EDITORIAL

I. Symposium on Leprosy Research, London, 20th June, 1960

Through the courtesy and cooperation of the International Academy of Pathology, Dr. R. J. W. Rees of the Acid-Fast Club of London was able to organise a Symposium on Leprosy Research in the Royal College of Surgeons, London. This occupied the whole of the day, was very well attended and yielded a fine crop of interesting papers and discussions. Dr. C. H. Binford kindly acted as Chairman of the morning session and Dr. P. D'Arcy Hart of the afternoon session. Excellent demonstrations were on view, namely, "Suggested Pattern of the Evolution of Leprosy", by R. G. Cochrane, London; "The Inoculation of *M. leprae* into the Golden Hamster", by C. H. Binford, Washington; "Histology of Peripheral Nerves in Leprosy", by D. G. Jamison and Elisabeth Palmer, Oxford; "Growth of M. lepraemurium in Macrophage Cultures", by Y. T. Chang, Bethesda. In the evening members of the Acid-Fast Club and visitors had an enjoyable dinner together in a London hotel. The whole day was a red-letter one, and all leprosy workers will be grateful for the alertness of the Acid-Fast Club to seize this opportunity, and for what they made of it.

1. Dr. R. Chaussinand of the Institut Pasteur of Paris gave the first paper on "Quelques Indications Théoriques et Pratiques Resultant de nos 28 Années de Recherches sur la Lèpre (Some Theoretical and Practical Ideas Arising from our 28 Years of Research into Leprosy). In some preliminary remarks he drew attention to the difficulty of first class research being done in remote leprosy research centres and of the value of liaison with central leprosy research centres, and of the necessity for WHO to take a practical interest in fostering leprosy research. In his paper, which was read in English by Dr. Rees, he described his studies in the morphology and grouping of M. leprae, showing that there existed normal, involuted, divided, and degenerate bacilli, and that there was a difference between a mass of bacilli and a globus. The globus in practice belongs only to lepromatous, prelepromatous and borderline leprosy. Morphological data are often neglected by leprologists but still remain important in the evaluation of the infection. He drew attention, in staining the bacillus, to the value of Sudan Black, which he has used for a long time and reported on as valuable in distinguishing mycobacteria from each other. Because *M. leprae* does not stain with Sudan Black, for some years the author has been searching in vain for a cultivable acid-alcohol-fast mycobacterium which does not stain with Sudan Black. Since 1932 Chaussinand has made repeated attempts at culture, without success. The basic problem is that of finding suitable culture media. In animal inoculations he obtained best results with the guinea pig and the monkey by grafting of leproma. A localised

leprotic infection was induced, but it died out. There was some success in transferring the infection from an infected guinea pig to a healthy one, but this infection also died out. Intraperitoneal inoculations of *M. leprae* to the rainbow perch (Eupomotis gibbosus) resulted in dissemination in the body and persistence in the liver and spleen for more than three-and-a-half years. There were some cases of death of the fish from bacillary embolism, which never occurred when the Stefansky bacillus was inoculated. The latter bacillus could keep its virulence for more than three-and-a-half years and infect the white rat when inoculated from the rainbow perch. Perhaps experiments with other cold blooded animals should now be tried. In his work on lepromin he found Wade's method the best. He made a standardised lepromin using the same technique each time and nodular material from different sources. Dilution to 1/50 turned out to be practical. In immunity he points out the influence of M. tuberculosis and vaccination and revaccination with BCG. The hypothetical natural "N factor" of Rothberg does not seem real, as it smacks of "predestination" applied to the evolution of the leprosy infection.

2. Dr. H. W. Wade, of Culion, Philippines, expounded his concept of the Histoid Leproma. Dr. Wade gives the name "histoid" to a variety of leproma, of which one peculiarity is its histological resemblance to an organised tissue which might be called fibromatoid, originating in connective tissue. The lepra cells tend to elongate more or less and to line up in rows separated by reticular or collagen fibres or both. This element is delicate and inconspicuous in young active lesions or parts of them, tending to distinct fibrosis as it stains deeper. The other peculiarity of histoid leproma is an absence of globus formation, because the lepra cells fail to produce the gloeal matrix. In the active lesions the cells contain large numbers of bacilli but do not vacuolize. There are some exceptions, rarely, where limited areas of a lesion show globi or vacuolated cells of xanthoma type, and there has been the rare finding of distinct tuberculoid foci inside the mass of a histoid lesion. The *third peculiarity* of histoid lesions is the tendency to enlarge by expansion from within rather than by infiltrating peripherally, a thing which typically ends up in producing well-defined intradermal or infradermal nodular masses. These may ulcerate and cause deformities. Areas within a given nodule vary greatly, and there is a tendency to small scale "reactions" in the nodules, leading to focal softening and sometimes small abscesses. Cases with histoid lesions cannot be identified clinically with certainty, but patients with especially prominent and sharply defined cutaneous nodules, and with persistent subcutaneous nodules, are likely cases for histoid lesions. Such cases seem liable to fail to respond to treatment. Nonnodular histoid lesions probably occur fairly commonly, but histopathologists do not recognise them as distinctive, and it is not known

whether such cases differ in later evolution and prognosis from patients with classical lepromas. There has been one complex borderline case, in which the diphasic lesions showed a lepromatous element which was non-nodular histoid. The histoid condition is worthy of study, correlating the clinical aspects with the histological. 3. Dr. V. Møller Christensen of Roskilde, Denmark, with many informative slides described Osseous Changes in Mediaeval Leprosy as studied in 92 complete skeletons from the mediaeval graveyard of St. George's Court in Naestved in Denmark, dating from 1250 to 1550 A.D. Traces of pathological changes typical of leprosy were found in these, viz: 94.5% had inflammatory changes in the nasal cavity and 82% had deformities of the hands and feet. There were also 111 skulls found separately in the graveyards which showed the same pathological changes. That makes 198 skulls which showed the signs of inflammation in the nasal cavity, the predominating being atrophy of the anterior nasal spine in 75.5%, central atrophy of the alveolar process of the maxilla in 67.1%, and increased bone in the orbit in 63.6%. The heavy incidence of chronic inflammation of the nasal cavity may have been a feature of mediaeval leprosy, and perhaps there may have been a causal connection but in modern leprosy, atrophy of the anterior nasal spine and atrophy of the maxillary alveolar process still remain common.

4. Drs. D. G. Jamison and Elisabeth Palmer of Oxford described The Histological Changes in Leprosy and Their Modification by Treatment. With illustrative slides they first described the histology of the three main types of leprosy as found in Northern Nigeria. The anaesthetic tuberculoid lesion showed absence of nerve fibres and of bacilli, and the presence of the typical granulomatous infiltrate with giant cells, epithelioid cells, and lymphocytes. In a silver-impregnated section of skin there were completely denervated hair follicles and no staining of other nerve fibres, considerable destruction of nerve fibres in the bundle running to a lesion, an infiltrate within the epineural sheath similar to that in the skin. In the lepromatous lesion the infiltrate has a large number of bacilli and the silver section shows the cutaneous nerve bundle with little reduction in the number of axons but an increased argyrophilia, and regeneration as well as degeneration of axons. In *dimorphous lesions* there is a mixed picture. For study of the effects of treatment material was taken from patients by using a 2 mm. biopsy punch, after infiltrating the skin with 2 ml. of procaine to which 1 ampoule of Hyaluronidase had been added. Each specimen was stained with haemotoxylin-eosin to show the general histological picture, with a combination of haematoxylin and the Fite-Faraco method to show up the bacilli, and with Schofield's modification of Bielschowsky method to show innervation. Also, serial silver-impregnated sections were counterstained by the Fite-Faraco method to show the relationship between bacilli and nerve fibres. The treatments given in the cases studied were DDS in Katsina outpatient centres, and in the Katsina Leprosarium, Etisul inunctions. The biopsies showed progressive reduction of infiltrate, often in advance of clinical signs of improvement, as well as a progressive decline in the number of bacilli in the skin. Bacilli were still to be found in the Schwann cells of peripheral nerves after 18 months of DDS therapy, although by that time they had disappeared from the skin.

As Etisul is a new drug under trial, more details are given.

(a) Four cases under Etisul for 9 months (inunction of 2 tubes a week). Of these the first case was dimorphous, a boy of 8 years, who was in a state of reaction to DDS, and this treatment was stopped when Etisul was begun. A biopsy taken before Etisul shows sections with dimorphous infiltrate. Biopsy from the same case after 9 months of Etisul shows a marked reduction in perivascular infiltrate, and a greater number of fibrocytes is seen in the infiltrate.

The second case was a child with 2 tuberculoid patches, who when first seen had signs of DDS reaction. After 9 months of twice weekly inunction of Etisul the histology shows less density in the tuberculoid infiltrate, epithelioid cells are fewer, and there is increased fibrosis at the edges.

The third case was a girl of 5 years with multiple dimorphous macules, and a state of reaction after 6 weeks of DDS administration. After 9 months of Etisul twice weekly the histology shows some improvement and acid-fast bacilli seem to have disappeared, though there were some in the first biopsy.

The fourth case was very advanced lepromatous, untreated. Here biopsy sections after 9 months of Etisul show almost complete disappearance of bacilli (the skin of the back).

(b) Daily application of Etisul was tried in lepromatous patients for 3 weeks. They had received very little previous treatment with DDS. Dr. Dreisbach kindly assisted in the selection of suitable patients, and provided laboratory space.

The first case showed, after 3 weeks of Etisul daily, a dramatic reduction in the density of the infiltrate and a complete disappearance of bacilli from the infiltrate. However in a section silver-impregnated and counterstained for bacilli, unaltered bacilli were seen in close relationship to the cutaneous nerve fibres, actually lying within the Schwann cell cytoplasm. In that same section some granular bacilli faintly stained were to be seen in the surrounding connective tissue.

The second lepromatous case also after 3 weeks of daily Etisul shows a great eradication of bacilli, and again the cutaneous nerve bundle shows acid-fast bacilli of normal appearance lying close to the axon.

The biopsies were taken from the scapular region before and after treatment in adjacent sites.

5. Dr. G. R. F. Hilson of London gave a paper on Immunological Studies in M. lepraemurium Infections in Rats. He investigated the immunological relationship between BCG and M lepraemurium by injecting white rats with various combinations of living and heat-killed BCG and M. lepraemurium suspensions. A subsequent intratesticular injection of living M. lepraemurium was given (usually 8 weeks later) to test the effect of the primary inoculation, and any multiplication of the challenge inoculum was estimated by making counts of acid-fast bacilli in testis homogenates. The results indicated that inoculation with living or killed M. lepraemurium produces an immunity which is barely detectable, and the combination of killed M. lepraemurium with living BCG is also ineffectual. Heat-killed BCG has the most immunizing effect, considered on a weight for weight basis.

6. Prof. J. M. Robson and Drs. J. T. Smith and F. M. Sullivan of London reported on their studies on *The Effect of Vaccination with Various Mycobacteria on the Multiplication of* M. lepraemurium *in Mice.* When *M. lepraemurium* is inoculated into the cornea of mice there is rapid multiplication there for about 6 weeks, but after this the rate slows down considerably. This might be due to immunity. Therefore a previous vaccination with *M. lepraemurium* was given to the mice, and after a period had been allowed for the development of possible immunity it was found that the organisms did not multiply in the corneas as much as in the control mice. BCG vaccination also had this effect but there was none from *M. leprae.*

7. Dr. D. S. Ridley of London gave a paper on The Nature of the Lepromin Reaction: Histological Observations. He recalled that patients who are positive to lepromin react to extracts of normal skin much the same way as to lepromin, and in an attempt to compare these reactions he obtained serial biopsies of reaction sites in cooperation with Dr. T. F. Davey of Uzuakoli, Eastern Nigeria. He found a vigorous eosinophil and polymorph cell infiltration as soon as 4 hours after the injection of lepromin. Later micro-abscesses developed in many cases and at that stage quite large fat accumulations could be noted. In over half the cases at the 4th week the Mitsuda reaction comprised a foreign body reaction to the fat; in the rest of the cases it was a reaction of tuberculoid type, with further tissue necrosis. Because of its timing and character, he thinks that the immediate reaction is one of hypersensitivity. Tissue breakdown during the reaction is what causes the appearance of fat. The explanation for the two types of Mitsuda reaction is still not clear. He found that the reactions to normal skin and to lepromin were essentially the same, and clinical and histological characters correlated only vaguely in quality, quantity and time.

8. Dr. K. R. Chatterjee of Calcutta (now in London) gave a paper on Observations on a Mycobacterial Infection in a Hybrid Strain of Black

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Mice Inoculated with Human Leprosy. He described his inoculation experiments in the Calcutta School of Tropical Medicine (reported first in 1958) and thought that the encouraging results were due to the use of bacillary suspensions freed from tissue elements by differential centrifugalization, and to the use of a selected hybrid strain of black mice bred under controlled supervision. There were 124 mice in the experiment. Inoculations were given to 56 of M. leprae which had been freshly isolated from 6 different human patients. The remaining 68 mice were re-inoculated with bacilli from the first mice. Infection to the 4th passage was maintained in some, but within 5 or 6 months of inoculation progressive infection was not observed, though heavy infections were obtained in the following 6 months. Of the 56 mice who received human bacilli directly, 30% showed mild infection, 10% moderate, and 3.5% showed generalised heavy infection. The internal organs (liver, spleen, lymph glands, omentum, ovaries) and the skin and peripheral nerves and the testes showed intracellular and extracellular acidfast bacilli. In heavy infections the cells were packed with bacilli, with displacement of the nucleus and disappearance of the cytoplasm. The possibility that the infection was due to the tubercle or saphrophytic acid-fast bacilli was excluded by inoculation of culture media with infected mouse tissues, wherein no growth was obtained. The bacillus of Stefanskii was excluded because inoculation into albino rats failed to produce the disease. A Dharmendra type lepromin was prepared from infected mouse tissues and tested on cases of human leprosy and gave a normal pattern of response, which shows that the bacilli from the mouse lesions are antigenically similar to *M*. leprae, a similarity which is not shared with the bacillus of Stefanskii or with several other strains of acid-fast bacilli.

9. Prof. N. Dungal of Reykjavik, Iceland, gave a paper on Is Leprosy Transmitted by Insects? He thinks that the way is still open for profitable study of insects as possible agents of the transmission of leprosy. The skin seems to be the main portal of entry of the bacilli, but the entry of the immobile organism into the skin is still not satisfactorily explained. Surely biting insects can be visualized reasonably as having a role here. But which insect? Prof. Dungal sent out an enquiry round the world about the prevalence of 10 species. Replies came from 42 places. Some insects could be excluded as vectors as they did not exist in half or more of the countries. Pediculus capitis and P. pubis were reported from every country with leprosy endemia, and Pulex irritans from 39 out of the 42 countries, and there are several suggestive arguments for this flea being the vector. Transmission by flying insects is probably rare, but Acarus scabiei is a possible. G. Muñoz Rivas of Colombia made experiments with fleas and acarus and found acid-fast bacilli in them, and a living association of these insects with leprosy patients. Prof. Dungal suggests that

some isolated island where leprosy is prevalent be selected for an attempt at eradicating leprosy by extermination of all ectoparasites of human beings, especially lice, fleas, and *Acarus scabiei*.

10. Dr. J. R. Innes of London gave a report on his investigations of The Russian Literature on Leprosy. The occasion for this was that in 1959 Prof. N. A. Torsuev of the Chair of Skin and Venereal Diseases of the Rostov-on-Don Medical Institute compiled and issued in printed form "Bibligraficheskii Ukazetel Rabot Otechestvenikh Avtorov po Lepre" (Bibliographical Index of Papers on Leprosy by Russian Authors) up to the year 1957, inclusive. This bibliography contains a total of 2,620 items, serially arranged, of papers and publications dealing with leprosy, given alphabetically under authors' names. Serial Nos. 1976-2620 consist of foreign authors and the names, titles, and references are printed in the Roman script so will be readily intelligible to most Western workers, but Nos. 1-1975 are of Russian authors and the names, titles, and references are given in the Russian script and language. It seemed clear that its usefulness in the West would be enormously enhanced if this Russian section were rendered into English, and this Dr. Innes did, and distributed cyclostyled copies of the same to those present at the meeting. (Other copies remain and if any desire them they should write to Dr. Innes at 8 Portman Street, London, W.1.) Copies of the original printed bibliography of Prof. N. A. Torsuev may be obtained by request to him: he will welcome exchange of literature. The great advantage of this bibliography and of the English rendering of the same is the inclusive nature of it up to 1957. Papers can be identified and asked for by serial number. (See article in this issue of Leprosy Review, p. 278.) Since 1957 there has been periodical issue of "Uchenie Zapiski Instituta po Izucheniyu Lepri" (Scientific Notes of the Leprosy Research Institute) which also no doubt could be obtained through Prof. Torsuev.

11. Dr. C. H. Binford of Washington gave a *Progress Report on* Animal Inoculation with Human Leprosy which he illustrated with many excellent slides. During the past $4\frac{1}{2}$ years he has carried out many experiments in species of laboratory animals to inoculate human leprosy. The first step was to produce local progressive lesions at the site of inoculation. On about 1,500 small animals 35 inoculation experiments were undertaken, and also on 31 monkeys, and several methods for reducing host resistance were used, particularly irradiation of the whole body and administration of cortisone. The factor of temperature of body sites was also applied and the cooler parts of animals were selected for inoculation, such as external ear, tail, foot, testis, scrotum, and skin, and the hair kept clipped on hairy sites of inoculation. In the monkeys the ulnar and femoral nerves were inoculated, because *M. leprae* has a predilection for peripheral nerves. In other animals, the inoculations were made by multiple

punctures, scarification, and intracutaneous routes, in the hope that bacilli might gain access to the terminal parts of tiny cutaneous nerves. Human material for inoculating the animals was obtained from the Philippines, Carville, and Washington. The specimens were homogenized and the bacillary concentrations under the Oil-Immersion varied from 10 to 100 bacilli per field. Heat-treated inoculum was used in controls. The inoculation sites were studied regularly by histology. The golden hamster yielded the most interesting results, in that histiocytic granulomatous lesions in testes and ears appeared about 18 months after the inoculation. These lesions resembled human lepromatous leprosy in their histological picture, in the number of intracellular acid-fast bacilli, and the presence of bacilli within nerves. Even with skin specimens that had been frozen with solid carbon dioxide and stored for 10 months a heavy growth of bacilli was produced in the ears of hamsters when inoculated. Total body irradiation produced no evidence of influence on the infection and cortisone-treated animals died too early to permit of any assessment of its influence. After 5 months of preliminary work several hamster to hamster passages have been made and attempts to infect other laboratory animals. The mycobacterium of the granulomatous infection of hamsters will grow on artificial media.

12. Dr. K. R. Chatterjee and R. Bose of Calcutta described their Observations on Immunological Reactions in Leprosy with Fractions of Kedrovskii's Bacillus. From this bacillus they obtained 9 chemical fractions. Three of them, A, B and C, were found to give early lepromin reactions of the Dharmendra type or positive complement fixation tests in leprosy. About 1,015 leprosy cases of all types were given skin tests with the 'A' fraction and found to give the same pattern of positivity as with Dharmendra lepromin. Then complement fixation tests with 'B' and 'C' fractions were carried out on 279 leprosy patients of all types, 139 patients with Wasserman-positive syphilis, 104 cases of kala azar and dermal leishmaniasis, 100 cases of active pulmonary tuberculosis and 50 healthy subjects. Of the leprosy patients, 70% reacted positively with 'B' fraction also with 'C' although weaker, compared with 2.3% of all the others tested. These fractions also reacted selectively in the immunological tests: fraction 'A' failed to give uniform complement fixation reactions and fractions 'B' and 'C' failed to give skin reactions.

13. Dr. P. D'Arcy Hart of London discussed the *Problem of* "Growth" of M. lepraemurium in vitro. At first sight the prospects are hardly rosy for success in obtaining multiplication of this organism in cell-free media, in view of the difficulties in tissue culture, though as these difficulties are overcome much may be learned to assist in cultivation in cell-free media. Until then experience with other micro-organisms which resist cultivation may reasonably be used in the approach to cell-free media. There have

been numerous earlier fruitless attempts at nutrient media for M. lepraemurium and these are of value by way of exclusion, and more recently workers have been guided by (a) the lack of response of the respiration of *M. lepraemurium* to the usual substrates which are potentially stimulating; (b) protection against a possible toxic effect of serum by substances such as albumin and yeast; (c) possible defect of entry of nutrients, metals, etc., into the organisms; (d) possible peculiarities of their surface; (e) possible requirements of special nutrients, as in the analogy of mycobactin for Johne's bacillus. There has been no success as yet along these lines but D'Arcy Hart and R. C. Valentine have recently reported the elongation of *M. lepraemurium* in a cell-free medium (*Nature*, **185**, No. 4705, Jan. 1960, pp. 58–60). Like *M. leprae* it is unusually slow growing in the body, with a generation time of 10 days. In 1958 there was an important advance when Rees, et al., Garbutt et al., Wallace et al. observed limited multiplication of it in tissue culture, but so far it remains uncultivated in a cell-free medium, and its respiratory metabolism shows an almost complete lack of response to many substances (Gray, 1952). Then McFadzean and Valentine (1959, 1960) distinguished by electronmicroscopy a completely degenerate form of *M*. lepraemurium which is not viable and is unable to produce disease. In conventional culture media it appears after incubation of a few weeks at 37°C. In one experiment, where the medium was a liquid nutrient with 20% added sucrose, by electronmicroscopy at 2 months there were seen among the degenerated bacilli some which looked unusually long, as if some limited growth had occurred before the death of the bacilli. Therefore D'Arcy Hart and Valentine investigated the frequency distribution of lengths after varying times of incubation in different media. The lengths of 100 or more bacilli from each subsequent sample were measured at X 10,000 under the electronmicroscope, and the proportions also estimated of completely degenerated bacilli. In 3 non-nutrient media there was no elongation, and degeneration was rapid. There was a small amount of elongation of bacilli in the ordinary nutrient media. But when 10%sucrose or 8% glucose was added the mean length nearly doubled. The proportion of bacilli longer than 2.5μ rose from 6 to 67% with the added sucrose and 51% with glucose added, and the greater part of the increase took place in the first 2 weeks. There was also slowed degeneration. INH was incorporated in one of the media and had the effect of preventing the elongation of bacilli, which suggests that it is not due to a passive stretching. More recently magnesium ions have been shown by these authors to stimulate lengthening with or without the sucrose. The long bacilli showed no change in electron density; there was a slight increase in width, which points to a real increase in bacterial protoplasm in the cultures and to there being some ability to metabolize and grow. Multiplication fails because the

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bacilli fail to divide, and if means could be found to encourage division their culture in cell-free media might at last become possible. This work continues.

14. Dr. R. J. W. Rees of London gave a paper on The Use of Cell-Cultures for the Cultivation of M. lepraemurium in vitro. Since 1958 definite but limited multiplication of M. lepraemurium in vitro has been reported using a variety of cell-cultures^{1,4}. Multiplication was usually limited to one or two generations but the bacilli appeared to divide at the same rate (every 10-12 days) as in vivo. Multiplication occurred at 34-37°C. and was inhibited by streptomycin and/or isoniazid^{1,2,4}. Successful multiplication was obtained both by infecting the cells in vivo^{2,3} or in vitro^{1,3,4}. One possible factor limiting multiplication was the deterioration which inevitably occurred in the host-cells between the third and fourth weeks. New techniques were therefore developed for subculturing the infected cells, approximately every three weeks, in order to maintain a healthy population of host-cells. This method has resulted in more continuous multiplication of the bacilli in some of the cultures. In one experiment the bacilli continued to multiply in the cells for 150 days (after which the cultures were contaminated). Furthermore, bacilli recovered from the cultures at day 150 and injected into mice produced a typical and progressive infection. Unfortunately the method does not regularly result in continued multiplication of *M. lepraemurium*. It is suggested that even under these more favourable conditions for tissue-culture the metabolic activity of the host-cells is inadequate to support regular multiplication of the intracellular bacilli.

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II. Reconstructive Plastic Surgery in Leprosy; Lectures by Mr. Paul Brand, M.B., F.R.C.S., in Berne, Switzerland.

Surgeons and orthopaedic surgeons of Switzerland, and also the general public interested in leprosy relief, had the privilege of hearing Mr. Paul Brand explain the principles governing this art, and the preventive principles for such leprosy deformities. The first lecture was held in the Surgical Clinic and second lecture was given at a function in the Schweitzerhof Hotel in Berne, and both were illustrated with very instructive films. His Excellency the Indian Ambassador to Switzerland, Shri M. K. Vellodi, had the idea of arranging for Mr. Brand to give these lectures when he heard that Mr. Brand was touring Switzerland at the time. Messrs. Ciba of Basel helped with the expenses and Shri M. K. Vellodi and Shrimati Vellodi were responsible for the delightful evening reception. The Editor attended these functions. Mr. Brand is a very clear thinker and a great teacher and his exposition of the causes of leprosy deformities and how the patient can be protected from developing such, and if they have irrevocably developed what are the operations which can relieve them, left all his hearers with a very definite knowledge and even an enthusiasm for these things. There is no doubt that Mr. Brand's thinking and work has started the revolution by which the common practice of doing precious little for leprosy deformities is beginning to change into the recognition that every piece of leprosy work should include provision for the prevention and surgical cure of deformities and cosmetic damage in the patient. India has become a centre of light and leading in these matters because there is the group of Brand and his colleagues at Vellore and the other group headed by Dr. N. H. Antia at Bombay. We hear that Mr. Brand is at present seeking finance for an enlargement of his centre at Vellore and that Dr. N. H. Antia is seeking to establish a special centre in the J. J. Hospital in Bombay. Both these projects can be fully recommended.

Considering that there must be millions of patients in the world today who are in need of the benefits of this sort of work, the Editor during a discussion of the first of Mr. Brand's lectures was emboldened to suggest that orthopaedic and plastic surgeons in Switzerland (and indeed in all Europe) might be interested in asking for Sabbatical leave to go to India to study these techniques, and thereafter become available on a valuable list which the Editor (in his capacity as Secretary General of the International Leprosy Association) would use to suggest to governments of African and other territories a surgeon who would be willing to go for a short time later, perhaps every year, and preferably to an African university or teaching centre, to undertake this sort of surgery. The same thing might well apply to physiotherapists, for physiotherapy is a very important part of the prevention and cure of these disabilities. This idea was received in a very friendly spirit and we hope that something will come of it.

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