

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.

BROWNE, S. G. Leprosy: the Christian attitude. *Expository Times* (Edinburgh) **53** (1962) 242-245.

The reference to "leprosy" in the Old and New Testaments are reviewed, and an attempt is made to determine the various diseases probably alluded to. It is concluded that the Hebrew word *tsara'ath*, translated leprosy, almost never refers to Hansen's disease. When used to designate a skin condition, it connotes a scaly rash and carries no definite diagnostic criteria. But it more generally implies ceremonial uncleanness and divine disfavor. Similarly, the Greek equivalents in the Septuagint and the words used in the New Testament are without precise clinical definition. They may have included leprosy. Tribute is paid to the beneficent effects of Christian concern for sufferers from leprosy, often formerly based—it must be admitted—on doubtful exegesis and misleading translation. "Few misidentifications and mistranslations in the history of literature can have had such unwarranted and far-reaching and unfortunate effects as those of the words appearing as 'leper' and 'leprosy' in the English Bible from Wyclif onwards, and in versions in many other languages." The author pleads that the word leprosy and its cognates be no longer used in those passages in the Bible where there is no definite reference to Hansen's disease.—AUTHOR'S ABSTRACT

QUIROGA, M. I. Papel de la esclavitud en la entrada de la lepra en la Argentina. [Role of slavery in the introduction of leprosy into Argentina.] *Leprológia* **6** (1961) 34-38.

In this review article it is concluded that the role of slavery in the introduction of leprosy into Argentina was of minimal importance. The more recent immigration in the 19th century was more important, increasing markedly the few cases that turned up in colonial times.—[From author's summary.]

BROWNE, S. G. Leprosy in Africa today. *Postgrad. Med. J.* **38** (1962) 86-91.

This paper gives an up-to-date summary of the estimated prevalence of leprosy in the continent of Africa, and of the measures employed in treatment campaigns. About one-half of the cases in the world are to be found there, principally in countries with poverty, low hygiene, malnutrition, and poor communications. Fortunately, the proportion of lepromatous cases is low, varying from 2% to 28%, and in tuberculoid cases spontaneous resolution is frequent. A clinical feature mentioned is the absence of the primary polyneuritic form. Also mentioned is the epidemiologic importance of the bacilliferous phases of the nonlepromatous forms of the disease. The centers where leprosy research is being prosecuted are listed. It is emphasized that, in spite of considerable progress in recent years, treatment is still not available for over one-half the patients needing it, that facilities for rehabilitation are scanty, and that much remains to be done in integrating leprosy control services into a developing health scheme in the diverse territories in Africa.—AUTHOR'S ABSTRACT

MAKIROV, K. A., [Some problems of morbidity due to leprosy in India.] *Zdravookhranenie Kazakhstana* **21** (1961) 46-50.

There are about 1.5 to 2 million leprosy cases in India, mainly in its southern and eastern parts, according to available data. In the northwestern part of the country the prevalence is much lower. Besides social and hygienic conditions, the definitive role may be played by physical and geographic factors. The family and caste customs as

well as religious intercourse in sacred places favor the transmission of infection. The increased number of registered cases is explained by the improvement of diagnosis and the greater attention paid to public health matters since independence was gained. At present there are 27,000 beds in the leprosaria of India. Of all registered patients 60% are in the states of Madras, Bombay, Bihar and Orissa. From 5% to 20% of all patients are of the lepromatous type. A Leprosy Research Institute is functioning in Chingleput, and 40 research centers are in various other parts of the country; 10 such centers are supposed to be opened according to the second five year-plan. Forty million rupees were allocated to the leprosy work.—N. TORSUEV

✓ MCCARTHY, D. D. and NUMA, J. Leprosy in the Cook Islands. *New Zealand Med. J.* **61** (1962) 77-85.

The Cook Islands, which since 1900 have been part of metropolitan New Zealand and form its only active focus of leprosy, comprise 15 small islands spread over 850,000 square miles of ocean. Rarotonga, the capital, with a population of 7,000, is about 1,700 miles northeast of Auckland; and Aitutaki, next in importance, is 140 miles north of Rarotonga. Leprosy is supposed to have been introduced by Chinese between 1860 and 1890. In the early years leprosy patients were driven to segregate themselves on islets near the larger islands. A survey in 1911 showed 32 cases and 4 suspects. In 1926 a survey showed 53 cases, and these were evacuated to Makogai in the Fiji Islands. By 1931, 7 more cases had appeared, and 31 more were sent to Makogai in 1934. A leprosy hospital was established on one of the Penrhyn islets in 1937. Between 1948 and 1953, 26 more patients were sent to Makogai. After this, when modern treatment was available, no more patients were transferred. In 1958 there were 205 cases in Aitutaki and 17 on other islands. For the first 60 years after the arrival of leprosy it occurred almost exclusively in adults, but after 1948 it began quickly to appear and increase rapidly among young people. In Aitutaki between 1953 and 1958 the proportion of those 10 years old and younger increased from 25.9% to 47.7%. Over the years the proportion of lepromatous cases has steadily diminished, while that of tuberculoid cases has correspondingly increased. Very close association between the disease and particular families has until recently been a feature of leprosy distribution in the Cook Islands, but the number of unrelated cases has increased in the past few years.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 786.]

✓ MONTESTRUC, E., MILLER, R. and GARCIN, D. La lèpre a la Martinique en 1960. [Leprosy in Martinique in 1960.] *Arch. Inst. Pasteur Martinique* **14** (1961) 70-83.

Some disappointment is expressed at the fact that, although the total number of new leprosy patients was less in 1960 than in previous years, the number of lepromatous patients had increased to 13, compared with 9 in the previous year. The fact that 2 of the new patients were contacts of tuberculoid cases makes the authors doubt that that type of leprosy is as inoffensive as it has been supposed to be. Treatment with sulfones continues to cure patients, although there have been some relapses in those who have stopped treatment too soon. One of the most satisfactory aspects is the total reduction of cases among children up to 5 years of age, following on BCG vaccination of all children of leprosy parents; it is questioned if this can be a mere coincidence. The authors express increased confidence in the prophylactic power of BCG.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 674.]

✓ MUIR, E. The Control of Leprosy in India. *Mission to Lepers' Occasional Paper No. 2*, April 1962.

The author begins by emphasizing the fact that leprosy is a communal disease, and must be treated communally and not just individually. Regarding the question

whether leprosy can be controlled by institutional treatment alone, by outpatient clinics alone, or by any combination of the two, it is concluded that to be successful the problem must be tackled in the villages by the people themselves. This involves the education of the village leaders with a view to securing their full cooperation. Next, the importance of the recruitment and training of suitable workers is emphasized. Their instruction must be undertaken by highly qualified doctors who would also act as leaders, initiators, supervisors and consultants. The Government of India's plan for leprosy control is referred to, and the opportunity it presents to the Indian Christian Church and Christian missions to recruit and train the right kind of workers.—N. D. FRASER

BOGOUNE, V. V. [The influence of contact inside and outside the family on the spread of leprosy.] *Sbornik Nauchnykh Rabot Po Leprol. i Dermatol.* **15** (1961) 20-23 (French summary).

Of a total of 2,430 contacts observed, 1,846 (76%) had been in contact with cases of lepromatous leprosy, 327 (13%) with cases of tuberculoid type, and 267 (11%) with indeterminate cases. Among these contacts, kept under observation for 14 years, 211 (8.7%) have contracted leprosy. In 102 cases (48.4%) the infection arose within the family and in 109 cases (51.6%) outside. Of the infections, 199 (94%) were of the lepromatous type, 4 (2%) were tuberculoid, and the remaining 8 (4%) were indeterminate.—[From translation of the author's summary by F. I. C. Apted in *Trop. Dis. Bull.* **59** (1962) 560.]

DHARMENDRA and CHATTERJEE, S. N. Maculo-anaesthetic leprosy—its diagnosis and classification. *Leprosy Rev.* **33** (1962) 106-118.

[This article is taken from a mimeographed paper on the subject which was widely distributed by the authors. Because in some countries the existence of the form of leprosy discussed is denied, it is desirable that the views of the Indian leprologists be understood. The lengthy summary is therefore reproduced in full, although not entirely verbatim.] 1. The flat hypopigmented anesthetic patches of leprosy constitute a distinct clinical entity, designated "maculoanesthetic" in the Indian classification. 2. A detailed description is given of these lesions, which are macular in the true dermatologic sense, being flat hypopigmented areas of skin, without any elevation but with clearly defined margins, with definite sensory changes, a rough dry surface, usually negative bacteriologically, histologically usually showing only simple banal infiltration, and having a benign course. 3. Differentiation of these maculoanesthetic lesions is considered from other macular lesions in leprosy, such as the macular lesions of the indeterminate and lepromatous forms, and residual flat lesions remaining after the subsidence of the thick raised patches of the tuberculoid, lepromatous and borderline forms. 4. The maculoanesthetic form is a benign one, allied to the tuberculoid type from the prognostic point of view. However, it is not tuberculoid, either from the histologic or the wider clinical point of view, neither having a definite tuberculoid histology nor being thick and elevated. 5. In the Madrid classification, these lesions are designated macular-tuberculoid. Besides this slight difference in the nomenclature of this form of leprosy in the two systems of classification, there is also some difference in its grouping. In the Indian classification they are included as a separate group, their close relationship to the tuberculoid type being indicated by both of them being included in the broad group of nonlepromatous (benign) leprosy. In the Madrid classification these flat lesions are included as a variety of the tuberculoid type (the other varieties being minor and major tuberculoid). 6. These differences in the terminology and grouping of these flat, hypopigmented, benign lesions in the two systems are considered to be only minor differences. A plea is made that they should not be unnecessarily magnified, and that efforts should be made to understand the two different points of view. 7. It is hoped that with mutual understanding it should be possible to evolve a unanimously-agreed classification, since there are no basic differences involved. 8. Until such agreement is reached, even with the existing differences it

is possible without difficulty to collect data for comparative studies from different countries. The tuberculoid type of the Madrid classification may be considered identical with the "nonlepromatous" group of the Indian classification; and the macular-tuberculoid component of the tuberculoid type (Madrid) identical with the maculoanesthetic component of the nonlepromatous group (Indian). It would be better and more informative if, for the purpose of collecting certain data in both the systems of classification, the flat patches are separated from the thick and raised patches in the type or group, as the case may be. Thus, in countries using the Indian classification, data should be collected separately for the maculoanesthetic and tuberculoid lesions, and in countries using the Madrid classification, data should be collected separately for the macular-tuberculoid and the other components (minor and major) of the tuberculoid type. This is essential because of the differences in the so-called macular-tuberculoid and the other components of tuberculoid type regarding the extent of nerve involvement and consequent deformities, the evolution of the lesions and the prognosis of the disease, and the response to the treatment.—[From the author's summary.]

CONTRERAS, OLIETE, TERCENIO, GUILLÉN, TORRENT and CONTRERAS RUBIO. La garra hanseniana. Su tratamiento. [The claw hand in leprosy; its treatment.] *Rev. Leprol. Fontiles* **4** (1961) 329-342.

After discussing some anatomic-functional ideas of the normal hand, the authors describe the pathologic characteristics of the hands in leprosy and the methods employed in the recently-created Rehabilitation Service in the Fontilles leprosarium. First they describe the physiotherapeutic treatment—paraffin baths, oil massage, etc.—and then the surgical techniques. Twelve cases are presented in which, considering the conditions that existed, the results obtained can be considered as exceptional.—[From authors' summary.]

REYNAUD, J. Aspects actuels de la lèpre en O.R.L. au Sénégal et au Soudan. [Present aspects of leprosy in relation to the ear, nose and throat in Senegal and Sudan.] *Bull. Mém. Facul. Nat. Méd. Pharm. de Dakar* **8** (1960) 280-286.

Details are given of the changes caused by leprosy, dealing chiefly with the lepromatous type. Nodules, epistaxis, dry rhinitis, and perforation of the septum are common features in the nose, and bone destruction is often found. The appearance of the mouth is normal in 75% of patients. In the rhinopharynx, although there are seldom nodules or ulcers, dry rhinitis is a common feature. The tongue is often affected, and nodules of the lips are common. Lesions of the larynx, sometimes so severe as to require tracheotomy, have become less common since the coming of chemotherapy. Deafness sometimes occurs, but is thought unlikely that this is due to leprosy infection of the tympanum, and there is no reason to suspect that the auditory nerve is ever infected. Apart from treatment for the alleviation of symptoms, the general treatment with sulfones is the most important. Plastic operations on the nose may help to relieve symptoms as well as repair disfigurements.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 562.]

AMORETTI, A. R., RAVECCA, P. and BURGOA, F. Lepra neural persistentemente pura. A propósito de un caso. [Persistently pure neural leprosy; report of a case.] *An. Fac. Med. Montevideo* **46** (1961) 283-286.

Report of a case of neural leprosy, with contractures and deformities, persisting in its pure form for 15 years—since 1945, when it began as alterations of sensitivity of the hands. The topography of the sensory alterations is almost generalized, corresponding to the syndrome of multiple neuritis of the small branches. In 1954-1955 some of the fingers were amputated surgically. Histopathology: Infiltration of lymphoid and mononuclear cells around blood vessels, and lesions of obliterative endarteritis. The prolonged stabilization of the clinical picture, the negative bacteriologic findings,

and the repeated negativity of the lepromin test warrant the inclusion of the case in the indeterminate [sic!] group. Nerve biopsy is considered unnecessary, since it does not modify the prophylactic behavior or the therapy.—[From authors' summary.]

MONTESTRUC, E. and HYRONIMUS, J. C. Quel intérêt pratique peut-on retirer de la thermométrie cutanée en léprologie. [What practical lessons may be drawn from the skin temperature in leprosy.] *Bul. Soc. Path. exot.* **54** (1961) 988-995.

Following the work of Michel Lechat, the authors investigated the significance of the skin temperature in leprosy, confining the enquiry to the fingers. Examined were 30 healthy and 440 leprosy hands, the latter being divided into 4 categories according to whether they were lepromatous or tuberculoid and with or without neuritic lesions. In every case the temperature was greatest in the thumb and least in the little finger, and this difference was most marked in patients with neuritic lesions and in the hands with the most marked neuritic lesion. The differences of temperature between thumb and little finger are shown in tables and graphs. Further investigation is contemplated to find out if this method may be usefully employed in following the evolution of lesions in early cases with nerve involvement.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 562.]

SERGEEV, K. K. [Receptor function of the skin in patients with leprosy.] *Vestnik Dermatol. & Venereol.* **35** (1961) 53-60.

Disturbance of the receptor function of the skin occurs in different forms of leprosy, although it is not an obligatory symptom. In complete exclusion of various receptor mechanisms, the pain sensitivity first becomes excluded, while in the last—mechanical. This is due to the fact that the pain sensitivity is connected with the low-differentiated neuroplasm which becomes destroyed in the first place, whereas the mechanical receptor apparatus is connected with neurofibrils, which are the most stable. Combined disturbance of different receptor mechanisms in one place, but to a varying degree, is explained by the polyvalent nature of the receptors and the specificity of receptor mechanisms.—[From author's summary, supplied by N. Torsuev.]

BROWNE, S. G. The anterior tibial compartment syndrome: differential diagnosis in a Nigerian leprosy settlement. *British J. Surg.* **39** (1962) 429-431.

The clinical syndrome characterized by the more or less sudden appearance of a painful and tender swelling confined to the anterior tibial compartment, often associated with symptoms of vascular compression and interruption of nerve pathways, is usually associated with local damage to either blood vessels or muscle masses. Similar painful swellings, at times accompanied by symptoms of compression of blood vessels and nerves, have been observed at Uzuakoli Leprosy settlement. The case histories of patients studied are summarized. Of special interest to leprosy workers are those cases in which the underlying causes of the syndrome were: acute allergic panniculitis; pyemic abscess in a patient with borderline lesions; and abscess of the external popliteal nerve. Other causes in this tropical setting were: Calabar swelling (due to *F. loaloa*), cellulitis due to guinea-worm (*D. medinensis*), and frambesial periostitis of the fibula.—AUTHOR'S ABSTRACT

REYNAUD, J., BEL, J. and DIOP, L. Sinusites maxillaires des hanséniens. [Maxillary sinusitis in leprosy patients.] *Bull. Soc. Méd. Afrique Noir Langue Française (Dakar)* **6** (1961) 496-499.

Of 25 leprosy patients examined, 7 were found to have maxillary sinusitis, diagnosed by radiologic examination, puncture and biopsy, as well as by routine examination. The lesions appear to be caused by the leprosy infection, but in most cases there was

a banal mixed infection superimposed. The condition is dependent on the state of the nasal fossae, which must be treated first.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 562.]

JAMES, D. G. Erythema nodosum. *British Med. J.* **1** (1961) 853-857.

A review of 170 cases of erythema nodosum in 126 females and 44 males. The majority of the patients were aged 20 to 39. The disease was most frequent during March, April and May. The lesions, characteristically appearing on the legs, also developed on the arms in 12 cases. The average course of the condition was 3 weeks. Recurrences developed in 12 patients. Polyarthralgia was present in 105 (62%). Chest roentgenograms were abnormal in 140, showing adenopathy with and without diffuse pulmonary mottling, and 126 patients were thought to have sarcoidosis. Among 148 patients who were tuberculin tested, 68 had positive reactions. Depot tuberculin tests were positive in 24 of 32 patients who had been negative Mantoux reactors. Kucin tests were positive in 107 of 152 patients tested. In 21 cases the erythema nodosum was associated with infections (streptococcal infections in 12, and tuberculosis in 4), while in 23 cases no cause for the condition was found. Spontaneous recovery occurred in all patients.—[From abstract by E. R. Riley in *American Rev. Resp. Dis.* **85** (1962) 152.]

WYNN-WILLIAMS, N. On erythema nodosum, bilateral hilar lymphadenopathy and sarcoidosis. *Tubercle (London)* **42** (1961) 57-63.

Among 190 patients with erythema nodosum seen at the Bedford General Hospital during the 10 years from 1949 to 1958, the etiologic factor of the eruption was thought to be streptococcal infection in 51 patients, tuberculosis in 44, drugs in 5, BCG vaccination in 1, and "uncertain" in 48. In 41 patients it was considered to be a manifestation of sarcoidosis. Tuberculin sensitivity was high in those cases caused by tuberculosis, low or absent in the sarcoidosis group, and approximated that of the general population in the other groups. The 41 patients with erythema nodosum as a manifestation of sarcoidosis formed part of a group of 70 patients who were seen with sarcoidosis and bilateral hilar lymphadenopathy. In this area it is probable that most cases of bilateral hilar lymphadenopathy with symptoms are diagnosed, but an unknown number that would be detected by regular routine roentgenography of adults remains undetected.—[From abstract by M. J. Small in *American Rev. Resp. Dis.* **85** (1962) 151-152.]

MUKERJEE, N. and GHOSH, S. Aqueous suspension of Avlosulfon in the treatment of leprosy. *Leprosy in India* **32** (1960) 130-132.

Eight leprosy patients (L5, T3) were treated with Avlosulfon suspension (DDS, I.C.I.) intramuscularly for 1½ years and showed considerable improvement. There were no toxic symptoms or signs observed in any case, even with a high dose of 4 cc. given intramuscularly twice weekly (1,600 mgm. of DDS). Blood concentration of DDS was found to be 0.49 mgm./% after 96 hours.—[From authors' summary, in *Trop. Dis. Bull.* **59** (1962) 563.]

CHAO, Y. F. Report of clinical trial with Etisul. *Leprosy Rev.* **33** (1962) 45-47.

The trial was made with 4 lepromatous and 4 tuberculoid cases, inunctions of Etisul being combined with either DDS or Ciba 1906 treatment for a period of 6 months. The patients selected were those who had shown no improvement on sulfones or Ciba 1906 during a period of 6 months. In 3 of the lepromatous cases there was marked clinical improvement with decrease in the bacterial index. One of these cases had far-advanced lepromatous leprosy of more than 14 years duration, and had shown no improvement after 2 years' treatment with DDS. In 1 tuberculoid case there was no resolution of the macules.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 564.]

EKAMBARAM, V. and SHARMA, C. S. G. A preliminary report on the treatment of leprosy with Etisul in a rural leprosy centre. *Leprosy Rev.* **33** (1962) 48-51.

Twice-weekly inunction of Etisul was given to 13 patients with lepromatous leprosy, 2 with nonlepromatous leprosy, and 2 with an intermediate variety over periods varying from 12 to 65 weeks. In combination, DDS was given to 7 patients, Sulphetrone injections and INH to 4, and DPT (Ciba 1906) to 2. [The combinations in the other 4 are not mentioned.] The average bacterial index was reduced to half in 14 months, whereas it took 22.3 months to reduce the index to half in 50 lepromatous patients on sulfones alone.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 564.]

WILKINSON, F. F., MANZI, R. O., PESSOLANO, C. A. and FALCIANI, S. J. A. La sulfadimetoxina en el tratamiento de la lepra. Resultados clínicos y baciloscópicos a los seis meses de observación. [Sulfadimetoxine in the treatment of leprosy. Clinical and bacteriological results in six months of observation.] *Leprológica* **6** (1961) 89-100.

The authors report results obtained by six months of treatment with sulfadimetoxine in leprosy. There was clinical and bacteriologic improvement, and lack of lepra reactions. Lepromas levelled and/or disappeared, infiltration of lesions resolved, and there was recuperation of the hair and eyebrows and improvement of laryngitis and rhinitis. Of 15 patients, 3 became bacteriologically negative and 12 improved. A control group of bacteriologically and clinically similar patients of the same hospital who were treated with sulfones during the same period showed less improvement than those who received sulfadimetoxine.—[From authors' summary.]

LANGULLON, J., PERSON, J. and PICART, P. Essai de traitement de la lèpre par quelques dérivés de l'hydrazide de l'acide isonicotinique: thioamide, éthionamide, néotizide. [Treatment trials of leprosy with some derivatives of isoniazid: thioamide, ethionamide, and neotizide.] *Bull. Soc. Méd. Afrique Noire Langue Française (Dakar)* **6** (1961) 500-507.

The authors report on 4 separate trials of derivatives of isoniazid: (1) the thioamide, 1 gm. daily for 12-15 months, given to 8 tuberculoid and 5 lepromatous patients; (2) the ethionamide, up to 1 gm. daily, given to 8 lepromatous, 1 borderline and 5 tuberculoid patients for various periods; (3) a combination of ethionamide and DDS, 0.5 gm. of each daily, given to 10 lepromatous patients for a year; (4) Neotizide (sodium and calcium salts of the orthomethane sulfone of isoniazid), 400 mgm. daily, given to 10 lepromatous and 13 tuberculoid patients for a year. With the first two of these treatments there was no significant improvement and the drugs were badly tolerated, causing vomiting, diarrhea, etc. In the third trial there was rapid amelioration of skin lesions, both clinically and bacteriologically; in 6 of the 10 patients the mucosa became negative, and in 3 the skin became negative, within a year. In the fourth trial, neotizide was practically inactive.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 564.]

INABA, T., KAWAWAKI, T. and ISHIKAWA, S. On the treatment of ENL with intravenous injection of a large quantity of vitamin C. *La Lepro* **30** (1961) 190-192 (in Japanese; English summary).

This is a further study of the effectiveness of the treatment of ENL with injections of vitamin C (1-ascorbic acid), using a large dose of that substance administered intravenously. Eleven ENL cases (5 males and 6 females) were treated. The vitamin C employed was Vitacimin (Takeda), in 1 cc. (100 mgm.) and 2 cc. (500 mgm.) ampules, administered daily in doses of 100, 200 or 500 mgm. The results are summarized as follows: 1. The total effectivity rate was 73% (8/11). 2. Fading of the erythema occurred in 2 to 6 days (4 days on an average), the total amount of ascorbic acid administered being 200 to 300 mgm. (1,328 mgm. on an average). 3. Complete disappearance of the

erythema occurred in 4 to 15 days (10 days on an average), the amount of ascorbic acid injected being 660 to 7,500 mgm. (3,120 mgm. on an average). 4. No side effects were encountered. Furthermore, even in a case with ENL in which there was mental disorder following cortisone treatment, the vitamin C therapy was well tolerated and gave a remarkably favorable effect.—[From authors' summary.]

ROLLIER, R. Essai de traitement des réactions lépreuses lépromateuses par l'histaglobine. [A trial of treatment of reactions in lepromatous leprosy by Histaglobine.] Bull. Soc. française Dermatol. Syph. **68** (1961) 551-556.

Because of the hyperergic character of ENL reactions, which sometimes require almost continuous treatment by corticosteroids, the author was led to try Histaglobine on 12 cases in the Central Hospital of Casablanca. In 4 cases given prolonged treatment the results were good; in 1 case there was clear improvement which was not maintained when the drug was stopped; in the others the numbers of injections given were too small for any effect.—H. W. W.

ROSS, W. F. Etiology and treatment of plantar ulcers. "Patients must not walk on wounded feet." *Leprosy Rev.* **33** (1962) 25-40.

Plantar ulcers, with which there may be as many as a million patients affected, occur only on feet which are anesthetic and walking. They are seen as either ulcers on virgin feet, or recurrent ulcers on previously damaged feet. The "first ulcer" is caused by infected casual trauma, plantar wart, cracks, or, most commonly, subcutaneous necrosis, which is manifested by tenderness, swelling, and sometimes by a small hematoma. If the patient gets off his feet at this stage the wound will heal; otherwise the skin breaks and the ulcer is liable to become septic. The curative treatment is summarized in 6 rules: clean the wound, excise dead tissues, allow free drainage, immobilize the part, prevent secondary infection, and prevent repetition of the trauma causing the wound. Detailed instructions are given for dealing with (a) the violently affected wound, (b) clean dry ulcers, and (c) mildly affected ulcers. Particulars are given for antibiotic treatment of the infected crack, preventive surgery dealing with claw toes and drop-foot, and the use of ascorbic acid. The preparation and use of suitable footwear are dealt with in an appendix to this useful article.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 563.]

REGINATO, L. E. O retalho frontal mediano na restauração do estofão nasal, na lepra. [The median frontal flap in the restoration of the fallen nose in leprosy.] *Rev. brasileira Leprol.* **29** (1961) 127-130.

The author reports his experience in the restoration of the contour of the retracted nose in 37 leprosy patients, using simply the median forehead flap for the reconstruction of the inner lining of the nose.—[From author's summary.]

DE MELLO, P. H. and REGINATO, L. E. A epineurectomia do fibular comum no tratamento do pé-caído de origem leprosa. [Epineurectomy of the common fibular nerve in the treatment of drop-foot in leprosy.] *Rev. brasileira Leprol.* **29** (1961) 105-122.

After discussing some relevant aspects of the incidence, pathogenesis, clinical and electrical propedeutics, and treatment, of drop-foot in leprosy, the authors report a surgical trial designed to determine the relative value of epineurectomy of the lateral popliteal nerve for drop-foot and trophic plantar ulcers. No signs of correlation were seen in relation to foot ulcers, but the number of cases is much too small to warrant the drawing of any definite conclusions. Regarding drop-foot, marked success was achieved in all cases. The authors recommend this method because of the favorable results obtained in drop-foot of 7 to 11 years' duration.—[From authors' summary.]

GARRE, E., FERRARIO, R. and SCHILLAGI, E. Topical use of antibiotic in the treatment of chronic skin ulcers. *Antibiotic Annual* (New York) 1958-1959, pp. 262-264.

The localized infectious process must be regarded not only as a starting point for generalized infection, but also as a contributing factor in the inhibition of the self-repairing capacity of the tissues. Seventy-five patients having symmetric bilateral chronic lesions resulting from burns, varicose veins, disturbances of arterial circulation, administration of norepinephrine, and surgical wounds, were divided into 3 groups according to time of development of the ulcer (50-70 days, 70-160 days, 160-545 days). In all cases there was local infection by organisms including *Staphylococcus aureus*, *Streptococcus* spp., *Proteus vulgaris*, *Alcaligenes faecalis*, *Proteus mirabilis*, *Pseudomonas fluorescens*, *Staphylococcus albus*, and *Escherichia coli*. In 60% of the cases the same bacteria found in the lesions were also found in the sebaceous and sudoriferous glands of the skin surrounding the lesions. Dressings saturated with oxytetracycline solution (0.2%) were applied to lesions on the right, while lesions on the left were dressed with penicillin (3 million units/liter), or with dihydrostreptomycin, erythromycin, novobiocin, tetracycline or chloramphenicol (0.2%), the dressings being changed every 8 hours. Bacteriologic cultures were made daily. A control group received treatment by the best known techniques for this type of lesion (wet dressings, boric acid, petrolatum). Ninety-five per cent of ulcers treated with oxytetracycline became sterile in 56 hours; 72% with chloramphenicol in 85 hours; 10% with tetracycline in 114 hours; 33% with erythromycin in 160 hours. Epithelialization and complete healing were achieved in 70% of treated cases; the remainder required skin grafts, which were uniformly successful. Oxytetracycline thus proved to be the most efficient of the seven agents tested.—J. A. ROBERTSEN

BARCLAY, C. A., WILKINSON, F. F., MANZI, R. O. and FALCIANI, S. J. A. Niveles sanguíneos de sulfadimetoxina en pacientes de mal de Hansen tratados con esta droga. [Blood levels of sulfadimetoxin in leprosy patients.] *Leprológia* 6 (1961) 39-50.

The findings are given for a total of 39 cases studied, 36 of them lepromatous, divided into 3 groups given daily doses of 0.5 gm., 1.0 gm. and 1.5 gm., respectively, of the drug (Madribon, Roche). The 24-hour blood levels were: 0.5 gm., 5.1 mgm/%; 1.0 gm., 6.2 mgm/%; 1.5 gm., 6.8 mgm/%. Of the 19 cases in the 1.0 gm. dose group, 16 showed definite clinical improvement, as did all 10 cases in the 1.5 gm. dose group. Most of the cases also showed bacteriologic improvement. The 1.5 gm. dose is regarded as sufficient for the treatment of leprosy in general. Tolerance was excellent.—H. W. W.

DE MELLO, P. H. Método rápido para pesquisas de sulfonamídicos na urina. [Rapid method for detection of sulfonamides in urine.] *Rev. brasileira Leprol.* 29 (1961) 79-82.

The author presents a new method for detection of sulfonamides in urine. A circle of filter paper is treated with Ehrlich reagent for urobilinogen, adequately diluted, and then dried. The test procedure consists of placing a drop of urine on the test paper, which results in the appearance of a yellow ring. The sensitivity and specificity of the test are discussed.—[From author's summary.]

TACHIKAWA, N. and TSUTSUMI, S. Analytical studies on antileprosy drugs. (Report V. Supplement.) Promin metabolites excreted into the urine of promin resistant patients. *La Lepro* 30 (1961) 149-150 (in Japanese; English summary).

As reported previously, Promin injected intravenously in the aural vein of the rabbit appears in the urine and plasma of the animal as N-glucosides of DDS. Similar investigations were made on the urine of both normal subjects and Promin-resistant patients. In them, as in rabbits, N-glucosides were detected as the main metabolites, without any appreciable difference in the urine of resistant patients. Further reports discuss the mode of the acquisition of Promin resistance.—[From authors' summary.]

LECHAT, M. F., CLOSE, J. and ROBYNS, E. L'électrophorèse des protéines sériques chez le lépreux congolais. [Electrophoresis of the serum proteins of leprosy patients in the Congo.] *Ann. Soc. Belge Méd. Trop.* **41** (1961) 535-566.

Report of a quantitative study of the serum proteins of 102 leprosy patients and 28 controls without leprosy at the Yonda leprosarium at Coquilhatville, Congo Republic. Antweiler's technique of microelectrophoresis in a liquid medium was followed. In non-lepromatous leprosy there was found a significant lowering of the α -globulins. There was a similar reduction in the lepromatous type, but an even more significant rise in the γ -globulins. Leprosy reaction is characterized by a considerable rise in the α -globulins and a rapid fall in albumin. Statistical analysis of the results shows significant differences in patients according to whether they are affected by the tuberculoid or lepromatous form of the disease, and also whether they give a positive or a negative reaction to lepromin, but with respect to the latter observation it is suggested that this disagreement places in doubt either the value of the antigen used or else the technique of performing the Mitsuda test. The disagreement between the results obtained in lepromatous and tuberculoid patients leads to the conclusion that there is no characteristic electrophoretic spectrum in leprosy.—[From authors' summary.]

ABE, M. and HIRAKO, T. C-reactive proteins in leprosy. I. The parallelism between the C-reactive protein and erythema nodosum leprosum. *La Leprosy* **30** (1961) 186-189 (in Japanese; English summary).

The C-reactive protein (CRP) test was applied to the sera of 291 leprosy patients, 250 lepromatous and 41 tuberculoid. Of the 84 lepromatous cases in the state of erythema nodosum leprosum (ENL), 72 (85.7%) were CRP positive. On the contrary, no CRP positives were found in the 27 lepromatous exacerbation cases, or 4 of "epithelioid reaction" (Hirako), (i.e., the other type of lepra reactions, including "pseudoexacerbation" of Souza Lima and "acute infiltration" of Tajiri). Only two cases (1.5%) were positive in the 135 residual lepromatous patients not in the reactional state at the time of the test, although many of them had experienced ENL previously. Of the 41 tuberculoid cases, only 1 (2.4%) was positive. CRP was absent in the sera of ENL patients whose symptoms were relatively light, but always present in the severe cases. Repeated CRP tests in certain ENL patients showed that CRP appeared in the serum within a few days after the onset of the reaction, and disappeared in the arrested stage. These findings suggest that the CRP test will be useful for the differentiation of ENL from the other lepra reactions and as an indication for cortisone treatment of ENL.—[From authors' summary.]

KABAKOV, E. N. [Detection of C-reactive protein in cases of leprosy.] *J. Microbiol., Epidemiol. & Immunobiol.* **32** (1961) 448-455 (translated from Russian).

C-reactive protein appeared in the blood in a considerable proportion of cases of leprosy, differing substantially in frequency in the various clinical forms and phases of the disease. There was a close correlation between the reaction to C-protein and the sedimentation rate, but a reverse quantitative correlation with the lepromin reaction in lepromatous cases on the one hand and in tuberculoid and indeterminate cases on the other hand. Since C-reactive protein appears with great regularity in the acute inflammatory phase of many diseases and leprosy is no exception to this rule, detection of increasing quantities of this protein in the tuberculoid and indeterminate forms, which are distinguished by their relatively subdued and benign course, must indicate the onset of acute changes in the reactivity of the body and further development of the disease. In other words, it serves as an unfavorable prognostic sign, and on this basis it may be used in practice as a valuable test. Further study of C-reactive protein in leprosy is essential; in particular it is important to determine the pattern of its appearance and

disappearance, and the effect of treatment, and to examine the relationship with the clinical forms and phases of the disease, etc., on a large scale.—[From abstract in *Trop. Dis. Bull.* **59** (1962) 787.]

WU, LI-T' IEN, CH' IN, KUANG-YU and LIU, TZE-CHUN. Leprosy lesions of internal viscera with special reference to the lesions of borderline leprosy and lepromatous reaction. *Chinese Med. J. (Peking)* **81** (1962) 30-38.

Brief references are made to autopsy findings in 23 cases of lepromatous and 9 of tuberculoid leprosy, and more detailed attention is given the findings in 2 borderline cases. In the first of the borderline cases, tuberculoid lesions with epithelioid and giant cells were found in the skin and several peripheral nerves, while lepromatous lesions with foamy cells and bacilli were found in the nasal mucosa, lymph nodes and epididymis. Both kinds were present in other peripheral nerves and in the testis. In the second case tuberculoid lesions were present in the myocardium and spleen; lepromatous lesions in the bone marrow, lymph nodes and nerves; and both forms in the skin and liver. Borderline leprosy is described as usually representing a transitional state in which a tuberculoid patient, on account of decreased resistance, is in the stage of passing into lepromatous leprosy.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 561.]

JAYARAJ, A. P. and CHAUDHURY, D. S. Epithelial and sub-epithelial innervation in lepromatous leprosy. *Leprosy in India* **32** (1960) 167-169.

This is a report of a preliminary study on the fine axon terminals in the epithelial and subepithelial layers of the skin in lepromatous leprosy. Biopsy specimens were taken from 20 patients with advanced leprosy, fixed in formalin, and studied in frozen sections 10 to 15 microns in thickness (cut parallel to the epithelium) after silver impregnation. Intact nerve fibers and filaments were demonstrated in the epithelium and subepithelium in sites which were anesthetic to "hair-brush drawing after shaving." It is believed that bacilli might have primarily invaded these nerve filaments.—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 676.]

KOOLJ, R. and PEPLER, W. J. A re-evaluation of tissue reactivity to BCG, tuberculin and ink in lepromatous leprosy. Absence of isopathic phenomenon. *Dermatologica (Basel)* **122** (1961) 360-372.

This article is a report of failure to elicit Sagher's isopathic phenomenon in patients with lepromatous leprosy. (1) BCG was injected into 35 patients. Of 15 biopsy specimens taken between 30 hours and 9 days after injection, 3 revealed only a nonspecific inflammation, while in 12 there was a nonspecific inflammation on a lepromatous background, the latter consisting of foam cell aggregates characteristic of lepromatous leprosy. In the specimens from the remaining 20 patients, which were taken between the 23rd and 65th days, there were epithelioid-cell reactions with foreign body giant cells, but no foam cells. (2) Tuberculin was injected into 10 patients. Again, 6 of the 10 biopsy specimens taken after various intervals revealed a lepromatous background in addition to an inflammatory or tuberculoid reaction. (3) India ink was injected into 10 patients. Biopsies made after 6 to 71 days revealed lepromatous infiltrates in only 2 cases. (4) The authors took control biopsy specimens from 32 out of the same 35 patients, of normal-looking skin from a symmetrical site on the other arm or from an area adjacent to the BCG papule. In 25 of the 32 cases a lepromatous infiltrate with bacilli was found. It was concluded that all these histologic pictures were no more than lepromatous background in the areas where the injections had been made.—F. SAGHER

[This matter is discussed at some length in the *Correspondence* section of this issue.—EDITOR.]

COCHRANE, R. C. Immunity in leprosy. *Leprosy in India* **32** (1960) 163-166.

The author states that after infection with *M. leprae* the bacilli are found very early in the Schwann sheath and axis cylinders. He resists the temptation, however, to support the hypothesis that "in order for leprosy to develop, the *M. leprae* must multiply in the Schwann cells and that thus the infection becomes established in the human tissues." He favors the opinion that lymphocytic response may reflect a measure of immunity or potential immunity, and that this may be called forth in a majority of cases by vaccination with BCG and other mycobacteria. The question is asked: "Does the type of disease determine the allergic response, or does the allergic response determine the type of disease?" The phases of leprosy are compared to a spectrum in which the ascendancy between the bacilli and the tissues is constantly varying. The lepromin reaction is a useful tool for assessing the degree of immunity. Lastly, erythema nodosum leprosum is discussed and differentiated from "progressive lepra reaction in which one of the most obvious features is the mobilization of plasma cells."—[From abstract by E. Muir in *Trop. Dis. Bull.* **59** (1962) 675-676.]

ABE, M., NAKAYAMA, T., YANAGISAWA, K., MAEDA, M., ASAMI, N., TACHIKAWA, N., and OKAMURA, K. Studies on the preparation, standardization and preservation of lepromin. I. Comparative experiments with lepromins made by the Mitsuda-Hayashi's original or the Wade's improved method and with a lepromin preserved by freeze-drying in vacuo. *La Lepro* **30** (1961) 163-168 (in Japanese; English summary).

To establish the best method for the preparation, standardization and preservation of lepromin, comparative studies of the skin reactions in leprosy patients were made using the following lepromin samples: (1) In the first experiment, two lepromins made by different methods (Mw, by Wade in 1956, and M8, by the Mitsuda-Hayashi method in 1958) were compared. The results of bacillus counting of the Mw and M8 were 150 and 220 millions per cc., respectively. With respect to the early reaction, the two lepromins gave no significant difference. The Mw, however, elicited weaker late reactions than the M8. (2) To ascertain the effect of heat on the potency of lepromin, fresh nodules from leprosy patients were homogenized and divided into two parts. One was autoclaved to make the Wade's lepromin (Ma), and the other was boiled with saline to make the Mitsuda-Hayashi's (Mb) preparation. Bacillus counting of the two lepromins gave nearly equal results, 276 millions per cc. in Ma and 289 in Mb. The Ma antigen, however, elicited stronger late reactions than the Mb, while no difference was found with respect to the early reactions. From these results and from practical considerations, lepromins actually used in Japan are always made by the Wade method. (3) An attempt was made to preserve the standard lepromin by freeze-drying in vacuo. After storage in the refrigerator for one year, the dried lepromin was resuspended in 0.5% carbol water and its potency was compared to the standard lepromin stored similarly for one year. No significant difference was observed between the two lepromins with respect to either the early or the late reactions.—[From authors' summary.]

MAEDA, M., ASAMI, N., NAKAYAMA, T., ABE, M., KOBAYASHI, S., ISHIWARA, S., ARAKAWA, I. and MINATO, J. Comparison of the potencies between the Japanese Mitsuda's antigen and the foreign Mitsuda's antigen. *La Lepro* **30** (1961) 169-173 (in Japanese; English summary).

Comparison of the potencies of the Mitsuda antigen prepared by Wade, that prepared by Mabalay, and an antigen (Lot 13) prepared in the National Institute for Leprosy Research, were made by means of bacillus counting and by tests in animals and man. The results of these tests showed no differences, in spite of the fact that these antigens were made from different lepromas, in different laboratories, and in different calendar years. Therefore, these three Mitsuda antigens were not suitable as materials used for the comparison of potency tests.—[From authors' summary.]

IEVLEVA, E. A. [The effect of the causative agents of leprosy and tuberculosis on the changes of skin reactivity in experimental animals.] *J. Microbiol., Epidemiol. & Immunobiol.* **31** (1960) 50-53.

Experiments were performed on white mice, rats, rabbits, guinea-pigs and monkeys to determine the cross effects of the causative agents of leprosy and tuberculosis on the skin reactivity. Mice and rats, with a low range of allergic reactivity, were not suitable for the study of allergic skin reactivity. BCG vaccination of the other species of animals brought about such changes with respect to *M. leprae* in the same form and degree as to *M. tuberculosis*. On the other hand, sensitization by *M. leprae* was so weak that it could be detected only by use of the stronger antigen (i.e., *M. tuberculosis*). Comparing the leprosy bacillus and the bacillus of tuberculosis with regard to their action as biologic allergens capable of provoking sensitization on the one hand, and of detecting this condition on the other, the latter bacillus was found to be a more powerful allergen. Nevertheless, one may suggest that the allergic changes of the skin reactivity accompanying the developed process of leprosy influences the development of one or another clinical form of the disease in man, who in contrast to animals possesses a more pronounced allergic reactivity.—[From author's summary, supplied by N. Torsuev.]

RESEARCH COMMITTEE, BRITISH TUBERCULOSIS ASSOCIATION. BCG vaccination by multiple puncture: preliminary report. *Tubercle (London)* **42** (1961) 413-427.

This work was done primarily to determine the effectiveness of multipuncture vaccination, which might be better than the standard intradermal vaccination in places where skilled personnel are lacking. Two-weeks, freeze-dried BCG vaccine was used, which maintains its stability for at least one year. Almost all of the school children vaccinated by this means in Lancashire and Salford were positive to the Heaf test 10-13 weeks after vaccination. In Lancashire, those vaccinated with 20 punctures and 70 mgm./cc. vaccine showed significantly higher sensitivity than those tested with fewer, or with more (40), needles; in Salford, 20 needles and 100 mgm./cc. gave the highest rates. The pressure at which the needles are released must be sufficient to produce full penetration into the skin.—[From summary.]

LECHAT, M. F. L'évolution de la bactérioscopie chez des lépreux traités par des sulfones. I. Délai de négativation. [Bacteriologic evolution in leprosy patients treated by the sulfones. I. Delay in negativization.] *Ann. Soc. Belge Méd. Trop.* **41** (1961) 509-522.

The bacteriologic evolution of 1,254 bacillus-positive leprosy patients treated by sulfones at the Yonda leprosarium, at Coquilhatville, Congo Republic, has been followed for 1-8 years. One-half of the patients became negative in rather less than 2 years. In this case we were dealing with all of the patients who were bacillus-positive before their admission, whether they had been previously treated or not and whatever the type of leprosy or its gravity. The conclusions to be drawn from this experience are of purely administrative interest, but in given conditions of endemicity and discovery they enable the capacity of the leprosarium to be adapted to the number of yearly admissions in order to permit an effective rotation of the patients. These conclusions cannot, however, be extended to other regions where conditions are different. Among the 1,254 patients observed, 468 were severe lepromatous cases not treated systematically before admission, and the length of treatment necessary for 50% of them to become negative was about 8 years. There is therefore need for a specific leprosy treatment with more rapid action than the sulfones, the cost of which will be balanced by a shorter hospitalization period, i.e., by a more rapid turnover of patients when hospitalization of these lepromatous cases is prescribed or recommended.—[From author's summary.]

LECHAT, M. F. L'évolution de la bactérioscopie chez des lépreux traités par des sulfones. II. Stratégie de l'examen bactérioscopique multiple. [Bacteriologic evolution in leprosy patients treated by the sulfones. II. Strategy of the multiple bacteriologic examination.] Ann. Soc. Belge Méd. Trop. **41** (1961) 523-534.

We have studied 2 series of leprosy cases, the first made up of untreated cases, the second of patients treated by sulfones. In the first group, 1,301 patients, a triple bacteriologic examination was performed: nasal mucosa, macule or infiltration, and lobule of the ear; a total of 3,903 examinations. If we had been content with the earlobe procedure, or if this was negative with tests of macules or infiltrations, the number of examinations could have been reduced to 1,535, but 21 patients would not have been detected; i.e., a 61% economy of effort for an error of 1.6%. In the second series, 6 bacteriologic examinations were made: nasal mucosa, macule or infiltration, earlobe, skin of the forehead, skin of the chin, and apparently healthy skin, in all 1,280 multiple examinations involving the taking of 7,680 specimens. Applying the same procedure as in the first group (earlobe, and if this was negative, macule or infiltration), 1,278 bacillus-positive patients would have been diagnosed out of the 1,280 detected by the six-fold examination—and that by taking only 1,328 specimens instead of 7,680; i.e., an 83% economy of effort for a chance error of 0.17%. It therefore seems useless to multiply to excess the number of simultaneous specimens taken for bacteriologic examination; taking 2 specimens (earlobe + macule or infiltration) seems to be sufficient. The examinations should be made in a definite order, e.g., earlobe specimen first, then that from a macule, the second only being done if the first is negative.—[From author's summary.]

MARTYNOVA, V. A. [Concerning the culturing of the leprosy pathogen by the method of "feeders."] J. Microbiol., Epidemiol. & Immunobiol. **32** (1961) 44-48.

Associated growth of the causative agent of leprosy with an acid-sensitive microflora was often observed in bacteriologic study of materials obtained from leprosy patients. This gives the basis for culturing *M. leprae* with the aid of "feeders." A culture of an acid-sensitive micrococcus isolated from a leprosy granuloma was used as a "feeder." It was characterized by changes of morphologic forms during its development cycle, was motile in the hanging drop, and possessed low biochemical activity. In combined culturing of the coccus culture with the causative agent of leprosy it was noted that, under certain experimental conditions, the interaction process of the two microorganisms is stage-wise. At first there is a period of latency, followed by a microscopically detectable growth, with a quantitative increase of the specific microbe during the second stage. The balance of the microbial population occurring at the time may, however, be disturbed, the "feeders" depressing the growth of *M. leprae*.—[From author's summary, supplied by N. Torsuev.]

IMAEDA, T. and CONVIT, J. Electron microscope study of *Mycobacterium leprae* and its environment in a vesicular leprosy lesion. J. Bact. **83** (1962) 43-52.

It would be more to the point were the title simply about *M. leprae* in a specimen of a borderline leprosy lesion. The two relatively low-power electron micrographs show a part of a host cell of the borderline lesion and the very different condition in a cell of a typical leprosy. In the former the numerous bacilli are all scattered and separate, and almost all are filled with cytoplasm in good condition. In the latter the numerous bacilli are all scattered, separate, almost all are filled with cytoplasm in good condition. In the latter the numerous bacilli are almost all clumped in groups within "foamy structures," and in almost all of them the cytoplasm is condensed and degenerate. [If the first is a typical picture, the separateness of the bacilli would seem to bear out a statement recently seen that smears from borderline lesions do not contain globi. The healthy conditions of the bacilli is like that described in the report by Convit *et al.*, in the pre-

ceding issue of THE JOURNAL, of successful inoculation of hamsters with material from borderline lesions.] Of no less interest than the descriptions of cytoplasmic bodies (nuclear apparatus and polyphosphate body) is that of the membrane system. First there is a rather indefinite membrane outside the cell wall that separates the bacillus from the host-cell cytoplasm, "...maybe the remnant of the host cell membrane taken into the cytoplasm when the bacilli were phagocytized. . ." [But what of bacilli born within the cells?] Next is the cell-wall proper, a single-layered, moderately dense structure which on high magnification appears to be vertically striate. Finally, inside the cell wall, is the three-layered "plasma membrane," composed of two fairly dense layers separated by one of low density. A particularly interesting feature of that plasma membrane is that it may invaginate into the bacterial cytoplasm, to form an "intra-cytoplasmic membrane system," the structure of which varies greatly in morphology in the several bacilli shown. The opinion is expressed that this structure may perhaps be one of the bacterial organelles concerned with metabolism. It is never seen in degenerating bacilli showing cytoplasmic condensation, as in the leproma.—H. W. W.

SHEPARD, C. C. and CHANG, Y. T. Effect of several anti-leprosy drugs on multiplication of human leprosy bacilli in foot-pads of mice. *Proc Soc. Exper. Biol. & Med.* **109** (1962) 636-638.

1. A comparison of the activity of 4 drugs was carried out in mice inoculated into the foot-pad with human leprosy bacilli. The drug was administered in the diet, starting on the day of inoculation. 2. Multiplication of the bacilli was completely suppressed by DDS, INH, and PAS, and it was delayed and partially suppressed by cycloserine.—[Authors' summary, from *Trop. Dis. Bull.* **59** (1962) 793.]

ROBERTSEN, J. A. A granulomatous lesion of mouse embryomas produced by *Mycobacterium leprae*. *J. Infect. Dis.* **110** (1962) 132-134.

A phenomenon is described in which large numbers of human leprosy bacilli can be found in lesions in experimentally produced mouse embryomas, despite repeated dilution by means of serial animal passage. It is suggested that this may be explained by multiplication of *M. leprae* in the embryomas. Experiments to further test this hypothesis are in progress.—[Author's summary, from *Trop. Dis. Bull.* **59** (1962) 793.]

REES, R. J. W. and HART, P. D'ARCY. Analysis of the host-parasite equilibrium in chronic murine tuberculosis by total and viable bacillary counts. *British J. Exper. Path.* **42** (1961) 83-88.

In chronic tuberculosis the animals usually remain alive for many weeks, with apparently stable pulmonary disease and a steady viable bacillus population in the lungs. The latter findings suggest that the tubercle bacilli remain viable but do not divide—a "static equilibrium"—yet evidence based on viable counts alone does not exclude a "dynamic equilibrium." This equilibrium was therefore analyzed further by following in parallel the viable and the total (stainable) bacillary populations in lung homogenates. The total counts remained steady and similar to the viable counts, indicating that unless dead organisms were being removed from the lungs or their acid-fastness was being lost, the bacillus population was viable and not multiplying. When similar determinations were made on treated mice, the results indicated that a high proportion of the nonviable bacilli (killed by treatment with isoniazid and pyrazinamide) were not removed from the lungs and retained their acid-fastness. It is therefore concluded that in chronic murine tuberculosis the bacilli are in a static or resting phase rather than in a dynamic equilibrium between multiplication and destruction.—[After authors' summary, by H. J. Henderson in *American Rev. Resp. Dis.* **85** (1962) 173-174.]

AZULAY, R. D. Valor da lepra murina em leprologia experimental. [Value of murine leprosy in experimental leprology.] *Rev. brasileira Leprol.* **29** (1961) 93-104.

A comparative study of murine and human leprosy has been attempted from the following points of view: clinical, bacteriologic, pathologic, immunologic, experimental (inoculations), and therapeutic. It is concluded that, up to now, murine leprosy represents the best tool for the study and understanding of the several enigmas of the human infection. As basic elements for future studies the following points are emphasized: 1. To improve knowledge of the metabolism of the mycobacteria in order to increase the infectiousness of the germ. 2. To discover new techniques to decrease or abolish the extracellular inhibitors. 3. To improve the macrophage exudate technique, and to employ it more and more. 4. To improve knowledge about the intracellular parasitism. 5. To get, by inbreeding, new strains of animals having different degrees of resistance to mycobacteria. 6. To investigate the importance of the prooxidant diet in experimental inoculations.—[From author's summary.]

NISHIMURA, S. and KOSAKA, K. Studies on the chemotherapy of leprosy (XXIII). Onset suppressing action on Ciba 1906, griseofulvin, zygomyacin A and several drugs in murine leprosy. *La Lepro* **30** (1961) 159-162 (in Japanese; English summary).

A number of screening tests of various drugs for murine leprosy have been performed by the authors. The present report deals with several drugs tested since 1959. (1) Ciba 1906 was unable to suppress the onset of the disease. (2) Griseofulvin had no suppressing or healing effect. (3) Zygomyacin A showed no effect by oral administration, but slight suppression after subcutaneous injection. (4) p-Ethoxyphenyl-methyl-dithiocarbamate (No. 255 Takeda) and p-Ethoxyphenyl-benzyl-dithiocarbamate (No. 258 Takeda) were ineffective, whether administered separately or in combination with DDS.—[From authors' summary.]

POGORELOV, V. N. and CHERNYSHEVA, L. M. [A study of the therapeutic action of monomyacin on white mice inoculated with rat leprosy *Mycobacterium leprae murium*.] *Antibiotiki* (1961), No. 9, 810-813.

Daily administration of monomyacin in a dose of 100 or 200 mgm/kgm inhibits the development of rat leprosy in mice. The inhibiting action of the antibiotic on the spread of the infection in the white mouse indicates the necessity of a further study of the effect of this antibiotic on mycobacterial infections.—[From authors' summary, supplied by N. Torsuev.]

NISHIMURA, S., ITO, T., MORI, T. and KOSAKA, K. The selection of test materials and the revision of the collection's method of murine leprosy bacillus for its metabolic investigations. (For basic studies on cultivation of the human and murine leprosy bacilli (1).) *La Lepro* **30** (1961) 151-158 (in Japanese; English summary).

The selection of lepromas for test material of sufficiently active bacilli, and a revision of Ito and Sonoda's collection method for a purer form of the bacillary emulsion, were studied for the experiments of the metabolic investigation of murine leprosy bacillus. The results are summarized as follows: (1) Lepromas produced 2-3 months after the intratesticular inoculation of the rat are most suitable for collecting fresh, active and viable bacilli. (2) For testing the purity of the bacilli collected, tissue components without affinity for methylene blue should be detected by staining with Nile blue, while some tissue components which do not stain with Nile blue should be demonstrated by determining their adenosine monophosphatase activity. (3) The tissue debris in the bacillary suspension that stains by Nile blue can be removed by repeated washing and low speed centrifugation, while the minute particles which show adenosine monophosphatase activity can be removed by treatment with 1/8N NaOH.—[From authors' summary.]

- GARBUTT, E. W., REES, R. J. W. and BARR, Y. M. Growth of *Mycobacterium leprae-murium* maintained in cultures of rat fibroblasts. *J. Gen. Microbiol.* **27** (1962) 259-268.

The authors had previously reported limited multiplication of *M. leprae murium* in rat fibroblasts, and here they report successful cultivation of the organism for periods up to 156 days. The 14pf line of fibroblasts was used, and the bacilli were of the Douglas strain obtained from the livers of infected mice. The cells were grown as a confluent sheet, and 4 days before the day of infection fresh medium containing 25 units of penicillin but no streptomycin was added to them. This medium was removed immediately before infecting, the cells were washed to remove serum that might have damaged the bacilli, and infection was accomplished by adding 0.6 cc. of a suspension containing 20-40 bacilli per cc. to 6 cc. of 0.0125% albumin in BSS. The bacilli were left in contact with cells for 24 hours, and over 80% of the cells ingested bacilli. After infection the cells were treated with trypsin and grown as sheet cultures incubated at 34°C, the medium being changed every 10-12 days. At 21-day intervals the cells were trypsinized and subcultured, and the numbers of bacilli present in the culture fluid and in the trypsinized cells were determined. Altogether 20 cell cultures were infected, but in only 11 experiments were the cells maintained successfully for more than 2 subcultures. In several experiments the increase in the number of bacilli represented 3 or 4 generations, but in the most successful experiments it was 8 generations. The success was attained by maintaining 50-75% of the cells in each subculture; with transplants of only 12-25% of the cells the number of bacilli became too few for the culture to be maintained. The viability of the bacilli after 156 days in culture was confirmed by electron microscopy and by injection into mice. Estimations of the generation time based on the total number of bacilli was 26.4 days, but when allowance was made for the degenerate bacilli revealed by the electron microscopy the time was reduced to 18.6 days.—[From abstract by S. R. M. Bushby in *Trop. Dis. Bull.* **59** (1962) 675.]

- MORI, T., KOSAKA, K. and ITO, T. Carbohydrate metabolism of the murine leprosy bacillus. I. Studies on the respiratory enzyme system, especially the diaphorase and malic dehydrogenase activities. *Biken's J. (Osaka)* **4** (1961) 225-233.

The murine leprosy bacillus has diphosphopyridine nucleotide and diaphorase I and II activities. Whole cells of this bacillus do not utilize externally-added reduced diphosphopyridine nucleotide, or reduced triphosphopyridine nucleotide. Reduced diphosphopyridine nucleotide is only slightly oxidized by an extract of ground bacilli. There is malic dehydrogenase activity in extracts of ground bacilli, but triosephosphate dehydrogenase and succinic dehydrogenase activities were not found.—[From authors' summary.]

- MATSUO, Y., MITO, A. and HAIZUKA, M. The nucleic acid and amino acids of murine leprosy bacilli. *La Lepro* **30** (1961) 182-185 (in Japanese; English abstract).

Murine leprosy bacilli were collected by the Nakamura-Hanks method from subcutaneous leproma of rats three months after inoculation, and lyophilized. The ribonucleic acids and amino acids of the bacilli were then studied. (1) The ribonucleic acid was extracted with the phenol method and fractionated. The r-RNA, represented for the constituent to alternate rapidly, was for the most part, and the p-A-RNA (s-RNA?), presumably taking part in protein synthesis, was for scanty part; thus, the -A:r value was as low as 1:5. From these findings it may be suggested the bacilli were in a resting phase with respect to the cell growth. (2) The total free amino acids of leprosy bacilli, the source of protein-amino acids, and in the former the amino acid such as glycine, arginine, leucine, methionine and cystine were less than in the latter. The evidence seems to suggest that slowness of the ability of protein biosynthesis of murine leprosy bacilli,

i.e., it may be called almost impossible of rapid multiplication of murine leprosy bacilli.
—[From authors' summary.]

RESSANG, A. A. and SUTARJO. *Lepra bubalorum*: report on transmissional experiments. *Communicationes Veterinariae* (Bogor, Indonesia) **5** (1961) 89-106.

An account is given in Part 1 of attempts at experimental transmission of buffalo leprosy in guinea-pig, mouse, white rat, rabbit, calf, heifer, horse, sheep, goat, dog, cat, monkey and alligator. Pretreatment with cortisone or total body irradiation was used on some of the animals in order to lower their resistance. The inoculum was injected or transplanted in various ways. The only positive result was in a heifer in which a subcutaneous transplant produced a growth after 7 months, and a second passage from this nodule produced a new growth smaller in size. In Part 2 is described a case of buffalo leprosy with intracutaneous, subcutaneous, and hitherto unrecorded intramuscular, periarterial, and perineural distribution of leprosy nodules. It was found that nerve bundles and arteries which were embedded in or attached to the granulomatous tissue were unaffected, no growth being observed within the perineurium or within the wall of an artery.—[From abstract in *Leprosy Rev.* **33** (1962) 155.]