CURRENT LITERATURE

This department carries selected abstracts of articles published in current medical journals dealing with leprosy and other mycobacterial diseases.

General and Historical

Sabin, Thomas D. The Penikese Hospital: A Massachusetts hospital for the treatment of Hansen's disease. N. Engl. J. Med. **304** (1981) 1610–1612.

This article is an interesting historical account of Hansen's disease in the state of Massachusetts and the development of a hospital for the care of Hansen's disease patients. The first recorded case in Massachusetts was in 1882 in Salem. In 1905, after failing to persuade the federal government to establish a national hospital for the care of patients with HD, the Massachusetts legislature purchased Penikese Island for the purpose of establishing a hospital for HD patients. This 74-acre island is at the southern end of the Elizabeth chain, which makes up the eastern border of Buzzard's Bay. "A more isolated location would be hard to find." On 17 November 1905, the original five HD patients were admitted to the Penikese Island Hospital, three from a quarantine hospital on Gallup's Island in Boston Harbor, one from Harwich, and one from Wareham. Review of the annual reports reveals a dedicated staff who were enlightened enough to make yearly pleas to end the exile of the patients by relocating them to one of the state hospitals on the mainland, to initiate programs to protect the patients' rights and improve their lifestyle, and to start research programs and keep abreast of the newest developments in the treatment of HD. They faced unfriendly neighbors, one-to-four week periods of isolation because of winter storms and ice floes, poor transportation facilities in waters infamous for treacherous riptides, a chronic shortage of fresh water, and worst of all, solitude. The Penikese Island Hospital closed on 10 March 1921, and the 13 remaining patients were transferred to the newly opened National Leprosarium in Carville.—RCH

Chemotherapy

Gangadharam, P. R., Pratt, P. F., Damle, P. B. and Davidson, P. T. Dynamic aspects of the activity of clofazimine against *Mycobacterium intracellulare*. Tubercle **62** (1981) 201–206.

The interactions of clofazimine with *M. intracellulare* was studied using the *in vitro* dialysis model and the membrane filtration technique. With the *in vitro* model, clofazimine, when it was inside the bag at 3 μg/ml or more, exerted a bactericidal action within 6 days. On the other hand, when the drug concentration in the outside medium was gradually raised from 1 μg/ml to 3 μg/ml over a period of 5 days, it produced only a bacteriostatic effect. Using the membrane filter technique, exposure of *M. intracellulare* to 1 μg/ml of clofazimine for 24 and 48 hr induced lag periods of 24 and 168 hrs, respectively.—Authors' Summary

Li Wenzhong, Ye Ganyun, Wang Heying, Ye Shunzhang, Wu Qinxue, Ma Lin, Zhang Yongfa and Ma Bukuan. Clinical and experimental studies on sulfone resistant leprosy. Chinese J. Dermatol. **14** (1981) 79–84. (in Chinese)

The most solid foundation for leprosy control today rests on the effectiveness of sulfone therapy. However, the emergence

of dapsone resistance with increasing frequency raises a serious problem for programs of treatment and control of leprosy. Twelve cases of dapsone resistant leprosy were proved by clinical trials and/or foot pad tests of mice in Qinhu Leprosarium during the period of 1975 to 1979. It was estimated that the dapsone resistant leprosy was 2.4% (12/499) of the total inpatients and 5.1% (12/236) of the BL-LL patients respectively. According to the results of calculation, the frequency of dapsone resistant leprosy was 4.5% (9/199) of all the BL-LL patients starting dapsone therapy before 1974 and still surviving in 1979. Among the 12 proved dapsone patients, eight cases were BL-LL leprosy with histoid lesions. It would indicate that the histoid leproma might be one of the clinical manifestations of dapsone resistant cases. Dapsone resistance would not only mean difficulty in treatment but also threatens susceptible individuals with infection due to resistant strains of *M. leprae*. Therefore, epidemiological investigation of the incidence of dapsone resistance in different epidemic areas would give important clues to formation of prevention and control programs of leprosy. We felt that short clinical observation alone would likely underestimate the incidence of dapsone resistance, and the investigation should be combined with mouse foot pad tests and prolonged observation.—Authors' Summary

Schifferli, J. A. and Jones, R. R. Dapsone and complement (Letter to the Editor). Lancet **2** (1981) 368–369.

Because of dapsone's therapeutic efficacy in some cases of cutaneous leucocytoclastic vasculitis, we studied its direct effect on four *in vitro* assays of serum complement function. Hemolytic plate assays were used for the measurement of CH_{50} and total alternative pathway activation. Complement mediated solubilization of preformed bovine serum albumin (BSA) rabbit anti-BSA immune precipitate was measured. Since solubilization capacity is mediated via the alternative pathway and enhanced by the classical pathway, assays were done with and without classical pathway activity. The results indicate no inhibitory effect at concentrations of dapsone ranging from 1 to 50 μg/ml.—(*Adapted from* the Letter to the Editor)

Wu Qin-Xue, *et al.* Method of determining serum DDS and serum level of DDS in 87 leprosy patients. J. Clin. Dermatol. **10** (1981) 117–119. (in Chinese)

The article presents a simplified quantitative method of Bratton, *et al.* for determination of dapsone (DDS). After modification it is more stable, available, and capable of measuring concentrations of down to about 0.05–0.1 μg/ml. Type 72 spectrophotometer is required for this procedure.

Serum levels of DDS were determined with this method in 87 cases of leprosy of various types. Patients were divided into two groups, i.e., oral dosage with DDS was 50 mg and 100 mg, respectively. Samples were collected 4 hr after administration for the determination of DDS. The average serum concentration was 2.36 μg/ml (doses of 50 mg group) and 3.83 μg/ml (doses of 100 mg group). The latter was 1.62 times as high as the former.

The simplified keys, the changed evidences for this method, and the precautions for the determination procedure were discussed in detail. The preliminary results of determining urinary DDS with this method were also introduced.—Authors' Summary

Clinical Sciences

Andriantsoa-Rasoavelonoro, V., Andrianjatovo, J., Razafintsalama, C. and Rajafindrangodona. Contribution à l'étude des manifestations oculaires de la lèpre à Madagascar. (Contribution to the study of ocular disease in leprosy in Madagascar.) J. Fr. Ophtalmol. **3** (1980) 469–472. (in French)

For this study, 250 leprosy patients from the National Leprosarium of Manankavaly (30 km from Tananarive) were examined. Among them, 31 had ocular damage.

In leprosy the eyes can be damaged to various degrees; the onset of these ocular disorders in relation to leprosy is not always in an exact or precise manner. Initial manifestations include conjunctival reactions such as prickling and watering of the eyes, with an inability to tolerate wind and light. Cataracts are rare; only one case was found among the patients examined in this study. In contrast, uveal tract involvement was common (32%) and deep or interstitial keratitis was frequent (35%). These lesions were usually bilateral. They do not seem to be affected by treatment. They can continue to develop long after stabilization of the disease (leprosy), so that sometimes a patient who is cured of leprosy returns to the leprosarium because of ocular problems.—(*Adapted from* the article)

Brandt, F., Kist, P. and Wos, J. Augenbefunde bei lepra. Ergebnisse einer studie im Green-Pastures Leprosy Hospital Pokíhara/Nepal. (Ocular findings in leprosy: Results of a survey in the Green Pastures Leprosy Hospital, Nepal.) Klin. Mbl. Augenheilk. **178** (1981) 55–58. (in German)

One hundred and seventy leprous patients underwent ophthalmic examination; of those with tuberculoid leprosy, 49.3% had ocular pathology; in patients with lepromatous leprosy the corresponding figure was 61.4%; 4.7% of all eyes examined were blind. Early chemotherapy prevents further complications in tuberculoid leprosy, but not in the lepromatous type. The results are compared with those of other authors.—Authors' Summary

Chovet, M., de la Panouse, A., Negrel, A. D. and Ducam, M. Les lésions oculaires de la lèpre lépromateuse (Ocular lesions in lepromatous leprosy.) J. Fr. Ophtalmol. **3** (1980) 473–482. (in French)

Ocular lesions observed in 111 cases of lepromatous or borderline leprosy are described. Tables are included which indicate the visual acuity, corneal sensitivity, and lesions noted in the appendages. Particular attention is paid to lesions in the pars plana, which include true posterior cyclitis having the appearance of "ants eggs" or "pearls" deposited on the retina, associated with vascular lesions and peripheral hyalitis. The absence of associated macular edema is strongly emphasized.

The etiopathogenicity of lesions of this type is probably directly related to leprous erythema nodosum. Detailed studies should be conducted on the chronological stages of these affections and their subsequent progression.—Authors' Summary

Brandt, F. and Malla, O. K. Ocular findings in leprous patients. A report of a survey in Malunga/Nepal. Albrecht von Grafes Arch. Ophthalmol. **217** (1981) 27–34.

A total of 116 patients in Nepal with advanced leprosy were examined in an ophthalmological survey. All patients were older than 20 years, and none had suffered from leprosy for less than 10 years. Abnormal ocular findings occurred in 69.8% of all patients and 9.3% of the eyes were blind. The results are compared with those of other authors.—Authors' Summary

Freiberger, H. F. and Fudenberg, H. H. An appetite for armadillo. Hosp. Practice **16** (1981) 137–144.

The article consists of a case report of a 70-year-old male native of Texas who was diagnosed as having lepromatous leprosy at the Medical University of South Carolina Hospital. The diagnosis was apparently not considered until a lesion on the patient's palate had been biopsied and revealed acid-fast bacilli. The patient had a serum concentration of cryoglobulin of 90 mg/100 ml. The cryoglobulin was of a mixed type including IgG, IgA, and IgM, as well as Clq. The patient showed a total absence of regulatory T cells in the peripheral blood, including suppressor as well as helper T cells. The patient was treated with dapsone 100 mg q i d (sic). The authors consider that the patient's history of past consumption of armadillo may be related to the acquisition of the disease.—RCH

Sher, R., Shulman, G., Baily, P. and Politzer, W. M. Serum trace elements and vitamin A in leprosy subtypes. Am. J. Clin. Nutr. **34** (1981) 1918–1924.

Serum zinc, copper, iron, and vitamin A levels were determined in patients with lep-

rosy and in healthy controls. Leprosy patients were classified according to the Ridley and Jopling classification and divided into two main groups as follows: tuberculoid, which consisted mainly of borderline tuberculoid patients, and lepromatous, which consisted of borderline lepromatous and true lepromatous patients. The lepromatous group was found to have significantly lower serum levels of zinc and iron and elevated levels of copper. Vitamin A levels were also significantly lower in the lepromatous groups than in the tuberculoid group. Furthermore, the true lepromatous vitamin A determinations were significantly lower than those of the borderline lepromatous patients. The mechanism of these alterations in trace elements is probably due to a redistribution of these metals from the blood to various tissues, brought about by the release of leucocyte endogenous mediators by continuing phagocytosis of tissue macrophages in the lepromatous group of patients.—Authors' Summary

Sheskin, J., Sabato, S. and Yosipovith, Z. Fehlende faltenbildung der fingerkuppe bei lepra. (Formation of finger wrinkles in leprosy.) Der Hautarzt **32** (1981) 14–16. (in German)

Soaking of the hand of leprosy patients in water of 38°–40°C for half an hour does not lead to the formation of wrinkles, in contrast to healthy individuals.

We tend to relate this lack of wrinkles to the damaged nerve ends which are often found in leprosy patients. The number of investigated individuals is small and repeated experiments are therefore required. Should the above results be established, the soaking test could serve as an additional tool for the diagnosis of leprosy.—Authors' Summary

Zambrano, M. T., Arenas, R. and Ortiz, S. Reaccion de Mitsuda. Estudio comparativo con lepromina integral humana y de armadillo en cincuenta pacientes de lepra. (The Mitsuda Reaction. A comparative study with whole human and armadillo lepromin in 50 leprosy patients). Dermatologia **24** (1980) 200–211. (in Spanish)

La leprominorreacción en los enfermos de lepra es de utilidad en la clasificación de los casos o para dar idea del pronóstico. En nuestro país se tiene larga experiencia con el uso de lepromina integral humana y sólo desde hace relativamente poco tiempo con lepromina integral de armadillo.

En el presente trabajo se comunican los hallazgos encontrados al aplicar lepromina integral humana y de armadillo en cincuenta pacientes de lepra de diferente clasificación. Los resultados son concordantes en los casos polares: negativos en lepromatosos y positivos en tuberculoides. Los casos indeterminados dan resultados variables y concordantes. En cambio, en los casos dimorfos los resultados varían de acuerdo a las diferentes formas en BT, BB o BL.—Authors' Summary

Immuno-Pathology

Bahr, G. M., Rook, G. A. W. and Stanford, J. L. Prostaglandin-dependent regulation of the *in vitro* proliferative response to mycobacterial antigens of peripheral blood lymphocytes from normal donors and from patients with tuberculosis or leprosy. Clin. Exp. Immunol. **45** (1981) 646–653.

The response to soluble mycobacterial antigens of peripheral blood mononuclear cells, from most normal donors, tuberculosis patients, or cases of tuberculoid leprosy (TT/BT) was enhanced by the addition of indomethacin. In contrast, indomethacin caused no enhancement of the response of cells from lepromatous leprosy (BL/LL) cases. Moreover, the addition of 10^{-5} M prostaglandin E_2 (PGE_2) failed to inhibit the proliferative responses of peripheral blood mononuclear cells from the other groups. The addition of PGE_2 or indomethacin to cells which had been precultured for 48 hr had no significant effect on the proliferative

responses of cells from any of the groups of donors. These results suggest that a normal, prostaglandin-dependent, indomethacin-sensitive regulatory mechanism is absent from the peripheral blood mononuclear cells of BL/LL patients.—Authors' Summary

Deo, M. G., Bapat, C. V., Chullawalla, R. G. and Bhatki, W. S. Potential anti-leprosy vaccine from killed ICRC bacilli—A clinicopathological study. Indian J. Med. Res. **74** (1981) 164–177.

Results of a clinical trial of a potential vaccine, prepared from ICRC bacilli (Strain C-44) killed by gamma-irradiation, are described. The "vaccine" was administered to 46 LL and 11 BB/BL patients who were on treatment with dapsone (DDS). Ten LL patients with high BI had also received rifampin for varying periods. Similarly treated 9 LL patients, who received saline used as the vehicle in the vaccine, served as controls. As expected, all patients were lepromin (Mitsuda) negative prior to vaccination. The "vaccine" was well-tolerated and produced no ill effects up to 15 months of observation period; 30 percent of LL patients developed ENL, which appeared to be related to high BI (bacillary index). No ENL was observed in the other groups. Histopathological examination of skin biopsies from the vaccinated LL patients revealed a picture consistent with regressive change. Four months after vaccination, lepromin conversion was observed in 50 and 80 percent of LL and BB/BL cases respectively. Lepromin reaction was also stronger in the latter. Since the rate of lepromin conversion and the intensity of the reaction appear to run parallel to immunological potentials of different groups, it is concluded that the ICRC "vaccine" induced conversions are linked to host immune mechanism specific against *M. leprae*. None of the patients, even in the BB/BL, showed any evidence of fresh nerve lesions. The data suggest that the "vaccine," which would have utility in immunoprophylaxis against leprosy, could be safely used in the field trials.—Authors' Summary

Greiner, J., Weber, F. J., Mauff, G. and Baur, M. Genetic polymorphisms of properdin factor B(Bf), the second component (C2), and the fourth component (C4) of complement in leprosy patients and healthy controls from Thailand. Immunobiol. **158** (1980) 134–138.

It is now assumed that immunogenetic factors play an important role in developing leprosy. According to current theory, the function of T and B lymphocytes in their cellular and humoral immunity is controlled by immune-response genes (Ir) which are closely linked to the known loci of the major histocompatability complex (MHC) on the short arm of chromosome 6. Genetic and immunologic considerations prompted us therefore to look for associations between the HLA system, complement factors, and leprosy.

Frozen serum samples were from healthy Thai and Chinese individuals and from leprosy patients from Northern Thailand. Significant positive and negative associations between leprosy and HLA were reported in different populations. In the first part of the study, HLA types of 205 leprosy patients with 183 controls as well as phenotypes of other genes in the MHC-linkage group were compared. There was a strong association of HLA-B7 with lepromatous leprosy and of HLA-B17 with the tuberculoid type. The allele PGM_3^1 was less represented in the TT and more frequent in the LL group as compared to healthy controls.

The distribution of Bf and C2 phenotypes among controls and leprosy patients, classified into the subtypes TT, BT, BB, BL, and LL, as well as a total group revealed no significant deviations. C4 types were classified in 201 patients and 123 healthy control persons by the presence or absence of fast F bands (F1), F bands, intermediate bands (I), S bands, and slow S bands (SR = S "rare"). Most remarkably, the fast C4 type, provisionally named C4F1, only occurred in the group of borderline and lepromatous cases. It appears that C4 polymorphism will prove increasingly informative if more extensive phenotyping of C4 will be possible.—(*Adapted from* the article)

León, A. P. Immunoterapia de la lepra. (Immunotherapy of leprosy.) Dermatologia **25** (1981) 27–33. (in Spanish)

Se refieren seis casos de lepra, cuatro de la forma LL y dos de la BL que fueron tratados por el autor con inmunoterapia activa por un antígeno, el polisacárido de *M. tuberculosis* combinado a IgG, asociada a al quimioterapia con rifampicina, que respondieron con muy buena mejoría clínica en cuatro casos, buena en un caso y moderada en el otro, con negativización del IM en 3 meses y negativización del IB en cerca de un año. Se refieren resultados semejantes obtenidos por varios autores con la inmunoterapia sola o asociada a la quimioterapia, usando diferentes agentes inmunomodulares. El autor clasifica los inmunomodulares en activos, pasivos y químicos.—Author's Summary

Rodbard, D. The role of regional body temperature in the pathogenesis of disease. New Engl. J. Med. **305** (1981) 808–814.

This is a brief but comprehensive review of the interplay between temperature and parasites and its impact on the pathogenesis of a wide range of infectious and non-infectious diseases. Syphilis, leprosy, and mycotic, rickettsial, chlamydial, viral, and protozoal diseases are included. Many classic observations on the physical diagnosis of disease can be placed on a rational basis by considering the manifold effects of local temperature gradients. Temperature is one of the factors to be considered in the use of laboratory animal models, conditions for *in vitro* culture attempts, and in the search for a reservoir of a pathogenic agent in nature.—RCH

Sansonetti, P. and Lagrange, P. H. The immunology of leprosy: speculations on the leprosy spectrum. Rev. Infect. Dis. **3** (1981) 422–469.

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae*. The disease presents a wide spectrum of clinical manifestations, ranging from lepromatous to tuberculoid leprosy; each form may be punctuated by episodes of acute exacerbation, called reactional states. These polar forms and reactional states appear to be determined by immunologic interactions between the host and the microorganism. This review describes the different measurable parameters that permit the classification of a particular form according to clinical, bacteriological, histologic, and immunologic spectra. Secondly, the current state of knowledge on essential immunologic features of leprosy is presented, with a description of the various alterations of cellular and humoral immune responses that can be tested by specific and nonspecific methods. The last part of the review is devoted to an analysis of the leprosy spectrum and to speculations about a number of possible factors that may influence the immune response of the host in a manner analogous to that observed in experimental models. (274 references)—Authors' Summary

Zhou Yong, *et al.* A modified procedure of oxidative acid-fast staining for non-deparaffinized sections of leprosy tissue. J. Clin. Dermatol. **10** (1981) 148–149.

This article describes a modified procedure of oxidative acid-fast staining for demonstrating leprosy bacilli in tissue sections. It can raise the positive rate, positive intensity, and morphological index. It has the merit of being simpler in technique, time-saving, and devoid of fading of specimen material and red coloring of the background. It also makes it easier to find and identify a few acid-fast mycobacteria in a weakly positive section.—Authors' Summary

Microbiology

Asselineau, C., Clavel, S., Clément, F., Daffé, M., David, H., Lanéelle, M. A. and Promé, J. C. Constituants lipidiques de *Mycobacterium leprae* isolé de tatou infecté expérimentalement. (Lipidic constituents of *Mycobacterium leprae* isolated from experimentally infected armadillo). Ann. Microbiol. (Inst. Pasteur) **132** (1981) 19–30. (in French)

Mycobacterium leprae (obtained from experimentally infected armadillo) was sub-

mitted to saponification. The liposoluble part was methylated and fractionated by chromatographic methods. Each fraction was studied by gas-liquid chromatography. Cholesterol (from the infected host) and the main fatty acids were identified. Mycolic acids were isolated, and their structures determined, using mass spectrometry. These structures are useful to make a comparison of *M. leprae* with some other mycobacteria. Some of these comparisons are discussed here. The absence—or, at least, the very low level—of tuberculostearate suggests comparative studies of *M. leprae* and *M. gordonae*.—Authors' Summary

Hunter, S. W. and Brennan, P. J. A novel phenolic glycolipid from *Mycobacterium leprae* possibly involved in immunogenicity and pathogenicity. J. Bacteriol. **147** (1981) 728–735.

A phenolic glycolipid was obtained in high amounts (2% of dry weight) from *Mycobacterium leprae* isolated from infected armadillo liver. Infrared and nuclear magnetic resonance spectroscopy showed that it is closely related to "mycoside A" from *Mycobacterium kansasii* and is therefore a glycosylphenolic phthiocerol diester. The crucial difference between the two products is in the composition of the attached trisaccharide. Gas-liquid chromatography-mass spectroscopy showed that the product from *M. kansasii* is composed of 2,4-di-*O*-methylrhamnose, 2-*O*-methylrhamnose, and 2-*O*-methylfucose, whereas that from *M. leprae* contains 2,3-di-*O*-methylrhamnose, 3-*O*-methylrhamnose, and 3,6-di-*O*-methylglucose. The distinct composition of the oligosaccharide segment of the glycolipid from *M. leprae* may make it useful for the chemical and serological differentiation of this organism from other mycobacteria. Surprisingly large quantities (2.2 mg/g of dry liver) of the glycolipid were also found in infected liver residue freed of *M. leprae*, suggesting that it may be responsible for the electron-transparent "foam" surrounding the organism in infected lepromatous tissue.—Authors' Summary

Ishaque, M. *In vitro* cultivation of *Mycobacterium lepraemurium* and its identification by animal inoculation. Can. J. Microbiol. **27** (1981) 788–794.

The primary *in vitro* cultures from lepromata of mice or rats previously infected with the Hawaiian strain of *Mycobacterium lepraemurium* were obtained on Ogawa egg-yolk medium at 34°C in approximately 90 days of incubation. Optimal growth of subcultures was achieved in 40 to 60 days of incubation, and such cultures were used to test their pathogenicity in animals. The *in vitro* grown subcultures provoked subcutaneous lepromata in mice identical to those produced by the *in vitro* grown *M. lepraemurium*. Also, mice infected subcutaneously and intravenously with the *in vitro* grown subcultures developed lesions in livers, spleens, and kidneys similar to those of mice infected with the mouse passage murine leprosy bacilli. Microscopically and histopathologically, the acid-fast bacilli derived from organs infected with the *in vitro* or *in vivo* grown cultures were indistinguishable from each other.—Author's Summary

Prasad, H. K. and Nath, I. Incorporation of ^{3}H-thymidine in *Mycobacterium leprae* within differentiated human macrophages. J. Med. Microbiol. **14** (1981) 279–293.

The factors influencing the incorporation of ^{3}H-thymidine (^{3}H-Tdr) in the DNA of *Mycobacterium leprae* within macrophages derived from human blood have been evaluated. Fifty strains of *M. leprae* derived from skin nodules of patients with lepromatous leprosy were studied for their ability to incorporate ^{3}H-Tdr. Control macrophages of the same donor maintained alone, or with autoclaved *M. leprae*, showed low levels of baseline ^{3}H-Tdr incorporation. During a 15-day period of pulsing, 27 of the *M. leprae* strains incorporated ^{3}H-Tdr at levels of 216–2834% of the incorporation by control cultures. Significant incorporation was observable by the second week of culture and cumulative increases occurred by the third week. A 24-h pulse with ^{3}H-Tdr was inadequate for a detectable increase. A minimal duration of 4–5 days of continuous pulsing was required to obtain a significant increase in the incorporation of ^{3}H-Tdr. Of the 50 *M. lep-*

rae strains, 23 (46%) failed to incorporate the radiolabel. This failure was apparently not related to differences in the disease status of patients, to the transport conditions for the biopsies, to morphological indices of the extracted *M. leprae* or to the origin of the host macrophages.—Authors' Summary

Experimental Infections

Lefford, M. J., Morgan, R. and Logie, P. S. Effect of *Mycobacterium bovis* BCG vaccination upon *Mycobacterium lepraemurium* infection. Infect. Immun. **28** (1980) 860–866.

Mice were infected with 10^8 *Mycobacterium lepraemurium* in the foot pad (unsuppressed mice), and some of these animals were concurrently given 10^9 heat-killed *M. lepraemurium* intravenously (suppressed mice). These groups of mice were preimmunized with 10^7 viable organisms of *Mycobacterium bovis* BCG by several routes. BCG inhibited the proliferation of *M. lepraemurium* in the unsuppressed mice, but not in the suppressed mice. In effect, the intravenous administration of heat-killed *M. lepraemurium* suppressed the immunity to *M. lepraemurium* that BCG vaccination had engendered. BCG did not protect normal mice against intravenous infection with *M. lepraemurium*. It appears that the inhibitory effect of BCG vaccination upon *M. lepraemurium* infection is due to cross-reactive immunity rather than to nonspecific immunity or immunopotentiation. Thus, the route of BCG vaccination was immaterial, and vaccination 12 weeks before *M. lepraemurium* infection was as beneficial as vaccination 4 weeks before infection. Moreover, spleen cells from *M. lepraemurium*-immunized mice conferred adoptive immunity to BCG. The implications of this study for the use of BCG as a prophylactic and therapeutic agent in human leprosy are discussed.—Authors' Summary

Patel, P. J. Antibacterial resistance in mice infected with *Mycobacterium lepraemurium*. Clin. Exp. Immunol. **45** (1981) 654–661.

The differences in susceptibility among C57Bl/6, DBA/2 mice and their F_1 hybrids to infections with *M. lepraemurium* were shown to depend upon the route of infection and size of the inoculum. A method was developed to measure the ability of lymphocytes obtained from *M. lepraemurium*-infected donors to effect adoptive immunization of syngeneic naive mice against infection with *M. tuberculosis*. This required sublethal irradiation of recipient mice prior to cell transfer and bacterial challenge. Using this method, it was found that mice infected subcutaneously generated antituberculosis immune mechanisms concordantly with the development of delayed hypersensitivity to antigens of *M. lepraemurium*. In contrast, intravenously infected mice demonstrated only a transient form of delayed hypersensitivity and little or no antimycobacterial immunity in that progression of infection was associated with a rapid decay of both these functions. Moreover, during the terminal stages, *M. lepraemurium*-infected mice lost the ability to control the growth of a sublethal intravenous inoculum of the antigenically unrelated bacterium, *Listeria monocytogenes*.—Author's Summary

Epidemiology and Prevention

Ministry of Health and of the Environment, Rio Grande do Sul, Brazil. Status of leprosy in Rio Grande do Sul, Brazil, 1979. Epid. Bull. **2** (1981) 12–15.

In 1979, 222 new cases of leprosy were diagnosed in Rio Grande do Sul, Brazil, representing an incidence of 2.73 cases/100,000 population. The state is located in the southeast of the country and it has 232 municipalities and 7,665,372 inhabitants. The active register of cases also included nine patients from other states and six in-

dividuals who had a recurrence of the disease, making a total of 237 cases in 1979.

Among the new cases, there was a marked predominance of more advanced ages; no case occurred in children under 5 years and only ten cases occurred in the under 15 age group. The distribution by sex showed a slightly higher incidence among females (112 against 110 male cases). Of the contagious forms of leprosy (lepromatous and dimorphous), 74 occurred in men and 56 in women.

Of the total of 237 cases registered, the most frequent clinical forms were lepromatous (43.9%) and tuberculoid (28.7%). As for the detection of the disease the majority of the cases (55) were discovered during medical consultations (50.6%), while 23 (18%) were reported cases.

On 31 December 1979, 3195 cases of leprosy had been registered in Rio Grande do Sul, representing a prevalence of 0.39 cases/1000. On the basis of WHO criteria, the state would be regarded as an area of medium endemicity (prevalence of between 0.2 and 1.0 cases/1000).

Of the cases reported, 63.9% were defined as lepromatous, 17.0% as tuberculoid, 10.3% as indeterminate, and 8.8% as dimorphous.

The coefficient of prevalence maintained the decreasing trend observed since 1968. There was a small increase in the number of registered cases in relation to the preceding year (3143), representing a rise of 1.65%, which is less than the state's population growth, calculated at 2.03% per annum.—(*Adapted from* the article)

Rehabilitation

Institute of Dermatology, Chinese Academy of Medical Sciences. Transplantation of posterior tibial muscles for correcting leprous foot-drop. J. Clin. Dermatol. **10** (1981) 129–131.

The tibialis posterior tendon transfer operation is frequently used to correct the foot drop of leprosy. The author presented results in 62 cases, altogether 64 feet: excellent 40, good 12, fair 4, no change 8. The advantages and disadvantages of various techniques and the cause of success and failure were discussed. The author believes that the tibialis posterior tendon fixed to the foot through the tunnel in front of the tibia was a good procedure, but not available for the varus deformity. In the other case, transferred tendon fixed to the foot through the interosseous membrane was used. If there was not osteoporosis, the transferred tendon was frequently fixed to the second cuneiform bone. Otherwise, the transferred tendon was fixed to the extensor hallucis longus or extensor digitoris longus. If the patient had digit-drop, tenodesis was necessary.—Authors' Summary

Other Mycobacterial Diseases and Related Entities

Brostoff, J., Lenzini, L., Rottoli, P. and Rottoli, L. Immune complexes in the spectrum of tuberculosis. Tubercle **62** (1981) 169–173.

We describe the presence of immune complexes in the spectrum of tuberculosis. The reactive patients with localized lesions have little free antibody and no immune complexes in the serum. The unreactive patients have high levels of antibody and complexes. A rising or maintained titer of immune complexes may be an indication of either bacterial drug resistance or failure of host response, or both. A measurement of immune complexes may be a useful tool in the management of patients with tuberculosis.—Authors' Summary

Gatner, E. M. S. and Rubinstein, E. The pattern of age-specific tuberculin hypersensitivity in two groups of South African schoolchildren. Tubercle **62** (1981) 181–185.

In epidemiological studies on tuberculosis we have observed a decrease in the prevalence of positive tuberculin reactions around the age of 13. This decrease was apparent in a variety of populations stud-

ied. Statistical analysis of the tuberculin testing data demonstrates the significance of the decrease in the proportion of positive reactors at age 13 and also of a reduction in size of reactions. The possibility of suppression of the delayed hypersensitivity reaction at about puberty is considered.—Authors' Summary

Kanai, K., Kondo, E. and Yasuda, T. An electron microscopy study of intra-cellular mycobacteria in experimental mouse tuberculosis. Tubercle **62** (1981) 187–195.

Ultrathin sections for electron microscopy (EM) were prepared from granulomatous lungs which developed in mice in response to experimental infection by a highly virulent strain of *M. bovis*. A subsidiary study was made of the EM appearance of mycobacteria separated from the lung tissue homogenate by differential centrifugation and trypsin-digestion.

Examination of many micrographs showed that the phagosomal membrane may, at least partly, be in close contact with the cell wall of ingested mycobacteria. Such areas of contact often produce an electron-dense granularity or a row of evenly spaced minute granules, accompanying the damage to the inner structure of the bacterial cell.

A variety of disintegrating bacterial figures were observed, characterized by inward detachment of the plasma membrane, shrinkage and digestion of the cytoplasm, and occasional rupture of the cell wall. Various forms of lamellated and osmophilic inclusion bodies were present in macrophages, but their relation to ingested mycobacteria was uncertain.—Authors' Summary

Mahakrisnan, A., Rajasekaram, V. and Pandian, P. I. Case Reports. Disseminated cutaneous rhinosporidiosis treated with dapsone. Trop. Geogr. Med. **33** (1981) 189–192.

A case of disseminated cutaneous rhinosporidiosis is reported. The possibility of leprosy was excluded. Dapsone was found very effective in curing the cutaneous nodules. Though many chemotherapeutic agents have been tried both topically and internally, so far surgery is considered to be the effective method of treatment. Our experience with this case suggests that dapsone may be a successful drug in cutaneous rhinosporidiosis.—Authors' Summary

Satyanarayana, K., Bhaskaram, P., Seshu, V. C. and Reddy, V. Influence of nutrition on postvaccinal tuberculin sensitivity. Am. J. Clin. Nutr. **33** (1980) 2334–2337.

Response to BCG vaccination was studied in 261 apparently normal preschool children in a community. They were classified into different nutritional groups based on deficit in weight for age. In addition, nine children who had kwashiorkor and were admitted to the hospital were investigated. They were given 0.1 ml of BCG vaccine, and 6 months later, tuberculin sensitivity was assessed using 5 U of PPD. Blood samples were collected from 84 subjects and leukocyte migration inhibition was determined using the same antigen. After BCG vaccination, over 80% of children in the community showed a positive tuberculin test, irrespective of the extent of growth retardation. There were no significant differences in the size of induration or the percentage of reactors between the various groups, indicating that the immune response to BCG vaccination is not affected by milder grades of malnutrition. However, the skin test was negative in most of the children who had kwashiorkor. Leukocyte migration inhibition was similar in all the groups of children, including those with kwashiorkor, indicating that sensitization of lymphocytes was not influenced by the nutritional status. In children with kwashiorkor, the leukocyte migration inhibition test was positive though the skin test was negative, suggesting that the former may be a better measure of assessing the response to BCG vaccination.—Authors' Summary

Scientific Working Group on Filariasis. The immunology of filariasis. Bull. WHO **59** (1981) 1–8.

This report summarizes the available information on the immunology of filariasis and discusses immunodiagnosis and the immunological factors influencing the host-parasite relationship in lymphatic filariasis and onchocerciasis. Several areas that re-

quire further research are identified, particularly concerning the development of new serological techniques and the fractionation of specific antigens. The problems associated with vaccine development are considered and the importance of finding better animal models for research is stressed.—Authors' Summary

NOTICE

Owing to circumstances beyond our control the Congress has been rescheduled and will now take place 16–25 February 1984 in New Delhi (workshops 16–18 February, Congress 20–25 February).—M. F. Lechat, President, International Leprosy Association.