

ABSTRACTS

Factors Influencing the Transmission of Leprosy. J. A. KINNEAR BROWN, Trans. Royal Soc. of Trop. Med. and Hygiene, **53**, 2; 1959, pp. 179-189.

From his seven years of work in Uganda and more than 100 leprosy surveys the author studies the transmission of leprosy. He concludes that the influence of climate, density of population, and overcrowding have only a secondary importance, nor under natural conditions are the children the only ones to sustain the infection. The age of onset is determined by the opportunity for infection, and individual susceptibility decides the issue. The author thinks that leprous cases are not the only source of infection, nor always the most important. Susceptibility is a compound factor, and there is a genetic component. Susceptible individuals form a race within a race. The response of the host determines the form of his disease, and the picture resulting is not always clear-cut, though there are certain predominating patterns.

The Problem of Self-administration of Drugs, with Particular Reference to Pulmonary Tuberculosis. WALLACE FOX, Tubercle, **39**, 5, Oct. 1958, pp. 269-274.

Most of what this author says will be of interest and value to leprosy workers also. He studies the unreliability of long-term self-administration of drugs by the patient. He finds that there is even failure of perfect short-term administration, and failure in prophylactic administration of drugs. In the Tuberculosis Chemotherapy Centre, Madras, the author made check studies and found plenty of evidence of irregularity in dosage, or under-dosage. Apart from side-effects from the medicine, many patients seem incapable of establishing the new pattern of behaviour which is called for by the need to take a medicine regularly for a long period. Much research is needed to obviate the human obstacles to regular self-administration, if full and continuous observation is not to be retained over the actual administration of drugs for chronic diseases.

The Nodule in Onchocerciasis. M. S. ISRAEL. Trans. Royal Soc. of Trop. Med. and Hygiene, **53**, 2; March, 1959, pp. 142-147.

This article contains eight informative illustrations and studies the subcutaneous nodules in which coiled-up adult worms may be demonstrated amid a mass of chronic inflammatory tissue, occurring as a feature of human infestation with *Onchocerca volvulus*. (This condition leads to confusion with leprosy in endemic areas of both diseases). The author examined 70 subcutaneous nodules obtained from Kaduna, North Nigeria. The tissue reaction round the worm is diverse and non-specific, including some form of foamy cell and giant cell. There is a great tendency to degeneration of the worms and

liquefaction of the contents of the nodules. The basis of the nodules seems to be a gradual fibrous encapsulation of worms which have become lodged at junctions of lymphatic vessels in the subcutaneous tissues. This non-abscessing fibrous tumour takes about a year to form. The change which precipitates encapsulation seems to be one of degeneration and death of the worm: healthy worms lie freely in the subcutaneous tissues and nodules are formed in response to products of autolysis of dying worms. The more numerous nodules are associated with the final stage of regression of onchocerciasis, when there is a decreased concentration of microfilariae in the skin and the cornea.

Clinical Evaluation Studies in Lepromatous Leprosy: Third Series: Nicotinamide and BCG as Supplements to DDS. J. A. DOULL, J. N. RODRIGUEZ, A. R. DAVISON, J. G. TOLENTINO, and J. V. FERNANDEZ. *Internat. J. of Leprosy*, **26**, 3: July-Sept. 1958, pp. 219-235.

This reports on a further section of the results of the excellent co-operative effort carried out at two leprosaria in the Philippines and one in the Union of South Africa. Two major groups of patients at each leprosarium were treated respectively with DDS, and with DDS plus nicotinamide. Of each group the tuberculin-negative were ascertained and divided into two sub-groups, of which one was given BCG vaccination at least once. The other sub-group was left unvaccinated. No evidence was found that either supplementary therapy with nicotinamide or initial vaccination with BCG was advantageous. There was clinical and bacteriological improvement in all classes of patients, but those treated only with DDS showed about the same progress as the others. Only six out of 434 patients developed lepromin reactivity of the Mitsuda type. Erythema nodosum leprosum occurred equally frequently in the two chief groups; it was not evoked by BCG vaccination, and was not associated with either clinical or bacteriological improvement, nor with reactivity to PPD.

Consideraciones Patogenicas acerca de los Momentos de Origen de la Enfermedad de Hansen. (Pathogenesis of the Early Stages of Leprosy). G. TARABINI and J. TERCENIO. *Revista de Leprologia*, Fontilles, **4**, 5, 1958, pp. 345-353.

The authors point out the importance of the activity of the suprarenal glands before or during the initial stage of leprosy, which occurs more frequently among young children. In young children, the suprarenals are small, and at about 12 years of age they reach again their former size which they had at the sixth month of intra-uterine life. The tendency to spontaneous healing of leprosy in children may have some relation to the physiological increase in activity of the suprarenals. At the other end of life, cases have been reported of middle aged persons who develop leprosy after extreme

psychological or physical suffering. This suggests that the appropriate hormonal treatment might be of value in checking the disease particularly in the early, but perhaps also in cases of late onset.

Ideas sobre la Inmunoalergia Hanseniana (Ideas on Leprosy Immunity and Allergy) G. TARABINI, *Revista de Leprología, Fontilles*, 4, 5; 1958, pp. 355-362.

The author suggests certain ideas for experimental and statistical study. The mesenchyme is the basis for the development of immunoallergy in the leprosy patient, which in itself gives rise to the individual diathesis of the patient in relation to leprosy.

Among the mesenchyme components of particular interest are the following: (a) the reticulocyte which turns into foamy cell or epithelioid cell and (b) the basic tissue substance which may give more or less resistance against the enzymes which modify its permeability. The antigens produced by *M. leprae* that act on this basic substance are (a) the proteic antigens which produce antiproteic antibodies in the serum, and the early lepromin reaction in the skin, and (b) the lipid antigens producing anti-lipoid antibodies in the serum, and the late lepromin reaction in the skin. The positive skin tests indicate the capacity of tissues to check the spread of antigens, whereas the serum antibodies indicate the amount of antigens which exist in each individual as a whole. BCG vaccination probably favours the development of allergy, probably acting through the neuro-endocrine system, giving it a tendency to produce the epithelioid rather than the foamy cell. The antiphagocytic power of the mesenchyme is expressed best in the late lepromin reaction, which has more importance than the early, because it expresses the power to limit the development of the bacillus by antagonism towards its lipoids.

La Triamcinolona en el Tratamiento de las Leprorreacciones (Triamcinolone in the Treatment of Lepra Reactions). G. TARABINI and V. HERNANDEZ. *Revista de Leprología, Fontilles*, 4, 6; 1958, pp. 481-488.

The authors tried triamcinolone (Triamcinalone) in lepra reactions in four female patients and found a marked action on the temperature and hepatic function disturbances, and a rapid improvement of the skin manifestations. There was a marked water depletion and a fall of arterial pressure without serious consequences, and a good gastric tolerance. The lack of gastric upsets was quite notable.

Symposium on Tuberculosis and Leprosy: On the Immunological Relations. S. W. A. KUPER. *Transactions of NAPT Commonwealth Chest Conference, London, 1958*, pp. 67-71.

He found in a study by meticulous techniques in patients in South Africa that there was no significant correlation between

lepromin and tuberculin sensitivity in healthy subjects nor in patients with leprosy of the two main types. But tuberculous subjects showed a strong positive correlation: high tuberculin sensitivity was frequently associated with raised lepromin sensitivity.

The experiment was later amplified to include many antigens. Again the leprosy subjects showed no correlation, but the wider results showed some relationship between lepromin and tuberculin sensitivity, but not a simple and direct one, so a study of the *histology of the reactions* was introduced in the hope of clarifying the picture. *Firstly* biopsies of the lepromin reaction at four weeks were made in 150 leprosy patients. In lepromatous leprosy the reaction consists of a widespread infiltration by active eosinophilic histiocytes, which accumulate round the sweat glands and permeate the neurovascular connective-tissue bundles and subpapillary plexus; there are no lymphocytes. In tuberculoid leprosy the cellular infiltration is largely lymphocytic; the histiocytes present tend to be vacuolated and to occur mainly near the centre of the inflammatory reaction; there may be tubercles and giant cells. Borderline leprosy shows a reaction intermediate between two extremes, usually with intensely vacuolated histiocytic accumulations, infiltrated by lymphocytes. *Secondly*, a study was made of the influence of BCG vaccine on the tuberculin. There were 30 lepromatous, eight tuberculoid, and 15 healthy subjects. Pre- and post-BCG reactions to lepromin were excised from each. Nearly three-quarters of the lepromatous showed a definite increase in lymphocytes, often accompanied by vacuolation of the histiocytes, and sometimes even tubercles and giant cells were seen. The effect of BCG vaccination on the histological reaction to lepromin is to stimulate a lymphocytic response in many patients with lepromatous leprosy. It would be of value to conduct a trial to assess the value of BCG injected repeatedly at intervals, as an ancillary to chemotherapy of lepromatous leprosy.

Lepra Infantil: Estudio de un Caso Tuberculoide. (Child Leprosy: Study of a Tuberculoid Case). A. SAUL. *Dermatologia, Revista Mexicana*, 2, 1-4: December, 1958, pp. 45-55.

With two clinical and two histological photographs the author reports the case of a girl of 3½ years who acquired tuberculoid leprosy by living for over one year in the same house as an adult who was lepromatous. The child developed three reddish-violet infiltrated plaques on the right side of the face. The Mitsuda reaction was positive. Histologically there was a tuberculoid granuloma with giant cells, and epithelioid cells and lymphocytes. The case was considered to be spontaneously curable, and no treatment was given. The lesions slowly decreased, becoming more and more pale, especially in the centre, and at the end of six months could scarcely be distinguished, except for a yellowish pink colour in the site of the

lesions and some fine wrinkles ("cigarette paper"). The author reflects on leprosy in childhood and points out its importance for study.

El Problema Social en el Enfermo de Lepra. (The Social Problem in the Leprosy Patient). SOR CATALINA MONTOJO: *Dermatologia; Revista Mexicana*: 2, 1-4: December, 1958, pp. 73-77.

Sister Catalina describes well the importance of the social problems of the leprosy patient, and the present humane and helpful approach in Mexico. The Social Service works well with the doctors, and time is given to a new patient to listen to his troubles and to establish confidence and sympathy even before he is subjected to the routine medical examination. After he is enrolled, methods of repressive institutional segregation are not applied, and he may be allowed to stay at home. His family and relations are also interviewed. The author cites an illustrative case of a patient of 42 years, a man of middle class who was in a state of great depression by remarks made to him by the doctor about the "high contagiousity" of his disease and the danger to his family. His alarm was dissipated at the first interview by the social worker, who gained his confidence by a sympathetic listening to his worries, and who explained the error in the idea of excessive contagion, and explained that he could even stay in his own home and be treated. The co-operation of this patient was thus assured by "a less scientific medicine but one very humane". This patient will continue his normal life while progressing towards cure, and his contacts would be supervised in the same humane manner.

The Treatment of Leprosy with the Preparation Diphenylthiourea (Ciba 1906): Interim Report. J. M. M. FERNANDEZ, *et al.* *Leprologia*, 3, 1, Jan.-June, 1958, pp. 86-87.

The authors report their experience in the treatment of leprosy using Ciba 1906, one of the derivatives of diphenylthiourea. They began the experiment in March, 1957, in two groups of patients, the first without any previous treatment, and the second with previous treatment with DDS or its derivatives. First of all a detailed study was made of the patients clinically and in the laboratory. There were 20 cases altogether of whom eight had not had previous treatment and 12 had received sulphones. Of the eight in the first group, seven were lepromatous and one reactional tuberculoid. The 12 patients who had had previous treatment with sulphones all belonged to the lepromatous type, and most of them intolerant to the sulphones. The dosage was based on the advice of Davey, and the treatment began with a dose of 1 gm. daily, increasing by $\frac{1}{2}$ gm. every 15 days to as to reach in some cases the maximum daily dose of 3 gm. In general tolerance was very good. There were no important

complications, except for two cases who had lepra reaction. There were no blood changes of any importance. The group of patients who had no previous treatment showed the most definite signs of the therapeutic activity of the drug. The clinical improvement which took place comprised flattening and re-absorption of the lepromas, disinfiltration of the lepromatous plaques, and partial or total regression of the macules. Bacteriologically there were changes in the morphology of the bacilli, in the shape of a more or less marked granulation. Changes in staining and in number of the bacilli were small.

The most favourable changes showed in the histopathology. There was a marked vacuolisation of the lepromatous lesions; fusion of the intracellular vacuoles with an increase in their size; fusion of the vacuoles of several cells, with the appearance of giant vacuoles, giving the appearance of Gruyere cheese. In some cases there were giant cells. There was a decrease in the density of the infiltrate giving the appearance of an old leproma. In general the histological changes were much as one would expect, in the lesions of patients given sulphone therapy.

The authors think that this new drug should be taken into account in the treatment of leprosy, because of the favourable results they have obtained, especially clinically, histopathologically, and because of its low toxicity. They are continuing with the study of nine cases.

Preliminary Report on DPT in the Treatment of Leprosy. N. MUKHERJEE and S. GHOSH. Bull. of the Calcutta Sch. of Trop. Med. 6, 4; October, 1958, p. 166.

The authors divided 25 cases into two groups at random and treated 13 patients with DPT with a dose varying between 125 and 1,000 mgm. per day by mouth. The control group were given ten to 100 mgm. DDS per day. There was no toxic effect, but it was not superior to DDS in producing bacteriological improvement. (ROSS INNES and DAVEY used doses of DPT in the region of 2 or even 3 g. per day, and in divided doses throughout the day. In a personal communication, G. A. ELLARD, biochemist at the East Africa Leprosy Research Centre, has reported that it is important for the absorption and action of DPT that the total daily dose be given in spaced intervals throughout the day, at least three times. EDITOR.)

A Further Inquiry into the Leprosy-Tuberculosis Relationship. G. MURRAY SHORT. East African Med. J. 36, 6: June, 1959, pp. 298-304.

The author discusses this relationship. Specific tuberculin sensitivity is produced by tuberculin infection and by BCG; non-specific sensitivity is produced by an agent as yet unknown, possibly leprosy infection; and is produced transiently by lepromin. Lepromin

sensitivity is produced by leprosy infection, but not consistently; it can be produced by tuberculous infection, either the natural infection or BCG; and by lepromin. He considers it especially important that no future mass BCG campaign should be carried out without the active co-operation of the leprologists. The leprosy and tubercle bacilli are both antigenic and allergenic. The former is the weaker agent, producing an inconstant lepromin conversion and no specific tuberculin conversion. Lepromatous leprosy forms the reservoir of leprosy infection and it is precisely in this type that the persistently negative lepromin reactors occur. The tubercle bacillus is the stronger agent, producing both tuberculin and lepromin conversion and in greater number. It may be possible to utilize a benign tuberculous infection, fortified perhaps by other acid-fast bacilli to the same end. There would then be a strong argument for the wide use of BCG in tropical countries, as a weapon against both tuberculosis and leprosy.

Trends in Leprosy in the Pacific. D. A. LONIE. 1959 Technical Information Circular No. 32, South Pacific Commission, Noumea, New Caledonia.

This account of the introduction and spread of leprosy in the Pacific represents a thesis presented by Dr. Lonie to the University of New Zealand. It gives a useful summary of the known history of the disease in the area and of its current prevalence. The areas dealt with are Polynesia, Micronesia, and Melanesia. The prevalence rate per 1000 population seems to run from 1 to 60. The history of the introduction of leprosy in many of the islands is comparatively recent. In Nauru it was in 1911 or 1912 and an epidemic followed. In the Solomons the survey of INNES in 1938 and RODRIGUEZ showed respectively a prevalence rate of 10.2 and 11 per 1000, and a lepromatous rate of 16.7% and 18.5%. In Netherlands New Guinea the prevalence rate varies greatly from area to area but seems to be generally high (46, 66, and 75 per 1000). Introduction of leprosy into the Pacific islands is usually ascribed to the immigration of Chinese, and from island to island by indigenous carriers in some cases. The slow rise of prevalence is the usual course of the endemic, though there are instances of the endemic state with epidemic periods, as in two places in French Polynesia, where epidemic spread occurred a quarter of a century after first introduction. Some high lepromatous rates are recorded, e.g., 64% in Western Samoa and 57% in the Gilbert and Ellice Islands.

Reaccion Leprosa. (The Lepra Reaction). A. J. MELAMED, *Medicina Panamericana*, **126**, 3-4, February, 1959, Buenos Aires, pp. 55-73.

The author was awarded the Prize of the Leprosy Association

of the Argentine Republic for his work, as the best work on leprosy published in 1957-58. He reviews previous work by many authors and deduces a body of evidence for the existence in every case of leprotic reaction of acute and subacute inflammatory phenomena, and that it is possible to explain the reactive state as an acute inflammation of the leprotic focus. This is bound up with physio-chemical alterations in arterioles and minor blood vessels. He thinks that neurological disturbances in leprosy set going the abnormal vascular reactions and changes in permeability. All elements of the local connective tissue also are affected. The inflammation may go on to necrosis and be the primitive and only manifestations in mild cases, whereas in severe cases they are only two steps in a long process of changes. The major factors which induce lepra reactions are neurogenic vascular ataxia, permeability disturbances in the connective tissue matrix (with capillary permeability, precipitation of colloid, and anoxia), auto-immune antibody variations, anti-inflammatory hormone changes due to stress, dysproteinaemia and especially hypoalbuminaemia. Therapy needs to be directed along these lines.

Present Status of Sulfone Therapy at Nagashima Aiseien. S.

TAKASHIMA. Nagashima Archives of Leprosy, **3**, 7, 1959, p. 1-11.

Most patients at Nagashima have been receiving sulphone therapy since 1949. The total number of patients admitted since 1930 is 1,753. On 367 patients reviewed in 1958, compared with 53 previously assessed by Doull in 1952, the author found that 75.2 were improved, compared with 24.5% in the earlier group. The influence of sulphones on the cutaneous lesions was also good; with remarkable results on mucous membrane lesions. A few cases failed to respond to the long term use of the sulphones, and for these it is proposed to use DPT which already has a good reputation, and the antibiotic Kanamycin. Between 1952 and 1958 the bacillary index has become five times less, but negative cases are few. Histology has shown a parallel improvement in most cases. With the lepromin test there was noted a paradoxical increase in negative cases over two years in one group but over a longer period there was a decrease in negative cases. Lepra reactions were troublesome in many, but not enough to spoil the therapy by sulphones. Sulphones seem of little effect in nerve symptoms and in secondary lesions.

*Skin Reaction in Leprosy with Antigens Prepared from Kedrowsky and Takeuchi Strains of Acidfast Bacilli Isolated from Human Leproma by Chatterjee-Bose Method. S. SATO, M. FUKUDA and M. TAKEDA. Science Reports of the Research Institutes of Tohoku University, **8**, 4; March, 1959, pp. 379-387.*

The authors applied the new antigen of Chatterjee-Bose in skin

tests on 155 leprosy patients and compared the results with those obtained from the Mitsuda, Dharmendra and Takeuchi antigens. They found the new antigen very promising.

A New Method of Detecting Leprosy Bacilli in the Circulating Blood:

A. A. SHTEIN and L. M. TUTKEVICH. Abstracts of Soviet Medicine, **2**, 2; 1958, pp. 178-179, para. 409: from *Sovremennye Voprosy Dermatologii*, Kiev, 1957, pp. 184-186.

In order to detect leprosy bacilli in the circulating blood the authors prepared a "large drop" from the blood of the patients, diluted with distilled water and stained by Poorman's method, without previous fixation. The preparations were stained for 1 minute with carbolfuchsin, washed with water, stained anew with 1% alcohol solution of methylene blue for 20 secs., washed anew with water and dried in the air. In addition to "large drops", blood smears from a vein and also smears from the tissue fluid of the skin in the ulnar flexure were prepared as a control. Single bacilli were observed in the smears; in the tissue fluid of the ulnar flexure, *M. leprae* were not found. Working on the "large drop" method the authors detected lepra bacilli in 115 out of 226 specimens prepared from the blood of 59 patients with lepromatous (nodular) type of leprosy (50.8%). The results obtained testify, according to the authors, to the presence of bacillaemia in patients with leprosy.

Relapse of Leprosy in American Samoa. R. B. PRICE. Amer. J. of Trop. Med. and Hygiene, **8**, 3: May, 1959, pp. 358-363.

The author has conducted a general survey of leprosy in American Samoa, which has a population of 20,154. The disease has been thought to have been introduced by Chinese coolies in the 19th century. The incidence of leprosy is 5.3 per thousand, with 24 open cases. He found that lepromatous leprosy shows a strong tendency to relapse (25% of cases) when sulphone therapy is discontinued, even after five years of such therapy. Tuberculoid leprosy tends to undergo arrest of activity, even when the chemotherapy has been of brief duration and long since discontinued. The importance of follow-up of patients is very great.

Caso Impressionante da Ineficacia das Sulfonas na Lepra. (An Impressive Case of the Ineffectiveness of the Sulfones in Leprosy).

H. C. DE SOUZA-ARAÚJO. Revista Brasileira de Medicina, **15**, 12, December, 1958, pp. 827-828.

The author reports the history of a male patient first seen by him at 20 years of age who presented as a tuberculoid leprosy in 1942. In 1945 he became lepromatous. He was treated from the beginning with intravenous Promine, and was also given Lyosulphone. After 11 years of this he still continues bacilliferous in the skin and nasal

mucosa, after 11 litres of Promine and Lyosulphone and more than 4.5 kg. of DDS.

Effect of Roentgen Rays on M. Leprae. S. GHOSH, S. P. BASU and N. MUKERJEE, *Leprosy in India*, **30**, 3; July, 1958, pp. 150–153.

Mukerjee in 1957 had observed beading or disintegration of leprosy bacilli when excised lepromatous tissue was subjected to prolonged irradiation with moderate doses (63r to 85r). The present authors extended the experiment to use different doses for varying periods, and also applied them to smears from the tissues. No detectable change was found in the morphology or staining character, nor decrease in the number of bacilli.

BCG Vaccination by Multiple Puncture. A. H. GRIFFITH. *The Lancet*, **1**, No. 7084, 6 June, 1959, pp. 1170–1172.

The author carried out two trials in Cardiff and Pembrokeshire to compare the allergenic effects of BCG by the multiple puncture method with BCG by the intradermal route. With the former the conversion rate was only 83% after using BCG suspension 50 mg. per ml. and 20 needles penetrating 3 mm. into the skin, compared with 100% using intradermal vaccination with freeze-dried and liquid fresh vaccines. In the trial at Cardiff the conversion was 93% by multipuncture of freeze-dried BCG 20 mg. per ml. with 20 needles, and a penetration of 2 mm.; it was 93% at the end of 8 to 12 weeks, 94% at the end of a year, and 85% at the end of two years.

The author therefore points out that the multipuncture method of BCG vaccination can be effective under some conditions and unsatisfactory under others. A significant difference existed between the multiple puncture methods used in these two trials, and the nature of this difference requires to be established in order to develop a reliable effective method of BCG vaccination. The general use of multiple puncture BCG vaccination should be delayed until the method has been improved and standardized.

Clinical and Immunological Examination of the Staff and their Family Members from a Leprosy Hospital. S. SCHUJMAN, C. K. LI, C. T. LIANG, T. C. HSU, Y. C. HO, M. W. TSANG and C. L. CHENG, *Chinese Medical Journal*; **78**, 1: January, 1959, p. 18.

The Sinchow Leprosy Hospital has 1000 patients. Staff members and their families live at 500 m. distance from the hospital. Clinical examination was given to 130 out of 135 staff members and their families and no one had leprosy manifestations. The lepromin test was applied to all, and the Mitsuda was found positive in all, and in 62% the Fernandez reaction was positive. The tuberculin test was found positive in 37%. There was no important difference in the reactivity to lepromin between the medical and administrative

staffs, nor between the staff as a whole and their families. Because most of them have been living there less than five years, this examination will be repeated periodically.

The Value of the Lepromin Test in the Classification of Leprosy.

S. SCHUJMAN and colleagues, Chinese Medical J., **78**, 1: January, 1959, pp. 19-21.

Schujman has apparently introduced the use of the lepromin test at the Sinchow Leprosy Hospital. On 81 patients there he demonstrated the value of the lepromin test in classification of cases, particularly of "pure neural" leprosy, wherein their position on the lepromatous or tuberculoid side was made clear.

Production of Immune Reactions by Electro-acupuncture and Simple Acupuncture. CH'EN K'O-CH'IN, National Medical J. of China,

44, 12, 1958, p. 1173 (Abstract in Chinese Med. J., **78**, 2; February, 1959, p. 183).

The revival of acupuncture in present-day Chinese medicine, wherein "t'u" or native medical methods are increasingly being brought in to aid "yang" or foreign, and wherein many diseases are being treated by acupuncture, even leprosy, makes any explanation of the rationale of acupuncture of interest. This author states that acupuncture elicits reactions of excitation and inhibition, and enhances the phagocytosis by leucocytes, especially of neutrophils. He carried out experiments to try to produce immune reactions. *In the first experiment* 34 healthy rabbits were divided into three groups. The first group contained 16 rabbits which had two fine steel needles inserted into the nerve on the median side of each foreleg. In addition, pulsating electric current of 0.02 m.a. at 0.15 to 0.3 v. with frequency of 50 c/s. was passed through these needles. The second group of 11 rabbits had the needles inserted but electric current was not passed through. The third group of seven rabbits were kept as controls. The rabbits were all immunized with *B. pertussis* in a preparation of 5 thousand million per ml., being given at five day intervals, 0.5 ml. subcutaneously and 1 and 2 ml. intravenously. After each injection, simple acupuncture or electro-acupuncture was applied for 30 minutes daily for three consecutive days. The author says "antibody responses were conspicuously increased by electro-acupuncture and simple acupuncture stimulations, especially the former". *In the second experiment* 24 healthy dogs were used. The first group of ten dogs were given electro-acupuncture, the second group of seven dogs were given simple acupuncture, and the third group of seven dogs were kept as controls. The nerves used were the median nerve of the right foreleg and sciatic nerve of the left hindleg. The frequency was 150 to 1000 kc. "The results showed that the serum complement responses were increased in the stimulated animals."

An Electron Microscope Study of the Disposition and Fine Structure of M. lepraemurium in Mouse Spleen. G. B. CHAPMAN, J. H. HANKS, and J. H. WALLACE, *Journal of Bact.*, **77**, 2: February, 1959, pp. 205–211: 11 illustrations, 16 references.

These authors studied ultrathin sections of mouse spleen infected with *M. lepraemurium*, embedded in methacrylate. The bacteria were found separated from the cytoplasm of the host by a membrane which enclosed a capsule or space apparently deriving from the host cytoplasm. The space is occupied by a finely granular material which may be bacterial product. The cell walls of the bacteria are about 150 Å thick and may be closely apposed to the cytoplasmic membrane or separated from it by a narrow shrinkage space. Low density areas have been noted in the bacteria. These sometimes show granular threads of denser material, and are thought to be the nuclear apparatus. Many sectioned bacteria showed inclusions containing numerous spherical particles. They are thought to be the mitochondria. Besides the low density areas thought to be nuclear, an occasional different low density inclusion was observed. Several bacteria were noted which had just completed cellular division.

The Problem of Leprosy. KHUSHDEVA SINGH. The Licentiate, Ambala, India, **8**, 11: February, 1959, pp. 359–364.

Dr. Singh gives a balanced description of leprosy as understood today and outlines the problem in India. The early work in leprosy in India was done by BELRA (now succeeded by Hind Kusht Nivaran Sangh) and the Mission to Lepers, and individual Mission, and in recent years their work has been augmented by the Gandhi Memorial Leprosy Foundation, WHO, The Belgian Leprosy Foundation, and the Government itself. The Government has launched the National Leprosy Control Programme and in its second Five-Year Plan proposes to spend Rupees 52,900,000 (£3,967,500) on pilot control projects, upgrading of leprosaria and clinics, training of doctors and ancillary workers, and mass treatment schemes including domiciliary treatment. It is estimated that there are at least 1,500,000 leprosy sufferers in India. There are 200 institutions, with a total accommodation of 23,000 patients. There are 1,300 clinics dealing with 200,000 patients. Altogether, only about 10% of leprosy patients are receiving care, a little over 1% as inpatients and the rest as outpatients. Dr. Singh points out that the disease is preventable and nowadays is eradicable, and appeals for the co-operation of the people themselves and all men of good will.

(On page 668 of the same journal, it is reported that Dr. Singh had collected funds for leprosy work in the streets of Patiala and obtained Rs. 6000 (£450) with which he proposes to begin a leprosy centre in Patiala.)

Prophylactic Value of BCG Vaccination against Leprosy: A Preliminary Report. K. R. CHATTERJEE, P. SOUCOU, and M. SAINTE-ROSE. Bull. of the Sch. of Trop. Med. Calcutta: **6**, 4: October, 1958, pp. 164-166.

The authors studied leprosy endemic areas in Pondicherry where BCG vaccinations had been given in 1953, comparing them with populations in the same region which had not received BCG. Children were grouped comparably, as to social status and degree of contact. It was found that the incidence of leprosy in children who did not receive BCG was 20 times greater than in the vaccinated. Not a single case of lepromatous leprosy developed among the vaccinated children. The authors conclude that the protective action of BCG against leprosy is considerable. This is the first report from India.

Reactivity of a Lecithin-Free Cardioliipin Preparation (Cardchol) in Leprosy Sera. H. SCHMIDT. Bull. Wld. Health Org. 1959, **20**, pp. 1175-1191.

He had previously found that a mixture of cardioliipin and cholesterol in absolute ethanol, named "cardchol", is usable as an antigen in complement fixation tests. He compared the activity of an ordinary cardioliipin antigen (CWRM) with cardchol and found that the reactivity of cardchol was especially pronounced in sera from false positive reactors. Sera from leprosy patients were found to be highly reactive with cardchol but non-reactive or faintly reactive with CWRM, and this was fully confirmed in a second and larger series. The highest reactivity occurred in lepromatous patients, particularly in those with leprosy of short duration. Electrophoretic studies showed that the substances reacting with cardchol were in the gamma-globulin or gama-and-beta-globulin serum fractions.

Isoniazid Neuropathies in Malnourished Tuberculous Patients. G. L. MONEY. J. of Trop. Med. and Hyg.: August, 1959, **62**, 8, pp. 198-202.

The author studied 84 tuberculosis patients in Ibadan, Western Nigeria, and found an incidence of polyneuropathy and burning feet in 16 on an isoniazid dosage level of 4 to 6 mg./kg. daily. The neuropathies found included a painful feet syndrome, pains and paraesthesiae in the feet and legs with patchy superficial sensory defects and a small amount of motor weakness. There was some evidence of myelopathy and encephalopathy, and there seems some relation to a pre-existing malnutrition. He recommends the routine use of cheap Vitamin B supplements (yeast) in treatment and prophylaxis.