Lepr. Rev. (1978) **49,** 328–334

Abstracts

68. McDOUGALL, A. C. & ROSE, P. **Integrated leprosy control in Guyana.**

This paper provides much interesting and relevant demographic, economic and medical data concerning leprosy patient care and attempts at leprosy control in Guyana from 1858 to 1975. These facts alone make it a valuable paper.

However, it is tantalising in that it omits data on child rates and deformity rates in new cases, which are available, and which would enable readers to better evaluate the efficacy of the present programme, the validity of the author's estimates of prevalence and the usefulness of their proposals for future action.

Guyana is not unique in having "a nagging yearly incidence of new cases", some known and some suspected foci of "high incidence" and a health education problem made worse by the continued presence of a now outmoded leprosarium. The additional data would have made the article much more useful to others facing the same problems.

The programme as described is partially integrated. Leprosy patients are treated at "skin clinics" run in general health facilities but the staff who run these clinics are specialist staff. General health staff play little or no part in the leprosy control effort. This may well be the right course for Guyana to follow at present but it is not integration. The paper has no proposals to make concerning progress, if it would be progress, toward full integration.

W. Felton Ross

The Abstracts which follow are reprinted from Tropical Diseases Bulletin *through the courtesy of the Director, Bureau of Hygiene and Tropical Diseases. They are classified according to subject.*

1. MICROBIOLOGY

69. NARAYANAN, E., SREEVATSA, KIRCHHEIMER, W. F. & BEDI, B. M. S. **Transfer of leprosy bacilli from patients to mouse footpads by *Aedes aegypti*.** *Lepr. India,* 1977, v. 49, No. 2, 181–186.

"*Aedes aegypti* mosquitoes which were first allowed to feed on untreated lepromatous leprosy patients, and then to refeed on mouse footpads were found to transfer *Mycobacterium leprae* to the footpads as seen by the subsequent multiplication of the bacilli in the footpads. Results presently available are insufficient to come to any conclusion about the actual role of mosquitoes in the transmission of leprosy in the field."

70. ISHAQUE, M., KATO, L. & SKINSNES, O. K. **Cytochrome-linked respiration in host grown *M. leprae* isolated from an armadillo *(Dasypus novemcinctus,* L.).** *Int. J. Lepr.,* 1977, v. †5, No. 2, 114–119.

"The bacilli were isolated from an armadillo (*Dasypus novemcinctus,* L.) and cytochrome systems as well as oxidation of succinate and NADH by *M. leprae* were studied. Cell-free extracts of *M. leprae* contained cytochromes of the $a + a_3$, *b, c* and *o* type. Whole cell suspensions catalyzed the oxidation of succinate. The process was unaffected by rotenone but

was markedly inhibited by thenoyltrifluroacetone, antimycin A and cyanide. Cell-free preparations of *M. leprae* also oxidized NADH with oxygen as the terminal electron acceptor. Although NADH oxidation was completely inhibited by rotenone, the process was inhibited to only 50% by 5 millimols cyanide. The results indicated that complete respiratory system is present in *M. leprae* isolated from leprous tissues of an armadillo. The effect of inhibitors on succinate and NADH oxidations showed that the respiration in host-grown *M. leprae* is mediated through the cytochrome system with oxygen as the final electron acceptor."

71. ISHAQUE, M. & KATO, L. **Oxidation of substrates by host grown *Mycobacterium leprae* and *Mycobacterium lepraemurium* and by *in vitro* grown mycobacteria cultured from human, armadillo and murine lepromas.** *Int. J. Lepr.,* 1977, v. 45, No. 2, 120–131.

"Oxidative activities of armadillo-grown *M. leprae* and rat-grown *M. lepraemurium* as well as of the *in vitro* grown mycobacteria cultured from human, armadillo and murine lepromas were investigated and compared with authentic strains of *M. scrofulaceum* and *M. bovis,* BCG. Yeast extract was oxidized at a slow rate by *in vivo* grown *M. leprae* and *M. lepraemurium,* but was actively utilized by all the cultures cultivated on artificial medium. Although no oxidation of glycerol by host-grown mycobacteria occurred, after a period of 60 minutes it was utilized at a slow rate by *in vitro* grown *Mlm* (M. lm 56) and *M. leprae* (M. Dakar). However, glycerol was actively oxidized by *M. leprae* (M. A6, armadillo derived), *M. scrofulaceum* and BCG. None of the intermediates of the glycolytic cycle as well as of the tricarboxylic acid cycle were oxidized by purified cell suspensions of *M. lepraemurium* but succinate was readily oxidized by *M. leprae* cell suspensions. Resting cell suspensions of all the *in vitro* grown cultures have been shown to increase their oxygen consumption in the presence of several members of the glycolytic and Krebs' cycles. Sulfur compounds, e.g., cysteine, dithioerythritol and penicillinamine were readily oxidized by all the *in vivo* and *in vitro* grown mycobacteria used in this study. While oleic acid was inactive to human and murine bacillary suspensions as well as to BCG, it was readily oxidized by M. lm 56, M. A6, M. Dakar, and *M. scrofulaceum.* All the *in vitro* grown cultures caused considerable increase in oxygen consumption over the endogenous value in the presence of Tween 80 and Tween 20 but the same substrates were slowly oxidized by murine leprosy bacilli. Comparative rates of oxidation of several substrates by host-grown and *in vitro* grown mycobacteria are discussed."

72. KATO, L. **The Janus-face of *Mycobacterium leprae:* characteristics of *in vitro* grown *M. leprae* are not predictable.** *Int. J. Lepr.,* 1977, v. 45, No. 2, 175–182.

The author of this Editorial reviews and comments on six of the many attempts that have been made to culture the leprosy bacillus, from Clegg in 1909 to Skinsnes *et al.* in 1975 and Kato and Ishaque in 1976 and 1977, with emphasis on the scotochromogenic cultures.

Before publication, the author sent copies to a number of people asking for their comments, and the replies which were received in time were published in the correspondence section of this issue of the *International Journal of Leprosy* (pp. 183–185). These from P. Beaulnes and M. Bourque, J. H. Hanks, K. Kanai, and M. Tsukamura, should be read together with the Editorial in the original. [See also abstr. 981 below.]

F.I.C. Apted

73. KATO, L. & ISHAQUE, M. A. **A scotochromogenic slow-growing mycobacterium probably the etiologic agent of rat leprosy.** *Int. J. Lepr.,* 1977, v. 45, No. 2, 139–149.

"Culture media were prepared in which yeast extract, succinate and L-cysteine, respectively, served as a source of energy. These substrates were oxidized by *M. lepraemurium* as measured with manometric technics. Glycerol was the only source of carbon in the media. Bacilli were isolated from subcutaneous lepromas of infected rats. After five weeks of latency, a heavy growth developed during a logarithmic growth phase lasting about ten days in media containing any of the substrates for energy generation with glycerol added. In phosphate buffer solution, at

pH 5.5, optimal growth occurred when incubated at 34°C. Bovine, horse, goat, and sheep serum respectively enhanced *in vitro* multiplication. Hyaluronic acid, heparin and serum albumin were toxic and inhibited growth in the primary *M. lepraemurium* cultures. When host grown murine leprosy bacilli were inoculated into Lowenstein or Dubos media no growth occurred.

"The cultures were scotochromogenic and produced a yellow pigment. Young cultures were nonacid-fast. Full acid-fastness developed during the logarithmic growth phase.

"The strains were easily subcultured not only in the homologue media but became rapidly adapted to new substrates. They then became adapted to and grew in the presence of hyaluronic acid, heparin and serum albumin as well as on Lowenstein and Dubos media. With subsequent subculturing, the latency period became as short as two days followed by three to four days of logarithmic growth. The primary cultures and their subcultures on the homologue media retained specific infectivity for rats but lost their pathogenicity and virulence considerably."

74. YAMAGAMI, A. & CHANG, Y. T. **Growth of *Mycobacterium lepraemurium* in cultures of macrophages obtained from various sources.** *Infection & Immunity,* 1977, v. 17, No. 3, 531–534.

"Studies were made on the growth of *Mycobacterium lepraemurium* in cultures of macrophages obtained from various sources, such as bone marrow, spleen, and blood of mice. Macrophages were maintained in good condition for more than 12 weeks. Marked intracellular multiplication of *M. lepraemurium* was observed in cultures from all three sources. Whereas *M. lepraemurium* freshly prepared from the animals showed good growth in the cultures, those that were kept at 4°C for 10 or 14 days showed no growth."

2. IMMUNOLOGY, PATHOLOGY

75. SAHA, K. & DUTTA, R. N. **Subtypes of Australia antigen in persistent Australia antigenemia and sporadic hepatitis among patients with lepromatous leprosy and their segregated children with no apparent clinical illness.** *Int. J. Lepr.,* 1977, v. 45, No. 1, 38–48.

Serum samples from 135 patients with biopsy-proven lepromatous leprosy in India and from 156 apparently healthy children of patients with leprosy were examined for hepatitis B surface antigen and surface antibody by counter-immunoelectrophoresis [an insensitive technique]. The antigen was detected in the serum of 10.3% of the patients with lepromatous leprosy and in 9.6% of their children, whereas the antigen was found in 2.28% of a control group of soldiers and in 2.9% of 34 undernourished subjects who also served as controls. [The antibody findings are quite meaningless in view of the insensitive method used.]

The predominant subtype of hepatitis B surface antigen was *ay* both among the patients with leprosy and their children.

A. J. Zuckerman

76. FRAGUELA RANGEL, J. V., FERNÁNDEZ BAQUERO, G., KRAFTCHENCO BEOTO, T. & HERNANDEZ ANGULO, M. Alopecia de cuero cabelludo en lepra. **[Scalp alopecia in leprosy.]** *Revta Cub. Med. Trop.,* 1977, v. 29, No. 1, 23–31. English summary (3 lines).

Of 270 patients in the El Rincón leprosy hospital in Cuba, 10, nine of whom were men, had alopecia. All the 10 had lepromatous leprosy. The clinical and histopathological features are described and illustrated in photographs.

F. I. C. Apted

77. TAKATA, H., SADA, M., OZAWA, S. & SEKIGUCHI, S. **HLA and mycobacterial infection: increased frequency of B8 in Japanese leprosy.** *Tissue Antigens,* 1978, v. 11, No. 1, 61–64.

"A total of 60 leprosy patients, 28 of lepromatous and 32 of tuberculoid form, and 70 active tuberculosis patients was compared with a control of 184 for 34 HLA specificities. The most interesting finding was an increased frequency (10.0%) for HLA-B8 (corrected $P \times 0.062$, relative risk $\times$ 20.3) in the leprosy patients as compared with the control group, despite the fact that the frequency of HLA-B8 was extremely low in Japanese. Furthermore, all leprosy patients with B8 had leprous member(s) in their family."

78. LIEBERMAN, J. & REA, T. H. **Serum angiotensin-converting enzyme in leprosy and coccidioidomycosis.** *Ann. Intern. Med.,* 1977, v. 87, No. 4, 422–425.

"Serum angiotensin-converting enzyme levels were found to be elevated in 71.4% of 42 leprosy patients, both treated and untreated, but in only one of 13 patients with disseminated coccidioidomycosis. The elevations with leprosy were present in association with each of the three major categories: lepromatous, borderline, or tuberculoid. Sulfone therapy had no immediate effect on the elevated serum levels, although long-term sulfone therapy appeared to result in a lowering of the level. Corticosteroid therapy had a more immediate and dramatic effect on reducing the elevated angiotensin-converting enzyme level in leprosy. This assay cannot distinguish between sarcoidosis and leprosy or between the various categories of leprosy, but it can help differentiate sarcoidosis from fungal or tuberculous disease. Elevated levels of serum angiotensin-converting enzyme have now been associated with three disease states: sarcoidosis, Gaucher's disease, and leprosy."

79. CRUICKSHANK, J. G. & ELLIS, B. P. B. **Leprosy and the serodiagnostic test for tuberculosis.** *J. Clin. Path.,* 1977, v. 30, No. 8, 728–730.

Agglutination tests were made using antigens prepared from *Mycobacterium tuberculosis* H37Rv in a modified Widal technique on sera from 227 subjects with leprosy.

86% of subjects with inactive disease had titres equal to or less than 1 in 250; 58% of those with healing disease had such titres and 20% of those with active disease; and of those in reaction, all had titres equal to or greater than 1 in 500.

One subject with lepromatous leprosy was followed up weekly for 10 weeks. At weeks 1 and 2 the titre was less than 1 in 125. During weeks 4, 5 and 6 the subject was "in reaction" and by week 7 the titre had risen to 1 in 1250. By week 9 it had fallen to less than 1 in 125 again.

It would appear that agglutinating antibody reflects to some extent the activity of leprosy but not with the degree of accuracy of more conventional tests.

P. A. Jenkins

80. SHESKIN, J. & ZEIMER, R. ***In vivo* study of trace elements in leprous skin.** *Int. J. Der.,* 1977, v. 16, No. 9, 745–747.

"The skin of leprous patients at various stages of the disease was investigated by diagnostic x-ray spectrometry. In the active stage raised iron and slightly raised zinc levels were found. The usefulness of the method in skin investigation is foreseen."

3. CLINICAL

81. HASAN, S. **A survey of leprosy deformities among the patients of Hyderabad City.** *Lepr. India,* 1977, v. 49, No. 3, 393–399.

"Neuropathic deformity is a major problem among the patients of Hyderabad city. Nearly 44.3% of the patients have one or the other kind of deformity of the hand, foot or face. 29.1% of

the upper limbs, 30.7% of the lower limbs and 5.2% of the faces were affected. The patients with lepromatous leprosy showed greater tendency to deformity (66.4%). Patients with simple anaesthesia in hand and feet formed the majority among the deformity cases, a total of 41.6%. Education of the patients in the hand and foot care is an essential feature of the clinic physiotherapy technician."

[This study was based on the first 1000 patients examined by the author between July 1969 and April 1971.]

82. YUMNAM, I. S.; KAUR, S.; KUMAR, B.; RASTOGI, G. K.; BANERJEE, A. K.; SEHGAL, S. **Evaluation of thyroid functions in leprosy. I. Thyroid function tests** [YUMNAM, KAUR, KUMAR & RASTOGI]. *Lepr. India,* 1977, v. 49, No. 4, 485–491. **II. Histopathology of the thyroid** [KAUR, YUMNAM, KUMAR, BANERJEE & RASTOGI]. *Ibid.,* 492–494. **III. Circulating auto-antibodies against thyroid and nuclear components** [YUMNAM, SEHGAL, KAUR, KUMAR & RASTOGI]. *Ibid.,* 495–499.

I. "Twenty-six patients of different types of leprosy were studied for radioactive iodine uptake (I^{131}) and serum levels of triiodothyronine (T_3), thyroxine (T_4) and thyroid stimulating hormone (TSH). None of the patients had clinical evidence of thyroid involvement. No significant difference was found between the values obtained in patients and normals and in different varieties of leprosy."

II. "Open thyroid biopsies from seven patients of bacilliferous leprosy were studied for leprous granuloma or amyloid deposition. None of the patients had clinical evidence of thyroid involvement. Histopathology did not reveal any specific abnormality."

III. "Sera from twenty-six patients of various types of leprosy were tested for the detection of circulating auto-antibodies and nuclear components against thyroid using various methods. Four patients of lepromatous leprosy had higher levels of thyroid auto-antibodies by latex agglutination. Three patients showed the presence of anti-nuclear antibodies, two belonged to the TT and one to the LL group."

83. SAHA, K., MITTAL, M. M. & MAHESWARI, H. B. **An attempt at passive transfer of immunity to leprosy patients by transfusion of allogeneic lymphocytes, inactivated with mitomycin C.** *Vox Sang.,* 1978, v. 34, No. 2, 104–110.

"An attempt was made to repair cell-mediated immunity in 7 patients suffering from lepromatous leprosy and severe erythema nodosum leprosum by intravenous infusion of 400 million allogeneic blood lymphocytes on 3 occasions. The lymphocytes were obtained from lepromin and tuberculin-positive subjects and were inactivated *in vitro* by treatment with mitomycin C. Immunotherapy with inactivated lymphocytes only modified the severity of erythema nodosum leprosum, without altering other aspects of the disease."

4. THERAPY

84. ANTONY, P. **Polambakkam splint for treatment of plantar ulcer in leprosy.** *Lepr. India,* 1977, v. 49, No. 4, 521–525.

"An open type of short leg splint is described and illustrated for the treatment of plantar ulcer in leprosy. Its fabrication, method of application, advantages and disadvantages are discussed as compared to the other methods of immobilization. In our short experience we have found that with the use of this splint, ulcers heal in a period of about 6 weeks and in many cases even earlier than this period."

5. EPIDEMIOLOGY AND CONTROL

85. GURD, C. H. **Leprosy in the Northern Territory.** [Correspondence.] *Med. J. Aust.,* 1977, Nov. 5, 652.

In an Editorial in *Med. J. Aust.,* 1977, v. 2, 345, it was stated that a highly endemic situation with regard to leprosy persists in the Northern Territory, and that no accurate figures are available. The Director of Health, Northern Territory Division, comments on the inaccuracy of these statements and provides information to show that control has largely been effected. Patients with leprosy in the Northern Territory are kept on the register indefinitely; this aids follow-up but does magnify the problem because in most of them the disease is inactive. Measures which have brought leprosy under control include the early detection of cases by rural health centre staff, effective and acceptable treatment, and surgical and self-help care for deformities. All cases are held on a register in Darwin. Figures for 1975 showed a total number of 695 Aboriginals on the register, 10 Aboriginals in whom the disease was still active, and 6 new cases in Aboriginals. A table gives the number of new notifications for each year from 1966 to 1976. In the first 3 years of this period notifications numbered 29, 46, and 39. Between 1969 and 1974, the annual figures ranged from 12 to 21 cases. In each of the years 1975 and 1976 only 6 cases were notified.

F. I. C. Apted

6. MISCELLANEOUS

86. LEPR. INDIA, 1976, v. 48, No. 4, Suppl., 460–895. **Baroda Leprosy Conference, April 10–14, 1976.**

The Biennial Leprosy Conferences conducted by the Indian Association of Leprologists and the Hind Kusht Nivaran Sangh are always an important stimulus to research and the sharing of experience in a country with over 3 million sufferers from leprosy. The Baroda Conference in 1976 was no exception. Among the wide range of subjects covered by original articles and discussion, the following merited special note:

Epidemiology. P. V. Kapoor (p. 490) reported that epidemiological surveys in 3 areas of Maharashtra, where leprosy control is well established, have shown that there has been a definite fall in leprosy incidence in children in all 3 areas, with the lepromatous rate and deformity rate virtually down to zero. Among adults progress after 15 years has become slower. S. K. Noordeen and P. N. Neelan (p. 492) found chemoprophylaxis with dapsone effective in preventing leprosy among household contacts below the age of 15 years exposed to non-lepromatous leprosy, though the efficacy rate was only 35%. B. R. Chatterjee (p. 493), who has followed up over several years clinically normal persons harbouring acid-fast bacilli (AFB) in ear lobes, failed to show incidence of leprosy among them higher than in control subjects. R. Ganapati, S. S. Naik and S. S. Pandya (p. 494) reported important studies in school-children in Bombay [see also *Trop. Dis. Bull.,* 1977, v. 74, abstr. 355].

Experimental studies and pathology. K. V. Desikan (p. 498) reported experiments in which multiplication occurred in mouse foot pads using an inoculum of AFB in which no normal staining rods were found, based on a count of 100 bacilli. E. J. Ambrose, N. H. Antia and S. R. Khanolkar (p. 499) with a view to developing a rapid *in vitro* assay for the viability of *Myco. leprae* combined radioactively labelled metabolites with high resolution autoradiography and found a significant correlation between MI and labelling index. D. K. Dastur (p. 500) reported on the role of the perineurium in leprous neuritis. V. Sengupta, M. J. Worms and R. J. W. Rees (p. 504) presented evidence that *Myco. lepraemurium* can be transmitted mechanically by mosquitoes *(Aedes aegypti).*

One full session was devoted to *Experiences with clofazimine therapy,* and well exposed the established facts with this drug. L. M. Hogerzeil (p. 524) reported that long term steroid therapy had no adverse effect on the bacteriological decline in lepromatous patients provided they were simultaneously treated with clofazimine. In the session on *Immunology,* V. Mehra, S. N. S. Hanjan, Z. Kidwal, L. K. Bhutani and G. P. Talwar (p. 518) presented evidence of an alteration

in the surface characteristics of lymphocytes derived from the peripheral blood of untreated lepromatous leprosy subjects. K. Saha (p. 521) reported dramatic improvement following the transplantation of human foetal thymus tissue in severe reactional cases of lepromatous leprosy. An important session on *Deformities and rehabilitation* concentrated on the long term results of surgical procedures in leprosy. The technical sessions of the conference were succeeded by the very important Leprosy Workers Conference, concerned with many practical problems in the vast undertaking of leprosy control in India, and on this occasion, especially with assessing progress and evaluating control procedures.

T. F. Davey