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.

Ouazzani, A. Remarques historiques et épidémiologiques de la lèpre au Maroc. [Historical and epidemiologic studies of leprosy in Morocco.] Maroc Méd. **38** (1959) 1329-1330.

The origins of leprosy in Morocco are buried in antiquity. It is believed to have been introduced among the original Berbers in turn by the Phoenicians, the Hebrews, and the Arabs. It was at its height in the 14th century with the influx of Moslems and Jews from Spain; and although it does not now reach such proportions as then it continues to smoulder in latent form. There are two great areas of endemicity. The first, in the north, is situated in the Sebou basin in the neighborhood of the Fèz-Taza region. The areas mostly affected are along the Ouergha and Inaouen valleys, where the disease exists among different tribes with an endemicity up to 1 per 1,000. Another highly endemic focus is to be found among the Beni Sadden tribe of Berbers: this is not far from Fèz, has been recently introduced, and is one of the most active foci in the area. The second main area is in the southwest, in the Oumer Rebia basin, and extends from the Mazagan to the Marrakesh regions; these are some highly endemic foci, with prevalence of up to 1 to 2 per 1,000. There is a third area of moderate endemicity in the heart of the Middle Atlas region, joining the other two. The Berbers are more frequently infected than the Arabs and Jews who originally contributed in introducing the disease. Poor living conditions and particularly overcrowding contribute to this. These conditions have stimulated the development of a campaign for early diagnosis, examination of suspected cases and contacts, protection of children, and social assistance. Education and the raising of living standards are especially needed.—[Abstract by H. J. O'D. Burke-Gaffney in *Trop. Dis. Bull.* **57** (1960) 39.]

Baruffa, G. Considerazioni sulla endemia di lebbra in Somalia. [A study of endemic leprosy in Somaliland.] Ann. Soc. Med. Igiene Trop. Somalia **2** (1954-1958) 13-23 (English summary).

The author refers to the 259 leprosy patients in the Alessandra Leprosarium in Italian Somaliland. Of these, 201 are lepromatous and 58 tuberculoid; there are only 22 patients under 15 years of age. From this high type rate and low child rate he argues that the disease is receding, and is likely soon to die out. Most of the patients are Negroid, and come from the valleys of the 2 principal rivers. [No mention is made of the method used for registering patients or of finding out how many patients there are outside the leprosarium, or what types are represented.]—[From abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 133.]

[Belgian Congo] Rapport annuel de la Direction Generale des Services Medical du Congo belge, Année 1958 [Annual report of the Director-General of Medical Services of the Belgian Congo for the year 1958.] 110 pp (+), mimeographed.

This document appears in its usual large format, unsigned and without indication of place of preparation. The Père Damien section of Foréami has continued its responsibilities in the execution and extension of the leprosy control project. The medical missions studying the influence of BCG on the evolution of leprosy, working in the provinces of Orientale, Kasai and Kivu, have repeated their first findings, but it is too early

to draw any conclusions. DDS in ethyl chaulmoograte has continued to be the basis of ambulatory treatment, but other depot excipients have been tried out, with encouraging results. At the other centers DDS tablets are used. The total number of cases under treatment was 286,064, up 15,000 from 1957. [There is, of course, no indication that there may not be a similar report for 1959.]—H. W. W.

[Queensland] Annual Report of the Health and Medical Services of the State of Queensland for the Year 1958-59. Government Printer, Brisbane, 1959, 120 pp.

With only 14 patients at Peel Island (3 of them eligible for discharge), it was planned to abandon that institution and transfer the patients to a newly-constructed ward of the South Brisbane Hospital. The conditions for discharge had been liberalized, the number of required monthly negative smears having been reduced from 12 to 3. There were 23 patients at the Fantome Island leprosarium for aborigines (26 the year before), the discharge rate keeping pace with the gradually decreasing admission rate. —H. W. W.

Hetzel, A. M. Health survey of the Trust Territory of the Pacific Islands. U. S. Armed Forces Med. J. **10** (1959) 1199-1222.

This refers to a survey said to have been begun in 1948, covering a large territory and involving almost all the inhabitants—the number not stated. Miniature radiography on 82% of the population revealed 4.5% with chest defects and 1.3% suspicious of active tuberculosis; while tuberculin tests on 90% of the population gave positive results in 47%, directly correlated with age. [Was any of the positivity ascribable to nonspecific hypersensitivity?] Leprosy was diagnosed in 86 cases (25 of them lepromatous), with a further 83 clinical suspects [Rate not evident.]—[From abstract by T. H. Davey in *Trop. Dis. Bull.* **57** (1960) 317.]

Diniz, O. Profilaxia da lepra no Brasil. Plano atual da campanha e sua execução. [Prophylaxis of leprosy in Brazil; the present plan of campaign and its execution.] Bol. Serv. Nac. Lepra **17** (1958) 231-246; *also* Rev. brasileira Leprol. **26** (1958) 141-153.

This paper traces the progress made in the control of leprosy during the years 1946 to 1957 in 22 states of Brazil. During that period 61,976 leprosy patients have been registered, of whom 36,635 were of the lepromatous type, 13,119 indeterminate, and 12,222 tuberculoid. During the period 5,377 new patients were discovered by the examination of contacts. A table shows that the 2 states with the most cases are São Paulo with 21,005, and Minas Gerais with 11,463. Stress is laid on the importance of early diagnosis and treatment through examination of contacts.—[From abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 42.]

Brand, P. W. Life after leprosy through rehabilitation. Rehabilit. Lit. **21** (1960) 239-245.

The problem of rehabilitation of the leprosy patient can no longer be shrugged off as hopeless. In recent years two great changes have come about. The first is the emergence of proved effective remedies for leprosy. The second is the development of reconstruction operations for the mutilations and paralyses caused by the disease. All of the 12 million people with leprosy who want to go back to life will have to combat prejudice; perhaps one-third of them will have the additional handicap of physical disability or obvious deformity. Proved techniques are available but the task is tremendous, chiefly because the basic machinery for rehabilitation in leprosy does not exist in contries where the disease is prevalent. The greatest danger now is that we, who previously did nothing because we thought nothing could be done, will now do nothing because the

little we can do seems so small compared with the size of the problem. To make a start, we must understand something of the peculiar difficulties associated with rehabilitation, namely (1) fear of the disease by the public; (2) disability making skilled work difficult; (3) ugliness as a barrier to acceptance; (4) danger of self-injury; (5) apathy and despair as a result of segregation and length of treatment, Each of these problems can be combated. It is emphasized that rehabilitation must start on the day of diagnosis. It is not because of any special difficulty that leprosy patients have not received the benefits of reconstruction and rehabilitation accorded those paralyzed by polio or nerve injuries, or deformed by burns and the like. It is because leprosy is not thought of as a disease at all. The average medical specialist pays no attention to leprosy, regarding it as belonging to the field of those workers who have chosen to dedicate themselves to the victims of that disease. This very dedication has involved a separation of the worker from his colleagues and from the current stream of advancing medical science. Leprosy control schemes of WHO and of most governments are based on the employment of nonmedical personnel versed in one disease, and are organized and supervised by specialists in public health and epidemiology rather than in internal medicine or surgery. Ophthalmologists, neurologists, plastic surgeons, physiotherapists, and orthopedic surgeons are not called in to advise or treat the complications that are the real disaster in an otherwise rather mild disease. The medical profession must be educated before education of the public can be expected to be effective. International agencies must help to establish reconstruction and rehabilitation units in the medical colleges of leprosy-endemic countries, to serve as training and propaganda centers. They will not only train surgeons and physiotherapists for work in leprosy. but they will put leprosy into its proper perspective, and awaken interest in research. Simultaneously the rehabilitation problem must be faced in the field. Where such a pattern has already been established in India it has proved to be of great value both to the patient and to the overall leprosy campaign.—J. A. Robertsen

Baptista, L. Reabilitação do hanseniano. (Situação do doente de lepra internado e do egresso, em face ao trabalho.) [Rehabilitation of the leprosy patient. (Situation of the leprosy patient, interned and released, with respect to work.)] Rev. brasileira Leprol. **27** (1959) 166-171.

The problem of rehabilitation of leprosy patients paroled from a sanatorium requires that public employers give attention to the subject, for those who have physical defects and maladjustments are still almost completely abandoned. It is an inhumane situation, antieconomic and antisocial. Various causes contribute to the inability of these people to work, especially the prejudices, taboos, false notions of contagion, and the lack of interest in relation to all that has been told about leprology until lately. There is a lack of official specialized services, and of interest of employers to accept people paroled from leprosy institutions. Considered are the psychologic, medical, social and professional aspects of the deficient, the evaluation of incapacity, and professional orientation. It is compatible with their health, and when possible in their former occupations. Rehabilitation should begin while the patients are in the sanatoria, and continue when they are later paroled.—[From author's summary.]

Lowinger, P. Leprosy and psychosis. American J. Psychiat. **116** (1959) 32-37.

In a report based on Carville records for 1950-1953, the author indicates a 10% prevalence of psychosis among Carville leprosy patients, as compared with a 1.25% prevalence among the U. S. population in general. This estimate is felt to be low, since only those patients who had presented medical, psychologic, or social problems were referred to the psychiatrist; in addtition, since many of the patients are Spanish-speaking, the language barrier may have acted to shield some psychoties. Most of the

schizophrenia seen (6.6% of the hospital population) was of long standing, and it is not known whether or not the disease preceded admission to Carville. Thinking disturbances, blunting of affect, apathy, and isolation were prominent clinical features; most had an intellectual deficit. While these symptoms are compatible with a diagnosis of chronic schizophrenia, they also may be related to the following: the low socioeconomic and educational level of most patients, the effects of physical illness, the loss of intellectual stimulus due to the isolation and stagnation of hospital life, and the language barrier, the latter also being an obstacle to psychological evaluation. Lack of diagnosed psychoneurotic reactions only indicates a relative infrequency of psychoneuroses. Psychoneurotics are kept from the psychiatrist by the fear and stigma attached to psychiatric referral and the unavailability of psychotherapy at Carville. The numbers are also reduced because of the reduction of anxiety by religion, work assignments, and general medical management. Manic-depressive and involutional reactions were found to be rare. The low socioeconomic level, the view of leprosy as life-long exile, and the overwhelming social stigma are offered as explanatory factors. Admission to Carville is often followed by a 2-3 months depression period, during which denial of leprosy may occur; withdrawal, guilt, and loss of self-esteem may result in depersonalization. The common sight of a few patients with cosmetic problems may correspond to disturbance of body image. The emotional atmosphere of the better-adjusted patient at Carville is one of passive-dependent resignation with paranoid overtones. Hope and gaiety are largely lacking. Many lifetime patients lose all family interest and ties. Some patients considered cured are unwilling to leave because they have no place to go. The author suggests that the atmosphere at Carville must be evaluated with regard to the psychosocial impact on the individual. This requires consideration of the institutional atmosphere, patients' racial, religious, language, and other subgroups. Long-standing barriers between patients and employees are significant. Psychodynamic studies by projective techniques are recommended. The impact of the psyche on the etiology, course, complications, and progress of leprosy could be studied. A biologic affinity of schizophrenia for leprosy patients could explain the amount of schizophrenia seen. Leprosy may cause organic, metabolic, or toxic lesions of the brain, although this has not been demonstrated at autopsy. A comprehensive study of Carville's mentally ill would fill a manifest need for data in order to plan psychologic care of such patients, and might give clues about schizophrenia in general.—J. A. Robertsen

[See the Letter to the Editor on the subject of this abstract, by Dr. Edgar B. Johnwick, in the Correspondence section of this issue.]

Browne, S. G. A hypermelanotic rash complicating sulphone therapy. Trans Roy. Soc. Trop. Med. & Hyg. **53** (1959) 495-505.

A hypermelanotic rash observed in 160 Bantu patients undergoing sulfone treatment for leprosy in the Belgian Congo is described. A similar rash has been seen in a patient taking sulfaguanidine, and in another taking sulfathiazole. The histology of the lesions is described, and the mechanism of their production is discussed. The histopathologic changes suggest a disturbance in the functional activity of the melanoblasts, without indicating the precise nature of this disturbance. They are consistent with a direct toxic action on areas of sensitive melanoblasts by diaminodiphenyl sulfone, with alteration of the mechanism of melanin formation or storage or transport.—[In part from the author's summary.]

Carayon, A. and Languillon, J. Contre-vérités et paradoxes cliniques de la névrite hansénienne. [Clinical contradictions and paradoxes in leprous neuritis.] Méd. Trop. (Marseilles) **19** (1959) 537-541.

This paper is an account of certain paradoxical findings in the examination of 73

leprosy patients selected from those without cutaneous lesions. In 2 patients there was normal sensation although total ulnar motor power was lacking. In 3 there was the classical form of dissociation, i.e., loss of thermal sensation with retention of tactile sensation. In 11 there was exactly the reverse of this. In 57 there was loss of both kinds of sensation. The first 2 cases mentioned are explained by the level at which the motor fibers leave the main nerve. The reversion of dissociation is explained by reference to the work of physiologists on the differing diameters and conduction speeds of various nerve fibers. When total anesthesia is present there may be complete sclerosis of the nerve.—[From abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 137-138.]

GOKHALE, B. B., VABLE, S. M. and MODAK, S. Circulation in the feet of leprosy patients, with and without ulcers. Leprosy Rev. **30** (1959) 234-241.

The object of the experiment reported was to determine whether pathologic involvement, or inherent inadequacies of the arterial system, are responsible in part for ulceration of the feet in leprosy. Four groups were chosen: healthy persons, patients with positive serologic tests for syphilis, leprosy patients without trophic ulcers of the feet, and leprosy patients with nonhealing ulcers of the feet. The temperatures of the mouth, the lower third of the legs, and the dorsa of the feet were registered before and after injection of 0.5% nupercaine as a spinal anesthetic. There was less difference in temperature before and after spinal anesthesia in the ulcerated than in the nonulcerated feet, but there was not this variation in the lower third of the same patients' legs. This may be due to pathologic involvement of the arteries of the ulcerated feet, or it may be due to an inherent defect of the arterial circulation of the patients.—[From abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 140.]

PRICE, E. W. Studies in plantar ulcers in leprosy. IV. Etiology of plantar ulcers. Leprosy Rev. **30** (1959) 242-248.

In this fourth article of a series are mentioned 5 theories of the cause of plantar ulcers: that they are specific lesions; that the automatic nervous system in involved; that trauma is the prime cause; that plantar pressure is a cause; that clawing of the toes exposes the metatarsal heads. The author believes that the 3 factors involved in the production of the plantar ulcers are: an anesthetic foot, a walking foot, a foot with a damaged musculature. Weakness of this nature comprises the mechanism by which the points of rotation are protected from damage during walking. "Plantar ulcers will heal and remain healed if the walking roll is interrupted, either by bed rest, or by wearing a plaster cast, or by wearing footwear with a rigid sole."—[From abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 139.]

LANGUILLON, J. L'asiaticoside dans le traitement des ulcères chez les lépreux. [Asiaticoside in the treatment of ulcers in leprosy patients.] Bull. Soc. Path. exot. **52** (1959) 249-261.

In 10 patients who had had ulcers for many months, asiaticoside (Madécassol) used as a cicatrizing agent for several months by intramuscular injection of 25 mgm., 3 times a week, brought about complete healing in 8 cases after periods of 3 to 9 weeks. The failures observed were due to the presence of underlying bone lesions.—N. BOURCART

RAMIREZ, O. Tratamiento local de las ulceras neurovasculares de los miembros inferiores. [Local treatment of neurovascular ulcers of the lower limbs.] Bol. Soc. cubana Dermatol. y Sifilog. **15** (1958) 59-64.

In four cases of neurovascular ulcers of the lower limbs, which had failed to heal after long periods of treatment, the author applied dehydrated coffee powder of the "instant coffee" type, in a simple dressing covered by gauze, and changed at intervals

of eight days for a similar dressing. There was healing of the ulcer in three or four weeks in three cases and in two weeks in one case. There have been no relapses, and this treatment was tolerated perfectly.—[Abstract from *Leprosy Rev.* **30** (1959) 130.]

LAVIRON, P. and BEYTOUT, D. Le traitement des perforants et ulcères lépreux par les dihydroalcaloïdes de l'ergotoxine. [The treatment of perforating ulcers of leprosy with the dihydro alkaloids of ergotoxine.] Méd. Trop. (Marseilles) **18** (1958) 267-272.

The authors, following the work of Gokhale, injected 19 patients intra-arterially daily for 5 months with 0.3 mgm. of the 3 hydrogenated alkaloids of ergot of rye. They did not obtain the immediate and complete healing claimed by Gokhale, but 9 of their patients healed, 3 showed amelioration, 6 remained stationary, and 1 became worse. The authors consider the treatment of use in healing ulcers, providing there is no underlying bone disease.—[From abstract by E. Muir in *Trop. Dis. Bull.* **55** (1958) 1129.]

IYENGAR, S. G. S. Trial of chloromycetin cream in the treatment of trophic ulcers. Leprosy in India **31** (1959) 51-53.

Summing up the report it is to be stated that chloromycetin cream with a watery base is very useful and safe local remedy for trophic ulcers in leprosy cases.—[From author's summary.]

TAKASHIMA, S. Present status of sulfone therapy at Nagashima Aiseien. Nagashima Arch. Leprosy **3** (1959) 1-11.

Most of the patients at Nagashima have been receiving sulfone therapy since 1949. Of 367 patients admitted in 1958, the author found that 75% were improved. The influence of sulfones on the cutaneous lesions was good, and remarkable on mucous membrane lesions. A few cases failed to respond to the long-term use of the sulfones, and for these it is proposed to use DPT and the antibiotic kanamycin. Between 1952 and 1958 the bacillus index has become five times less, but negative cases are few. Histology has shown a parallel improvement in most cases. With the lepromin test there was found a paradoxical increase in negative cases over 2 years in one group, but over a longer period there was a decrease in negatives. Lepra reactions were troublesome in many patients, but not enough to interfere with sulfone therapy. Sulfones seem to have little effect on nerve symptoms or on secondary lesions.—[From abstract in *Leprosy Rev.* **30** (1959) 262.]

CURRIE, G. Short and long acting sulphones by intramuscular injection. Leprosy Rev. **30** (1959) 220-233.

Using DDS (300 mgm. twice weekly by mouth) as a control, the author compared 3 methods of administering sulfones by injection. These were: (1) Avlosulfon soluble, a 41% aqueous solution of the acetaldehyde sodium bisulphite complex of DDS, of which 6 cc. (the equivalent of 1.2 gm. of DDS) was injected intramuscularly at fortnightly intervals; (2) DDS suspended in ethyl esters of hydnocarpus oil (1.25 gm. in 5 cc. with 4% guaiacol added), injected intramuscularly at two-weeks intervals; (3) a 20% suspension of DDS in water, the drug in small particles which make injection easy, the retard effect secured by "a novel agent which maintains dapsone in watery suspension." It was found that 0.6 gm. given fortnightly, one-half the amount required with oral DDS, was sufficient to maintain the conventionally accepted blood level. There is evidence that, although a high blood level lasts for only 3 days out of the 14, the "hammer-like" action of "regular irregularity" produces clinical improvement comparable with that of sustained blood concentrations. There were no significant differences in the results of the different groups. The aqueous suspension was considered the preparation of choice on the grounds of freedom from pain, absence of side effects, convenience of

injection and economy of the total amount of sulfone used. It was not found that with these sulfones given parenterally there were fewer lepra reactions and less erythema nodosum.—[From abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 140.]

GARROD, J. M. B. Two years' experience with diphenylthiourea (DPT or Ciba 1906) in the treatment of leprosy. Leprosy Rev. **30** (1959) 210-214.

The author tested the therapeutic effects of diphenylthiourea (DPT) on 40 leprosy patients who had sought inpatient treatment, and gives the results after 24 months; patients on the standard treatment with DDS served as controls. Improvement, based on bacillary index results and taking the initial average as 100, was 62.5 after 12 months, and 50 after 24 months; the corresponding figures for DDS were 100, 74 and 48. There thus appeared to be quicker improvement to begin with, which slackened off later. The chief value of DPT is, however, in the comparative absence or mildness of lepra reaction or erythema nodosum, as is illustrated in the history of 6 cases. Also, toxic side effects are less common. From the point of view of economy also DPT may have an advantage, as with its use expensive inpatient treatment is less necessary owing to the rarity of reactions and side effects. While DPT does not replace DDS as the drug of choice for mass treatment, it is of particular value when DDS is not tolerated well.—[Abstract by E. Muir from *Trop. Dis. Bull.* **57** (1960) 140-141.]

LANGUILLON, J., BEYTOUT, D. and CLARY, J. Le traitement de la maladie de Hansen par la diphényl-thiourée (4-butoxy-4'-diaméthylamino-thiocarbanilide). [The treatment of leprosy with diphenylthiourea (4-butoxy-4'-dimethylaminothiocarbanilide).] Bull. Soc. Path. exot. **52** (1959) 160-166.

The authors describe the treatment of 20 adult leprosy patients (12 tuberculoid and 8 lepromatous) who for over a year were given 2 gm. daily of the 15095/E preparation (Ciba 1906). The 8 lepromatous cases improved clinically to a significant degree. In all of them the modifications of the bacillus index were very favorable, 2 of them having become bacteriologically negative in the nasal mucosa and the skin. The hemagglutination rate always approached normal. Of the 12 tuberculoid cases, 9 were considerably improved and the remaining 3 were moderately improved. The drug was remarkably well tolerated in all cases. The results of the treatment were as good as those obtained with DDS. It is not believed, however, that this drug should be regarded as replacing the sulfones, but it is a valuable medicament in those cases in which sulfone treatment is not well supported (intolerance, psychoses, and lepra reaction).—[From the authors' summary, supplied by N. Bourcart.]

LANGUILLON, J. and CLARY, J. Traitement de la maladie de Hansen par la D-cyclosérine. [Treatment of leprosy with D-cycloserine.] Méd. Trop. (Marseilles) **19** (1959) 431-437.

Because of its good effects in tuberculosis the authors tried D-cycloserine in leprosy. They treated 4 patients with lepromatous and 1 with tuberculoid leprosy. Beginning with a daily dose of 250 mgm. they increased it to 1,000 mgm., but finally decided to limit the dose to 750 mgm. After a year's treatment there was marked clinical improvement in all patients, and in the lepromatous cases there was granulation of the bacilli and marked reduction of the bacillary index, especially in nasal smears. It is concluded that D-cycloserine should be given a place in the antileprosy therapeutic arsenal.—[Abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 41-42.]

CONTRERAS, F., GUILLÉN, J., TERENCIO, J. and TARABINI, G. Tratamiento de la lepra con "Dipasic." [Treatment of leprosy with "Dipasic."] Rev. Leprol. Fontilles **4** (1959) 545-551.

The authors report the results of treatment of 28 strongly positive lepromatous

cases of leprosy with Dipasic (a combination of PAS and isoniazid). Short histories are given of the patients and their progress under treatment. In general the tolerance of this combination of drugs was excellent under the dosage used, which was 5 mgm. daily for every 10 kgm. of the patient's weight, sometimes increasing to 900 mgm. with careful control. In 11 patients there was definite clinical improvement, but bacteriologic improvement was less obvious. Patients who had become bacteriologically negative on sulfones maintained their good clinical and bacteriologic condition when kept on Dipasic. The authors consider that Dipasic could be effectively used before sulfone treatment is begun, in combination with sulfones, and also in certain patients who are refractory to sulfones.—[Abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 251-252.]

Mercadal P., J. and Planas G., J. Cirugia estetica en los enfermos hansenianos. (A proposito de un caso de reposición de cejas.) [Plastic surgery in leprosy patients. (Concerning a case of restoration of the eyebrows.)] Actas Dermo-Sifiliogr. **51** (1960) 35-39.

Report of a case of restoration of the eyebrows in a person who had been a lepromatous patient, by transplantation of a strip of skin from the temporal region with a pedicle containing the temporal artery and vein. A photograph taken three weeks later shows excellent, natural-looking results, supposedly better than when transplants are made from the more heavily-haired scalp.—H. W. W.

Kao, H-A *et al.* Acupuncture and galvanic current in the treatment of lepra reaction. Chinese J. Dermat. **6** (1958) 298.

Nerve joint pains and erythema nodosum in leprosy patients were treated by the typical techniques of Chinese acupuncture. Apparently the needle is inserted into the nerve trunk thought to govern the area, and galvanic current from a 1.5 volt storage cell is allowed to run for 30 to 50 minutes. This treatment is given on alternate days until 15 treatments have been given, and then a rest of one to two weeks is given. In 72 cases of severe arthralgia and neuralgia and in 21 cases with erythema nodosum the results were very good. Thus in 18 cases of erythema nodosum the lesions subsided rapidly in 15 and improved greatly in 3.—[Abstract in *Leprosy Rev.* **30** (1959) 128.]

Bonatti, A. A. and Lebrón, E. J. Fraccionamiento electroforético en suerò de leprosos. [Electrophoresis of the sera of leprosy patients.] Rev. Facul. Med. Tucumán **1** (1958) 143-149 (English summary).

The English summary appended to the paper is essentially as follows: The authors have performed paper electrophoresis on the sera of 67 leprosy patients. In 38 cases of nodular leprosy there was a marked increase of gamma globulins; in the tuberculoid cases the electrophoresis curves were normal with only a few exceptions; in the indeterminate and borderline cases the gamma globulin values were slightly higher. The other globulin fractions were absent or scarcely altered. The albumin percentage values were relatively decreased. Leprosy causes a dysproteinemia with hypergammaglobulinemia caused by the infection itself.—[From note in *Trop. Dis. Bull.* **57** (1960) 136.]

Jardin, C. and Beytout, D. Étude des protéines sériques du Soudanais hansénien par micoélectrophorèse. Essai d'interpretation des résultats. [Study of serum proteins in Sudanese leprosy patients by microelectrophoresis; interpretation of the results.] Méd. Trop. (Marseilles) **20** (1960) 81-101.

A study of the sera of 68 leprosy patients in the Sudan (24 lepromatous and 44 tuberculoid) and of 33 nonleprous persons has been made by paper electrophoresis. In the leprosy patients there was found an increase of the relative levels of the globulins in relation with the increase of the amount of the serum proteins, and a decrease of the relative level of the other fractions (albumin, and alpha and beta globulins). It is the

increase of the gamma fraction to which is attributed the decrease of the other fractions. The protein disequilibrium is more marked in the lepromatous than the tuberculoid form of the disease. Other modifications sometimes found in leprosy patients (alpha and beta globulins, gluco- and lipoproteins) are not attributable to the leprosy itself but to secondary or concomitant affections (tuberculosis, nephrites or nephroses, and especially amyloidosis). The globulin/albumin ratio is not statistically modified in tuberculoid leprosy; its lowering in lepromatous leprosy is not sufficient to be of interest in clinical biochemistry, at least in the African of the Sudan. Electrophoresis of the sera of leprosy patients, whether lepromatous or tuberculoid, sometimes shows a practically normal protein curve. In all cases the results obtained are not specific, and one should be careful about attributing to leprosy the modifications observed, which may have multiple causes.—[From the author's summary, supplied by N. Bourcart.]

HOLLANDER, A. and SOMMERS, S. C. Histochemical comparison of Boeck's sarcoid with other cutaneous granulomas. A.M.A. Arch. Dermat. **81** (1960) 944-946.

The use of Alcian blue has opened a new road for the histochemical study of the mucopolysaccharides of the skin. In a previous study of "cutaneous" leprosy the authors had observed a decrease of dermal neutral mucopolysaccharides in the leprous granulomas; a lesser effect on the acid mucopolysaccharides of the dermis; and an unanticipated abundance of mast cells" [which last leads to a question of just what form or phase of the leproma showed that cytology]. It has been found that Boeck's sarcoid is distinguishable from other cutaneous granulomas by a predominance of PAS-staining material, an abundance of Alcian-blue-staining acid MPS's, and an abundance of reticulin proliferation ascribed to neutral MPS's. Part of the PAS-positive material is believed to be lipoid.—H. W. W.

BRIEGER, E. M. The fine structure of the lepra cell. Trans. Roy. Soc. Trop. Med. & Hyg. **53** (1959) 346-348.

In the author's opinion the term "lepra cell" should be reserved for the cell-parasite relationship which results in the disintegration of the ingested bacilli and of the cytoplasm of the host cell. A different term should be reserved for the macrophage in which the ingested bacillus multiplies and bursts the cell. A description is given of the appearance of the bacilli in electron micrograms of ultra-thin sections of lepromatous nodules fixed in Susa solution. The nuclei of the cells were found to be well preserved, but the cytoplasm was largely replaced by "peculiar cytoplasmic inclusions." Normal mitochondria were present. Some of the inclusions consisted of vacuoles of various sizes with well-defined membranes and embedded in a strongly osmiophilic and granular matrix. Some of these vacuoles were empty, but others appeared to contain cross-sections of bacilli or parts of disintegrating bacilli. Intact longitudinal sections of bacilli were sometimes found in the cytoplasm of a cell having inclusions; these forms were rarely found in the inclusions. In contrast to the lepra cell development were cells which had more recently ingested bacilli which were shown in cigar-shaped bundles. The cell nuclei were swollen, or there was only the nuclear membrane remaining. "In longitudinal section the bacilli are seen to be of filamentous type and to have a uniform coarsely granular cytoplasm with no definite sign of internal organization."—[From abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 135.]

FAZIO, M., DOGLIOTTI, M. and NICOLA, M. Lèpre lépromateuse. Données cliniques et histologiques des atteintes hépatiques. [Lepromatous leprosy; clinical and histologic findings in liver involvement.] Presse Méd. **67** (1959) 1871-1874.

The histologic observations concerning the liver in leprosy were for a long time based exclusively on autopsy reports, the findings representing the last evolutive stage

of the morbid process. Only in recent years has puncture biopsy been practiced. The authors report here a comparative study, histologic and functional, of the liver in 4 cases of lepromatous leprosy. The laboratory examinations showed a manifest alteration of the liver function. The histologic examination showed: (1) nonspecific changes of hepatitis of toxico-infectious etiology, such as degenerative phenomena, small lymphomonocytic infiltrations, hyperplasia of the Kupffer cells, periportal proliferation of the connective tissue, and alterations of the lattice fibers; and (2) specific changes represented by granulomas and the foamy cells of Virchow. The granuloma, centered by necrosis of some of the hepatic cells, is formed by an essentially histiocytic infiltrate and is limited by an thin connective tissue band. This granuloma, which never contains either giant cells or foamy cells, and which remains of limited dimensions, ends by transforming into a sclerotic fibrous mass of spongy aspect containing the cellular elements in its meshes. The foamy cells, which constitute the specific element, are usually found at the periphery of the hepatic lobule, in small groups each surrounded by a narrow connective-tissue corona. Puncture biopsy also enables one to detect the leprosy bacilli, which are found in the intercellular spaces, in the Kupffer cells, and in the foamy cells in which they are grouped in globi, as well as in the interior of the granulomas except in the area of fibrous organization. A second puncture biopsy, made in the same patients after 4 to 6 months of treatment, showed the same histologic and bacteriologic picture. These findings confirm previously-published observations, and the usefulness of the puncture biopsy of the liver in following the progress of the disease.—N. Bourcart

Languillon, J. and Boissan, R. Contribution à l'étude de l'aspect radiologique des lésions des extrémités osseuses chez le lépreux soudanais (Institut Marchoux-Bamako). [Study of the radiologic aspect of bone lesions of the extremities in Sudanese leprosy patients.] Méd. Trop. (Marseilles) **19** (1955) 558-567.

This paper is based upon a 10-months' study of 302 unselected leprosy patients at the Institut Marchoux at Bamako. Of these, 57% were lepromatous, 36% tuberculoid, and 7% indeterminate. The majority of bone lesions found affected the hands. There was total absence of disease in the sesamoid bones. There was lack of correlation between the diameter of the foramina and the degree of leprous affection of the extremities. Osteoarthritis was relatively most frequent (50%) in the interphalangeal joints of the hands (illustrated by drawings). The most frequent lesion in the upper or lower extremities was osteolysis at the ends of the digits. It was exceptional to find arthritis in the claw-hand condition, only 1 case in 51.—[From abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 139.]

Ogata, T., Fukushi, K., Yukawa, T., Iidaka, K., Takano, K. and Nakayama, T. Relationship between tuberculosis and leprosy as seen from the standpoint of pathology. La Lepro (1960) Special issue pp. 19-36.

We have reached the following conclusions by pathologic anatomy and experimental pathology in regard to the pathologic relationship between tuberculosis and leprosy. (1) Various findings show that, histopathologically, the basic form of the origin of the pathologic change of tuberculosis and leprosy is the same. (2) As mycobacterial diseases, in the pathologic changes of both tuberculosis and leprosy could be proved the symbiotic phase (S-type), the exudative-necrotic phase (E-type) and the granulomatous phase (G-type); and at the same time it was confirmed that change from one phase to the other occurs. (3) It was proved that the three pathologic phases were determined by the interrelationship of the endurability of the mycobacterium within the host tissue, and the resistance (function of reticuloendothelial system, immunity, congenital constitution) of the living body towards the mycobacterium. (4) The fact that cross immunity is established between the two diseases was proved. (5) It is assumed that there is a common

antigenicity for *M. tuberculosis* var. *hominis* and *M. leprae*.—[From the authors' conclusions.]

MENEZES, D. Influência da calmetização da lepra indiferenciada para tuberculóide reacional. [Influence of BCG vaccination in the transformation of indeterminate leprosy to reactional tuberculoid.] Rev. brasileira Leprol. **27** (1959) 93-99.

The author has studied the influence of BCG vaccination (doses varying from 400 to 1200 mgm.) in 16 leprosy cases classified as indeterminate (for one reason or another) and observed in 7 of them (44%) sudden transformation to the reactional tuberculoid form, undoubtedly induced or precipitated by the vaccination. There was no such transformation in cases of other types vaccinated, they including lepromatous and tuberculoid. Another case which had had a reactional tuberculoid outbreak, which cleared up, was found several months later to have pulmonary tuberculosis, and in retrospect the tuberculoid reaction was ascribed to the infection with tuberculosis, this also exemplifying a relationship between the tubercle and leprosy bacilli. Separating allergy and immunity, which usually occur together, the author advances the hypothesis that in most cases reactional tuberculoid leprosy is provoked by an excess of antigen, at a given moment, in persons sensitized to the leprosy bacillus, whether he be a patient or in the incubation phase of indeterminate leprosy. The antigen can be the leprosy bacillus itself (in view of the frequent positivity of the bacillus at the beginning of the outbreak), or BCG alone or associated with the leprosy bacillus (the 7 cases reported), or the Koch bacillus.—[In part from author's summary.]

MORENO, S. R. Viragem do Mitsuda pelo B.C.G. em filhos de hansenianos. [Change of the Mitsuda reaction by BCG in children of leprosy patients.] Rev. brasileira Leprol. **27** (1959) 183-191.

This report, from Colombia, is of work with 264 preventorium children, aged up to 19 years (78% of them 10 years or more). Of the whole, 76% gave positive Mitsuda reactions of some degree, the percentages increasing with age (the percentages 50, 69, 75 and 85 in the four 5-year groups); 22% were Fernandez positive. All of the early reactors also gave the late reaction, against 68% of the Fernandez negatives. The tuberculin positives (of which there were 41, or 16%) also gave more late reactions than the tuberculin negatives (75% *vs* 55%). In considering the effects of BCG vaccination (105 children, including the 1+ reactors) only those giving stronger (2+ or 3+) reactions are considered converted—in total 38, or 36%. There was no notable difference between those vaccinated orally or intradermally (about 40%), while the control group—retested but not vaccinated—showed the same change in 28%, this indicating that change can be induced by retesting alone. The change occurred somewhat more frequently in the oldest (15-19 years) group than in the three younger groups. It is concluded that the high lepromin index, in relation to the low tuberculin index, indicates a direct, not cross, type of resistance. Also that there is no advantage in intradermal over oral vaccination, while there are good reasons—including the lack of necessity of preliminary tuberculin testing—for preferring the oral route.—H. W. W.

SILVA, C. and RABELLO NETO, A. Influencia da vaccinação pelo BCG sôbre a lepromino reação em pessôas sadias comunicantes e não comunicantes de casos de lepra. [Influence of BCG vaccination on lepromin reaction in healthy persons, with or without contact with leprosy cases.] Rev. brasileira Leprol **27** (1959) 129-143.

Since 1952 an experimental program of BCG vaccination of contacts has been carried out in the area of the Nova Iguaçu Dispensary, with strict follow-up. The lepromin-negative contacts were divided into 2 groups, drawn by lot, one to be vaccinated and the other to serve for a control. The vaccinated group was given 6 consecutive bi-weekly

oral doses of 200 mgm. of fresh BCG, while the control group was given a placebo of the same appearance. Second lepromin tests were made 6 to 8 months after the vaccination, to observe transformations of reactivity. Conversion from negative to positive was found to occur in practically the same proportions in the 2 groups. To observe the progress of the cutaneous reactivity, subsequent lepromin tests were made after different intervals. Unexpectedly, some individuals were found to have reactional instability, being again negative after having reacted very well. Another investigation showed no difference in the percentages of the lepromin negatives in contacts and noncontacts. Also observed was a persistence of lepromin negativity in contacts of tuberculosis, including adults. Mentioned is the case of an adolescent girl who was persistently lepromin negative and who, between 1953 and 1955, took 2,000 mgm. of BCG orally, but nevertheless became lepromatous in 1958. The persistence of lepromin negatives among vaccinated persons in the same proportion found in the nonvaccinated controls creates serious doubt about the preventive character of BCG vaccination in relation to leprosy infection, susceptibility to which is generally held to be exclusively a characteristic of nonreactors to lepromin.—[From author's summary.]

YANAGISAWA, K. On the immunological relationship between tuberculosis and leprosy with special reference to the effect of BCG administration upon the prophylaxis of leprosy. La Lepro (1960) Special issue, pp. 37-47.

Interesting results were obtained in our studies on the relationship between the tuberculin and lepromin reactions, and on the common antigenicity possessed by tubercle and leprosy bacilli. It was established that BCG vaccination can prevent the manifestations of leprosy. However, there still remain unsolved many doubtful points, and it is strongly desired that investigators engaged in studies of leprosy and tuberculosis will cooperate in order to face these problems.—[From author's summary.]

MONTESTRUC, E. Quelle est la part de la réaction de Mitsuda dans les critères du blanchiment et de la cessation du traitement des malades atteints de lèpre? [What is the role of the Mitsuda reaction in the criteria of cure and cessation of treatment in leprosy patients?] Bull. Soc. Path. exot. **52** (1959) 742-746.

With respect to the question asked, the intradermal reaction to lepromin provides valuable information which it would be very difficult to dispense with. In tuberculoid cases, although the reaction is almost always positive, it is not without interest, because its weakening is a contraindication to the stopping of treatment. In indeterminate cases, treatment should be continued in all the lepromin negatives, and the other criteria of cure and suspension of treatment can be applied to the lepromin positives. It is not agreed that in lepromin-positive lepromatous cases the treatment should nevertheless be continued without interruption; that rule is applicable only to the lepromin-negative lepromatous cases. In the lepromin-positive lepromatous cases, under conditions of inactivity and arrest, and after a surveillance of which it is not possible to fix a uniform duration, interruption of treatment can be considered, always provided that the patient shall remain under medical control and that clinical and biologic examinations are regularly performed.—[From summary and conclusion.]

OLMOS CASTRO, N., ARCURI, P. and CONEJOS, M. Hipersensibilidad en lepra. [Hypersensitivity in leprosy.] Leprología **4** (1959) 63-85.

(1) Bacillus-body hypersensitivity (hypersensitivity of vaccination or of infection): The intradermal injection of heat-killed *M. leprae* in man or dog without previous contact with this microorganism, or infection by the same mycobacterium in some persons, creates a state of altered reactivity (hypersensitivity) to a new dose of the bacillary bodies. This state of altered reactivity may be revealed by means of the intradermal injection

of lepromin. Under these conditions there is an accelerated formation of an erythematous tubercle, becoming clearly visible between the 4th and 7th days. This nodular reaction is generally preceded by the 48-hour tuberculin-type (Fernandez) reaction, although that may be absent, depending on the degree of actual hypersensitivity. (2) Protein hypersensitivity: The conditions previously stated create a state of altered reactivity (hypersensitivity) to the injection of protein derivates of *M. leprae*, which condition may be revealed by the intradermal injection of protein antigens, which causes a local reaction of the tuberculin type. (3) Histology of the Wade phenomenon: Comparison is made between the lesions induced by injection of lepromin (*a*) in normal dogs and (*b*) in dogs previously injected with lepromin. The morphologic aspect of the different stages of the evolutive development of the inflammatory reaction under the two conditions is essentially the same, the peculiarities being too insignificant to distinguish one from the other. There are, however, marked differences between the histologic pictures as regards the time and the intensity of the inflammatory process; in the previously injected (sensitized) dog the development of the inflammatory process is quicker and more intense. —[From author's conclusions, supplied by G. Basombrio.]

[Some of the tables in this article, several of which are not discussed in the text, contain data of interest. Of 214 adult noncontacts tested with lepromin, only 12% gave the early reaction (97% of the 92 read later were Mitsuda positive), whereas 67% of the 79 retested were Fernandez positive. Another table shows that of 70 contacts tested with LPT without previous lepromin testing, only 18% were positive, whereas of 52 similarly tested after lepromin, 90% were positive. Clearly, lepromin testing induces the early-type sensitivity in large proportions of subjects.

[Full data of periodic readings (in mm.) after the first and the second lepromin testing of healthy persons are given for only 6 individuals, but—with individual variations—the results are reasonably well in accord with the following averages:

	2nd d.	*7th d.*	*14th d.*	*21st d.*
First test	3.4	4.2	6.5	7.5
Second test	15.3	10.2	11.1	8.6

[Nothing is said in this connection about changes of character of the reaction lesion with the passage of time, so there is here no basis for determining acceleration of the late reaction, either in second tests of normals or in reactions of tuberculoid cases as compared with first tests of normals.

[The rate of development of nodules ("tubercles") in tuberculoid cases can be worked out from two detailed tables dealing with a total of 51 tuberculoid leprosy cases. To simplify: At the 2-day reading all (except 1 negative reactor) had erythematous infiltrations (EI), averaging 18.8 mm. (range, 37-4 mm.). On the 7th day the symbol "T" (tubercle) appears in the records of 31 cases, with or without the EI symbol, and by the 14th day in 41 cases; a few ulcerated directly from the EI stage without the tubercle formation. Apparently for the most part the reactions had reached their maximum by the end of two weeks.

[Mention may be made of two tables bearing on the early reactions of two lots (28 persons each) of inmates of an asylum tested with different lots of lepromin. Virtually all were Mitsuda positive on the first test, so the percentages were not affected by the testing. (There is no indication of the degrees of the reactions.) Of one lot only 14% gave Fernandez reactions to the first test, but 46% to the second test. In the other lot these figures were 61% and 79%, respectively. Only in the first lot did the subsequent LPT test show evidence of increased Fernandez sensitivity ascribable to the second lepromin testing. Here, in the difference between the two groups, is another example of a considerable difference of early-reaction antigenicity of two lots of lepromin, but none with respect to late reactions (see Guinto and Wade, THE JOURNAL **26** (1958) 328-345). —H. W. W.]

Fernandez, J. M. M. Reacciones provocadas por antígenos leprosos y tuberculosos en individuos sanos, infectados y enfermos. [Reactions provoked by antigens used in leprosy and tuberculosis in healthy individuals, contacts and leprosy patients.] Leprología **4** (1959) 88-107.

The antigens used in leprosy and tuberculosis are classified as of two principal types: (1) those containing bacillary bodies and proteins (lepromins, bacillus suspensions, BCG, and tuberculous tissues), and (2) those that only contain proteins (leprolins and tuberculins). Regarding the reactions that the leprosy antigen provokes, on the one hand are grouped, under the name of lepromin reaction, or Mitsuda reaction, all the phenomena that follow the intradermal injection of lepromin in leprosy patients, in contacts, in healthy subjects previously inoculated with lepromin, and in subjects with previous contact with *M. tuberculosis* or other acid-fast bacilli. On the other hand, under the name of the Wade reaction or phenomenon, is placed the response provoked by the lepromin injection in a subject without previous contact with *M. leprae* or tuberculosis, or other acid-fast bacilli. The Mitsuda reaction, when complete, is regarded as developing in three stages: (*a*) the infiltrated erythema of the Fernandez reaction, at 24-48 hours; (*b*) the accelerated nodular reaction, or Olmos Castro phenomenon (4 to 7 days); (*c*) the delayed nodule, or the Mitsuda reaction strictly speaking (3 to 4 weeks). In the incomplete Mitsuda reaction, there may be no first stage, but it is still unknown whether the second stage may also be absent. The Fernandez reaction and the Wade phenomenon are two different processes. The former expresses hypersensitivity, and a certain degree of resistance, whereas the latter reflects the organisms's capacity to react allergically in the presence of the bacilli inoculated as the antigen. It is held that in leprosy, provided there is hypersensitivity, there is also resistance, and it is not yet certain that resistance can exist without hypersensitivity. The second part of this paper deals with the reactions provoked by tuberculosis antigens in healthy and infected subjects. In organisms with previous contact with *M. tuberculosis*—hypersensitized—the reactions provoked by BCG are similar to those observed in leprosy, especially the early reaction, equivalent to the Fernandez reaction, to which he attributes the same imporatnce and meaning as to the accelerated nodule. On comparison of the immunoallergic phenomena observed in tuberculosis and leprosy, it is concluded that there is a great similarity between them as regards their clinical aspect, evolution and mechanism, but in practice the meanings of a tuberculin reaction and a lepromin reaction are very different, since the latter is a prognostic test and the former a diagnostic proof of infection.—[From author's summary supplied by G. Basombrio.]

Souza Campos, N. Antígeno de Mitsuda preparado com gânglio de doente lepromatoso. [Mitsuda antigen prepared with lymph nodes of lepromatous patients.] Rev. brasileira Leprol. **27** (1959) 213-214.

In this brief note the author recounts the increasing difficulties in obtaining nodular leproma materials suitable for the making of lepromin. The problem cannot be met by the plan of using visceral tissues obtained at autopsy. He suggests the use of lymph nodes of lepromatous cases, especially those with lymph-node infarction secondary to lepra reaction at the beginning of sulfone therapy. From one diffuse [non-nodular] lepromatous case in reaction there were obtained two inguinal nodes, rich in bacilli, which weighed about 10 gm. each, whereas from a nodular case it might require several skin lesions to make 4 or 5 gm. From another diffuse lepromatous case with lymph node infarction there were obtained 5 nodes weighing in total 15 gm. Antigen prepared from such material behaves in a manner identical with antigen prepared from lepromas. —H. W. W.

WILKINSON, F. F. Método para simplificar la preparación de lepromina integral o bacilar. [A method for simplifying the preparation of integral or bacillary lepromin.] Rev. argentina Dermat. **43** (1959) 21-22.

The author proposes replacing the usual procedures of grinding, desiccation or maceration by making a suspension at approximately 15,000 r.p.m. Thus a greater amount of bacilli will be obtained. The other steps are similar to those of the Mitsuda-Hayashi or Dharmendra method, according to whether an integral or a bacillary preparation is desired. For the titration of suspensions of the product, progressive dilutions are prepared. Considered as a type is one which has a one-plus (1+) bacillary concentration of the Sommer scheme.—[From author's summary, supplied by G. Basombrio.]

BECHELLI, L. M., RATH DE SOUZA, P. and QUAGLIATO, R. Correlação entre os resultados da leitura clínica e do exame histopatológico da reação de Mitsuda. [Correlation between the results of the clinical reading and the histopathologic examination of the Mitsuda reaction.] Rev. brasileira Leprol. **27** (1959) 172-182.

The authors presented a report on this subject, based on 139 observations, at the Tokyo congress [THE JOURNAL **26** (1958) 426], but pending further work offered no general conclusion about the basic question whether the correlation of the clinical and histologic findings indicated new criteria for the reading of the reaction. The study has now been extended to a total of 293 cases, 231 patients and 62 contacts. The histologic grading used was: (1) positive, granulomatous infiltrate of tuberculoid structure, predominantly epithelioid, with very few or no bacilli; (2) favoring positive chronic inflammatory infiltrate not entirely granulomatous nor predominantly epithelioid but with a tendency to grouping as nodular structures, giant cells few when any, bacilli absent or rare; (3) negative, banal chronic inflammatory, usually with few or no bacilli, or granulomatous without tuberculoid structure composed of histiocytes without epithelioid characteristics and with many bacilli. Clinical readings were: 1+, 3-5 mm.; 2+, more than 5 mm.; 3+, any with ulceration. The findings in the 237 indeterminate and tuberculoid cases and contacts are summarized as follows:

Clinical reading	*Negative histology*	*Favoring positive*	*Positive histology*	*Total*
Neg.	10 (83%)	2 (17%)	0 (0%)	12 (5%)
±	14 (56%)	9 (36%)	2 (8%)	25 (11%)
1+	23 (25%)	28 (30%)	41 (45%)	92 (39%)
2±	9 (12%)	24 (32%)	41 (55%)	74 (32%)
3+	0 (0%)	15 (44%)	19 (56%)	34 (14%)
Total	56 (24%)	78 (33%)	103 (43%)	237

It appears that of the 1+ reactions a substantial proportion (25%) were histologically negative, and somewhat less than half (45%) were definitely positive; inclusion of the "in favor" findings brings that figure to 75%. The figures for the 2+ cases are not strikingly different. Even for the 3+ (ulcerated) lesions, none of which was histologically negative, only 56% were definitely positive. Of the 52 cleared-up (bacteriologically negative) lepromatous cases studied, 23 gave ± or 1+ reactions, of which none was histologically positive but 8 (35%) favored positive. The authors hold that the findings in the 1+ and 2+ reactions [nonulcerated], show a great similarity, usually frankly positive or in favor of positive (negative histology in such reactions perhaps indicate a less favorable course of the disease in some of the cases), and they suggest that with study of further cases it may be found desirable to combine the 1+ and 2+ grades as one (1+) and rank the 3+ readings as 2+.—H. W. W.

BROWN, J. A. K. and STONE, M. M. The multipuncture depot lepromin test: Investigations with different antigens. Leprosy Rev. **30** (1959) 215-219.

This paper is in sequence to previous work with the authors' multipuncture depot lepromin test and BCG vaccination. In the earlier work the antigen used was made from lepromatous lesions; in this work other antigens are also used. Two experiments are described. In the first, an antigen made from tuberculoid skin lesions was used in 25 patients who were positive to ordinary lepromin; 1 gave a moderately positive reaction, 7 were slightly positive, and the remaining 17 were negative. In the second experiment 56 nonleprous children were divided into two groups, A and B. In Group A, 37 were tested simultaneously with 1/20 depot antigens made of (*a*) normal skin, (*b*) active tuberculoid tissue, (*c*) bacteriologically-negative skin from a lepromatous patient, and (*d*) standard lepromin. In Group B, 19 children, the antigens were the same as in Group A except that they were made up with normal saline. All but 9 of the children in Group A were positive to the normal lepromin; 3 gave slightly positive reactions to the bacteriologically-negative lepromatous-case antigen; while all tests with the other 2 antigens were negative. After BCG vaccination the lepromin depots of 3 negatives showed conversion, and 6 showed increased positivity. It is concluded that, with the depot method of lepromin testing, antigens other than those containing lepra bacilli do not give positive results such as those that are sometimes produced when the antigen is given by injection. BCG had no effect on any of the depots except those containing lepromin from bacteriologically-positive lepromatous tissue, but after BCG all the subjects who were lepromin negative became positive, and the majority of those who were positive showed an increase in positivity. "The bacilli appear to be the important factor [in the lepromin reaction], and BCG vaccination quickly alters the attitude of the host toward them in the majority of healthy individuals, a change which of course might take place later and more slowly by natural processes."—[From abstract by E. Muir in *Trop. Dis. Bull.* **57** (1960) 136-137,] [See article by Kinnear Brown and Stone in this issue, pp. 1-13.]

BROWN, J. A. K. and STONE, M. M. Lepromin sensitivity. Leprosy Rev. **31** (1960) 172-177.

Continuing the study with the multipuncture depot method in Uganda it was found that the test injections of tuberculin did not affect the response to lepromin, whether given previously or at the same time. In comparable groups, the lepromin reactor rate after BCG vaccination of the tuberculin negatives was 29% higher than in the controls who had had only the one lepromin test. The difference is significant, and is due to the vaccination. The lepromin reactor rate among those who became tuberculin positive after BCG vaccination was significantly higher than among the naturally-occurring tuberculin positives. Sensitivity probably includes more than one or two elements. BCG not only increased the lepromin reactor rate; it also increased significantly the number of strong reactors. A less concentrated antigen can be used where it is desired only to distinguish weak or negative reactors from those whose response is adequate. The lepromin reactor rate in normal children varied from 29% at ages 5 and 6 to 78% at ages 15 and 16. BCG vaccination produces within one month a rate which would not be reached naturally for many years. Doubt has been thrown on the part played by BCG in producing lepromin conversion because lepromin injected intradermally in relatively large doses can itself sensitize, but in this work the test injection could not contribute to the sensitivity that developed after BCG vaccination. In the sequence, "lepromin test plus vaccination plus lepromin test," it may be that synergic or adjuvant actions of the lepromin and BCG may produce more lepromin conversions than either could alone, a matter which should be explored. The value of BCG is not lessened because lepromin itself helps to sensitize. This work confirms the advantages of the multipuncture depot lepromin test.—[From authors' conclusions.]

KOOIJ, R. The nature of the Mitsuda reaction. Leprosy Rev. **30** (1959) 137-138 (correspondence).

In this informal, solicited note the author says that he has shown that in the late, or Mitsuda, reaction to lepromin both the bacilli and the tissue components are involved. Suspensions of normal tissue give positive reactions in tuberculoid leprosy cases, but not in lepromatous cases. This explains why the lepromin reaction is not diagnostic or specific (except for its specific negativity in lepromatous cases). Lepromatous negativity is probably due to inability to break down the bacilli, perhaps signifying lack of special enzyme systems. Contact with the leprosy bacillus is not necessary for reactivity, but the reaction to lepromin is accelerated and intensified by leprosy and tuberculosis. Thus, probably, can be explained conversions by BCG vaccination, perhaps through the nonspecific Dienes effect although cross sensitization cannot be ruled out. This reaction is of an unusual type, there being only two others like it—the Kveim reaction and the reaction to normal tissue suspensions—and very special conditions are required for evoking such reactions. "Probably we are dealing with a kind of foreign body reaction or isomorphic (isopathic) phenomenon of certain individuals due to their individual constitution." The matter of "these so-called foreign-body reactions" is then discussed at some length. —H. W. W.

SAGHER, F. On the nature of the isomorphic and isopathic reactions in leprosy. Leprosy Rev. **30** (1959) 138-140 (correspondence).

In this further solicited note the writer points out that only leprosy and sarcoidosis react to injection of materials taken from patients with these diseases with a late (3-5 weeks) reaction. Histologically this reaction is of the same nature as the original disease process, and therefore it can be called an isomorphic or Koebner's phenomenon, as in psoriasis and lichen planus, except that the reaction lesions are granulomatous and not especially produced in the dermis. The isopathic phenomenon—which has been studied mainly in lepromatous and arrested cases, there having been little experience with tuberculoid or indeterminate cases—is a granuloma similar to the leproma and not to a tubercle. [A limitation would seem to be necessary here, since the positive Mitsuda reaction to lepromin is essentially of tuberculoid structure.] It appears that in lepromatous leprosy there is a profound specific alteration of the tissue reactivity of the host which causes various substances (including leishmanin, tuberculin, milk, peptone, India ink and sand-fly bites) to elicit changes characteristic of the lepromatous disease process, irrespective of bacilli at the sites. This alteration may persist long after a case is bacteriologically negative. There is no relation to the patient's reactivity to tuberculin or lepromin, and the nature of the injected material seems to be of little consequence. These observations may speak in favor of Kooij's view that the leprosy bacillus, although essential for the occurrence of leprosy, is not the only factor determining the occurrence and development of the disease. A suggestion is offered for a possible use of the phenomenon, when more is known about it.—H. W. W.

SHELLEY, W. B. Some reflections on certain new granulomata. Trans. St. John's Hosp. Dermatol. Soc. (1957) No. 39.

In this paper, the 1957 Prosser White Oration given before the St. John's Dermatological Society in London, the author relates recent studies (made with H. J. Hurley) on the genesis of a certain type of tuberculoid granuloma, the paper ending with the tagline, "Allergy has a new frontier." Of the many people who apply a certain deodorant stick to the axilla, a rare few individuals show an eruption of slowly-developing and long-persisting papules of granulomatous (tuberculoid) nature. Of the two principal components of the deodorant stick, the sodium stearate base and the active substance sodium zirconium lactate, the former was found to be regularly granulomagenic when injected intradermally in relatively large quantities, but not when given in trace amounts or

applied to the surface, so that substance was ruled out. In an experiment with the deodorant stick, granulomas were produced in 2 of 30 subjects, and study of them and of 4 patients showed that the condition was due to the zirconium compound, the lesions ascribed to a "specific allergic hypersensitivity" [better, perhaps, allergic reactivity] to zirconium. The lesions, which could be induced in any part of the skin by injection of as little as 1 to 2 gamma of zirconium (but not by patch testing), are a delayed response appearing after from 10 days to several weeks without any preceding reaction, clinical or histologic. This induced condition is specific, without any cross relationship to other metals such as beryllium. It was concluded that all of the granulomas associated with beryllium, silicon, foreign bodies and tattoos are local allergic reactions to various metallic antigens, the long latent periods—which have varied from days to years—being due to the "variable incubation period required for sensitization." This view indicates the need for new studies of sarcoidosis, leprosy, tuberculosis, and other chronic granulomas. "Allergy has a new frontier."—H. W. W.

SHELLEY, W. B. and HURLEY, H. J. The allergic origin of zirconium deodorant granulomas. British J. Dermat. **70** (1958) 75-101.

In this comprehensive article, the authors add their 6 new cases of zirconium allergy (see preceding abstract) to the 64 previously reported, consideration of which led them to a general study of the granulomas (as defined) of the skin. There is a list of foreign bodies (38 of them) which may give rise to tuberculoid granulomas, and another of disease conditions (42, beginning with "allergic granulomatosis") in which such granulomas may be found. There is repeated mention (but not particularly illuminating) of the lepromin and Kveim tests. Experiments with zirconium preparations on two groups of normal men (30 in one group, size of other group not stated) induced the production of axillary granulomatous lesions in 2 of them, which were shown by appropriate tests to be of allergic nature. This is said to be the first direct demonstration in man that "introduction of extremely small amounts of a pure substance may produce a delayed allergic reaction in the form of an epithelioid granuloma. This is an entirely new facet of immunologic response which must be explored in relation to all the granulomatous processes in medicine"—including leprosy.—H. W. W.

HURLEY, H. J. and SHELLEY, W. B. Comparison of the granuloma producing capacity of normals and sarcoid granuloma patients: Experimental analysis of the sarcoid diathesis theory. American J. Med. Sci. **237** (1959) 685-692.

In this study the authors attempt to evaluate the importance of the sarcoid diathesis, or sarcoid mode of reaction, in the pathogenesis of sarcoid granulomatous disorders. The local response to intradermal injection of selected test agents of known composition was observed in a comparative study involving 35 patients with sarcoidosis, 6 persons with cutaneous zirconium granulomas (specific allergy—delayed hypersensitivity—sarcoid granulomas developing after use of zirconium-containing axillary deodorants) and a control group of 300 normal male white and Negro volunteers. The test substances used included ultra-pure sodium stearate, a soap which regularly produces granulomas on injection into the skin of normals, 73 metals and elements of the periodic table (all in 1:10,000 concentration), and autologous whole blood. Injections of each of these substances (0.03-0.05 cc.) were given into the skin of the back or forearm of the test subjects. Clinical observations were correlated with biopsy findings. No significant qualitative or quantitative variation in the local cutaneous response to these test agents was observed in any of the subjects, including the sarcoidosis group, except in the zirconium granuloma patients; and they reacted only to the injection of the water-soluble zirconium salt. The lesion produced in them, after 3 to 5 weeks, was a granulomatous papule, typically sarcoid in type histologically. The delayed appearance of this reaction is reminiscent of the delayed development of the skin-test granulomas in sarcoidosis patients after the Kveim

test, and in patients with tuberculoid leprosy after the injection of lepromin (Mitsuda reaction). It is concluded that the sarcoid mode of reaction—i.e., the inherent capacity of an individual to react with a sarcoid granuloma in response to many different stimuli—is not operative in the pathogenesis of sarcoid granulomas, at least in those of sarcoidosis and the zirconium granulomas. It is postulated that in these diseases, and perhaps in other sarcoid granulomas as well, a specific granulomagenic agent is responsible.—AUTHORS' ABSTRACT

HURLEY, H. J. and SHELLEY, W. B. Sarcoid granulomas after intradermal tuberculin in normal human skin. Arch. Dermat. **82** (1960) 65-72.

In extension of their studies of granulomatous skin reactions, especially with reference to cases of sensitivity to zirconium (see preceding abstracts), the authors have studied the infrequently-observed delayed (2-4 weeks) granulomatous reactions to tuberculin, the lesions histologically "sarcoid" or "tuberculoid." They tested a group of 50 healthy Negro volunteers with the first dose of PPD tuberculin (1:5,000,000). Among the 36 subjects who reacted positively, 5 developed persistent reaction papules which when biopsied at 4 weeks were found to be tuberculoid, with focal epithelioid granulomatous change and with variable numbers of inflammatory cells. Repeat tests in these subjects gave similar results. Although no early (tuberculin) nonreactor gave the late reaction, there was no correlation between the occurrence of the latter and the intensity of the former, so the granulomas were not secondary to intense inflammation and tissue destruction due to the early reactions. Repeated tests with progressively larger doses of tuberculin did not induce granulomatous reactions in other persons than those who gave that reaction with the first dose. That maneuver did cause some increase in size of the granulomas in the late reactors, but the increases were not proportional to the dose, nor was there any change of the histologic picture. The granulomas which did occur "may well be the result of a special type of allergic hypersensitivity analogous to that of patients with zirconium and other sarcoid granulomas." Later: "... this reaction may be induced by a variety of substances through the mechanism of a newly described type of hypersensitivity which manifests itself as a granuloma."—H. W. W.

BUU-HOI, N. P. and BANG, T. V. Réaction de la peau des lépreux aux injections intradermiques d'acides gras provenant du bacille tuberculeux. [Reactions of the skin of leprosy patients to intradermal injections of fatty acids from tubercle bacilli.] Rev. française Études clin. et biol. **3** (1958) 770-773.

The bacilli of tuberculosis and leprosy are very similar in their lipid content. The phenomena of allergy and parallergy between these bacilli have been held to suggest a similarity of chemical composition. The lipids of the tubercle bacillus have been shown to be made up in great part by branched-chain fatty acids of high molecular weight, one of the most interesting being phthienoic acid, especially abundant in the virulent strains. The authors have tried the effects of fatty acids from the tubercle bacillus in conditions similar to those of the Mitsuda test. They isolated fractions with more than 20 atoms of carbon, and by intradermal injection obtained skin reactions in lepromatous cases, papules and nodules of varying intensity. These reactions are nonspecific, as they also occur in nonleprous subjects.—[From abstract in *Leprosy Rev.* **30** (1950) 125.]

EDWARDS, L. B., EDWARDS, P. Q. and PALMER, C. E. Sources of tuberculin sensitivity in human populations. A summing up of recent epidemiologic research. Acta Tuberc. Scandinavica **47** (1959) 77-97 (supplement).

Disparities in the geographic patterns of sensitivity to small (5 to 10 TU) and large (100 or 250 TU) doses of tuberculin, and the fact that signs of tuberculous infection and disease are closely related to small-dose but not to large-dose sensitivity, point almost inescapably to the conclusion drawn 10 years ago that reactions to the 5-TU dose of

tuberculin are largely a result of tuberculous infection, but that most reactions to a large dose are cross reactions caused by infection with other organisms. Further studies have revealed that in some geographic areas many of the small reactions to 5 TU should also be interpreted as cross reactions; they appear to have the same significance as the sensitivity brought out more readily by the 100-TU or 250-TU test. Comparative studies with standard tuberculin PPD-S and with PPD antigens prepared from various kinds of acid-fast organisms show that in some regions of the United States, notably the Southeast, sensitivity to several of the new antigens is highly prevalent, many times more so than sensitivity to PPD-S. Cross reactions to tuberculin apparently are the result of widespread infection with an organism (or organisms) more closely related antigenically to avian tubercle bacilli and some of the recently isolated "atypical" mycobacteria than to human tubercle bacilli. To improve the efficiency of preventive measures, a reliable method for distinguishing between specific tuberculin reactions and cross reactions is urgently needed. The most promising possibility lies in the development of appropriate antigens and techniques for skin testing.—[From abstract in *American Rev. Resp. Dis.* **81** (1960) 627.]

Edwards, L. B., Palmer, C. E., Affronti, L. F., Hopwood, L. and Edwards, P. Q. Epidemiologic studies of tuberculin sensitivity. II. Response to experimental infection with mycobacteria isolated from human sources. American J. Hyg. **71** (1960) 218-241.

In a study concerning the nature of specific sensitivity (to the homologous antigen) and of the cross sensitivity (to a heterologous antigen) produced by mycobacterial infections, the authors inoculated 12 groups of guinea-pigs with 9 "atypical" strains of apparent pathogens, and 3 other strains including BCG (but not the avian bacillus), and tested them with PPD's prepared from those organisms. Among the highlights is the fact that nearly all of the animals reacted to their homologous PPD's, yet the infections remained benign. Cross reactions were often obtained with the heterologous antigens, those reactions generally smaller than those to the homologous antigens. The activity of the antigens, as shown by the reactions to them, were sometimes of the "broad spectrum" type involving several of the organisms, sometimes of limited range, indicating wide differences in the antigenic capabilities of the mycobacteria used. One inference is that reactions by human beings to a given antigen do not necessarily imply infection by the particular mycobacterium from which that antigen was prepared. This has been shown for tuberculin (nonspecific sensitivity); it may be equally true of, for example, the Battey bacillus.—H. W. W.

Youmans, G. P., Youmans, A. S. and Parlett, R. The incidence of hypersensitivity to mammalian and Battey PPD in medical and dental students. American Rev. Resp. Dis. **82** (1960) 114-116 (notes).

One hundred and seventy-eight medical and dental students at Northwestern University, Chicago, were skin-tested with 5 TU of PPD prepared from unclassified Battey mycobacterium and with 5 TU of PPD prepared from *M. tuberculosis*. Fifty-four students (30.3%) gave reactions; 21 (11.8%) reacted to both tuberculins, 27 (15.2%) reacted only to PPD-B, and 6 (3.4%) only to PPD-S.—[Authors' summary.]

Nyboe, J. The efficacy of the tuberculin test; an analysis based on results from 33 countries. Bull. Wld. Hlth. Org. **22** (1960) 5-37.

Nyboe here makes a summary analysis of the accumulated date on the tuberculin testing done under WHO auspices of some 190,000 persons in 33 different countries in Africa, America, Asia and Europe in the 1950-1958 period. There is a map showing the distribution of rates of reactions to the standard 5 TU test measuring 8-11 mm. among persons 10-14 years old. The lowest frequencies (0-1.9%) were found entirely outside

of the tropical zone—in Europe and Basutoland in southern Africa—and the highest frequencies (10% and over) all within the tropics. It is indicated that these intermediate reactions are caused by mass exposure of the population "...to certain unidentified agents producing cross-reactions to tuberculin. In tropical regions a clear-cut distinction between tuberculosis infected and uninfected evidently cannot be made by means of the present tuberculin test."—H. W. W.

WARWICK, W. J., GOOD, R. A. and SMITH, R. T. Failure of passive transfer of delayed hypersensitivity in the newborn human infant. J. Lab. & Clin. Med. **56** (1960) 139-147.

At birth, and for a variable period thereafter, the newborn human has a limited capacity to produce circulating antibodies in response to injected antigens. Maturation of the immune response coincides with the development of plasma cells and secondary follicles in the stimulated lymph nodes. The capacity to express delayed hypersensitivity is also absent at, and shortly after, birth. Clinical and experimental observations are limited to infants unintentionally infected with less tubercle bacilli by their mothers and to infants given BCG vaccination. In these infants, delayed hypersensitivity can occasionally be demonstrated as early as 21 days of age and uniformly by 4 to 6 weeks of age. It is well known that the unresponsive neonate can accept and utilize passively transferred antibody, but only Schlange's study has suggested that the neonate could manifest delayed hypersensitivity to tuberculin after exchange transfusion. The authors' studies with a variety of passive transfer techniques indicate that newborn infants, 1.5 hours to 1 month of age, are unable to accept the passive transfer of delayed hypersensitivity. These observations indicate that newborn infants are defective in their capacity either to express delayed allergy, or to accept passively-transferred delayed-type hypersensitivity. This deficiency suggests that the recipient of so-called passively-transferred hypersensitivity may participate actively in the development of the delayed allergy. In addition, the observation may have important bearing on understanding of the basis for deficient resistance to infection which characterizes the neonate.—[From synopsis.]

ABE, M. Serological relationship of leprosy, tuberculosis and syphilis. II. In vitro antigenicity of the lipid recovered from leprous nodule. La Lepro (1960) Special issue, pp. 59-65.

This study deals with the lipids in the ether solution of those extracted from the leproma tissue by chloroform, in the preparation of the Dharmendra antigen. They were divided into 3 fractions, alcohol-, ether- and chloroform-soluble, respectively designated A, B and C. The first of them proved almost inactive serologically. It was concluded that at least 2 sorts of antigenic lipids exist in the leprous nodule. One is a phospholipid similar in action to a 1:1 cardiolipin-lecithin mixture. The other is a lysopolysaccharide whose polysaccharide part has serologic activity in common with tuberculin polysaccharide. —H. W. W.

WILKINSON, F. F., CHIERI, R. A. and FOLLMANN, E. Inoculatión de Mycobacterium leprae a ratas en carencia de vitamina E; estudio experimental (nota previa). [Inoculation of *M. leprae* into rats deficient in vitamin E; experimental study (preliminary note).] Leprología **4** (1959) 35-44.

The authors describe the results of an experience of inoculating *M. leprae* to rats lacking vitamin E. One draw-back is pointed out: the high mortality, attributable to a multiple lack of vitamins. Nevertheless, certain facts indicate as probable that the Hansen bacillus multiplies in rats deprived of vitamin E. It is believed that the method is promising, and that—provided the experiment is done under adequate conditions—more categorial conclusions may be attained.—[In part from authors' summary, supplied by G. Basombrio.]

GHOSH, S., BASU, S. P. and MUKERJEE, N. Effect of roentgen rays on *M. leprae*. Leprosy in India **30** (1958) 150-153.

Mukerjee had observed beading or disintegration of leprosy bacilli when excised lepromatous tissue was subjected to prolonged x-ray irradiation with moderate doses (63r to 85r). The experiment has been extended to the use of different doses for varying periods, and such exposures were also applied to smears from the tissues. No detectable changes were found in the morphology or staining character, nor decrease in the number of bacilli.—[From abstract in *Leprosy Rev.* **30** (1959) 264.]

SMITH, N. The 'Dassie' bacillus. Tubercle (London) **41** (1960) 203-212.

Some aspects of the morphology, growth requirements and resistance of a mycobacterium isolated from the South African rodent Cape hydrax, *Procavia capensis* (Pallas) or "Dassie," are described. The morphology and staining features of this "Dassie" bacillus resemble closely that of the *Mycobacterium* var: *muris*, or vole bacillus. Both organisms grow on Dorset egg medium without glycerine, but the "Dassie" bacillus does not grow as well in Dubos medium as does the vole bacillus. However, a modified Dubos medium in which the casein digest is replaced by l-glutamic acid sodium salt at 0.1% is a satisfactory medium for its growth. The "Dassie" bacillus was found to be sensitive to both streptomycin and isonicotinic acid hydrazide.—[From author's summary.]

MAYAMA, A. Influence of serum protein fractions of leprosy patients and rats infected with experimental murine leprosy on the growth of tubercle bacilli. La Lepro (1960) Special issue, pp. 67-78.

In previous studies (1951) the author found that sera from leprosy patients, and from rats with murine leprosy, have a strong tuberculostatic effect in cultures. In the present study the proteins of such sera were separated by the ethanol fractionation method of Cohn. It was found that Fraction II had the most marked tuberculostatic effect, Fraction III somewhat less, and Fraction IV none. Electrophoresis showed that the strongly inhibiting fractions contained beta and gamma globulins in high concentration. —H. W. W.

SUZUKI, M. Studies on the infections mechanism of murine leprosy. Part I. Experiment on blocking of the cells of the reticuloendothelial system. (1) Experiment on the peritoneal blocking in the intraperitoneally inoculated murine leprosy. La Lepro **28** (1959) 301-310 (in Japanese; English abstract).

——— Idem. Idem. (2) Experiment on the percutaneous blocking in the subcutaneously inoculated murine leprosy. Ibid. pp. 311-317.

——— Idem. Idem. (3) Experiment on the blocking from different routes in the subcutaneously and intraperitoneally inoculated murine leprosy. Ibid. pp. 319-323.

——— Idem. Part II. The influence of anti-monocyte serum on murine leprosy Ibid. pp. 324-330.

——— Idem. Part III. Alteration of infections mechanism of murine leprosy after removal of the omentum major. Ibid **29** (1960) 13-18.

——— Idem. Part IV. Influence of the removal of spleen upon the occurrence of murine leprosy. Ibid. pp. 19-25.

Part I. (1) Blocking the cells of the reticuloendothelial system with a colloidal suspension of carbon black was done for the purpose of analyzing the mechanism of infection in murine leprosy according to its development when the symbioses between bacilli and murine leprosy cells were alternated; 104 mice were used, divided into 8 groups. The course of the blocking was observed for 5 months, before and after inoculation of bacilli. The results were as follows: (*a*) A marked inhibition of development of the infection was seen in both the group injected with carbon black before the inoculation and the group blocked before and after the inoculation. (*b*) There was marked inhibition in a

group in which the blocking was done before the 15th day after the inoculation. (*c*) There was slight inhibition in the group in which the blocking was done after the 20th day. (*d*) Marked acceleration was observed in the group injected with a mixture of carbon black and bacilli.

(2) The influence of percutaneous blocking of the reticuloendothelial system with carbon black was investigated in rats inoculated subcutaneously. A lot of 35 rats was divided into 5 groups, the percutaneous blocking of the subcutaneous leproma being attempted in various ways. Results: (*a*) There was development of the infection in the rats which, prior to inoculation, were injected with carbon black; the lepromas of the viscera were marked, and the formation of fresh lepromas seemed easy in weakly-blocked regions or the subcutaneous tissue free of blocking. (*b*) Prolonged percutaneous blocking caused marked degeneration of the bacilli in the subcutaneous leproma, and inhibition of the development of fresh lepromas and of the dissemination of bacilli into the organs. (*c*) As for the development of subcutaneous lepromas, the rats injected with a mixture of bacilli and carbon black showed no differences from the control group, but there was marked accentuation of the dissemination of bacilli into the organs.

(3) In the previous experiments the inoculation of a mixture of carbon black and bacilli accentuated the development of infection in the organs. In the work here reported, firstly, an intravenous injection with carbon black was done in animals inoculated intraperitoneally. The dissemination of bacilli into the organs was not different from that in the control group. Secondly, frequently-repeated intraperitoneal injections with carbon black were done in animals inoculated subcutaneously, for observing a relationship between the murine bacilli and the function of the reticuloendothelial system. Marked development of lepromas was observed early, but dissemination of bacilli into the organs was inhibited as compared with control group.

Part II. In this experiment 126 rats were used. The antimonocytè serum was obtained from rabbits sensitized by intraperitoneal injection of monocytes of rats. The host cells of the murine bacilli were injured by the reversed-allergic reaction caused by this serum. When the inoculations were made intraperitoneally, multiplication of the bacilli in the intraperitoneal monocytes was markedly inhibited, as compared with the control group, and the bacilli soon left the cells. In animals autopsied after 40 days, development of lepromas was inhibited markedly. Autopsies after 5 months showed inhibition of the dissemination of bacilli. Exceptionally, in a group which was injected with liquid paraffin before the injection of serum, multiplication of the bacilli was inhibited as compared with the untreated group.

Part III. To investigate the role of the omentum major in intraperitoneal infection, the following experiment was carried out in 30 rats divided into 2 groups. In one group, the omentum major was removed, and the bacilli were inoculated intraperitoneally. Autopsy after 5 months showed the development of large lepromas on the capsule of the spleen in all rats of the experimental group, but not in any of the control group. With regard to the dissemination of the bacilli, no difference was found between the experimental and control groups. It was therefore concluded that development of lepromas on the capsule of the spleen compensated the dysplasty of leproma on "milk pox" due to removal of the ometum.

Part IV. To study the mechanism of infection in rats in which the function of the reticuloendothelial system is inhibited, the spleen was removed. Inoculations were made immediately afterward in the first experiment, and 10 days after the removal in the second experiment. After the inoculation o a 10^{-2} suspension there was early and marked development of lepromas in the experimental group as compared with the control group in both experiments. The dissemination of bacilli throughout the body was accelerated markedly. Acceleration of development of murine leprosy was marked in the spleen-removed group of the first experiment in comparison with that of the second ex-

periment. After the inoculation of a 10^{-4} suspension there was no difference between the experimental and control groups.—[From abstracts.]

KAWAGUCHI, Y., KANAI, K. and YANAGISAWA, K. Kanamycin in experimental mouse leprosy. Japanese J. Microbiol. **2** (1958) 95-99.

In the first experiment, groups of mice infected subcutaneously with *M. leprae murium* were treated with kanamycin administered intraperitoneally, 2 mgm. once daily, 6 days a week. The effects were assessed by the size of the resulting lepromas and the time of their appearance. In the untreated control mice the lesions developed within 6 weeks, reaching a maximum size in 10 weeks, but in those treated with kanamycin a lesion was palpable in only 1 of the 7 animals at the 10th week. In the second experiment the kanamycin treatment was delayed for 12 weeks after infection. The daily dose was 5 mgm., and it was given 6 days a week for 3 weeks, followed by a week without treatment and then a further 4 weeks' treatment. During the first period of treatment the size of the leproma remained stationary, but it increased during the week of no treatment. It is concluded that in mouse leprosy kanamycin is less active than is isoniazid.—[From abstract by S. R. M. Bushby in *Trop. Dis. Bull.* **56** (1959) 58.]

BUTTLE, G. A. H., D'ARCY, P. F. and HOWARD, E. M. The influence of cortisone and hydrocortisone acetates on the course of *Mycobacterium leprae murium* infection in rats. British J. Pharmacol. & Chemother. **13** (1958) 95-97.

Prolonged administration of cortisone acetate or hydrocortisone acetate produces a decrease in the rate of growth of rats, the latter steroid having the more pronounced effect. Lepromata in the steroid-treated animals are significantly smaller than those in the control rats, cortisone having the more pronounced effect. There is no appreciable difference in the distribution of organisms in the lepromata, however, but the spread of infection is not increased by the steroid treatment.—[From summary in *Trop. Dis. Bull.* **55** (1958) 662.]

MCFADZEAN, J. A. and VALENTINE, R. C. The value of acridine orange and of electron microscopy in determining the viability of *Mycobacterium leprae murium*. Trans. Roy. Soc. Trop. Med. & Hyg. **53** (1959) 414-422.

It has been reported (Strugger) that living tubercle bacilli stained with acridine orange fluoresced green under ultraviolet light, whereas dead ones fluoresced red. The authors report an attempt to use this dye for detecting the viability of *M. leprae murium* derived from rat lepromas. The organisms were treated by various methods, i.e., heat (80°C), formaldehyde, Carnoy fixative, ethanol, UV irradiation, and by storage at 2°C and 37°C. Films of them were then stained with 1:4,000 acridine orange at pH 7.4. Untreated and unstained bacilli fluoresced from nil to blue-green, and when stained the majority still fluoresced blue-green with only an occasional one fluorescing red. All the stained dead bacilli also fluoresced blue-green except those killed by heating, which were red. The bacilli that were stored at 2°C and 37°C were also examined by electron microscopy. Those stored at 2°C were almost all of uniform electron density, but most of those kept at 37°C were obviously degenerate since—apart from dense masses of shrunken material—they were largely empty. Injection into rats confirmed that those kept at 37°C were dead, and that those kept at 2°C were viable. It is therefore concluded that use of the acridine dye does not enable dead and living bacilli to be distinguished except when the bacilli have been killed by heat. It is thought that the red fluorescence of these bacilli might be due to a change in the permeability of the cell membrane, but this is apparently not the explanation since bacilli whose membranes had been ruptured in a Hughes press also failed to fluoresce. An incidental observation was that the dye in red-fluorescing bacilli or in solution changes to green when exposed to blue light, and this phenomenon may explain certain anomalies in the literature concerning this dye.—[From abstract by S. R. M. Bushby in *Trop. Dis. Bull.* **57** 141-142.]

IIDAKA, K. Studies on muri-lepromin reaction and tuberculin reaction in mice which were sensitized with murine leprosy bacilli or tubercle bacilli. (I) Studies on the muri-lepromin reaction. La Lepro **29** (1960) 1-12 (in Japanese; English abstract).

Mice of the dd strain were divided into two groups, one of which (A) was sensitized with murine leprosy bacilli, and the other (B) with tubercle bacilli. The animals of both groups received subconjunctival and intradermal injections of murine lepromin antigen, and histopathologic examinations were made after 24 and 48 hours and 2 weeks. The differences of the degrees of inflammation in the two groups was not marked, and they did not differ materially in nature, but in the A group they were slightly stronger than in the B group.—[From abstract.]

TAMEMASA, O. and TSUTSUMI, S. On the metabolism of mycobacteria. I. Dehydrogenase activities of *Mycobacterium lepraemurium*. Japanese J. Exper. Med. **28** (1958) 183-197.

Dehydrogenase activities of murine leprosy bacilli prepared from the subcutaneous lepromas of rats were tested on a number of substances including sugars, amino acids, fatty acids and aliphatic acids, aromatic acids, alcohols, aldehydes, amines, etc., using tetrazolium violet as a hydrogen acceptor. It was found that o-aminophenol, higher fatty acids such as lauric or myristic acid, and indole or skatole, responded in the order listed in intensity. Not a few aromatic acids also showed a faint response. These dehydrogenase activities were observed only under anaerobic conditions. *M. tuberculosis* (H37Rv) and BCG were found to possess dehydrogenase activities on the three kinds of substances mentioned, while they were absent in *Staph. aureus* and *E. coli*.—[From authors' summary.]