 the Suppression of Hansen's Disease Ordinance was passed, by which all known cases were to be compulsorily segregated whether considered infectious or not; but since 1956 only open cases are sent to leprosaria, and others are treated in villages. In 1958-59 there were 4 colonies in Papua where 231 patients were registered, of whom 128 were discharged as suitable for outpatient treatment, and 307 patients received treatment

outside. In the 7 colonies in New Guinea the corresponding figures were 1,623, 682 and 864. The treatment given is in line with the usual treatment elsewhere. In 1958, WHO gave the author a 6-months' fellowship to study in various centers, and in the light of the experience gathered he discusses future policy of the leprosy campaign. This begins with an assessment of the leprosy problem through Medical Assistants and Infant Welfare Sisters, trained in the recognition and control of leprosy, who detect cases while patrolling the districts. To this is added education of the public with the cooperation of the Department of Native Affairs. Plans for treatment are comprehensive. Outpatients are treated at a "Hansenide Colony," district hospitals, mission hospitals and aid posts. The difficulties of rehabilitation, especially of those who live at great distances from aid posts, are discussed.—[From abstract by E. Muir in *Trop. Dis. Bull.* **58** (1961) 694-695.]

MONTESTRUC, E. L'hospitalisation des lépreux contagieux constitue un acte prophylactique de première importance et doit être pratiquée dans tous pays où elle est possible. [The hospitalization of contagious leprosy patients is a prophylactic measure of primary importance and should be practiced in all countries in which it is possible.] *Rev. Méd. Hyg. Outre-Mer* **30** (1958) 132-134.

The arguments against compulsory segregation of leprosy patients cited at the Belo Horizonte seminar (1958) can easily be refused if one substitutes for it voluntarily hospitalization of contagious patients. The latter has numerous advantages over ambulatory treatment. In infectious diseases, isolation constitutes the primary means of prophylaxis, permitting the protection of the patient and his household from contamination. It is in the hospital that the patient is best cared for; among other things he will benefit from a rational diet. The rehabilitation of the discharged patient is easier, because he knows that he is really being cared for. Finally, not hospitalizing recently-affected and contagious patients closes the door to all scientific research concerning leprosy, which is indispensable. It goes without saying that the conditions of their stay should be made as little disagreeable as possible, and reasonably liberal.—N. BOURCART

BASOMBRIO, G. Profilaxis de la lepra. [Prophylaxis of leprosy.] *Leprológia* **5** (1960) 52-68.

A review of methods of prophylaxis before and after the sulfone era.

The final recommendation is to follow the program approved by the WHO symposium held in Belo Horizonte.—E. D. J. JONQUIERES

McFADZEAN, J. A. and MACDONALD, W. W. An investigation of the possible role of mosquitoes and bed bugs in the transmission of leprosy. *Trans. Roy. Soc. Trop. Med. & Hyg.* **55** (1961) 232-234.

This paper reports failure to demonstrate that mosquitoes and bed bugs can take up *M. leprae* from the skin of a lepromatous patient during a blood meal, or to demonstrate that bacilli can be introduced into the skin of another individual at a later meal. Similarly, attempts to demonstrate a microlepromin reaction in tuberculoid patients following the bite of insects which had fed previously on lepromatous patients also failed. Lepromatous patients showed no delayed reaction to mosquito bites, in contrast to tuberculoid patients and healthy volunteers. It is suggested that this finding may parallel the absence of a lepromin reaction in patients with lepromatous leprosy. Whether or not a mosquito has had a previous blood feed does not influence the size of the delayed reaction to their bites in healthy volunteers.—[From abstract in *Leprosy Rev.* **32** (1961) 297.]

RIORDAN, D. C. The hand in leprosy—a seven-year study. Part I. General aspects of leprosy. Part II. Orthopaedic aspects of leprosy. Part III. (On reconstructive surgery of hand deformities in leprosy; to be published.) *J. Bone & Joint Surg.* **42** (1960) 661-690.

In a concise but thorough fashion the author neatly summarizes much of the present knowledge of leprosy, first the disease in general, than as it affects the hand. Part I

includes: historical background; etiology; epidemiology; classification; diagnosis; details of lepromatous and tuberculoid leprosy with regard to lesions of the skin, mucous membranes, viscera, eye, and nerve; reactive episodes; and medical treatment; with a good 56-item bibliography. Part II includes leprosy osteitis; periostitis; bone absorption; charcot joints; and osteomyelitis. Part III, which has not yet appeared in print, will deal with reconstructive surgery.—J. A. ROBERTSEN

MERKLEN, F. P., BLOCH-MICHEL, H., RIOU, M. V., BENOIST, M. and COPHIGNON, J.  
Les manifestations ostéo-articulaires de la lèpre. [The osteoarticular manifestations of leprosy.] *Rev. Prat.* **10** (1960) 2049-2055.

In the first place, the different aspects of the lesions are discussed; namely: osteitis or osteoarthritis due to the leprosy bacilli, which are small destructive lesions observed in lepromatous leprosy; osteitis or osteoarthritis due to pyogenic infection following infection of the soft parts; and osteolysis of tropic appearance, resembling neurogenic osteolysis and fitting the picture of neural osteoarthropathia. Next is taken up the pathogenesis of the lesions of osteolysis, the mechanism of which is always debatable and with which the following are apparently associated: an essential neural factor (anesthesia favoring microtraumatism, abolition of the reflex stimuli necessary to tissue trophicity, vasomotor disturbances); arteriolar lesions; the infectious factor; and the leprosy factor itself. This multiplicity of factors is undoubtedly the cause of the so peculiar physiognomy of these leprosy osteolyses.—N. BOURCART

MELAMED, A. J. and MANZI, R. O. El compuesto Ciba-1906 en el tratamiento de han-senianos resistentes y/o intolerantes a las sulfones. [Ciba-1906 in the treatment of leprosy patients resistant to and/or intolerant of the sulfones.] *Leprológia* **5** (1960) 85-90.

Eleven patients (10 lepromatous and 1 borderline) were treated with this compound for periods ranging from 1 to 2 years, several of whom had had intractable lepromatous reactions. The results were as follows: There was demonstrable a greater tolerance to diphenylthiourea than to similar doses of DDS in reactional lepromatous leprosy. Patients resistant to sulfones, although little influenced by Ciba-1906, seemed to find some encouragement with this drug. The antileprosy activity of the compound is not greater than that of DDS. Tolerance was satisfactory, although in some cases lepra reactions (including acute neuritis), and mild degrees of anemia and jaundice were observed.—

E. D. L. JONQUIERES

BASOMBRIÓ, G., GATTI, J. C., CARDAMA, J. E., BALINA, L. M., CHERI, R. A. and ELLIS, W.  
Resultados y tolerancia en los primeros meses de tratamiento con el preparado de difeniltiourea (Ciba-1906). [Results and tolerance in the first months of treatment with diphenylthiourea (Ciba-1906).] *Leprológia* **5** (1960) 91-95.

The authors present their first observations on 40 leprosy patients, 32 of which were lepromatous, treated with diphenylthiourea for periods up to 9 months. They conclude that the drug is useful in the treatment of the different forms of leprosy. Some 40% of the patients had intolerance of different degrees (i.e., reactional states, digestive disorders, headaches, rashes, etc.). Although their experience with it has been short, they consider that the drug has not the same value as DDS. The bacteriologic findings were unchanged in 25 of 32 lepromatous cases, and the histopathology was not perceptibly modified. Nevertheless, Ciba-1906 should be tried in cases of sulfone intolerance, or in alternate courses with this drug.—E. D. L. JONQUIERES

[ANONYMOUS] Preliminary report on diphenyl thiourea compound (D.P.T.) Ciba-1906 in the treatment of leprosy. *Med. J. Malaya* **14** (1960) 249.

This brief anonymous note records the treatment with Ciba-1906 (maintenance dose

of 2 gm. daily in two divided doses) of 12 patients (2 borderline and 10 lepromatous); 12 control patients received 800 mgm. of DDS by injection weekly in 2 divided doses. Treatment was continued for 1 year; smears were taken every 3 months, and biopsy specimens every 6 months. The 2 patients with borderline leprosy showed remarkable results; smears became negative and the patients were discharged after one year. The 10 patients with lepromatous leprosy improved considerably both clinically and bacteriologically. The results "were more or less equal to those of sulphone." The drug was well tolerated and no skin, liver or kidney damage was noted; mild erythema nodosum leprosum occurred in 2 patients but responded to Stibophen. No drug resistance was encountered. It is concluded that Ciba-1906 is less toxic than sulfone, and at least as effective therapeutically. "The higher cost and the inconvenience of daily administration of Ciba-1906 compared to sulfones are not considered of much consequence in selective treatment."—[From abstract by H. J. O'D. Burke-Gaffney in *Trop. Dis. Bull.* **58** (1961) 464-465.]

Roy, A. T. Treatment of leprosy with SU-1906 (D.P.T.) (4-butoxy-4'-dimethyl amino diphenyl thiourea). *Indian Med. J.* **54** (1960) 84-86.

The author tested the therapeutic effects of SU-1906 (DPT) on 7 lepromatous patients and gives the results obtained in 5 of them. The adult dose was 1-3 gm. daily to begin with, rising to 4.5 gm. which was tolerated well. The results of previous reports are confirmed that there is rapid clinical improvement for the first 4 months accompanied by a fall in the bacterial index, in this case an average fall from 4.35 to 2.92, decreasing to 1.2 after 24 months. A repeatedly reacting patient who made particular improvement under this treatment is described. It is said that reactions, common in some lepromatous patients with DDS, can be avoided with DPT.—[From abstract by E. Muir in *Trop. Dis. Bull.* **58** (1961) 593.]

SCHNEIDER, J., LANGUILLON, J., CLARY, J., BOISSAN, R. and PICARD, P. Traitement de la lèpre par la sulfaméthopyrazine employée par voie orale et sous forme de suspensions injectables (2<sup>e</sup> note). [Treatment of leprosy by sulfamethopyrazine given orally and in the form of injectable suspensions (2nd report).] *Bull. Soc. Path. exot.* **53** (1960) 173-179.

Favorable results having been obtained in 10 patients with sulfamethopyrazine (Sultirene, Kynex, 7522 R.P.) in the course of an observation covering a period of 11 months, 51 new patients were placed under this treatment. The dosage of 0.75 gm. by mouth every second day gives a sulfamide blood level of over 25 mgm. per liter during 48 hours. In tuberculoid patients, there is rapid clinical cure of the cutaneous lesions; out of 30 cases, only 1 failure was noted, in an infant 10 years of age. The lepromatous cases, although some were benefited from the clinical point of view and others on the bacteriologic level, the results were not so good; they were even bad in 3 out of the 23 cases. The medicament is well tolerated, although lepra reactions were noted in 2 lepromatous patients in the 4th month of treatment. The search for an injectable preparation for use in mass treatment has shown that aqueous suspensions of sulfamethopyrazine are incapable of maintaining a sufficient blood sulfamide level even for a period of one week. On the contrary, the aqueous suspension containing 23% acetylsulfamethopyrazine injected in doses of 4 gm. by the intramuscular route, gives a stable and sustained blood sulfamide level for a minimum period of 15 days.—N. BOURCART

BASSET, A., CAMAIN, R., BASSET and SOW, A. M. Traitement des formes de début de la lèpre par le 7522 R.P. (Sultirène). Premiers résultats. [Treatment of early forms of leprosy with 7522 RP (Sultirene). First results.] *Bull. Soc. Méd. Afrique Noire Langue Française (Dakar)* **5** (1960) 461-465.

This drug [sulphamethopyrazine] was employed in the treatment of 20 patients,

3 tablets of 250 mgm. each being given every second day, for from 1 to 16 months. The patients had different forms of leprosy, but all were early. The drug was well tolerated, there was no change in the blood picture, and reactions were few. In many cases there was clinical improvement from the first few weeks, and it was marked at the end of 6 months. In some borderline and tuberculoid patients, for example, there was rapid clinical and bacteriologic healing. A lepromatous case is cited in which there was disappearance of globi after 11 months' treatment, only few bacilli persisting. The drug is considered better than DDS in that it does not provoke exacerbations or cause nerve pains. Histopathologic improvement is always slower than clinical, as is the case in other treatments, and the duration of treatment is bound to be prolonged.—[From abstract by E. Muir in *Trop. Di. Bull.* **58** (1961) 1020-1021.]

WILKINSON, F. F., MANZI, R. O., PESSOLANO, C. A. and FALCIANI, S. La sulfadimetoxina en el tratamiento de la lepra. [Sulfadimetoxine in the treatment of leprosy.] *Leprológia* **5** (1960) 96-104.

Sulfadimetoxine is a sulfa drug of slow action, commonly employed in a great variety of bacterial infections, whose lack of toxicity makes it available for the treatment of leprosy. (Schneider, Languillon and Clary have reported good results with another long-acting sulfonamide: sulfamethoxypyridazine.) Fifteen lepromatous were treated by the authors for three months, during which time no evidence of toxicity was seen, and no reactions occurred. The drug was easy to give at doses of: (a) attack: 4 tablets (2 gm.) in one ingestion; then (b) 2 tablets a day during the time of treatment. Improvement was noticeable in the photographs presented. Intercurrent common infections are under control with this drug.—E. D. L. JONQUIERES

MUKERJEE, N., GHOSH, S. and KUNDU, S. Therapeutic evaluation of bacterial conversion in lepromatous leprosy. A comparative evaluation of sulphone and hydnocarpus oil. *J. Indian Med. Assoc.* **36** (1961) 396-398.

The authors found that sulfone is better than hydnocarpus oil in reducing bacterial positivity in leprosy, especially after the first year of treatment. It can bring about absolute bacteriologic negativity in 55% of cases in 7 years, as against only 17% for the oil, but a longer course of treatment is required for the remaining 45% of cases. In an outpatient clinic such long-term treatment is seldom possible, and doses higher than 100 mgm. daily cannot be introduced as an outpatient routine. In outpatient clinics, over 7 years of regular attendances is seldom found.—[From abstract in *Leprosy Rev.* **32** (1961) 283.]

GATTI, J. C., WILKINSON, F. F., CARDAMA, J. E. and BALIÑA, L. M. Ensayos clínicos sobre la acción del asiaticósido en las lesiones ulcerosas de los hansenianos. [Clinical experiments on the action of asiaticoside in the ulcerous lesions of leprosy patients.] *Orientación Med.* **10** (1961) 565-566.

Eight patients (7 lepromatous and 1 borderline), 4 of them with malum perforans plantaris, the remaining with ulcus cruris leproticum, were treated with the asiaticoside, or principle of *Centella asiática*. Both injections and ointments and/or powder were used, with good results after a treatment course of a month. The most impressive improvements were seen in three of the cases of malum perforans; in some long-standing ulcers (up to 20 years) there was a great trend towards granulation. The number of injections was between 11 and 32 in thirty days.—E. D. L. JONQUIERES

BROWNE, S. G. and HOGERZEIL, L. M. Long-acting prednisolone in the control of lepra reaction. *Leprosy Rev.* **32** (1961) 269-272.

Twelve lepromatous patients, all suffering from prolonged lepra reaction (relatively stable in its degree of severity) controllable only by corticosteroid oral therapy, were

given prednisolone acetate (Pfizer) in aqueous suspension by intramuscular injection at weekly intervals for 15 weeks. The symptoms were adequately controlled, and antileprosy therapy was continued, or resumed. Side-effects of prolonged corticosteroid therapy in appropriate dosage adjusted to individual requirements, were negligible. There is thus a definite place for a long-acting injectable prednisolone in the control of severe, long-standing lepra reaction in lepromatous patients whose corticosteroid requirements are relatively stable.—[From authors' summary.]

LECHAT, M. F. and PUISSANT, F. Problems of rehabilitation of the leprosy patient in a high prevalence area of Africa. *J. Chronic Dis.* **13** (1961) 221-227.

Drug therapy does little to remedy the physical disabilities which are the sequelae of leprosy. Often the best that can be done is to convert an infectious cripple into a healthy one. Direct damage by the leprosy bacillus probably can be controlled by the sulfones, but the major atrophic bone changes are due to nerve and vascular changes or to secondary infection and trauma. X-ray data reveal continued bone absorption despite long-term sulfone therapy. It is necessary to reach patients through education and propaganda earlier in the course of the disease. The many useful rehabilitative measures which are both simple and inexpensive include early treatment of wounds and burns, oil massage and wax bath for atrophied and palsied hands, active and passive exercise, progressive stretching and splinting of fingers, splinting of swollen fingers during reactions to maintain functional position in the event of resulting stiffness. Important is accurate diagnosis and selection of suitable cases, and proper instruction to helpers. At Yonda, more complicated procedures were undertaken under the direction of one leprologist with special knowledge obtained through WHO-sponsored visits to other centers, after enlarging the staff and facilities. An attack was made on the problem of plantar ulcers, and healing was obtained in 67 of 70 patients whose ulcers had resisted previous treatment. Occupational training was an essential part of the Yonda program, fitting to patient and his rehabilitation. To develop the potentialities of Yonda as a rehabilitation and teaching center, rather than one for segregation, measures had been taken to convert to an International Inter-African Center for the rehabilitation of leprosy patients. WHO could assist the leprosy rehabilitation problem in several ways: (1) by providing facilities for training surgeons and physiotherapists in a few selected leprosaria in different parts of the world; (2) by making recommendations to governments from time to time, concerning surgery and rehabilitation as they apply to leprosy patients; (3) by assisting governments so desiring in setting up a model rehabilitation program for leprosy patients.—J. A. ROBERTSEN

RAMANATHAN, M. K. Élévation de la cuprémie sérique au cours de la lépre avec et sans gynécomastie. [Raised level of serum copper in leprosy with and without gynecomastia.] *Bull. Soc. Path. exot.* **53** (1960) 608-610.

It has been suggested that an increase of copper in the serum in certain conditions is associated with an excess of circulating estrogens. The author, in Pondichéry, India, set out to determine whether in leprosy there is an increased level of serum copper, and especially whether gynecomastia affected this level. He made determinations in 11 healthy students, 11 lepromatous patients without gynecomastia, and 13 such patients with gynecomastia. The average in the students was within normal limits (i.e., 121  $\mu\text{gm.}/100$  cc.). In the patients without gynecomastia the mean was 152  $\mu\text{gm.}/100$  cc., and in those with gynecomastia it was 180  $\mu\text{gm.}/100$  cc. This suggests that in leprosy the level of serum copper is increased, and that if gynecomastia is present it is increased still further, which would seem to indicate an increase of circulating estrogens which raise the level of serum copper. Statistical analysis indicated that the differences between the 3 groups were highly significant.—[From abstract by H. J. O'D. Burke-Gaffney, in *Trop. Dis. Bull.* **58** (1961) 461-462.]

CHEKHERDEMIAN, M. Determinación del colesterol, fosfolípidos, lípidos totales y proteínas totales y proteínas, glucoproteínas y lipoproteínas por electroforesis en las distintas formas de lepra. [Determination of cholesterol, phospholipids, total lipids and total proteins, and glucoproteins and lipoproteins by electrophoresis in the distinct forms of leprosy.] *Leprología* **5** (1960) 69-79.

In fifty leprosy patients, distributed in five groups (lepomatous, reactional lepomatous, tuberculoid, reactional tuberculoid, and indeterminate), the cholesterol (Zlatkis, Zak and Boyle method), phospholipids (Fiske and Subbarow), total lipids (Manuel Matas), total proteins (Frattini), protein electrophoresis (stained with bromophenol blue), lipoproteins (stained with sudan black), and glycoproteins (fuchsin), were observed. Hypocholesterolemia was found in all clinical forms, but there was marked hyperlipemia. The total proteins were also slightly higher than normal, with in all forms a marked dysproteinemia with decreased albumin and increased alpha 1 and gamma globulin. This dysproteinemia is highly significant in lepomatous reactions. The decrease of albumin and alpha-lipoprotein and the increase of the beta lipoprotein were observed in every case.—[From author's summary, supplied by E. D. L. Jonquieres.]

BEDDOW, R. M. and TILDEN, I. L. Malabsorption syndrome due to amyloidosis of the intestine secondary to lepomatous leprosy; report of a case. *Ann. Intern. Med.* **53** (1960) 1017-1027.

The authors begin by quoting from other workers' cases of patients who have suffered from a sprue-like syndrome due to amyloidosis of the internal organs, particularly those of the gastrointestinal tract. Amyloidosis is frequent in lepomatous leprosy at Carville and also at Kalaupapa in Hawaii. They then describe in detail the history of a lepomatous patient who was treated for 2 years with Promin, to which he became poorly tolerant because of reactions, and later with SU-1906. Under the latter he developed anorexia, epigastric pain, occasional nausea and vomiting, and diarrhea, because of which the drug was discontinued. At that time there was no anemia, which was against a diagnosis of sprue, but "the presence of albuminuria and moderate microhematuria, associated with a normal blood urea nitrogen and  $\text{CO}_2$  combining power, led to a consideration of amyloidosis in the differential diagnosis." Biopsy of the bowel confirmed this diagnosis; and when the patient died, autopsy showed extensive amyloidosis involving the entire gastrointestinal tract including the esophagus and rectum; also the heart, blood vessels, abdominal fat, abdominal lymph nodes, spleen, kidneys, the liver and adrenals. During the administration of SU-1906 there had been rapid enlargement of the thyroid, which was thought to be due to this treatment, but the thyroid was found to be functioning normally.—[From abstract by E. Muir in *Trop. Dis. Bull.* **58** (1961) 464.]

BROWN, J. A. K. and STONE, M. M. Lepromin conversion following infection with leprosy. *Trans. Roy. Soc. Trop. Med. & Hyg.* **55** (1961) 443-445.

The case of a boy with a tuberculoid patch on the leg, with activation of the site of a Heaf-type lepromin test which had been made nearly 2 years before with negative results, is the subject of considerable speculation, summarized by the authors as follows: The conversion was probably stimulated by the infection with leprosy. The incubation period was much shorter than that normally assumed, and the time required for sensitivity to develop was longer than one might expect. The association of a negative lepromin reaction with a positive tuberculin one is a matter of some interest and importance. The sequence of events raises two questions: (a) Was the lepromin conversion specific, or due to the synergic action of the two infections? (b) Would vaccination with killed leprosy bacilli, or BCG, or both, have made any difference?—H. W. W.

OLMOS CASTRO, N., ARCURI, P. B. and USANDEVARAS, R. L. El factor tempo en la actividad de la leprolina proteica total. [The time factor in the activity of the total proteic leprolin.] *Leprología* **5** (1960) 80-84.

A study is made of the activity of the total proteic leprolin (LPT) according to the period elapsed between its preparation and the testing. The results were similar with all the samples, independently of the time of preparation (48 to 1,245 days before). The authors concluded that LPT is an antigen of high activity, independent of the time of preparation.—E. D. L. JONQUIERES

BEASLEY, W. B. R. Lepromin-like reactions to normal tissue antigens. *Trans. Roy. Soc. Trop. Med. & Hyg.* **54** (1960) 459-465.

This is a report of tests of 22 leprosy patients (14 L, 5 T, and 3 "D"), and 14 healthy controls. The antigens used were a Lowe lepromin, a Wade-Mitsuda lepromin, and suspensions of normal skin and normal heart muscle made by the Wade-Mitsuda method (after boiling for 30 minutes and grinding in a mortar for 3 hours). Readings of the reactions to lepromin were according to the Madrid congress criteria; a 1 mm. induration for the normal tissue suspensions were regarded as positive for the late reaction. (Any individual with an early reaction only was recorded as positive, but only late reactions are considered here.) Of the tuberculin-negative control group (6) there were 2 late reactors to lepromin, but none to the other antigens. In the tuberculin positives (8) there were 6 lepromin positives and 4 positive to the skin antigen (by the experimental standard used), but none to the heart muscle antigen. Of the lepromatous cases, all were negative to all of the antigens. Of the tuberculoid group (5), all were positive to lepromin, and 1 had a positive late reaction to the skin antigen, none to the cardiac antigen. Of the "dimorphous" cases (3), 2 were lepromin positive and 1 negative; none gave a late reaction to either of the other antigens. It is concluded that there was a correlation between the skin antigen and true lepromin in late reactions. [There is seen little justification for this conclusion, with only 1 positive late reaction to the skin antigen in 5 lepromin-positive tuberculoid cases.]—H. W. W.

MAEDA, M., MATSUMURA, K. and YOSHIDA, K. The influence upon tuberculin reaction and Fernandez's reaction caused by the repeated intracutaneous injection of Dharmendra's antigen. 1st Report: The results in guinea pigs, injected repeatedly with Dharmendra's antigen and dead BCG suspension. *La Lepro* **30** (1961) 69-75 (in Japanese; English abstract).

The influence of repeated intracutaneous injections of the Dharmendra-antigen was studied experimentally in guinea-pigs, with the following results: (1) The Fernandez reaction provoked by the Dharmendra antigen was increased in BCG-vaccinated animals, when intracutaneous injections of the Dharmendra antigen were made repeatedly. On the other hand, no influence on the tuberculin reaction was found, in either vaccinated or unvaccinated animals. (2) When the dead BCG suspension was injected intracutaneously and repeatedly, instead of the Dharmendra antigen, there was no influence on the tuberculin reaction or the Fernandez reaction in BCG-vaccinated animals, but in unvaccinated animals both reactions were increased and converted to positive. (3) All experimental animals were challenged by tubercle bacilli for comparison of the antiinfectious ability against tuberculosis. These abilities were mostly related equivalently to the strength of tuberculin reactions, and were not related to the strength of the Fernandez reaction provoked by the Dharmendra antigen.—[From authors' abstract.]

MAEDA, M., MATSUMURA, K. and YOSHIDA, K. The influence upon tuberculin reaction and Fernandez's reaction caused by the repeated intracutaneous injection of Dharmendra's antigen. 2nd Report: Reinvestigation of the influence in BCG-vaccinated guinea pigs. *La Lepro* **30** (1961) 76-80 (in Japanese; English abstract).

The influence of repeated injections of the Dharmendra antigen on the Fernandez reaction in BCG-vaccinated guinea-pigs was reinvestigated, with the following results:



In BCG-vaccinated guinea-pigs, it was found that the Fernandez reaction caused by the repeated intracutaneous injection of the Dharmendra antigen was stronger than the first reaction before the repeated injections of the antigen. Nevertheless, the antiinfectious ability against tuberculosis in the increased reaction group was equivalent as that in control group, so that there was no recognizable influence of the repeated injections of the Dharmendra antigen upon the antituberculosis ability.—[From authors' abstract.]

SUSHIDA, K. and HIRANO, N. The detection of antibodies against "atypical acid-fast bacilli" in the serum of leprosy patients by the Ouchterlony method. *La Lepro* **30** (1961) 81-88 (in Japanese; English abstract).

Sera obtained from 86 leprosy patients were tested for the presence of circulating antibodies by means of the Ouchterlony method. The antigens employed were filtrate preparations of Youmans' culture media of the H37Rv human strain, the bovine strain (BCG, 263), two strains of atypical acidfasts isolated from the sputum of tuberculous patients, and saprophytic strains of mycobacteria (scotochromogenic acid-fast bacilli), and a milk strain. Results: Of the 86 sera, 54 gave positive reactions. Of the 54 reactive sera, 13 were positive only with the H37Rv antigen, 5 only with the bovine antigen, and 2 only with the antigens present in the atypical acid-fast bacilli. The other 34 specimens reacted with the common antigens present in all of the antigens used, including the milk strain and the Dharmendra antigen. Antibodies to the antigens of atypical mycobacteria were also detected in sera of tuberculous patients (previously reported). The positive Ouchterlony rate in sera of tuberculous patients was less than that in leprosy patients. In so far as these tests show, there are significant differences between the positive results obtained in lepromatous and tuberculoid leprosy. For example, 51 of the 54 positive reactions were in lepromatous leprosy, and only the remaining 3 in sera of [how many?] tuberculoid cases. Sex, age and progress of the disease, as well as associated tuberculosis, do not affect the results. Sera from healthy nurses did not show any precipitation band, with the exception of one in whom no evidence of tuberculous disease had been noted in the past.—[From authors' abstract.]

SUSHIDA, K. and HIRANO, N. The detection of antibodies in the serum of leprosy patients against acid-fast bacilli antigens by the Ouchterlony method. *La Lepro* **30** (1961) 89-95 (in Japanese; English abstract).

Sera from 74 patients of the Zensho-en leprosarium were tested and the results compared with those obtained at the Fukusei leprosarium. For control, sera taken for the Wassermann test, including sera of pregnant women, were used. The antigens employed were culture filtrates [as in the preceding abstract], and in addition CF and PPD derived from a human tuberculosis strain. The results were as follows: (1) Of the total of 74 sera, 27 reacted with the H37Rv antigen, 14 with the BCG antigen, and 23 with the atypical mycobacterial antigens. The positive percentages in this experiment were very similar to the results in the Fukusei leprosarium. (2) There was a marked difference between sera of lepromatous and tuberculoid leprosy. The sera of lepromatous cases were almost always positive, while those of tuberculoid cases were often negative. (3) Sera of patients of macular leprosy (TM-type) and of lepromatous leprosy gave almost the same results, whereas the results with sera of anesthetic leprosy patients were quite different, as if not related. (4) The sera of pregnant women and other patients used for control did not show any precipitation band. (5) Some specimens from leprosy and control patients reacted with the fresh-milk antigen. (6) The lepromatous leprosy sera reacted with the PPD antigen, more markedly than to the CF antigen.—[From authors' abstract.]

UTKU, E. Le test de Nelson-Mayer et les réactions faussement positives dans la lèpre. [The Nelson-Mayer test and false positive reactions in leprosy.] *Türk İjiven Teerübi Biyoloji Dergisi* **20** (1960) 93-95 (in Turkish with French summary).

The author performed the TPI test in 48 leprosy cases (26 lepromatous, 16 tuberculoid and 6 indeterminate) who showed no manifestation of syphilis, and found no serum to give a positive or doubtful result. Leprosy, therefore, seemingly does not provoke false positive reactions with the Nelson test.—[From authors' summary, supplied by N. Bourcart.]

MOLLOHAN, C. S. and ROWER, M. S. Public health significance of swimming pool granuloma. *American J. Publ. Hlth.* **51** (1961) 883-891.

An outbreak of 262 cases of a granulomatous disease of the skin, especially of the elbows and knees, occurring at Glenwood Springs, Colorado, is described. All gave a history of having used an open outdoor swimming pool fed from a non-chlorinated mixture of naturally-occurring hot mineral spring water and Colorado River water. The lesions began as reddish, rice-grain-sized papules, 3 to 4 weeks after swimming in the pool. Two weeks later, the original lesion enlarged to pea size, became somewhat hardened, and was purplish-red in color. Some opened and drained slightly at this stage. Eventually the lesion became covered with a brownish crust, under which was a shallow ulcer, containing a small amount of greyish secretion. Satellite papules were frequently seen. Spontaneous healing occurred in a few months to two years, leaving a soft, shiny scar. No treatment, drug or surgical, gave uniformly good results. Fifteen biopsy specimens as well as the pool itself yielded the photochromogenic *M. balnei*. Tuberculin tests of 1,648 children in the area revealed 82% positives among 185 with swimming pool granuloma, whereas there were only 4.3% positives among those with no lesions. No x-ray evidence of tuberculosis could be found in the positively-reacting granuloma cases. Many severe patch-test reactions suggested the advisability of beginning intradermal testing with a test dose no greater than 5 TU if *M. balnei* infection is suspected. Public health questions presently unanswered include the natural reservoir of *M. balnei*, reasons for disease concentration in the school age group, other diseases possibly caused by *M. balnei*, criteria for evaluation of tuberculin tests in the light of their findings, and the use of an *M. balnei* "tuberculin."—J. A. ROBERTSEN

MCFADZEAN, J. A. and RIDLEY, D. S. Studies on the inoculation of *M. leprae* into monkeys. *Trans. Roy. Soc. Med. & Hyg.* **55** (1961) 235-238.

The authors inoculated normal and x-irradiated monkeys with suspensions of *M. leprae* by intravenous and intradermal routes, and followed the evolution of the lesions presumably due to *M. leprae* by serial skin biopsies and at autopsy. The control animals showed an initial polymorphonuclear infiltration, followed by the development of a lepromatous type of lesion; this in turn was replaced by lesions corresponding to those of borderline and tuberculoid leprosy. In general, there was no difference in the response to bacilli whether they were fresh or heat-killed, nor was there any difference in the resolution of the lesions. X-irradiation suppressed the initial lymphocytic infiltration and delayed the disappearance of the bacilli. This delay was associated with the better development of foam cells, but there was no evidence that x-irradiation enabled multiplication of the bacilli to take place.—[From abstract in *Leprosy Rev.* **32** (1961) 296.]

TARSHIS, M. S. The preservation of mycobacteria by freezing in various diluents. *American Rev. Resp. Dis.* **83** (1961) 762-766 (notes).

Longevity of 14 strains of mycobacteria, ranging from virulent *M. tuberculosis* to saprophytes, and 10 other strains of human tubercle bacilli which were drug resistant, on storage in the frozen state is reported. The experiment was primarily to compare the value of different diluents, of which 5 were used with each of the culture strains; the

storage temperature was  $-20^{\circ}\text{C}$ . The suspensions were thawed at yearly intervals for 3 years, and all were found to remain viable regardless of the diluent in which they were frozen. Furthermore, they had retained their original biologic characteristics, including the drug resistance on the part of those which had it. [These results are in line with the recent experience of Binford and of Shepard that leprosy bacilli which had been shipped from the Philippines to the United States frozen with "dry ice" had retained their viability, although beforehand there had been some doubt as to whether they would do so.]—H. W. W.

SATO, S. and MAYAMA, A. Inoculation experiments of leprosy in goldfish and crucian. I. Brief comparison of the results obtained by inoculation with lepra bacilli and those obtained with tubercle or saprophytic acid-fast bacilli. *Sci. Rep. Res. Inst. Tohoku Univ. C* **10** (1961) 185-199.

Lepra bacilli were inoculated intraperitoneally into 39 goldfish and 92 crucians and observed for 1-2 years, the visceral changes produced being examined bacteriologically and histologically. The results were compared with those obtained in 18 goldfish inoculated with tubercle bacilli, and those in 18 crucians inoculated with the "M III" strain of saprophytic acidfast. (1) Lepra bacilli were demonstrable in smear specimens of some viscera throughout the whole course of the experiment, not always but occasionally. (2) Histologically, bacilli were found in large numbers and frequently in the ovary, pancreas and mesentery, rather rarely and scantily in the liver and spleen, seldom in the heart and gill, and never in the air-bladder, contrary to the findings in smear films. They were found isolated or agglomerated, and intra- or extracellularly, in the viscera without noticeable tissue reaction. (3) Successive subtransplantations of the viscera positive for bacilli to goldfish or crucians led to no noteworthy results. (4) Properly speaking, about the same results were obtained in the cases of tubercle and saprophytic acid-fast bacilli. The tubercle bacillus was no longer recoverable on egg media some 4 months after inoculation, and the saprophytic bacillus after 9 months, in spite of the fact that they were readily found in smeared or sectioned specimens.—[From authors' summary.]