CURRENT LITERATURE

It is intended that the current literature of leprosy 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.

ALL-INDIA CONFERENCE, 1955

The conference held in Jamshedpur, Bihar, in March 1955 comprised two meetings: the Fifth All-India Leprosy Workers' Conference, concerned with administrative and like matters, and the second biennial meeting of the Indian Association of Leprologists, the scientific sessions of the conference. It has been intended to use here all of the 28 abstracts of the papers read at the two meetings, from the special issue of *Leprosy in India* dated April 1955, in which eight of the papers were published in full. After repeated postponements because of lack of space, it has been found necessary to use only the abstracts of the papers read at the Association meeting, and simply to list those of the Leprosy Workers' sessions, which are not susceptible to condensation without much loss of substance although a review by Muir in *Tropical Disease Bulletin* **52** (1955) 1092-1094 contains some of the highlights. Anyone especially interested in that material should obtain a copy of the magazine from the Editor, at the Leprosy Research Department, School of Tropical Medicine, Calcutta (Rs 1/- including postage).—EDITOR.

1. *Leprosy Workers' Conference*

LAKSHMANAN, C. K. The planning and administration of the leprosy control programme (abstract, p. 59; full article, pp. 124-130).

DEBI, B. M. Planning and administration of leprosy work in Orissa (abstract p. 60).

WARDEKAR, R. V. Planning and administration of leprosy work (abstract p. 60).

KAIRNAR, S. B. Planning and administration of leprosy work (abstract p. 62).

WARDEKAR, R. V. A brief review of the outstanding features of the work of the Gandhi Memorial Leprosy Foundation (abstract p. 67).

DIWAN, M. Outstanding features of anti-leprosy work of Dattapur Leprosy Colony, Wardha (abstract p. 68).

DAS, D. N. A brief review of the current and proposed anti-leprosy measures in the State of West Bengal (abstract p. 69).

KHOSHOO, P. N. A short note on the plan of anti-leprosy campaign in Orissa (abstract p. 70).

SHAMA RAO, A. A review of anti-leprosy organization and work in Hyderabad State (abstract p. 71).

LALL, H. K. Anti-leprosy measures in Bihar (abstract p. 72).

BOSE, D. N. A review of the current and proposed anti-leprosy measures in Asansol Mining Settlement (abstract p. 73).

BAILEY, W. The Mission to Lepers 1953-1955 (abstract p. 74).

BHATTACHARJEE, S. C. Anti-leprosy activities in the North East Frontier Agency (abstract p. 75).

THA SAING. Leprosy control project in Burma (abstract p. 75).

MALHOTRA, B. L. Leprosy in Ceylon (abstract p. 76).

SEN, P. Mass education in leprosy—methods and means (abstract p. 76; full article, pp. 166-171).

KOTHANDAPANI, C. R. Mass education on leprosy—methods and means (abstract p. 79).

PATWARDHAN, P. Women and leprosy—a poser (abstract p. 79).

2. *Indian Association of Leprologists*

BRAND, P. W. The value of surgical and physiotherapeutic measures in leprosy. Lep. India **27** (1955) 131-137 (abstract p. 86).

When a negative patient tries to return to society, his chief difficulties are connected with his residual deformities. The function of the reconstructive surgeon is to make his patients as nearly normal as possible in appearance and in the working of his hands and feet. The depressed nose can often be restored by bone or cartilage graft, but only after all ulcers of the mucosa are soundly healed. Hair-bearing skin can be grafted from the scalp into the eyebrows. Ears can be improved in shape by grafts of skin from the neck, or by implantation of cartilage or plastic material; but this type of reconstruction is difficult and the results are not always satisfactory. An artificial ear of vinyl plastic may give a better appearance and is very satisfactory. The old practice of injections of hydnocarpus oil is probably still the best way of treating resistant hypopigmented patches of the skin. Tarsorrhaphy for lagophthalmos should be performed early, as soon as it is noticed that a patient cannot close his eyes, to avoid corneal ulceration and perhaps blindness. Hands that are weakened by paralysis can often be restored to activity by tendon transfer operations, because the forearm muscles supplied by the median nerve are not paralyzed. The indication for tendon operation is limitation of movement of a joint that is due to muscle weakness, and not to stiffness of joints, which tendon operations will not help. Stiff joints need mobilization by physiotherapy, exercises and splinting, after which the tendon transplantation can be performed. Claw-hand deformity can be corrected in this way, and the paralyzed thumb may also be made able to oppose the fingers in grasp and pinch. In badly damaged joints, arthrodesis may be necessary; it will give a stiff joint a useful position, or one that will not give the appearance of deformity. In the foot, paralysis is also limited, the medial popliteal nerve being usually spared. It is therefore possible to operate for foot-drop and give a good range of dorsiflexion. Operations have also been done for claw-toes, which gives some protection to the metatarsal heads in the prevention of ulceration. Apart from these reconstructive operations, the most important principle in the treatment of ulceration is rest. Patients with anesthetic feet must adjust their lives accordingly; when they have to stand much their weight should be spread out over all the underside of the foot by moulded shoes. Education of patients in the prevention of deformity is of more value than attempts to correct deformity. Social workers and physiotherapists should be a part of every leprosy institution and program.—[From abstract. Another abstract of a report by this author appears on page 232.]

THOMAS, R. E. Physiotherapy in relation to neural involvement in leprosy. Lep. India **27** (1955) 138-143 (abstract p. 88).

Physiotherapy in leprosy consists of: overcoming the hopeless attitude of patients as regards their weakened or deformed hands; physical treatment of such hands, including massage with oil, wax-bath therapy, electrical stimulation of weakened or paralyzed muscles, and exercises of passive, assisted active, or free-active nature; and rehabilitation of patients. The patients should be encouraged to make the best use of what is left of their hands and perform some work within their capabilities, and that should be started at an early stage. The intrinsic muscles of the hands supplied by the ulnar nerve are first affected, and often also some such muscles supplied by the median, this leading to the development of the "claw-hand." According to the nature of hand defects patients may be classified as having paresis or paralysis of muscle without flexion deformity or contracture; that condition with flexion deformity but no contracture; or all three conditions. Physiotherapy is of great value for all types of defects. Oil massage is done by the patient himself, for which he is given some groundnut oil and instructed to rub the fingers from the metacarphophalangeal joints downwards to the tip. Wax therapy consists of dipping the hands a number of

times in fairly quick succession into a bath of melted paraffin wax at 120°-130°F. This helps to loosen stiff joints and makes the skin smooth and supple. In some cases it restores sweat function and sense of heat, and relieves nerve pain. Regarding electrical stimulation of muscles, when there is the reaction of degeneration the interrupted galvanic current is used, otherwise the faradic current. The aim is to produce rhythmic contraction of muscles to maintain their nutrition and tone in the hope of delaying or averting flexion deformity and contracture. This treatment is contraindicated in the acute phases, where there is much pain in the hand. Exercises for the hands, which always follow these preliminary treatments, consist of passive movements, with care not to use undue force in straightening contracted and stiff fingers; assisted active exercises, which aim at helping the patient to perform actively an exercise that he is unable to do freely, such as lumbrical action; and free active exercises, which are most important as they help the patient to practise movements required in his everyday life, e. g., opening and closing the hand, meeting each finger-tip with that of the thumb in turn, or picking up small objects with the thumb and one of the other fingers in turn. In all exercises, hyperextension at the metacarpophalangeal joint is to be avoided. When the muscles are atrophied beyond recovery some kind of trick movement, i. e., a movement performed in some other manner than by the use of prime movers, is indicated. To be of value, physiotherapy should be regular and prolonged. It can either improve the condition of the hand or else prevent further deterioration. Rehabilitation of patients should go hand in hand with physiotherapy. The occupation selected for the patient should be harmless to him, stimulate his active interest, and enable him to earn a living wage. [From abstract.]

DAS, A. K. The importance of physiotherapy and orthopedic surgery in leprosy. Lep. India **27** (1955) 89 (abstract).

Among new patients attending the leprosy clinic at the School of Tropical Medicine, Calcutta, with different types of trophic changes, many such changes and deformities are of minor degree and can be corrected by physiotherapeutic measures; only a small proportion of cases, with well-established deformities, require help of the orthopedic surgeon. Physiotherapy should be provided for in all important outpatient centers, since they do not involve much expenditure or additional personnel. This does not apply to orthopedic surgery, for which especially trained surgeons and special equipment are required. Such arrangements should be provided in inpatient leprosy institutions, perhaps on a regional basis. General hospitals should have beds for noninfectious leprosy cases, or at least the rule against the admission of such cases in general hospitals should be removed, so that persons suffering from deformities caused by leprosy could have the advantage of the orthopedic facilities available in those hospitals.—[From abstract.]

DHARMENDRA. Classification of leprosy. Lep. India **27** (1955) 93 (abstract).

The discussion of this matter, really the subject of the meeting [taking up two full sessions], was introduced by a resumé of the conclusions of a special committee of the Association published in the October 1953 issue of *Leprosy in India*, together with an editorial in that issue and another in the issue for January 1955. In making their recommendations the committee was guided by the principles that classification should be simple, mainly clinicobacteriological, yet capable of elaboration; that the number of classes or forms should be minimal; that there should be a broad grouping of certain categories of primary classes; and that the purely polyneuritic cases should be recognized as a separate clinical entity. The six forms for which recognition was recommended can be placed in three broad classes:

Nonlepromatous (N)	Intermediate (N?L)	Lepromatous (L)
Tuberculoid (T)	Borderline (B)	Lepromatous (L)
Maculoanesthetic (MA)	Indeterminate (I)	
Polyneuritic (P)		

This broad grouping is not an obligatory part of the system, but only a convenient arrangement for those who would prefer to use a simpler method instead of the more elaborate one. For the purposes of general medical men and some field workers, most cases can be grouped as lepromatous (L) or nonlepromatous (N), the small number of nonconforming, doubtful cases to be called intermediate (N?L). Workers who want to go further can subdivide the nonlepromatous class on the basis of the skin lesions and neural manifestations into tuberculoid (T), maculoanesthetic (MA), and polyneuritic (P)—sensory or motor changes due to nerve trunk involvement without evidence or history of skin lesions. Such workers will use the doubtful (N?L) and lepromatous (L) classes, thus employing five symbols. Finally, those who have better laboratory facilities can investigate the nature of the lesions of the doubtful category and classify them accordingly. The patches in the N?L class may be either flat or thick. The flat ones may sometimes be maculoanesthetic, sometimes flat lepromatous, but mostly indeterminate (I)—these last resembling maculoanesthetic in certain respects and flat lepromatous in other respects but differing from both in some respects. Similarly, the thick patches in the N?L class may sometimes be either tuberculoid or thick localized lepromatous, but mostly borderline (B), which resemble the tuberculoid patches in certain respects and thick lepromatous lesions in other respects but differing from both in some respects. With the help of bacteriological, immunological (lepromin) and histological findings it will be possible to separate the lesions in this class into appropriate groups. Thus, workers of this category will recognize all of the 6 groups. Comparing this classification recommended by the Indian Association with others, including those of the WHO Expert Committee on Leprosy (1952), Wade (1952), the Madrid congress (1953), and Khanolkar and Cochrane at the Madrid congress, it is apparent that the six-class proposal is almost identical with the one suggested by Wade, and that the three-group proposal has much in common with that of Khanolkar and Cochrane, with of course some points of disagreement. It is clear that there is a wide agreement regarding the clinical forms of leprosy to be recognized. Differences of opinion arise over terminology, and more when attempts are made to arrange some of the forms to show their relationships. Much of the difficulty has been caused by differences regarding the relative importance given to the various criteria of classification. It is now more or less generally agreed that the primary basis of classification must be clinicobacteriological, although it should be based broadly on immunological and histological backgrounds. In practice, however, it is not unusual for the clinical criteria to be subordinated and the immunological and histological criteria to be given more importance. [The speaker, who was the presiding officer, then opened the subject for discussion, which occupied another session.]—[From abstract.]

MUKERJEE, N. B. C. G. vaccination in the control of leprosy. Lep. India **27** (1955) 144-148 (abstract p. 100).

In the prophylaxis of tuberculosis, intradermal vaccination of tuberculin-negative individuals converts the reaction to positive in nearly all, lowers the incidence of the disease by one-fifth, and prevents the development of its serious forms. Since it affords only partial protection, it is considered an emergency measure where all the modern methods of tuberculosis control cannot be applied. In considering conversion of the lepromin reaction, it should be noted that conversion may occur spontaneously, and that it can be induced by repeated injections of crude lepromin. BCG, dead or alive, can do the same, in healthy individuals (contacts or noncontacts) and in cases of nonlepromatous or lepromatous leprosy; it will also enhance the reaction

in some nonlepromatous cases. Oral vaccination has been largely employed, 100-200 mgm. weekly for 1-4 weeks, resulting in Mitsuda conversion in about 99%. It has also been used intradermally to a limited extent, in about 1/40 mgm. dose, and conversion of the lepromin reaction occurred in 44% in 3 months, increased to 94% in 2 years. This induced lepromin sensitivity has been found so far to persist up to 3 years. Regarding the value of vaccination in leprosy prophylaxis, reports of only four workers are available. They show that although a few cases developed in vaccinated individuals, all were of benign nature. Because these findings are concerned either with small numbers of individuals observed for a number of years, or large groups observed for very short periods, there is need for a thorough investigation of the matter. There are strong indications that the vaccine has value, but it seems to have limitations. It does not afford absolute protection, for some cases have developed among the vaccinated, although as yet no malignant case has been reported. It can be regarded as a measure ancillary to other methods of prevention, viz., isolation. Isolation of contacts even after vaccination will lessen the chance of their developing the disease, and that measure is considered essential in the case of newborn children of parents with infectious leprosy. For an investigation of the value of BCG vaccination, the oral method seems best because of the ease of administration, even with young children, and because preliminary testing with tuberculin can be dispensed with. The only question is the availability of the large amounts of the vaccine required. The use of lyophylized vaccine has been advocated to obviate the difficulties of distribution. Decision would not be easy; a large, carefully-planned and adequately-controlled experiment would have to be carried on for at least 10-15 years. It would be difficult to find in nature two adequate groups comparable in every respect that would satisfy all the requirements of a statistician. Before the results of such an investigation are available, vaccination as a prophylactic against leprosy on a mass scale cannot be advocated. It could be undertaken from the point of view of tuberculosis control, and observation of the vaccinated individuals for the development of leprosy in them would be a side-observation which might be of considerable value to leprologists.—[From abstract.]

CHATTERJEE, K. R. Prognostic value of the lepromin test in contacts of leprosy cases. Lep. India **27** (1955) 102 (abstract).

The prognostic value of spontaneously-occurring lepromin positivity in contacts has been studied in a rural area of the Bankura District of West Bengal. The tests were done 15-20 years ago. Of the 680 tested persons available for recent examination, 39 (5.7%) were found to have developed leprosy. The relationship between the results of the initial tests and development of the disease follows:

Initial lepromin Reaction	No. of persons	Cases of leprosy		
		L	N	Total
Negative	156	15 (9.6%)	7 (4.5%)	22 (14.0%)
Positive, weak	163	—	9	9 (5.5%)
Positive, moderate	125	—	3	3 (2.4%)
Positive, strong	236	—	5	5 (2.1%)
Total positive	524	—	17	17 (3.2%)
Total	680	15 (2.2%)	24 (3.5%)	39 (5.7%)

These findings point to the great prognostic value of the naturally-occurring lepromin reaction in persons exposed to leprous infection. They lend support to the generally-

held view that, compared with the spontaneously-positive contacts, those with negative reactions are more likely both to develop the disease and to get it in the more serious (lepromatous) form. This prognostic value of the natural lepromin positivity in contacts has a bearing on the possible prophylactic value against leprosy of the BCG-induced positive lepromin reaction.—[From abstract. This report is based on one with the same title, by Dharmendra and Chatterjee, which appeared in the same issue, pp. 149-152. The table here used is from that article; the one in the original abstract, with different data, had evidently been used inadvertently.—EDITOR.]

CHATTERJEE, S. N. Prospect of chemotherapy on leprosy control in India. Lep. India **27** (1955) 153-158 (abstract p. 104).

A new approach to the huge and difficult problem of leprosy control in India has been made possible by the new drugs for treatment, and the value of chemotherapy in control is worth investigating. Under this treatment there is a gradual reduction in the number of bacilli, the body area discharging bacilli becomes much reduced, and the nasal smears become negative long before the skin smears. But there are limitations and shortcomings in the practical application of this method of control, and the speaker stressed the need for a control experiment in an endemic area with a high leprosy prevalence. This would have to be carried on for many years to assess the value of the measure. Considering the fact that isolation is an important item in the control of all other infectious disease, it should not be completely ignored in any leprosy control program. It is yet too early to express any definite opinion regarding the value of BCG vaccination, or of sulfone treatment of contacts in prophylaxis.—[From abstract.]

WARDEKAR, R. V. Control of leprosy with chemotherapy. Lep. India **27** (1955) 159-165 (abstract p. 105).

The control of leprosy cannot be achieved by any single method, and, whatever part the new medicaments may have in control, it will only be an adjuvant to other methods. The Madrid congress recommended extensive investigations of chemotherapy in control in countries where institutional isolation is not possible. As India is such a country, it is urgent that we should give it a scientific trial. Due to practical difficulties it is not possible to have any "control" for the "study" areas, and hence the next best method for controlled studies is to spread out the "study" areas in different states. Along with drugs it is necessary to employ village segregation, but that seems to be very difficult and for practical purposes it will end up with the use of drugs without segregation. These drugs, if used for a long time, will reduce the total infectivity, and even if new cases develop because of absence of segregation the number of persons spreading the infection will gradually go down and the number of new infections will also be less. Hypothetically, infectious cases may ultimately become so few that we can then employ institutional isolation more effectively. The drugs have their own limitations, and experiments with patients are not under the same control as those with animals. Also, our knowledge about the disease and its transmission is incomplete. These and other factors will have to be considered in assessing results. The drug of choice is DDS, which should be administered orally so that treatment can be partially decentralized. Studies made on contacts suggest that these drugs may also play some role in prophylaxis, and carefully-planned experiments on these lines should also be carried out. The matter is in an experimental stage, but it needs a fair trial, methodically and scientifically planned. Even if this approach results in control of the disease to a certain extent, it does not do away with the necessity of other antileprosy measures and of raising the standard of living, sanitation and hygiene.—[From abstract.]

KAPOOR, P. Possible prophylactic use of sulphones in contacts of leprosy. Lep. India **27** (1955) 106 (abstract).

This paper concerns the possible role of DDS, given orally to all contacts of leprosy cases, in the prevention of the disease in them. Sulfone treatment of only the patients is not sufficient to check the spread of the disease in the members of their families. This is shown by the finding, in Bombay, that out of 1,297 contacts examined during the last four years, 926 were already infected—481 without any skin lesions but with a few acid-fast bacilli in their skin, 194 with primary lesions, and 251 with well-established lesions (224 nonlepromatous and 27 lepromatous)—in spite of sulfone treatment of the infecting sources. Isolation of the source of infection from the family members is an effective measure but it has many practical difficulties, and it would not affect prior infection of some family members. Prophylaxis with BCG vaccination is still experimental. A pilot experiment on the prophylactic value of sulfones has been carried out in the Ackworth Leprosy Home of Bombay. Contacts harboring no acid-fast bacilli in their skin were divided into two groups. Eight were treated with DDS, 10, 25 or 50 mgm., twice a week for 3-13 months; none became infected or developed leprous lesions. Seven were not treated, and 1 of them, a child, became infected and 2 others developed lesions. Of 31 contacts harboring a few acid-fast bacilli in their skin, 27 were treated and 9 became bacteriologically negative while 1 developed a basic lesion. Of the 4 untreated ones, 3 developed leprous lesions. It is planned to give the method a thorough trial. This will involve regular home visitation of patients by a trained health assistant, treatment of patients (who are irregular in attending the clinic) with standard doses of DDS, treatment of all their contacts with prophylactic doses, periodic inspection of inmates of the homes, and other measures.—[From abstract.]

BOSE, D. N. Control of leprosy with reference to chemotherapy. Lep. India **27** (1955) 107 (abstract).

This paper dealt with the efficacy of combined treatment with sulfones by mouth and hydnocarpus oil by injections, which during the last three years has been seen to give better results both clinically and bacteriologically than sulfone alone. For a comprehensive study there were selected 264 cases (30 tuberculoid and 234 lepromatous), all of whom had previously been treated with hydnocarpus oil. The character of the lesions and the bacteriological findings in the cases were almost of equal standard. Duration of treatment was 36 months. The three groups each consisted of 88 cases, 10 tuberculoid and 78 lepromatous. Group 1 received injections of 50% aqueous Novotrone solution, the average dosage per patient per week being 4 gm. Group 2 received DDS orally, the dose averaging 500 mgm. per week. Group 3 got a combined treatment of DDS by mouth (average 500 mgm. per week) and hydnocarpus oil, 1-3 cc. per week, by injection intradermally into the lepromatous infiltrations or subcutaneously. The most satisfactory results were seen in Group 3. Of the 78 lepromatous cases, 8 (10.2%) had become bacillus-free, and bacilli had diminished in number and become fragmented in 13 (16.6%). Of the 10 tuberculoid cases, 6 (60%) had become completely free from signs of the disease. No relapses occurred among the arrested cases of this group. In the other groups, the percentages of improvement were very low. Absorption, diminution, and disappearance of bacilli from leprous lesions are hastened by intradermal and subcutaneous injections of hydnocarpus oil along with the administration of sulfones by mouth. Since the bacteriological findings are the true criterion of progress in recovery, and since the combined treatment gave better bacteriological results in a shorter time, it is likely to be a better measure than sulfone treatment alone for the control of leprosy. —[From abstract.]

ROKSTAD, I. Trekk fra lepraforskningens historie i Bergen. [Glimpses of the history

of leprosy research in Bergen.] Tidsskr. norske Laegefor. (Oslo) **74** (1954) 562-564.

Leprosy, once very common in Norway, was made the subject of extensive studies in Bergen by Daniel Cornelius Danielssen (1815-1894) and Gerhard Armauer Hansen (1841-1912). Danielssen's interest was focused particularly on the clinical picture and the pathological anatomy of the disease, and he described the characteristic features of the symptomatology on which the diagnosis is based. From numerous autopsies he was able to demonstrate the localization of the disease in internal organs, and through histological examinations he tried to discover its cause, although without success. He did not pay so much attention to treatment, although he tried all the "older and newer remedies," finding them unsatisfactory. He also experimented with "syphilization" of leprosy patients, without this having any effect on the disease. For his monograph with C. W. Boeck, "Traité sur la Spedalskhed," the authors were awarded the Prix Monthyon (2000 fr.) by the Académie Française. The money was given to the university in Christiania (Oslo) as a fund the interest of which every three years was to be used as an award for a paper on skin diseases. The first to receive this award was Hansen, who was Danielssen's pupil. At first his interest, too, was concerned with pathological anatomy, but he soon turned to inquiring into the cause of the disease. The prevalent view, in which Danielssen shared, was that leprosy was an inborn disease, but Hansen held firmly that it was a communicable disease. Through epidemiological studies he showed that its occurrence was governed by possibilities of contact rather than by family relations, and through histological studies he procured corroborative evidence. Bacteriology was still in its beginning and its techniques were primitive, but Hansen untiredly looked for microorganisms in his sections. As early as 1869 he drew attention to certain peculiarities of the histological picture of the lymph nodes, and these same characteristics, which he thought specific to leprosy, he discovered in other organs as well. In 1874 he reported the "rod-shaped bodies" which he held to be bacteria and the contagium of leprosy. His discovery of the bacillus was of decisive importance for the conquest of this disease. While Norway 100 years ago had 3,000 cases in a population of about one and a half million, today there remain only a very few cases.

—AUTHOR'S ABSTRACT

JOPLING, W. H. Leprosy in Britain. Lancet **2** (1955) 856-857.

In England and Wales leprosy was made reportable direct to the Ministry of Health in 1951 (Scotland through the local medical officers of health), but there are no statutory powers whereby a patient can be sent to, or kept in, a hospital against his will. Since that time, 175 cases have been reported, all of them infected abroad. An account is given of the Jordan Hospital in Surrey, which is administered by University College Hospital, London, and staffed by the Hospital for Tropical Diseases. There are accommodations for 18 patients, each having a small flat, and a new block is being built to provide for 6 others. Only lepromatous cases are admitted. For some years they have been treated with sulfones, but in spite of evident clinical improvement the results have been poor. Bacilli have shown significant decrease in numbers only after 4-5 years of treatment. Many of the patients experience bouts of erythema nodosum leprosum, and although treatment with cortisone or corticotropin is symptomatically dramatic it does not end the attack, which may persist for months. In some patients the reaction affects mainly the peripheral nerves, and if muscle function is threatened nerve stripping must be done. Isoniazid and thiacetazone have proved disappointing. The doctor-patient relationship is particularly important in leprosy, and the author writes with understanding of the difficulties of persuading the patients to remain in the hospital for their own good and that of their families. Outpatient treatment has proved often unsatisfactory because many fail to report for examination, and some will not carry out the pre-

scribed treatment—in one case with disastrous results. Inpatient treatment is desirable, but the staff must be sympathetic of the frustrations and disabilities of the victims of this chronic disease, who are liable to develop psychological states of great difficulty. Occupational therapy is helpful; articles that are made are sterilized and sold.—[From abstract in *Trop. Dis. Bull.* **52** (1955) 645.]

NICHOLAS, G. J. Leprosy in British Guiana, 1954. Leprosy Rev. **26** (1955) 156-162.

British Guiana has a population of about 479,000 and an area of about 83,000 square miles. The population is almost entirely confined to the coastal belt. Leprosy appears to have been introduced by African slave labor, and later by Indian and Chinese immigrants; there is no history of it among the original Amerindians. The over-all prevalence is about 2.7 per thousand. Of the 1,259 known cases, 611 are African and 491 East Indian. Admission figures in 1950 showed a ratio of 2-1/2 tuberculoid to 1 lepromatous, but in 1954 the ratio was 6 to 1. Among Africans the ratio is about 3 to 1, and among East Indians 5 to 1. Methods of control include compulsory reporting and compulsory isolation of open cases, periodic examination of contacts, lepromin-testing of children vaccinated with BCG in the anti-tuberculosis campaign, periodic re-examination of discharged patients, yearly school examinations, and health education. A social welfare officer should be appointed for rehabilitation of recovered patients.—[From abstract in *Trop. Dis. Bull.* **53** (1956) 197.]

SMITH, M. L. Survey of leper colonies in Kyongsand Namdo province. [Korea] Leprosy Rev. **26** (1955) 147-155.

Kyongsang Namdo is the southernmost and second largest province of Korea, with about 3 million population. Leprosy patients, about one-fifth of whom are lepromatous, are at present lodged in 22 colonies, including the Sangai leprosarium near Pusan (map). This is a report of an investigation of these village colonies to decide what changes and improvements should be made. Points to be reviewed were: effective segregation, land tenure difficulties, acceptance by local people, suitable local medical attendance, and separation of uninfected children from parents. To concentrate all the rural colonies in one leprosarium would need sympathetic handling, and adequate land and housing and facilities for treatment. There are great differences between the colonies in the nature of the land, supplies of food, and the efficiency with which they are run. One of the most urgent recommendations is that a Provincial Leprosy Committee should be formed to safeguard the rights of the rural colonies and the health of the public. Other projects are: the building of preventoria, arrangements for preventive treatment of children of patients and BCG immunization, appointment of nonleprous superintendents for approved colonies, and sympathetic, long-term education of patients and the public.—[From abstract in *Trop. Dis. Bull.* **53** (1956) 198.]

ROBERTO, G. Los problemas médicos de la Isla de Pascua. [The medical problems of Easter Island.] Rev. Méd. Valparaiso **7** (1954) 302-309.

This little island, nearly 1,900 miles to the west from Chile to which it was annexed in 1888, has an area of about 69 square miles. The population does not exceed 800. The chief sanitary problem is leprosy, which is supposed to have been brought by Polynesians. In 1952 there were 34 patients (12 women and 22 men), 27 of whom were between 20 and 30 years of age. There is a leprosy hospital with 3 wards and 20 beds, and the condition of the patients is now much better than it was 20 years ago. There are 14 in the hospital, 21 on ambulatory treatment with DDS, and 17 under observation. Tuberculosis has not been introduced, and it is suggested that the inhabitants should be protected by BCG vaccination.—[From abstract in *Trop. Dis. Bull.* **53** (1956) 259.]

MAYER, C. F. Around the world. Military Med. **118** (1956) 156-158.

This article discusses the health problems in the Polynesian islands and the various countries of Asia. Statistics are given of the numbers of cases of leprosy in India, China, Thailand, Korea, Philippines and Japan. The Indian government proposes to open about 100 leprosy centers for treatment and study. An all-India training and research center for leprologists is being organized at Tirumani, Madras. Immunization by means of BCG vaccination is discussed. —SR. HILARY ROSS

GOLDMAN, J. Coins for use by patients with Hansen's disease. J. Hist. Med. & Allied Sci. **10** (1955) 430.

Photographs are shown of the coins issued at the Palo Seco leprosarium, Canal Zone, and the Culion Sanitarium in the Philippines, and the history of the development of these coinages is outlined. American influence was responsible in both instances. [That of course was not the case with the special coinage used in the leprosaria of Japan for many years.] —SR. HILARY ROSS

COCHRANE, R. G. A critical appraisal of the Madrid classification of leprosy. La Lepro **24** (1955) 236-240 (in Japanese); 241-246 (in English); *also* Lep. India **27** (1955) 234-240.

This article, intended for presentation at the 28th general meeting of the Japanese Leprosy Association, bears evidence of preparation while on tour without access to reference sources. It is first pointed out that the earliest attempts at classification were entirely clinical, or entirely bacteriological, whereas cases are now differentiated by means of the Mitsuda reaction into those which have "active tissue immunity" and those which do not. Although mention is made of developments represented by views adopted by previous meetings at which schemes of classification were adopted—the Leonard Wood Memorial conference (Manila, 1931—which in fact was the first ever to attempt a systematic classification), the Cairo congress (1938), and the Havana congress (1948), (but not the Pan-American conference, Rio de Janeiro 1946, or the WHO Committee meeting, 1952), it is said that "the first logical step" in classification was taken by the Madrid congress (1953). The scheme adopted there is discussed at some length [not, however, without certain inadvertent errors of fact and terminology], preliminary to the presentation of what the author regards as a more logical approach to classification. A diagram shows, first, a "silent phase," based on Khanolkar's demonstration of bacilli in the skin of healthy contacts of open cases; and, second, when clinical signs of the disease appear (which happens in only a minority of such persons), an indeterminate phase in which it is impossible to say whether the development will be toward the lepromatous or the tuberculoid end of the scale. This phase is difficult to determine because patients are seldom seen in so early a stage. Once the lesion has definitely developed, it is possible on clinical grounds, supported by immunological and histological methods, to place the great majority of macules (macules in the dermatological sense) in one of three categories —tuberculoid or lepromatous at the ends of the scale, or dimorphous (borderline) between them. The tuberculoid state is sensitized, the lepromatous one desensitized, and the dimorphous condition is a state of unstable equilibrium. A table is given to show the main clinical differences of these three kinds of macules, it being pointed out that the infiltrated lesions of these three classes are more developed and therefore more prominent clinically but that they are no longer macules. Another tabulation deals with histological and immunological differences between tuberculoid, lepromatous and dimorphous (borderline) lesions, with the remark that when the lesions are grossly infiltrated all the features are exaggerated. For details of these tables the original article must be consulted. The presentation ends with the following scheme:

Silent phase

Indeterminate lesion[1]

	Tuberculoid	Lepromatous	Dimorphous
(a)	Macular tuberculoid (maculoanesthetic)	Macular Prelepromatous[1] Lepromatous macular	Macular[1]
(b)	Infiltrated Minor tuberculoid Major tuberculoid	Infiltrated Diffuse Nodular	Infiltrated Atypical tuberculoid Atypical leproma
(c)	Polyneuritic tuberculoid[2]	Polyneuritic leproma[2]	Polyneuritic[1]

[1] These lesions are placed in the indeterminate group in the Madrid classification.

[2] These lesions cannot be recognized without the lepromin test, and therefore may also have to be placed in the indeterminate group.

[Actually, the word "polyneuritic" does not appear in the Madrid classification, but "neuritic," which in current usage is not entirely the same in its implications.—Editor.]

Hope is expressed that study of this modification of the Madrid classification will make it possible to "complete the final step towards a logical classification of the disease." —H. W. W.

MONTGOMERY, R. Leprosy (lepromatous type). A. M. A. Arch. Dermat. **73** (1956) 181-182 (society transactions).

This was a case demonstration, a white man, 42 years old, born in the Philippines who in 1949 had "red spots" in the face with loss of hair from the eyebrows, and who now presented marked lepromatous leprosy. The interest lies in the discussion with respect to the attitude of the New York City health authorities. They were notified when the man was first seen, in 1949, when he was working in a restaurant; but they said that that was all right as long as he was under treatment and did not have ulcerations. He was not very cooperative, changed doctors, and lapsed from observation, and the disease progressed markedly. Finally his employer at the restaurant discharged him from his job because of his appearance, and shortly afterward he appeared at a hospital because he felt ill, with neuritis and ulcers. He was later sent to Carville. —SR. HILARY ROSS

CHOYCE, D. P. Ocular leprosy, with reference to certain cases shown. Proc. Roy. Soc. Med. **48** (1955) 108-112.

This is part of a symposium at which six cases of leprosy of the eye were demonstrated. Involvement of the VII nerve causes atrophy of the superior part of the orbicularis oculi muscle, and that of the V nerve causes corneal anesthesia and sometimes ulceration. Various theories of the modes of infection of the eyeball are discussed, the author holding that "in view of the known predilection of the leprosy bacillus for peripheral nervous tissue [it is a reasonable] theory that they migrate to these regions along the ciliary nerves." The pannus of leprosy is distinguished from that of trachoma by the absence of involvement of the tarsal plates, abundant anastomoses, and a lesser degree of infiltration of the substantia propria. It is said that "secondary glaucoma is frequent and of great danger to the patient, as it is this complication which is, in part, responsible for the high incidence of blindness in ocular leprosy." The claim of Elliott to have diagnosed six cases of leprous choroidoretinal lesions is questioned, on the grounds that leprosy is confined to the anterior segment. Provided the disease is in the quiescent phase, leprosy lesions of the eye respond surprisingly well to surgical procedures.—[From abstract in *Trop. Dis. Bull.* **52** (1955) 651.]

KIRWAN, E. W. O'G. Ocular leprosy. Proc. Roy. Soc. Med. **48** (1955) 112-117.

The author draws upon his unrivalled experience of ocular leprosy to provide an excellent description of the clinical manifestations of the condition, giving in considerable detail the manner in which the various parts of the eye may be affected. The importance of early diagnosis and treatment of eye lesions is stressed, but it is pointed out that there is considerable benefit from sulfone therapy. Lepra reaction is indicated as a dangerous complication, and the use of cortisone in its control is discussed. Regarding lesions of the posterior segment, the author's touch is less sure. He first states, "lesions of the posterior segment. . . do occasionally occur. . . The wonder is that they are not more frequently observed," but then says that ". . . lesions of the posterior segment of the eye do not occur, or at all events occur rarely. . ." This leaves the reader uncertain about the author's real belief concerning this controversial point. This, however, is a minor detail, and this paper should be read by all who are interested in the subject.—[From abstract in *Trop. Dis. Bull.* **52** (1955) 651.]

MANN, I. Ophthalmic impressions of a leprosarium. Leprosy Rev. **26** (1955) 10-14.

Among 273 patients at the Derby leprosarium in Western Australia the author found that 47 had ocular complications. These were: leprotic keratitis in 22, iritis in 21, and facial paralysis in 4. In active cases of keratitis and iritis, cortisone eye drops are recommended to decrease the edema and exudative processes while the sulfones are dealing with the infection. In iritis, the cortisone should be combined with 1% atropine. None was blind from leprosy alone, and sulfone treatment appeared to prevent any serious ocular complication. Cases of trachoma were far more numerous, 172, but—an interesting fact—no active case was seen. From the findings of the trachoma survey elsewhere, it was obvious that the leprosy treatment with sulphetrone and DDS "had entirely killed the trachoma virus" and also cured secondary infections. This finding was subsequently confirmed by a clinical experiment with DDS in a group of children with active trachoma but no leprosy. The cure, however, was not as rapid as with oral sulfadiazine or sulfadimidine combined with local aureomycin or oxytetracycline ointment.—[From abstract in *Trop. Dis. Bull.* **52** (1955) 546.]

COELHO, J. T. Considerações sôbre aspectos constatados na formação de uma lesão lepromatosa. [Features observed in the formation of a lepromatous lesion.] Arq. mineiros Leprol. **15** (1955) 278-283.

The author describes a case of generalized lepromatous leprosy with a tumor on the internal surface of the right elbow. This tumor appeared 30 years ago when the patient made a great effort to raise a heavy weight, thus causing a rupture or hernia of the muscle. When, later, the patient became infected with lepromatous leprosy, this tumor was involved and became transformed into a gigantic leprotic tumor, proved by histologic and bacteriologic examinations.—[From summary.]

DOULL, J. A. and WOLCOTT, R. R. Treatment of leprosy. 1. Chemotherapy. New England J. Med. **254** (1956) 20-25.

After reviewing the classification of leprosy, with a description of each type of the disease, this article discusses therapeutic trials of the following drugs, and the results: the sulfones, dihydrostreptomycin and sulfones singly and combined, isonicotinic acid hydrazides singly and in combination with dihydrostreptomycin, thiosemicarbazones, nonspecific vaccines (BCG and *M. marianum*), and cortisone and ACTH in complications. Although by far the greatest advance in leprosy therapy in recent years has been the introduction of the sulfones, it is said, these drugs are neither curative nor bactericidal. They are of special value in the healing of lepromatous ulcers, and long-continued treatment seems to assist natural processes

of recovery by repressing multiplication of the bacilli. The disease becomes apparently arrested in a considerable proportion of cases, but an appreciable proportion of them relapse and may become refractory to further sulfone treatment. The Leonard Wood Memorial studies show the value of dihydrostreptomycin to be equivalent to that of the sulfones, as far as can be judged after one year of therapy. Combined treatment with a sulfone and dihydrostreptomycin offers no advantage. Other antibiotics that have been tried are of value only with respect to secondary infections. The reported value of sulfone therapy in the tuberculoid type remains to be established by controlled studies. Tuberculoid macules may become inactive without treatment of any kind, but sensory changes remain in the residual, often depigmented, scars. No method of antileprosy treatment has restored, or can be expected to restore, the anesthesia and trophic effects resulting from invasion of peripheral nerves by *M. leprae*. This invasion occurs early, especially in the tuberculoid type. Also unfortunate is the fact that early diagnosis is exceptional. "There is therefore urgent need for educational measures directed toward earlier recognition, as well as for discovery of a bactericidal drug." —SR. HILARY ROSS

BRAND, P. W. Treatment of leprosy. II. The role of surgery. New England J. Med. **254** (1956) 64-67.

The early measures of reconstructive surgery in leprosy were limited to the excising ot nodules from ears and the repair of loose folds of the skin of the face in arrested cases, to make it easier for the patient to rejoin society. The discussion of present-day methods reviews tissue absorption, wound healing, motor paralysis, hand surgery, physiotherapy, denervated feet, and facial deformities. Absorption in the hands and feet occurs earliest and most seriously in tuberculoid leprosy, in which the bacilli are usually absent from deep structures. When absorption of digits develops in lepromatous patients it is often late in the disease, when there are few bacilli, or even after the patient has become bacteriologically negative in routine smears. Injury, sepsis, and trophic changes are responsible for most leprous tissue absorption—conditions which, with care, are preventable. Cases of paralysis of the hands in the author's experience fall into three groups: 1. Pure ulnar palsy, with no motor nerve damage, 46% of all hands presented for surgery. 2. Total paralysis of all the ulnar-supplied muscles, and paralysis of the median-supplied muscles below the wrist, 52% of the patients; this group had clawing of the fingers. 3. Total ulnar paralysis, median paralysis below the wrist, and total paralysis of radial-supplied forearm muscles, 1.5%. Operative and physiotherapy procedure for these deformities are discussed. A well-staffed physiotherapy department is essential in a hand-reconstruction center. Many of the classical facial deformities have proved amenable to plastic surgery. In a plea for the patient it is said, "This is the time for the orthopedic and plastic surgeon to come forward and open the door that leads the leprosy patient from isolation back to his family life and job." [Another abstract of a report by this author is in the All-India group in this issue.] —SR. HILARY ROSS

UTSONOMIYA, S., KOGA, K. and IGAWA, S. On the progress of eyebrow transplantation for alopecia leprosa. La Lepro **24** (1955) 166-173 (in Japanese; English abstract p. 166).

In the Oshima Seisho-en 111 patients (109 tuberous and 2 neural) have had plastic operations on the eyebrows. Auto-hair transplantation done on 110 patients gave favorable results in all cases. In 1 case the hairs were transplanted upon a hypoesthetic part, in which sensibility was recovered after a year. Homo-hair transplantation done on 5 patients failed in all cases. With pedunculated autoplantation, one case succeeded while in the other one there was necrosis and scar formation. The latter case received auto-hair transplantation with success. Hair transplantation gave favorable results on the lesion of alopecia leprosa, as well as upon the normal. The plastic eyebrow operation in leprosy patients is the most adequate treatment,

not only as regards function but also from the cosmetic point of view, to ameliorate the mental agonies.—[From abstract.]

COCHRANE, R. G. The treatment of leprosy. A. M. A. Arch. Int. Med. **97** (1956) 208-214.

The types of leprosy are described briefly, and the three different types of tissue response as indicated by the lepromin reaction: (*a*) a potential state of hypersensitivity (reaction strongly positive); (*b*) a state in which the tissues are desensitized (reaction negative); and (*c*) an unstable intermediate state of partial sensitivity (weakly positive or negative reaction). These defense responses show themselves in the clinical lesions, which are divided into tuberculoid, lepromatous and dimorphous (borderline) with their characteristic clinical, histological, and immunological manifestations. A diagram of the author's own concept of classification is given. Treatment with the sulfones and other drugs is discussed, especially with respect to DDS. For treatment of reactions special emphasis is laid on antimony preparations and, in acute cases, cortisone. Orthopedic and physiotherapeutic measures are also discussed.
—SR. HILARY ROSS

BUU-HOI, N. P. New developments in the chemotherapy of leprosy. Bull. Calcutta Sch. Trop. Med. **3** (1955) 133-136.

After speaking of the difficulties inherent in study of the chemotherapy of leprosy, the author notes that the double bond present in chaulmoogric and hydnocarpic acid are not necessary for therapeutic effect but are responsible for most of the toxic effects of chaulmoogra oil. He had therefore introduced the hydrogenated oil and also dihydrohydnocarpic and dihydrochaulmoogric esters. Such products have been superseded by the sulfones, although chaulmoogra does not merit outright rejection and in some places is still used. Regarding other drugs that have been tried, such as isoniazid, they are generally poorly soluble in lipoids or have low fungicidal activities, and "the Hansen bacillus seems to be closer to the fungi than does the tubercle bacillus." To meet these conditions, and to lessen the toxicity of DDS which limits its dosage, he prepared the 4:4′-diaminodiphenylsulfoxide (with the SO group instead of SO_2 as in DDS), and this product (DDSO) has been used on a large scale in South Vietnam with satisfactory results. Of another group of substances, 4:4′-diethylthiocarbanilide (Dialide) has also been tried out on a large scale in South Vietnam; it is even less toxic than DDSO, with which it may perhaps be alternated with profit. Still another preparation under trial is an addition compound of ascorbic acid and nicotinamide (Nicoscorbine), which is being used successfully as a supplementary agent along with the two substances mentioned above. Attempts are also being made to obtain thiosemicarbazones of less toxicity than TB-1 and others used heretofore.
—H. W. W.

BUU-HOI, NG. P., NGUYEN-BA-KHUYEN and NGHYEN-DAT-XUONG. Six mois de chemiothérapie antilépreuse au Sud-Vietnam avec le 4,4′-diaminodiphénylsulfoxyde et le 4,4′-diéthoxythiocarbanilide. [Six months of antileprosy chemotherapy in South Vietnam with 4,4′-diaminodiphenylsulfoxide and 4-4′-diethoxythiocarbanilide.] Bull. Acad. nat. Méd. **139** (1955) 275-280.

Thirty-four patients (27 mixed forms, 6 lepromatous, and 1 indeterminate) were treated for 6 months with 4,4′-diaminodiphenylsulfoxide (DDSO) and 4,4′-diethylthiocarbanilide (Dialide) in doses of 100 mgm. daily by mouth. Of the 19 who had been followed up, 6 showed little change while 13 showed improvement consisting of regression of the cutaneous lesions and, in some cases, diminution or disappearance of bacilli in the nasal mucosa and the skin lesions. An additional 300 patients were treated with Dialide, and clinical improvement was also seen in them. Both drugs were well tolerated, although two lepra reactions occurring during the treatment by DDSO, and skin eruptions appearing during the treatment with Dialide made

it necessary to reduce the dose temporarily to 50 mgm. Both drugs are regarded as less toxic than DDS. —M. VIETTE

LAVIRON, P., LAURET, L., KERBASTARD, M. and JARDIN, C. Le traitement de la lèpre par des injections mensuelles de 2,50 de diamino-diphényl-sulfone; note préliminaire. [The treatment of leprosy by monthly injections of 2.5 DDS; preliminary note.] Bull. Soc. Path. exot. **48** (1955) 126-128.

Experience up to three and four years with the same patients had proved the innocuousness of the DDS treatment by intramuscular injections given semimonthly, 6 cc. of a suspension containing 1.25 gm. of DDS in a mixture of equal parts of chaulmoogra oil and esters. "The ease of treatment, the absence of any local or general reaction, the perfect tolerance of the product as well as the therapeutic results, have led us to consider this technique the most practical and efficacious for treatment in the bush." They have now investigated whether, by doubling the dose of DDS, they could reduce the number of the injections to only one per month. The trial was with 27 patients, most of them new. The new ones were started by mouth, increasing the dose gradually to 200 mgm. per day in the fourth week, then changing to the intramuscular route with 1.25 gm. every 15 days, then 2.0 gm. every 3 weeks, and finally 2.5 gm. (8.5 cc.) once a month. The vehicle was the chaulmoogra oil-esters mixture and the DDS crystals of the 140-190 *tamis* grade; the suspension was easily injected with a 8/10 [0.8 mm.] needle. Not painful at the time of injection or afterward; no induration resulted, nor anemia. Blood levels, followed in 10 of the cases, often showed a peak (*clocher*) which reached as high as 19.5 mgm. per liter, and then a gradual fall usually to the 1 mgm. level between the 12th and 15th days. The authors had always thought that the blood level should be as regular and prolonged as possible, and such curves without peaks had been obtained with semimonthly injections of 1.25 gm. in chaulmoogra ethyl esters—maxima of 3-4 mgm. during the first days, decreasing very slowly to never less than 1 mgm. on the 15th day. With peanut oil there was an early peak. The curves observed in the present study were like those obtained with peanut oil, except that with the latter (1.25 gm. dose) the blood level was almost always below 1 mgm. by the 8th day. All of the 14 lepromatous cases showed improvement [the period apparently about 1 year], marked in 10, and in another 10 there was diminution of bacilli although without appreciable morphological changes; 9 of the 12 tuberculoid cases improved, 5 of them markedly, while 1 became worse; the 1 indeterminate case was slightly improved. It is concluded that monthly injection is possible and sufficient, and it would permit great expansion of the mass treatment in French Africa. Emphasis is laid on the "perfect tolerance": "sulfone treatment by injection is much better tolerated than by the oral route." Only 6 slight lepra reactions were observed in 14 cases. [Evidently the lepromatous cases. This is stated at the end, although earlier it is said that in one case treatment had to be interrupted temporarily because of reactions.] —H. W. W.

BLAAUW, K. H. An account of clinical results of 33 months of sulphetrone treatment in leprosy. Med. J. Malaya **9** (1955) 292-317.

It is said that "there is no endemic focus of leprosy in North Borneo. In the Berhala colony at Sandakan there are about 55 patients, reduced from 90 during the Japanese occupation. Sulphetrone by mouth has been used since 1949. Severe toxic reactions are not infrequent, but can mostly be avoided by careful supervision and judgment of the individual case. An assessment of 73 patients after about 33 months' treatment showed 5 cures and the hope of 8 further cures in the following year. There is a problem in the slower disappearance of bacilli than of the lepromatous lesions, so there is little hope for cure in less than 3 years of treatment. Tuberculoid cases do not seem to become lepromatous, and in five-sixths of them

improvement or a stationary phase resulted. [The abstractor, Muir, remarked that this observation is important, for in Chinese patients in Malaya, prior to sulfone treatment, tuberculoid cases often went on to the lepromatous type.]—[From abstract in *Trop. Dis. Bull.* **53** (1956) 66.]

JOPLING, W. H. and RIDLEY, D. S. Isoniazid with sulphone in lepromatous leprosy. Trans. Roy. Soc. Trop. Med. & Hyg. **49** (1955) 453-454.

Four batches of lepromatous patients (1 was borderline) were tested, 3 receiving sulfones only, 3 sulfones with isoniazid, 3 the combined treatment followed by sulfones, and 2 sulfones followed by combined treatment. The results at the end of 2 years failed to establish any advantage for either of the two types of treatment (sulfones alone or combined treatment). The only side effect of isoniazid was an elevation of the glucose curve, followed by a return to normal after the cessation of treatment.—[From abstract in *Trop. Dis. Bull.* **53** (1956) 203.]

GARRETT, A. Isoniazid in leprosy treatment. Leprosy Rev. **26** (1955) 171-175.

A group of 14 patients was chosen who were considered difficult because of the slowness or absence of bacteriological improvement, or because of severe reactions. DDS was combined with isoniazid, 3 mgm./kgm. of body weight being given for the first 12 months, and 6 mgm. thereafter. The results are thus described: "My opinion is that the improvement is more rapid than could be expected of Dapsone alone, but the difference is not very marked. Dapsone alone is so successful in the vast majority of our patients that the great addition to expense in buying isoniazid and to staff time in giving daily treatment is not warranted for routine work. There are, however, the few for whom it appears that this additional treatment is of great value." —[From abstract in *Trop. Dis. Bull.* **53** (1956) 203.]

KATSUMI, H. Studies on leprosy. Part II. Clinical studies. Treatment effect of TB1 and INH and their resorption, discharge and concentration of various organs. La Lepro **24** (1955) 137-146 (in Japanese; English abstract p. 137).

Relatively small quantities of TB-1 and INH were administered. The effects of treatment and experimental results regarding absorption, discharge, and organ concentrations of these two chemical agents are reported. TB-1, 50-100 mgm. daily, gave excellent results. INH was effective in tuberculoid leprosy, but cases of other types were unchanged or aggravated. Toxic manifestations were insignificant with both drugs. Blood concentrations of TB-1 were perceptible after 5 hours in normals, and still detectable after 24 hours in both. The amount excreted in the urine in 24 hours was 27.7% in the normals and 5.37% in the patients. TB-1 was found in large quantities in the liver, kidney, lung and heart, but not at all in the skin or the muscles. The organ concentration increased as the administration was prolonged. After treatment with TB-1 the drug was not found in the nodular or tuberculoid lesions. After administration of INH to adult rabbits by various ways, the concentrations in the blood and organs were determined: (*a*) After 1 hour the blood concentration was 13 I/u after subcutaneous injection, 8 I/u after oral administration. However given, it decreased to 2 I/cc after 16 hours. The decrease was relatively gradual after subcutaneous injection, prompt (1 hour) after intravenous injection, and very slow after oral administration. (*b*) After 16 hours the organ concentrations were higher with subcutaneous injection than with the other two methods. (*c*) With oral administration the concentrations were high in the kidney, skin and muscles. As for the periodical variations, it increased in the liver and adrenal, and decreased markedly in the kidney, lung, brain and muscle.—[From abstract.]

DHARMENDRA and CHATTERJEE, K. R. Cepharanthin in the treatment of leprosy. Lep. India **26** (1954) 157-159.

Cepharanthine is an alkaloid derived from two species of *Stephania* of the

Menispermaceae family. Good results in the treatment of leprosy were reported by Japanese workers [THE JOURNAL **19** (1951) 103] after 7 years' trial on 444 patients. Sato [THE JOURNAL **21** (1953) 416] also reported unfavorably. The authors, after a trial for 41 weeks in 7 lepromatous cases, and for 52 weeks in 8 tuberculoid cases, were unable to confirm the results claimed by the earlier Japanese workers, although there was definite improvement in 3 patients.—[From abstract in *Trop. Dis. Bull.* **52** (1955) 548.]

FLOCH, H. Essai du largactil associé à la D. D. S. en thérapeutique antilépreuse. [Trial of largactil combined with DDS in antileprosy therapy.] Bull. Soc. Path. exot. **48** (1955) 402-404.

Largactil was used in 3 patients. One, lepromatous, received 1.2 gm. of DDS per week intramuscularly, and 37.5 mgm. of largactil daily by mouth; he became greatly improved clinically [the treatment period not stated, but apparently about 8 months]. The second, tuberculoid, treated with DDS for 2 years, presented a moderate reaction; daily intramuscular injection of 25 mgm. of largactil for 10 days had no definite effect. The third, indeterminate, treated with DDS for 5 years, presented a febrile reaction with cutaneous elements of the nodular erythema type; given injections of 25 mgm. of largactil daily, the reaction improved in 7 days and subsided in 12 days. —M. VIETTE

SATANI, Y., NISHIMURA, S., KONO, M., NOJIMA, T., TAKAHASHI, T., UEMURA, M. SAKURAI, H., SAIKAWA, K., YOKOTA, T., MIYASAKI, M. and HATA, C. Intracutaneous injection of acidomycin in the treatment of leprosy. La Lepro **24** (1955) 174-180 (in Japanese; English abstract p. 174).

Because of the idea that an antileprosy drug may be found among the medicines for tuberculosis, a new chemical, acidomycin, was tried out for the treatment of leprosy in three leprosaria and a laboratory. In this treatment it is specific to inject the medicine intracutaneously in the lesions or in the normal skin. A total of 66 patients (39 lepromatous, 20 tuberculoid, and 7 neural) were given 20-193 injections, totalling 200-3,865 mgm., of acidomycin. The results were: markedly improved, 16; moderately improved, 13; slightly improved, 10; unchanged, 20; aggravated, 4; and unclear, 3. Acidomycin was more efficacious in tuberous than in neural or tuberculoid lesions, and fresh lesions responded well.—[From abstract.]

CONTRERAS, GUILLEN, S. MIGUEL, TERENCIO and TARABINI. Tratamiento de las leprorreacciones con cortisona. [Treatment of lepra reactions with cortisone.] Fontilles **3** (1955) 555-571.

The reactional phenomena were controlled by cortisone in all cases so treated, but it was necessary to give maintenance doses because of frequent relapses when the cortisone was withdrawn. The earliest symptom to disappear is the fever (from 24 hours to 3 days); the muco-cutaneous manifestations, adenitis, and neuritis subside more slowly, and also the joint (bone) pains. General well-being, both physical and psychical, and appetite appear early. The doses given did not exceed 1.5 gm., even in patients who had repeated treatments because of relapses, in contrast to doses ranging from 4 to 8 gm. used by other leprologists. Tolerance was good, except in one case in which there was generalized edema, ascites and albumin, but this patient had had lepra reaction for about a year. This work will be followed up, but in Fontilles most of the lepra reactions are still treated with hemotherapy, which usually gives excellent results. In some cases in which it failed, the reactions were controlled with cortisone. Hemotherapy is preferred, but there are cases in which cortisone in indicated. It should be used in iritis and acute iridociclitis, for which it is effective.—[From authors' conclusions.]

DHARMENDRA and SEN, N. R. Vitamin C in the treatment of reactions in tuberculoid leprosy. Lep. India **26** (1954) 163-164.

The authors attempted to confirm the results of Floch and Sureau who treated 2 cases of reacting tuberculoid leprosy with vitamin C [see THE JOURNAL **22** (1954) 237]. Eight patients were given intramuscular injections of 500 mgm. of vitamin C daily, 6 days a week, for varying periods. The first two were treated for 8 and 10 weeks, with total doses of 26 and 31 gm., respectively, but the improvement was only slight, slow and incomplete. It was decided that in the other patients the treatment should be ended earlier if improvement was absent or slight after 1 to 3 weeks, to be replaced by the more usual treatment by intravenous injections of calcium gluconate and potassium antimony tartrate. The upshot was that little benefit was seen from the use of vitamin C in this condition; better results followed the usual and much less expensive treatment.—[From abstract in *Trop. Dis. Bull.* **52** (1955) 547.]

DHARMENDRA, CHATTERJI, S. N. and SEN, N. R. A by-product of DDS for treatment of trophic ulcers in leprosy. Lep. India **27** (1955) 180-185.

The product used, obtained in the manufacture of DDS, is the substance from which the latter has been extracted by alcohol. It is a dark-colored, sticky substance, much more soluble in alcohol than DDS, containing a quantity of 2:4′-diaminodiphenyl sulfone (DDS being the 4:4′-diaminodiphenyl sulfone) and also some DDS. It was applied to trophic plantar ulcers as a dressing, and the patients were allowed to walk about. The treatment was used in 22 patients chiefly of the tuberculoid type, 18 of whom had had previous treatment without results. In 15 the ulcers healed completely and the patients had no relapse during a period of a year. In the others, although the ulcers became cleaner and smaller, there was not healing, and x-ray examination showed that there was diseased or dead bone. Trials with DDS dissolved in alcohol showed that the healing effects could not be due entirely to the DDS present in the by-product.—[From abstract in *Trop. Dis. Bull.* **53** (1956) 327.]

NEWMAN, F. and ANDERSON, A. Preliminary report on treatment of ulcers in leprosy patients at Ndjazen Leprosy Colony, French Cameroun. Leprosy Rev. **26** (1955) 168-170.

The treatment included preventive measures and special dressings. A survey was made of all the ways in which patients injured their hands and feet, and they were taught to use proper shoes to protect their feet and to use certain appliances to protect their hands while cooking or at their work. Ulcers were divided into three categories. The more superficial ones were exposed to the sun and sprayed with a dye combining crystal violet, brilliant green and acriflavine. Infected and foul ulcers were poulticed with magnesium sulphate in glycerin. Chronic, deep ulcers were scraped and packed with vaseline gauze, and a plaster cast was applied undisturbed for 6 weeks, during which time the patient could walk on crutches if only one foot was involved, otherwise he remained in bed. All the patients eventually recovered or found their way into the first category.—[From abstract in *Trop. Dis. Bull.* **53** (1956) 201.]

KATSUMI, H. Studies on leprosy. Part I. Studies on vital physiology of leprosy. 2. On the electromyography. La. Lepro **24** (1955) 133-136 (in Japanese; English abstract p. 133).

Electromyography of 6 macular [tuberculoid], 1 neural, and 5 nodular cases was done on lesions of the forearms and lower legs under resting and gradually contracting conditions. The wave and the distance of the discharge were compared with those of normal people. The wave measured on 6 places of both forearms of marked nodular patients with mutilation of the fingers and claw-hands showed the wave of grouping-

voltage, although there were some differences. At rest, no spike discharge was observed. No differences were observed between the results with slightly deformed patients and those with normal people. The waves and the distances of discharge presented no differences unless the patients had marked deformities.—[From abstract.]

ROSS, SR. H. The blood in leprosy: morphology, chemistry, immunology. A review. Part I. Cytology, blood groups, and red cells sedimentation. Leprosy Briefs **6** (1955) 21-23 (No. 6).

———— *Idem.* Part II. Chemistry. *Ibid.* pp. 26-28; 29-31 (Nos. 7 & 8).

———— *Idem.* Part III. Immunology. *Ibid.* pp. 31-32; 33-36; 37-40; 41-44; 45-47 (Nos. 8, 9, 10, 11 & 12).

[This comprehensive but succinct three-part review does not lend itself to abstracting.—EDITOR.]

PATERSON, D. E. Radiological bone changes and angiographic findings in leprosy, with special reference to the pathogenesis of 'atrophic' condition of the digits. J. Fac. Radiologists (London) **7** (1955) 35-56.

This is an illustrated report of 542 films from 116 selected leprosy patients. Bone changes are divided into: bone destruction, joint changes, bone absorption, and osteoporosis. Bone destruction may be local and in the form of "cysts" due to foci of lepra bacilli, especially when lepra reaction occurs, and a destructive lesion in the medulla may cause an expansion of the cortex similar to tuberculous dactylitis; but bone destruction is most commonly connected with injury resulting from the diminution or absence of sensation, secondary infection entering and spreading to the bone. Joint changes are commonly the result of leprous infection in the subarticular bone. In bone absorption, the bone is evenly and smoothly removed from the ends or from the subperiosteal layers. The author does not believe that this change, found in 97 of the 108 cases, can be termed "atrophic"; it includes appearances similar to those seen in acute osteitis, periostitis and osteomyelitis, in which there is no neural involvement. Angiograms of the vessels of the fingers were made after intra-arterial injection of diodone. Digital arteries were found to be narrowed in badly deformed fingers, as in rheumatoid arthritis, but this may be due to want of use or to former nonspecific infection. Evidence is quoted for the theory that bone formation and destruction can be caused by nerve lesions (trophic changes), but there is no evidence that the bone changes in leprosy are primarily due to loss of the nervous mechanism. The type of concentric "atrophy" seen in leprosy, tabes and syringomyelia can also occur in mycetoma and nonspecific ulceration where there is no disease of the nervous system. "It is thought that in cases of concentric absorption there is occlusion of the vascular end-loops in the soft tissue and in the periosteum as a result of periostitis, haematomas, or devitalized tissue. Blood-supply to the periosteum is therefore affected in such a way that osteoclasts rather than osteoblasts are at work. The vascular end-loops and the veins draining the medulla may be protected from this process, and so in the medulla compensatory new-bone formation can take place."—[From abstract in *Trop. Dis. Bull.* **53** (1956) 199.]

HARADA, K. Histochemical studies of leprosy, especially the mode of formation of lepra cells. La Lepro **24** (1955) 277-282 (in Japanese; English abstract p. 277).

The routine staining, Masson's methyl green-pyronin, PAS methods, lipoid staining (Sudan III, Sudan black), lipophanerosis (Nile blue sulfate), were applied to investigate the formation of lepra cells. The results revealed that they derive from fixed macrophages and monocytes. The phagocytosed bacilli and the cytoplasm undergo fatty degeneration, and neutral fat is discharged into the blood. These changes can be divided into three stages by the histochemical methods for fatty substances: (1) the leprosy bacilli are phagocytosed by histiocytes, (2) fatty degeneration takes place, and (3) neutral fat is produced and vacuoles are observed.—[From abstract.]

RIDLEY, D. S. The bacteriological interpretation of skin smears and biopsies in leprosy. Trans. Roy. Soc. Trop. Med. & Hyg. **49** (1955) 449-452.

It was found in histological studies of 11 leprosy patients that treatment did not always diminish the density of bacilli in the leproma, but led to invasion of the leproma by the surrounding healthy corium while the uninvaded portion remained densely bacteriologically positive. In this way many nodules disappear during the early stages of the treatment. It is considered that serial biopsies at 2-month intervals, and the use of improved methods of staining sections, give a more accurate estimate of improvement under treatment, although multiple smears provide a more rigorous test of cure.—[Abstract from *Trop. Dis. Bull.* **53** (1956) 200.]

CHAUSSINAND, R. A propos du voeu, concernant la standardixation de la lépromine, formulé par le Société de Pathologie Exotique. [Regarding the proposal by the Société de Pathologie Exotique concerning standardization of lepromin.] Bull. Soc. Path. exot. **48** (1955) 782-783.

The Société de Pathologie Exotique proposed, in June 1955, that lepromin for all the countries of the French Union should be prepared at the leprosy laboratory of the Institut Pasteur of Paris, so that all leprologists might use the same product. The director of the Service de Santé of the overseas territories sent out a circular telling of the plan, and as a result the laboratory has received a large quantity of lepromatous nodules from numerous overseas territories. Furthermore, the Belgian Congo and Portugal and its colonies have expressed their desire to participate in this "pool." The leprologists who participate remove lepromatous nodules, rich in bacilli and preferably from untreated patients, place them in sealed tubes or special containers supplied by the leprosy laboratory, autoclave them, and mail them in. The senders receive an amount of lepromin corresponding to the weight of the nodules they supply. The antigen is sent out in ampules of 2 and 10 doses. The sending of the sterilized containers which they use, and the preparation of the lepromin and its shipment, are free of charge. [A note on the subject appears in the news section of this issue.] —M. VIETTE

FLOCH, H. Il est possible de renforcer la positivité des réactions de Mitsuda pratiquées à l'aide d'antigènes dilués san perdre la spécificité de leur réponse. [It is possible to enhance the positivity of the Mitsuda reaction with diluted antigens without losing the specificity of their response.] Bull. Soc. Path. exot. **48** (1955) 372-375.

Because lepromin diluted 1:750 provokes weaker Mitsuda reactions than the normal antigen (1:20 or 1:30), attempts have been made to enhance its activity by adding 12% glycerin and 2% paraffin oil (lepromin 1:750 G. P.). [This work was also reported in THE JOURNAL **23** (1955) 295-300.] —M. VIETTE

GUIMARAES, A. S. Testes cutâneos na lepra. Cutaneous tests on leprosy. Arq. mineiros Leprol. **15** (1955) 264-277 (Portuguese and English).

This is a report of tests made on Mitsuda-positive healthy boys and tuberculoid cases, and Mitsuda-negative lepromatous cases, with (1) a "lepromina" made of a "Maria" culture, (2) a "leprolina" made of a "José" culture, and (3) a Stefansky antigen. Early (Fernandez-type) reactions were so rare that the results given are only of the late reactions. Among 33 healthy boys, the first of these antigens gave positive results in 9 of 12, the second in 11 of 12, and the third in only 5 of 9, (Later, 15 more were tested in groups of 5, with somewhat different results.) Among the tuberculoid cases, the first antigen gave positive results in 9 of 12, the second in 11 of 14, and the third in 11 of 13. (In a later test with fewer cases, none failed to react.) Among Mitsuda-negative lepromatous cases, all reactions were positive, 4 with the first antigen, 3 with the second, and 3 with the third. It is concluded that the antigens used lack specificity. —H. W. W.

ROGERS, F. J. and HASERICK, J. R. Sarcoidosis and the Kveim reaction. J. Invest. Dermat. **23** (1954) 389-406.

The Kveim test was found to be both reliable and practical in the diagnosis of sarcoidosis. Some properties of the Kveim antigen were observed. The pathogenesis of the positive reaction was studied by comparing reactions of the same and different durations and by serial biopsy. It is suggested that the papule produced is fundamentally a lesion of sarcoidosis, in which case the pathogenesis of sarcoidosis is revealed. On the basis of the observations, a concept of sarcoidosis involving an antigen-antibody mechanism is suggested. Preliminary study to support this concept is encouraging.—[From abstract in *Biol. Abstr.* **29** (1955) #16340, supplied by J. H. Hanks.]

TARABINI CASTELLANI, G. Serología en lepra; anticuerpos antilipoideos y antitreponémicos. [Serology of leprosy; antilipoid and antitreponema antibodies.] Fontilles **3** (1955) 572-577.

The pallida test (TPI, complement fixation using Reiter treponema) was made on 20 sera from leprous patients who had positive Wassermann reactions (Bordet antigen) and also positive Meinicke, Kahn and Citacol reactions, either partly or totally. Two sera were positive to the TPI test, one was doubtful and all the rest were negative. It was concluded that antilipoid antibodies were present in all the sera, but treponema antibodies were present in only two and doubtful in one.—[From author's résumé.]

ROLLIER, R., PELBOIS, F. and CHRAIBI, L. Sérologie et test de Nelson dans la lèpre. [Serology and the Nelson test in leprosy.] Bull. Soc. française Derm. et Syph. **62** (1955) 326-329; *also*, Maroc Med. **34** (1955) 575-576.

The serological reactions of syphilis and the Nelson test were compared in 197 leprosy patients. The results agreed in 48 of 59 tuberculoid and indeterminate cases. There were 8 TIT positives and 3 negatives in individuals who gave negative or dissociated result with classical serology. Among 138 lepromatous cases, 85 had concordant results with both types of reactions; 7 had positive classical serology with negative TIT; 8 had dissociated or negative classical serology with positive TIT; 1 had a doubtful TIT with negative serology; and lastly, 37 had negative TIT with dissociated classical serology. Thus, in the total of 197 patients, 19% were positive with both types of reactions, a figure comparable to that of the nonleprous population, and 26.5% had dissociated classical serology, an abnormally high figure. The serology was also compared with the albumin/globulin ratio. The proportion of dissociated reactions was higher as the A/G ratio was lower. —M. VIETTE

ITOH, M., SHIONUMA, E. and HIBI, H. Studies on bacterial flora in conjunctival sacs of leprosy patients. La Lepro **24** (1955) 147-155 (in Japanese; English abstract p. 147).

The bacterial flora of the conjunctival sac was studied in 114 leprosy patients (32 neural and 82 macular), and 72 nonleprous people, by means of Ziehl-Neelsen smears and blood-agar plate cultures. The leprosy bacillus was not found in any case. By cultivation, Cor., Sta. alb. et aur., Pn., Str. hem., vir. et nonhem., K. W., M. A., Friedländ., Micrococ., Pyocya., gram + and gram — bacilli, Neisseria and Blastomyces were isolated. The kinds of organisms and the frequency of positive results were more remarkable in leprosy patients than in the normal people, with no type differences in the former. The average number of varieties of organisms in one eye was 0.95 in the nonleprous people, 1.23 in the L type, and 1.71 in the M and N types. In patients without recognizable conjunctivitis there were few or no organisms regarded as pathogens or facultative pathogens. Sta. alb. and other nonpathogens were found with no difference in frequency between the two groups.

Fourteen kinds of organisms were obtained from the leprosy patients with chronic catarrhal conjunctivitis, the most frequent being Cor. (69.9%), Sta. alb. (25.3%), Sta. aur. (19.2%), Pn. (18.5%). Fifteen kinds of organisms were obtained from the patients with lagophthalmos and ectropion, similar in kinds and frequencies to those with chronic conjunctivitis. Phthisis bulbi and anophthalmos were always complicated with chronic conjunctivitis. It is seen that the bacterial flora of the conjunctival sac has a relation with lagophthalmos or ectropion, they being associated with chronic catarrhal conjunctivitis which is provoked not only by simple outer irritation but by the bacteria in the conjunctival sac.—[From abstract.]

AMERICANO FREIRE, S. New bacteriological aspects of leprosy. V. Chemotherapic tests *"in vitro"* on the etiological agent of human leprosy (pseudo-yeast shape): (*a*) In Sabouraud medium (aerobic), (*b*) in liquid medium (anaerobic). Arq. mineiros Leprol. **15** (1955) 141-150.

This report describes culture features of the pseudoyeast isolated from a lepromatous patient [see THE JOURNAL **23** (1955) 483]. It is an aerobic, pleomorphic germ with partially acid-fast, yeast-like mycelia that break up into nonacid-fast coccoid or bacillary elements. It does not ferment monose or saccharose, because its action is proteolytic. Two chemotherapy test techniques were employed to ascertain the role of the pseudoyeast as an etiological agent of human leprosy, employing the Sabouraud and the Kirchner-plasma media. With the Sabouraud medium, aerobic tests were made at room temperature with 26 different substances. Many of them were found to cause total inhibition even in 1:1,000,000 dilution or more. Among these inhibitors were the following antibiotics: chloromycetin, terramycin, aureomycin, tetraclin, streptomycin and bacitricin. DDS, on the other hand, was not inhibitory; it acted as a stimulant in 1:100,000 dilution or more. With the Kirchner-plasma medium in anaerobic tests, all the 26 substances and 13 others were found inactive, but DDS was again found to have growth-stimulating action. This action explains why, in smears from lepromatous patients treated for several years with DDS, the pseudoyeasts and other forms of their cyanophilic cycle occur in inverse proportion to the Hansen bacilli, a patient on the road to clinical recovery usually having the more pseudoyeasts the fewer the *M. leprae* he has. This is one of the reasons for the frequency of relapses in clinically healed patients. In them the pseudoyeasts can be regarded as the source of the Hansen bacilli, as in the case of reactional tuberculoid leprosy. On the other hand, in the latter condition or in major tuberculoid leprosy (when the pseudoyeasts and Hansen bacilli, the latter sometimes in the form of globi, appear together), the use of sulfone sometimes aggravates the skin and nerve lesions and the attendant muscular atrophies. This is because the pseudoyeasts, which are responsible for the lesions of the tuberculoid leprosy, are stimulated by DDS. Sulfone plays the role of a metabolite for the pseudoyeasts, and not that of an antimetabolite as it is for *M. leprae.*—[From the author's summary.]

WILSON, G. C. and MORTON, D. E. The clinical incidence of acid-fast bacilli nonpathogenic for guinea pigs. American Rev. Tuberc. & Pulm. Dis. **73** (1956) 351-361.

At the Uncas-on-Thames Sanatorium (Norwich, Connecticut) 46 patients were seen during 1953 and 1954 who were excreting acid-fast bacilli which were nonpathogenic for guinea-pigs. Chest films of 7 were normal; 7 had nontuberculous lung disease; 30 had probably inactive pulmonary tuberculosis, of whom 18 had received previous antituberculosis chemotherapy; 1 had probably active pulmonary tuberculosis; and 1 had probably active urinary-tract tuberculosis. Fifty cultures of acid-fast bacilli were obtained from these patients which failed to produce tuberculosis in guinea-pigs. Of these cultures, 37 had the appearance typical of tubercle bacilli, 9 were chromogenic, and 4 showed other atypical characteristics. The occasional finding of acid-fast bacilli, not pathogenic for guinea-pigs, in the sputum of tuber-

culous and nontuberculous patients emphasizes a major pitfall in the diagnosis of active tuberculosis and the differential diagnosis of other chest diseases. Antituberculosis drugs may play a role in developing avirulent strains of tubercle bacilli, but avirulent acid-fast bacilli morphologically identical with virulent tubercle bacilli may be found in patients with or without previous demonstrable tuberculosis who have not received chemotherapy. —SR. HILARY ROSS

FRANCIS, J. The behavior of various mycobacteria in the chick and duck embryo. American Rev. Tuberc. & Pulm. Dis. **73** (1956) 276-290.

Human, bovine and avian types of tubercle bacilli, vole bacillus, and rat-leprosy bacillus were inoculated onto the chorioallantois of chick embryos, and in many instances of duck embryos. The macroscopic and microscopic appearances of the chorioallantois after inoculation with a heavy suspension of rat-leprosy bacilli were similar to those seen following infection with avian tubercle bacilli, and cells stuffed with acid-fast bacilli gave a very characteristic appearance. Estimations of the numbers of bacilli gave no indication of multiplication, and the organisms disappeared after three to four passages in the chick embryo. The purpose of this study was to compare the behavior of various mycobacteria in the cells of the chick embryo, which has not developed species-specific resistance. Under these conditions the various types of tubercle bacilli have about the same relative virulence and toxicity as they do in the cells of tissue cultures derived from a variety of species. The hatched bird acquires the power of preventing multiplication of mammalian bacilli, and consequently the latter do not produce progressive disease or lesions. It may seem strange that the relative pathogenicity of avian and mammalian tubercle bacilli differs in the embryo and the hatched bird, but it appears that the response of tissue in the guinea-pig fetus may be different from that in the adult.

—SR. HILARY ROSS

MUDROW-REICHENEAU, L. Die Rattenlepra als chemotherapeutisches Testobjekt. [The value of rat leprosy in the evaluation of chemotherapeutics.] Ztschr. Tropenmed. u. Parasit. **6** (1955) 460-472.

For more than 20 years the author has used rat leprosy for the evaluation of chemotherapeutic substances. She describes the various techniques of experimental infection of the rat, mouse and golden hamster, and the manner in which various drugs are tested for their efficacy. The manner and rapidity of dissemination of the bacilli in the animal are largely independent of the mode of infection, and dissemination is not increased by hyaluronidase. She has tested more than 50 chaulmoogra derivatives, stilbamidine, diaminostilbene, pentamidine, thiosemicarbazones and isoniazid. Only the last showed a definite effect on rat leprosy, but even it was ineffective in golden hamsters; the mouse gave variable results, and finally only the rat was used. Apparently there exist greater differences between *M. leprae*, *M. tuberculosis* and *M. leprae murium* than has been previously assumed. The author's experience is contrary to the long-held opinion that rat leprosy is an important tool in the study of the effects of drugs for use in human leprosy. Domagk has also concluded that rat leprosy should be abandoned, and that only such drugs as have been found effective in tuberculosis should be used. The body-defense mechanism cannot be equally displayed in man and animal, especially when the animal is infected with enormous amounts of bacteria. Everyone interested in the matter of animal studies and chemotherapeutic evaluation will gain from reading this paper. —ERNST KEIL

NISHIMURA, S. and IWASA, K. Fundamental studies on the screening test of chemical agents for murine leprosy. Part I. On the strain, inoculated site and doses. La Lepro **24** (1955) 156-165 (in Japanese; English abstract p. 156).

It is desirable, for the screening test of chemical agents, to shorten the experi-

mental process and provide simple standards to judge results. The following experiments were carried out, in mice, to ascertain the strain of the murine bacillus, the inoculation site, and the dose which can satisfy those conditions. Regarding virulence, the Hawaii, Kumamoto, Keischicho and Fukuoka strains were compared by subcutaneous inoculation. Regarding inoculation sites, subcutaneous injection produces in an early period local lepromas which can be observed exactly. Intraperitoneal and intravenous injections give a rise to the disease in various organs after a long while. The organ of predilection cannot be found, and the results are shown by a bacillus-distribution index and not by a practical standard. Regarding inoculation dose, 0.2 cc. of 10^2-10^4 leproma suspension gives rise to lesions 2-3 months after subcutaneous inoculation. With more dilute suspensions the period is longer. By intraperitoneal injection, 0.5 cc. of a $50\times$ dilution produced the disease after 3-4 months. Three months after intravenous injection of 0.2 cc. of a 10^2 suspension there were visible changes in 30% of the viscera. It is concluded that experiments are best made in mice with the Hawaiian strain because its international status, by subcutaneous inoculation in the dose of 0.2 of a 10^2-10^4 suspension, development to be observed for 3 months.—[From abstract.]

NISHIMURA, S., MASUDA, T., HAYASHI, I. and SONODA, R. Studies on the treatment of leprosy. (Part 17.) La Lepro **24** (1955) 283-287 (In Japanese; English abstract p. 283).

Seven groups of 20 rats each with large lepromata were employed. Groups 1-3 were given INH (Hycozid, Takeda) in doses of 0.4, 4, and 40 mgm./kgm., respectively. Groups 4-6 received DDS (Hoshitomi) in doses of 1.5, 15, and 150 mgm./kgm., respectively. Group 7 remained untreated as the control. Both drugs were given by mouth, 6 days a week, for 150 days. The lepromata were examined at intervals of 30 days. The animals were autopsied and the weights of the lepromata and the distribution of the bacilli were determined. It was found that in severe murine leprosy, the smallest dose of INH given for 150 days was ineffective, but the larger doses were effective. In 4 of the animals that received the largest dose, the lepromatous granulations disappeared, although bacilli were found at the sites and in the lymph nodes. DDS was ineffective in any of the doses used. It appears that chemical agents are most effective when administered in the largest possible doses. —[From abstract.]

KAWAGUCHI, Y. The immunological correlation of tuberculosis to leprosy. Part 2. La Lepro **24** (1955) 288-294 (in Japanese; English abstract p. 288).

Slightly increased resistance against tuberculous infection in mice infected with murine leprosy bacilli has been observed. Mice inoculated with murine leprosy bacilli showed partial immunity of low grade against infection with virulent tubercle bacilli. This was manifested by inhibition of the growth of the tubercle bacilli in the organs in the early stage of the infection, although there was no difference between the survival times of treated mice and the controls. When mice severely infected after intraperitoneal inoculation with murine bacilli were infected with tubercle bacilli, the latter were slightly more abundant than in the controls in cultures made from the organs.—[From abstract.]