

## CURRENT LITERATURE

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## General and Historical

**LEPROSY IN INDIA, Vol. 48, No. 4 (Supplement), 1976.** Baroda Leprosy Conference Special Issue, April 10-14, 1976, pp 460-893.

The supplement to issue Number 4 of *LEPROSY IN INDIA* (Vol. 48, 1976) was delayed in issue because of its size (435 pages), and therefore this notice is delayed. It is a special issue covering the Baroda Leprosy Conference (April 10-14, 1976). The contents are too voluminous to abstract for this section of the *IJL*.

The first 274 pages contain the proceedings and addresses to the conference as well as the reports of the six scientific sessions of the Indian Association of Leprologists, and the five working sessions of the All India Leprosy Workers Conference in which new concepts are expressed and the application of many established concepts relating to leprosy are discussed.

The latter half of the issue contains two appendices. Appendix "A" contains 27 selected papers relating to epidemiology, experimental studies and pathology, clofazimine therapy, deformities and rehabilitation; and finally, clinical aspects including complications and therapy.

Appendix "B" contains 13 selected papers concerning leprosy control, rehabilitation, health education, field problems and general aspects of leprosy. This issue is well worth special attention because of its broad coverages.—O. K. Skinsnes

**Meade, T. W.** How effective is the treatment of leprosy? *Lepr. Rev.* **48** (1977) 3-8.

This transcript of the 1976 Clayton Memorial Lecture sets the problem of eradicating leprosy against a similar situation affecting several other major diseases. We already have sufficient knowledge either to eradicate or radically influence the prevalence of such diseases, but they nevertheless continue with little prospect of any rapid decline. The reasons for this unbridged gap between knowledge and its effective application vary to some extent. The various factors in the "application gap" which are of relevance to leprosy are discussed and the importance of prevention as a primary objective is emphasized.—Author's Abstract

**Turk, John L.** Leprosy as a model of subacute and chronic immunologic diseases. *J. Invest. Dermatol.* **67** (1976) 457-463.

A review has been made of the immunologic bases for the various clinical appearances that may be found during infection with *M. leprae*. This infection may serve as a model for the understanding of the mechanisms behind the same clinical appearances when they occur in situations in which the primary etiologic agent has not yet been discovered.

[This paper was one of many contributions to a symposium on immune mechanisms in cutaneous disorders, published in this special issue of the journal.]—(From *Trop. Dis. Bull.*)

## Clinical Sciences

**Alamdarov, I. N., Verbina, N. K. and Kaluznii, N. A.** The differential diagnosis of leprosy and myelodysplasia. *Sci. Works Lepr. Res. Inst.* **9/14** (1976) 94-98. (In Russian)

The differential diagnosis of leprosy and myelodysplasia presents some difficulties. The authors give the differential diagnosis of leprosy and myelodys-

plasia. In four patients with myelodysplasia the nondifferentiated type of leprosy was diagnosed in two. They were treated in spite of not confirming the diagnosis histopathologically and bacteriologically. Trophic disorders (trophic ulcers, mutilations of the fingers, osteolysis ossis pedis) in the patients were similar to such changes in leprosy. Not characteristic of leprosy were the [rootbet?] type of sensitivity disorders, the atrophy of not only the shank muscles but of the thigh too, imperative urges to urinate, hypertrichosis in the waist region and of the affected extremities. In two other patients the pelvic disorders predominated. In all patients Spina bifida roentgenologically in lumbar vertebrae was found.—(Adapted from N. Torsuev's translation)

**Almeida Neto, E.** Viragem lepromínica en crianças de 4 a 26 meses. [Changes in lepromin reaction in children aged 4-26 months.] *An. Bras. Dermatol.* **50** (1975) 111-134. (In Portuguese)

This is a trial of repeated BCG vaccination by the oral route in children previously lepromin and tuberculin (PPD) negative, in a social institution for children whose parents live in a leprosy hospital. Twenty-two of them were followed through two years and seven successive BCG doses, the Mitsuda test being performed after each. A control group of 17 children from other origins was also tested and followed in the same way. At the end of the study two children remained Mitsuda negative (5.2%), six had doubtful reactions (15.4%), and 31 had turned positive (79.4%). The effect of successive doses is analyzed in detail and genetic factors which might affect the reaction are discussed. Results are also compared with those of other trials of BCG vaccination against leprosy, and technics for reading the Mitsuda test are discussed.—(From *Trop. Dis. Bull.*)

**Andersen, Johs. G.** Surgical management of gross mid-foot damage. *Lepr. Rev.* **48** (1977) 35-42.

A technic is presented for radical surgical management of gross mid-foot damage with preserved, useful plantar skin in the heel area. It is essentially a combination of pre-talar amputation and calcaneo-tibial fusion with the calcaneum in 45 degrees rotation.

This ensures a sound weightbearing surface and a trouble-free take-off area. This technic does not depend on sophisticated orthoses or prostheses.—Author's Abstract

**Bogush, T. G.** The question of the menstrual function in women with lepromatous leprosy before pubescence. *Sci. Works Lepr. Res. Inst.* **9/14** (1976) 116-118. (In Russian)

The author studied the menstrual function in 86 adult women who developed lepromatous leprosy before pubescence. The frequency and character of menstrual dysfunctions in such patients are given. Early initiation of antileprosy treatment with sulfone drugs prevents menstrual dysfunction.—(Adapted from N. Torsuev's translation)

**Carayon, A., Courbil, J. L. and Merrien, Y.** Réactivation proximale des muscles intrinsèques des doigts dans les paralysies cubitales de la lèpre. [Proximal reactivation of the intrinsic muscles of the fingers in cases of cubital paralysis in leprosy.] *Acta Leprol.* **66-67** (1977) 163-173. (In French)

In cases of cubital paralysis in leprosy the authors describe a technic for reactivation of the intrinsic muscles, at the level of the palm of the hand, sectioning the large palmar muscle at the wrist and its extension by four narrow strips of fascia lata. They analyze the technical problems posed by this operation and its results in 27 cases.—(Adapted from authors' English summary)

**Fleury, R. N., Opromolla, D. V. A., Tolentino, M. M. and Tonello, C. J. S.** Hanseníase Virchowiana do couro cabeludo. [Virchowian Hanseniasis of the scalp.] *Hansen. Int.* **1** (1976) 25-32. (In Portuguese)

A study was made of the scalp involvement in 30 males suffering from active virchowian Hanseniasis (lepromatous leprosy). Clinical evaluations were made before and after the patients' heads were shaved and four "punch" biopsies were performed in standardized locations. The results showed that shaving increased the possibility of detecting clinical lesions, which are present in the large majority of patients. These lesions were principally of the macular form. The results also showed the existence of alopecia

related to the specific process. Histopathologically, all patients showed signs of specific involvement either by the presence of infiltration or by the presence of bacilli in the core of infiltrated mononuclear cells. In spite of this involvement, it could not be compared with that observed in the rest of the skin. The infiltrated areas were always discretely regressive. Bacilli were always few and granular. This finding demonstrates the anatomical peculiarities of the scalp, which is not a suitable locale for the development of bacilli.—(*Adapted from authors' English summary*)

**Horta, Eduardo Parreiras.** Tratamento de nevrite Hanseniana com medicação anti-Hanseniana mais hidrazida. [Treatment of neuritis in leprosy with antileprosy drugs and isoniazid.] *An. Brasil. Dermatol.* **52** (1977) 35-39. (In Portuguese)

Good results were obtained in treating neuritis in leprosy by using a combination of sulfone or clofazimine and isoniazid, 400 mg per day.—(*Adapted from author's English summary*)

**Kenzebaiev, A. Ja. and Vdovina, N. A.** Absorption of oleic acid in the intestines of leprosy patients. *Sci. Works Lepr. Res. Inst.* **9/14** (1976) 138-140. (In Russian)

The loss of oleic acid in feces of persons with leprosy is increased depending on the heaviness and duration of leprosy and on accompanying diseases of the gastro-intestinal tract. The most intensive steatorrhoea occurs when the specific leprosy process is increasing and in cases with atrophic alteration of the small intestine's mucous membrane.—(*Adapted from N. Torsuev's translation*)

**Lee, J. B., Kim, H. O., Houh, W. and Choi, S. R.** Prognosis of leprosy under chemotherapy. I. Bacterial Index in lepromatous and borderline leprosy. *Korean Med. Abstracts* **7** (1977) 33.

This survey was to elucidate the bacterial clearance time (BCT) in patients with lepromatous and borderline leprosy who had been under chemotherapy and had been followed by bacterial examinations four times a year for more than three years at the Chronic Disease Laboratory of the Catholic Medical College.

Ninety-nine patients, 53 lepromatous and 46 borderline, were selected for this study. These patients were classified into two groups: 80 patients with negative and 19 patients with positive Bacterial Indices (BI).

The patients with a negative BI were subdivided into three groups by BCT: 1) rapid decrease group (RA group),  $BCT < 4$  years; 2) standard decrease group (ST group),  $4 \leq BCT < 7$ ; and 3) slow decrease groups (SL group),  $7 \leq BCT$ .

The results were as follows:

1. Patients should be under regular and uninterrupted chemotherapy for more than three years, and up to seven years.

2. There is a close relationship between the type of leprosy and BCT as well as with the type of leprosy lesion. The borderline group showed a better response than the lepromatous, and erythematous macular lesions showed a better response than nodular lesions.

3. The age of onset, sex, lepra reaction, time lag from onset of the disease to start of treatment and previous treatment had no effect on the BCT.—(*Adapted from English abstract*)

**Miller, S. H. and Wood, A. M.** Surgical treatment of facial nerve involvement caused by leprosy. *Am. J. Trop. Med. Hyg.* **25** (1976) 445-448.

Following a discussion of nerve damage underlying facial paralysis in leprosy, muscle transfer procedures are described: temporalis transfer to the eyelid, and masseter transfer to the mouth and nasolabial fold. These were found successful in small minimally equipped hospitals in Africa.—T. F. Davey (*From Trop. Dis. Bull.*)

**Namasivayam, P. R.** A spiral splint for claw fingers. *Lepr. India* **48** (1976) 258-260.

A simple spiral splint made from galvanized iron wire is described for use in early paralysis of the small muscles of the fingers and in claw fingers. This splint will prevent stretching of the weak or paralyzed muscles by keeping the metacarpophalangeal joints of the fingers in slight flexion. It will also help to prevent flexion contractures of the interphalangeal joints by encouraging active extension of these joints.—(*From Trop. Dis. Bull.*)

**Sehgal, V. N., Agarwal, D. P. and Sehgal, N.** Ocular leprosy. *Indian J. Med. Res.* **64** (1976) 1600-1606.

Four hundred and thirty leprosy patients were studied for ocular involvement of which 229 were tuberculoid, 69 lepromatous, 69 borderline, 63 neuritic, and 3 patients in reaction of which 2 were lepromatous and 1 borderline. Ocular lesions were seen in 106 patients: 43 (18.7%) tuberculoid, 30 (43.4%) lepromatous, 15 (21.7%) each borderline and neuritic, and 3 (4.2%) in reaction. The majority of patients with eye afflictions ranged from ages 20-59 years. The most common clinical signs in the different types of leprosy were madarosis and infiltration of eyebrows and eyelids and these were seen frequently in lepromatous leprosy. Conjunctivitis, episcleral nodules, interstitial keratitis, pannus, punctate keratitis and corneal opacities were also seen but their occurrence was infrequent. Affection of the posterior segment of the eye was uncommon. The demonstration of *Mycobacterium leprae* in conjunctival scrapings and/or fluid in patients with lepromatous leprosy was of interest as it supports the earlier reports of direct invasion of ocular tissues in this type of leprosy.—(Adapted from authors' abstract)

**Terencio de las Aguas, J., Gatti, C. F. and Herburger, E.** Modificaciones clinicas e histologicas de la reaccion de Mitsuda en enfermos de lepra lepromatosa inactivada. [Clinical and histologic modifications of the Mitsuda reaction in inactive leproma-

tous leprosy.] *Fontilles II* (1977) 37-44. (In Spanish)

Mitsuda tests were performed on 46 polar lepromatous patients who had over a year of clinical and bacteriologic activity. Clinical positivity was detected in three cases. This was histologically confirmed by visible tuberculoid granuloma. These three cases belong to the group of patients with over 11 years inactivity, seriously affected peripheral nervous systems, and still under medical treatment. The lepromin reaction remains negative for the rest of lepromatous patients' lives in all but a few exceptional cases.—(Adapted from authors' English summary)

**Verbina, N. K., Evstratova, V. A. and Leshenko, A. I.** Influence of monotonic and complex treatment of the peripheral nervous system in leprosy patients. *Uchenye Zapiski Inst. Isutcheniou Lepr.* **9/14** (1976) 83-84. (In Russian)

A comparative estimation is given of the influence of monotonic (monovalent) and complex treatment on the state of the peripheral nervous system in leprosy patients. Regression of the neuritic symptoms occurred twice as often in the patients receiving complex treatment, when compared with patients treated with only one drug. The increase of symptoms of the nervous system affection in patients having neuritis before treatment took place with the same frequency independent of monotonic or complex treatment.—(Adapted from N. Torsuev's translation)

## Chemotherapy

**Beiguelman, Bernardo.** Terapêutica da lepra e farmacogenética. [Leprosy therapy and pharmacogenetics.] *Hansen. Int.* **1** (1976) 61-78. (In Portuguese)

Some pharmacogenetic traits which are human genetic polymorphisms and that influence the action of 4,4'-diaminodiphenylsulfone (DDS), the most widely used drug in leprosy therapy, were analyzed. Special attention was given to the polymorphisms of acetyltransferase, glucose-6-phosphate dehydrogenase and NADH methemoglobin reductase. Besides the review and critical analysis of the pertinent literature, suggestions

for further investigations are presented.—Author's English Summary

**Beiguelman, Bernardo and Pisani, Regina C. B.** Chromosomal aberrations in leukocyte metaphases of leprosy patients under dapsone therapy. *Hansen. Int.* **1** (1976) 53-60.

Chromosome analyses were made on leukocyte metaphases of 18 leprosy patients who were ingesting daily doses of 50 mg or 100 mg of DDS and of 40 healthy individuals used for control.

These analyses have shown that the pro-

portion of numerical chromosomal aberrations in the leukocyte metaphases of the leprosy patients did not differ significantly from that observed in the cells of the controls. In contrast, the frequency of cells with chromatid or chromosome breaks and gaps was significantly increased in the leukocytes of leprosy patients.

Multiple regression analysis applied to the data recorded has shown that the increase of breaks and gaps in the chromosomes of leprosy patients cannot be attributed to age, years under sulfone therapy, or to concentration of DDS in blood.—Authors' Summary

**Bragina, B. S., Chernisheva, L. M. and Khrikov, N. A.** The effectiveness of rifampicin in leprosy. *Sci. Works Lepr. Res. Inst.* 9/14 (1976) 105-109. (In Russian)

Thirty-three patients with leprosy (30 lepromatous, 3 tuberculoid) were treated with rifampicin, 300-400 mg per day. The duration of treatment was 6-12 months. Skin eruption regression began after 2-3 weeks of treatment. After 6-12 months there was full regression of the infiltrative nodule eruptions, the bacterial and pathomorphologic data being improved. The best results occurred in patients who had not had previous antileprosy treatment and in patients with relapses of the disease.—(Adapted from N. Torsuev's translation)

**Bragina, V. S., Loginov, V. K., Ryzova, N. J., Sluvko, Z. A. and Lintchevkaia, A. P.** Prothionamide in the complex treatment of leprosy. *Uchenye Zapiski Inst. Isuthcheniu Lepr.* 9/14 (1976) 77-82. (In Russian)

Patients treated only with prothionamide showed positive regression of skin eruptions and improvement of bacteriologic and histologic data. When given together with sulfones and Ciba-1906, prothionamide improved the results of treatment. Prothionamide is as active as ethionamide and is well tolerated by the patients.—(Adapted from N. Torsuev's translation)

**Carayon, A.** Limites actuelles de la chimiothérapie antihansénienne sur la névrite et danger de ses effets secondaires immunologiques. [Current limitations of antileprotic chemotherapy for neuritis and danger of secondary immunologic effects.]

*Med. Afr. Noire* 23 (1976) 567-577. (In French)

From his long and wide field experience in Africa, the author gives timely warnings against generalizations in the treatment of leprosy. Since the pathology of nerve damage is complex and multifactorial, treatment that is successful in controlling the disease may have little effect, or an adverse effect, on the appearance or worsening of damage to peripheral nerves. The action of antileptotics on leprosy bacilli present within the nerves depends on such factors as diffusion of the drug and its relative solubility in lipids, and on such side-effects as rupture of the bacilli and of tissue cells. Another factor that has some bearing on the limitations of drug therapy is the apparent induction of suprarenal insufficiency through some little understood mechanism.

The author reviews the wide range of drugs now available for the treatment of leprosy and attempts to assess their place in the prevention and control of damage to the peripheral nerves. He favors clofazimine in the general treatment of multibacillary leprosy and suggests that, despite the fact that it does not enter the nerves themselves, it appears to exert its bacteriostatic effect by intracellular concentration in the neighborhood of engulfed and multiplying bacilli.

The apparent effect of the various drugs on cellular immunity in relation to progressive nerve damage is briefly assessed and the indications for the use of rifampicin, clofazimine and the sulfonamides are reviewed, together with the action of the various anti-inflammatory products now available. He gives a warning against the use of drugs in borderline leprosy that might provoke dangerous degrees of cellular reaction, with resulting irreversible damage to peripheral nerve fibers. This paper should be consulted in the original for its summary of wide-ranging work.—S. G. Browne (*From Trop. Dis. Bull.*)

**Ganapati, R., Naik, S. S., Shah, M. H., Shirsat, L. S. and Gaitonde, B. B.** Clinical trial of DADDS in lepromatous leprosy. *Lepr. India* 48 (1976) 238-243.

Injection of 225 mg acedapsone (DADDS) every 70 days to 23 patients with lepromatous leprosy produced clinical regression noticeable shortly after the second injection.

Three to seven injections led to a fall in the Morphologic Index from 5.0 to 0.6. *Erythema nodosum leprosum* was encountered in seven patients and it is thought advisable to discontinue dapsone when this complication occurs. Dapsone levels in the blood were found to be more than 10 ng/ml before each fresh administration of acedapson. The trial extended to seven injections.—T. F. Davey (*From Trop. Dis. Bull.*)

**Gill, G. V.** Rifampicin and breakfast. *Lancet* **II** (1976) 1135.

It may not be fully appreciated that rifampicin is best absorbed on an empty stomach. In a hospital in Zambia some patients on short-term chemotherapy for tuberculosis, based on daily rifampicin and isoniazid, failed to respond and it was found that they were being given their drugs at 9 a.m., after breakfast. When the drugs were given at the previous round, at 3 a.m., seven hours after the last meal, all responded to treatment.—F. I. C. Apter (*From Trop. Dis. Bull.*)

**Khrikov, N. A., Strutchkova, N. V., Lintchevskaia, N. K. and Verbina, N. K.** Results of treatment of leprosy patients with thalidomide. *Sci. Works Lepr. Res. Inst.* **9/14** (1976) 88-90. (In Russian)

Treatment with thalidomide of leprosy patients' reactions and acute neuritis is very effective. Acute inflammatory reactions on the skin disappeared in 8-18 days, pains along the neural trunks diminished in 2-3 days and disappeared in 10-14 days. When the pain disappeared the diameter of the nerve trunks diminished. The occurrence of leprous reactions in a part of the patient population is easily controlled and does not prevent the continuation of the antileprosy treatment.—(*Adapted from N. Torsuev's translation*)

**Peters, J. H., Murray, J. F., Jr., Gordon, G. R., Levy, L., Russell, D. A., Scott, G. C., Vincin, D. R. and Shepard, C. C.** Acedapson treatment of leprosy patients: response versus drug disposition. *Am. J. Trop. Med. Hyg.* **26** (1977) 127-136.

In 22 lepromatous Filipino patients receiving their first injection of 225 mg acedapson (DADDS), dapsone (DDS), and monoacetyl DDS (MADDS) were present in

plasma in approximately equal quantities. Peak levels of parent drug DDS, and MADDS occurred between 22 and 35 days. The half-times of disappearance ( $T_{1/2}$ ) from plasma were 43 days for DDS and MADDS and 46 days for DADDS. Acetylator phenotyping with sulfamethazine (SMZ) and DDS showed that 17 patients were rapid and 5 patients were slow acetylators. Correlations between acetylation of SMZ and DDS after DDS and of acetylation of DDS after DDS and DADDS were highly significant. However, acetylation of DDS after DADDS did not differentiate the patients into acetylator phenotypes. The  $T_{1/2}$  of DDS after DDS in the patients was directly related to the minimum levels of DDS at 77 days after DADDS treatment. These minimum levels were eightfold higher than the minimum inhibitory concentration (MIC) of DDS for *Mycobacterium leprae* in mice and rats, but not all patients responded satisfactorily. No relationship could be demonstrated between the bacteriologic response and any of the pharmacologic parameters examined in these Filipino patients. In a companion study, levels of DADDS, MADDS, and DDS were determined in 447 leprosy patients of all disease types from the Karimui District of Papua New Guinea who had been receiving 225 mg DADDS every 70 to 80 days for the past five years. All patients exhibited DDS levels above the MIC of DDS for *M. leprae*, no significant differences in plasma sulfone levels were found among disease types, no relationship between rate of healing in paucibacillary patients and sulfone levels were found, and type of response in multibacillary patients and sulfone-levels were unrelated. No substantial accumulation of the sulfones in the Karimui patients receiving continuous therapy with DADDS for five years was indicated from a comparison with the levels in the Filipino patients following a single injection of DADDS.—Authors' Abstract

**Poloz, T. P. and Goloschapov, N. M.** Methyluracil in complex treatment of leprosy patients with drug resistance. *Uchenye Zapiski Inst. Isutcheniu Lepr.* **9/14** (1976) 85-87. (In Russian)

The results of treatment of 18 drug-resistant lepromatous leprosy patients with Methyluracil and common antileprosy therapy are given. This complex treatment for

three to four years resulted in the recovery of sulfone-resistant patients: 6 of 18 patients were discharged from the hospital, 11 patients showed improvement, and only in one woman were there no changes.—(Adapted from N. Torsuev's translation)

**World Health Organization.** Experimental chemotherapy in leprosy. Bull. WHO 53 (1976) 425-433.

The Memorandum reviews the considerable progress that has been made in research on the chemotherapy of leprosy during the last 10-15 years, as a result of which it is now possible to study the same topics in leprosy

as are studied in other bacterial diseases. Thus drugs have been screened in mice for their activity against *Mycobacterium leprae*. Those that have been found to have the greatest activity against *M. leprae* at acceptable dosages—dapsons, rifampicin, and clofazimine—have been characterized in terms of the minimal effective dosage and rate of bacterial kill. Similarly, their pharmacokinetics in man and in certain animals have been defined. The theoretical basis for drug trials in leprosy patients is discussed in terms of the number of viable and the number of dead *M. leprae* that remain at various stages of therapy.—(From Trop. Dis. Bull.)

## Immuno-Pathology

**Anders, E. M., McAdam, K. P. W. J. and Anders, R. F.** Cell-mediated immunity in amyloidosis secondary to lepromatous leprosy. Clin. Exp. Immunol. 27 (1977) 111-117.

Cell-mediated immunity in lepromatous leprosy patients with and without amyloidosis has been studied. Amyloidosis occurred mostly in patients with a history of recurrent erythema nodosum leprosum (ENL) reactions. For this reason, two control groups of leprosy patients were included, one having a history of recurrent ENL and the other little or no ENL. The lack of responsiveness to lepromin *in vivo* and *in vitro*, characteristic of lepromatous leprosy, was not altered by the presence of amyloidosis or a history of ENL. No significant difference between the patient groups was observed in the response to PPD *in vitro*, but skin reactivity to PPD was significantly lower in the patients with amyloidosis than in those without amyloidosis. In contrast, the PHA responses of patients with amyloidosis were significantly higher than those of control patients without a history of ENL, but not significantly different from those of control patients with a history of recurrent ENL.

Lepromatous leprosy patients who develop amyloidosis thus appear to belong to a group, susceptible to repeated attacks of ENL, whose PHA responses are higher than those of other lepromatous leprosy patients. The lower skin reactivity to PPD observed in the amyloid group may reflect a general

impairment in delayed cutaneous hypersensitivity.—(From Trop. Dis. Bull.)

**Balybin, E. S.** Perspectives of application of radioisotopic methods of investigations in leprology. Uchenye Zapiski Inst. Isutcheniu Lepr. 9/14 (1976) 22-29. (In Russian)

The role and possibilities of radioisotopic methods of investigation in leprosy are presented. These methods are more sensitive than biochemical methods in the study of liver and kidney function. The use of radioisotopic methods is useful in studying the endocrine and hemopoietic system in leprosy patients. The investigations of such data as the vital dynamics of the thyroid hormones and vitamin B<sub>12</sub> in tissues, and the intensity and speed of intestinal iron absorption in the gastrointestinal tract have become possible only because of the application of radioisotopic methods. The use of specific anti-leprosy drugs marked by radioactive atoms will make it possible to research the activity of these drugs at the subcellular level. Radioisotopic methods are more adequate than data from the blast-transformation reaction of lymphocytes. These methods provide the possibility of studying the metabolic processes of *Mycobacterium leprae* without breaking the bacterial cell structure.—(Adapted from N. Torsuev's translation)

**Bjorvatn, B., Barnetson, R. S., Kronvall, G., Zubler, R. H. and Lambert, P. H.** Immune complexes and complement hypercatabo-

lism in patients with leprosy. *Clin. Exp. Immunol.* **26** (1976) 388-396.

The occurrence of immune complexes in the serum and the level of the C3 breakdown product C3d in the plasma from patients with leprosy were studied by quantitative methods and the results were compared in various forms of the disease. These studies were performed on 62 samples from 26 patients. The serum  $^{125}\text{I}$ -C1q binding activity was found to be increased by more than 2 s.d., as compared to the normal values, in most of the sera from patients with *erythema nodosum leprosum* (ENL) (80%) and uncomplicated lepromatous leprosy (82%), but also in the sera from patients with tuberculoid leprosy (58%). *In vitro* studies suggested that immune complexes involving mycobacterial antigens were present in leprosy sera. An increased C3d level (>2 s.d.) was also found in most of the plasma from patients with ENL (70%), but rarely in the plasma from patients with uncomplicated lepromatous leprosy (18%) and never in tuberculoid leprosy patients' plasma. The absence of a significant correlation between the  $^{125}\text{I}$ -C1q binding activity and the C3d level in leprosy patients may suggest that extravascular immune complexes are involved in the complement activation occurring in ENL. The quantitation of C3d in plasma may be of some practical interest in the early diagnosis of ENL complications of leprosy.—(From *Trop. Dis. Bull.*)

**Bjune, G. and Barnetson, R. St.C.** Plasma factors in delayed-type hypersensitivity. Augmentation of lymphocyte responses in borderline leprosy reactions. *Clin. Exp. Immunol.* **26** (1976) 397-402.

The phytohemagglutinin-induced responses of lymphocytes were found to be inhibited by plasma from patients with leprosy when compared with their responses in pooled serum from healthy donors. When patients developed reversal reactions, the initial inhibitory effect of their plasma was replaced by an augmentary effect on the response to phytohemagglutinin. The period of augmentation coincided with that of the reversal reaction in patients with borderline tuberculoid leprosy, but was delayed in patients with borderline lepromatous leprosy. The plasma from each leprosy patient was also observed to have the same effect on

lymphocytes from unrelated individuals, showing that the inhibition and augmentation were due to factors in the plasma and not to a change in lymphocyte receptors.

It is possible that the normal stable state of leprosy results from the presence of factors in plasma which act as a control mechanism, and that delayed hypersensitivity reactions may be caused by a breakdown of this control.—(From *Trop. Dis. Bull.*)

**Celikoglu, S. I. Goksel, F. M., Saylan, T., Haznedar, S. and Goldberg, J. D.** A preliminary report on a study of serum alpha-1-antitrypsin and immunoglobulin levels in lepromatous leprosy. *Lepr. Rev.* **47** (1976) 291-294.

The quantitative assay of alpha-1-antitrypsin and immunoglobulins in this study demonstrates that levels of IgG, IgA, IgM and alpha-1-antitrypsin are all elevated in the sera of patients with leprosy when compared with normal controls. In addition, these immunoglobulins are uncorrelated with alpha-1-antitrypsin in either leprosy patients or in normal controls.

Thus, the independence of immunoglobulin classes which has been observed in normal individuals (Allan Smith *et al*) appears to be unchanged in leprosy even though chronic antigenic stimulation by *M. leprae* results in marked changes in concentration in all of the immunoglobulin classes.—Authors' Summary

**Chernisheva, L. M.** Serologic investigations of leprosy patients with application of the immunofluorescence method. *Sci. Works Lepr. Res. Inst.* **9/14** (1976) 128-130. (In Russian)

The possibility of using the indirect immunofluorescence method for the serologic diagnosis of leprosy was studied. In all patients (94 lepromatous, 9 tuberculoid, 4 undifferentiated) mycobacterial antibodies were found in titers of 1:50 and 1:100. This is practically absent in the serum of healthy subjects. The best results were obtained when the Stefansky mycobacterium was used as the test-antigen. An attempt to use blood serum dried on paper for the reaction was unsuccessful. The immunofluorescence reaction can be used as an additional method of laboratory diagnosis of leprosy.—(Adapted from N. Torsuev's translation)



**Crawford, C. L., Hardwicke, P. M. D., Evans, D. H. L. and Evans, E. M.** Granulomatous hypersensitivity induced by sensory peripheral nerve. *Nature* **265** (1977) 457-459.

Skin lesions have been shown to develop in rabbits after injection with homogenates of peripheral sensory nerves. It is now reported that such lesions sometimes possess organized granulomas in tubercles, and that similar granulomas can be produced by skin testing rabbits sensitized with sensory nerve, using cutaneous nerve as the challenging antigens. These granulomas have the histologic features of nonlepromatous leprosy. It suggests that skin lesions in nonlepromatous leprosy are autoimmune responses to sensory peripheral nerves rather than being directly due to *Mycobacterium leprae*. It is concluded that it should be possible to devise a skin test specific for leprosy, using sensory nerve as antigen.—M. F. Lechat

**Date, A., Thomas, A., Mathai, R. and Johny, K. V.** Glomerular pathology in leprosy. An electron microscopic study. *Am. J. Trop. Med. Hyg.* **26** (1977) 266-272.

Electron microscopic examination of renal biopsies from 19 patients with leprosy who had edema, proteinuria, or hematuria showed a proliferative glomerulonephritis in 12, amyloidosis in 2, and no lesion in 5. The proliferative glomerulonephritis was of different patterns: diffuse with or without exudation, focal, or mesangial. Subendothelial and/or subepithelial deposits were seen in five biopsies. Of the patients with glomerulonephritis, three had a reduced total serum complement level, five had *erythema nodosum leprosum*, five had evidence of recent streptococcal infection, and two had microfilariae in the peripheral blood. The significance of these findings is discussed.—Authors' Abstract

**De Vries, R. R. P., Fat, R. F. M. L. A., Nijenhuis, L. E. and Van Rood, J. J.** HLA-linked genetic control of host response to *Mycobacterium leprae*. *Lancet* (1976) 1328-1330.

Nonrandom parental HLA-haplotype segregation is demonstrated in siblings with leprosy. A new method is described for the statistical analysis of nonrandom segregation among sibships of different sizes. Sibs

with the same type of leprosy show a significant excess of identical HLA haplotypes. This is also true for families in which only tuberculoid leprosy is found, which is by far the commonest type in the population studied. However, sibs affected with different types of leprosy share a haploid type less often than expected. This indicates that both susceptibility to and type of leprosy are controlled by at least two HLA-linked genes. Our findings suggest that the equivocal results of previous population studies are due to differences of linkage disequilibrium between HLA-linked genes controlling the host response to *Mycobacterium leprae* and alleles of HLA A and B loci in various populations.—(From *Trop. Dis. Bull.*)

**Ganapati, R., Deshpande, D. H. and Chulawala, R. G.** Calcification of cutaneous nerves in leprosy—a case report. *Lepr. India* **48** (1976) 309-310.

A boy aged 13 years, attending a leprosy clinic in Bombay, had an anesthetic tuberculoid lesion on the front of the right forearm. There was thickening of the ulnar nerve and also of the cutaneous swells in relation to the lesion. Firm nodular swellings along the course of the cutaneous nerves showed evidence of calcification on X-ray (the radiograph is reproduced). Calcification was also demonstrated histologically. The authors comment on the rarity of reports of nerve calcification in leprosy but suggest that if more radiologic and histologic studies were undertaken more such cases would be revealed.—F. I. C. Apter (From *Trop. Dis. Bull.*)

**Garcia-Gonzalez, J. E., Rojas-Espinosa, O. and Estrada-Parra, S.** Phagocytosis in leprosy. I. The levels of "diaphorase,"  $\beta$ -glucuronidase, acid phosphatase, alkaline phosphatase and lipase in circulating leucocytes. *Lepr. Rev.* **48** (1977) 17-26.

Peripheral blood leucocytes were obtained from 18 patients with active lepromatous leprosy and 18 healthy volunteers. These cells were disrupted and served as the source of  $\beta$ -glucuronidase,  $\beta$ -galactosidase, acid phosphatase, alkaline phosphatase and lipase activities. A quantitative NBT test was performed with freshly prepared intact cell suspensions. Although most of the studied activities were slightly increased in the

leprosy group, the differences resulted in nonstatistical significance. Other enzymatic and metabolic activities have to be studied to corroborate that leucocytes from leprosy patients behave in an essentially normal manner.—Authors' Abstract

**Kenzebaiev, A. Ja.** The iron reserve in patients with leprosy. *Sci. Works Lepr. Res. Inst.* 9/14 (1976) 135-137. (In Russian)

The quantity of iron in 24 hour urine samples in 50 patients was studied before the "Desferal test," and in 30 patients having varied types of leprosy after the same test. Controls consisted of 12 healthy persons. The hematoxylin method was used. It was found that persons with leprosy excrete iron in greater quantities than healthy persons. The most extensive siderouria occurs in active lepromatous leprosy when the anemic syndrome is present. The degree of siderouria is directly proportional to the stage, form and duration of leprosy. Iron that takes no part in erythropoiesis was found by this method. Anemia in leprosy has a complex and polyvalent character.—(Adapted from N. Torsuev's translation)

**Mittal, M. M., Saha, K. and Maheswari, H. B.** Passive transfer of immunity in lepromatous leprosy patients by Lawrence's transfer factor. *J. Indian Med. Assoc.* 66 (1976) 197-199.

Lawrence's transfer factor prepared from leucocytes from healthy donors who were tuberculin and lepromin (Mitsuda) positive was transfused into four patients with lepromatous leprosy, each patient receiving transfer factor prepared from 250 ml blood on three occasions at monthly intervals. All four patients were intolerant to antileprosy drugs. After each transfusion reactive symptoms were exaggerated for three to five days. Seven and a half months after the first transfusion, while appreciable improvement had occurred in the immunologic status of the patients, there was no considerable improvement in clinical, histologic or bacteriologic status.—T. F. Davey (*From Trop. Dis. Bull.*)

**Pervukhin, I. V., Nasarov, K. I. and Evstratova, V. A.** The indices of nonspecific immunity in leprosy patients. *Sci. Works Lepr. Res. Inst.* 9/14 (1976) 125-127. (In Russian)

Patients with lepromatous leprosy in regressive and residual stages, and tuberculoid and undifferentiated leprosy cases, demonstrated an increased nonspecific cell immunity in comparison with patients in active stages of lepromatous leprosy. In patients with all forms of leprosy, there was found a tendency to sharp lowering of the indices of nonspecific humoral immunity (antibacterial activity and serum lysozyme).—(Adapted from N. Torsuev's translation)

**Quinete, S. S., Marques, A. de S., Rangel, E. R. and Rocha, G. L.** Lepra de Lucio. [Lucio leprosy.] *An. Brasil. Dermatol.* 52 (1977) 107-115. (In Portuguese)

One case of lepromatous leprosy with the Lucio phenomenon is presented. The conception of Lucio leprosy and the Lucio phenomenon is discussed; the vasculitis underlying the phenomenon in the case presently described is stressed.—Authors' English Summary

**Rea, T. H., Levan, N. E. and Terasaki, P. I.** Histocompatibility antigens in patients with leprosy. *J. Infect. Dis.* 134 (1976) 615-618.

The frequencies of distribution of 25 histocompatibility antigens were determined in 92 Mexican patients with leprosy and compared with those in 315 Mexicans who did not have the disease. No statistically significant differences were found between the patients and the controls in regard to histocompatibility antigens, and subgroups with a significant difference could not be identified by division of the patients according to the density of *Mycobacterium leprae*, or the presence or absence of cell-mediated immunity directed against antigens of *M. leprae*.—(*From Trop. Dis. Bull.*)

**Risova, N. Ja., Evstratova, V. A., Aksanova, R. A.** The concentration of sulfetron in blood and intracellular fluid of skin as an index of vascular permeability in leprosy. *Sci. Works Lepr. Res. Inst.* 9/14 (1976) 131-134. (In Russian)

The results of the study of vascular permeability in outpatients with lepromatous leprosy, treated for more than seven years (15 patients), and with tuberculoid leprosy (16 patients) are given, described as mea-

measurements of sulfetron concentration in blood and intracellular fluid. It was found that different degrees of vascular permeability are characteristic for different types and stages of leprosy as expressed by the "permeability coefficient." The lowest "permeability coefficient" is characteristic of tuberculoid leprosy and of patients with residual stages of lepromatous leprosy. The highest level of the coefficient was found in patients with exacerbation or relapse of the disease. These data were compared with the formerly obtained results of investigation of the antihistamine factor of blood and tissue fluid, reflecting the rather high allergy in patients with lepromatous leprosy near the residual stage which may lead to exacerbation. The "permeability coefficient" may be used in conjunction with histamine titers together with clinical, bacteriologic and other laboratory data as objective criteria for recovery from leprosy.—(*Adapted from N. Torsuev's translation*)

**Shwe, T., Thane-Toe and Aung Than Ba Tu.**

Serum iron and total iron binding capacity in Burmese patients with leprosy. *Lepr. Rev.* **47** (1976) 287-290.

Serum iron and total iron binding capacity were estimated in the sera collected from 96 male leprosy patients (age 20-40 years) belonging to Leprosy Hospital, Htaukkyant. The sera from 22 healthy subjects were included in the study as controls. A low level of serum iron (below 50  $\mu\text{g}\%$ ) with normal iron binding capacity was recorded in 36 out of 60 patients (60%) with lepromatous, 14 out of 36 patients (39%) with tuberculoid type, and only 4 out of 22 controls (18%). There was no difference in the prevalence of low serum iron and percentage saturation between those leprosy patients who had been on DDS and ferrous sulphate pills for at least two years and untreated leprosy patients.

Bone marrow from seven patients with anemia and low serum iron, as well as the liver at autopsy from three male patients with advanced lepromatous leprosy and low socio-economic status showed normal iron content. Injection of parenteral iron (10 daily injections of Imferon) to six patients with anemia and low serum iron also showed no increase in hemoglobin level.

Thus the anemia in leprosy is not due to

true lack of iron in the body (tissue iron deficiency). However, reduction in serum iron level is probably due in part to the toxic process of the disease upon the body.—*Authors' Abstract*

**Silva, O. P., Ferri, R. G., Moraes, N. and Marques, A. L. V.** Estudos imunoquímicos na hanseníase. I. Eletro e imuno-eletroforese das proteínas séricas. Tentativa de associação com a reação de Rubino. [Immunochemical studies on leprosy. I. Electrophoresis and immunoelectrophoresis of serum proteins. Tentative association to Rubino's reaction.] *Hansen. Int.* **1** (1976) 33-41. (In Portuguese)

An attempt was made to establish if leprosy patients with positive Rubino's reaction would display immunologic characteristics that could distinguish them from those with negative Rubino's reaction. By electrophoresis, Rubino-negative patients (virchowian and tuberculoid) showed higher levels of  $\alpha_2$  globulin than Rubino-positive patients, virchowian and normal individuals. Beta globulin levels were decreased in Rubino-positive and increased in Rubino-negative virchowian patients. By immunoelectrophoresis similar results were found for the two lepromatous groups: constant increase of IgG and IgM and infrequent raise of IgA.—(*Adapted from authors' English summary*)

**Silva, O. P., Ferri, R. G., Moraes, N. and Marques, A. L. V.** Estudos imunoquímicos na hanseníase. II. Quantificação de imunoglobulinas séricas. Tentativa de associação com a reação de Rubino. [Immunochemical studies on leprosy. II. Quantitation of the serum immunoglobulins. Tentative association to Rubino's reaction.] *Hansen. Int.* **1** (1976) 43-52. (In Portuguese)

Sera from 60 virchowian patients of Hanseniasis (30 Rubino-positive and 30 Rubino-negative) and 16 tuberculoid patients (Rubino-negative) were analyzed through the quantitation of immunoglobulins by single radial immunodiffusion. There was an increase of the IgG and IgA levels in the two virchowian groups. The levels of IgM were augmented only in Rubino-positive virchowians. The IgD levels were normal in the

three groups. In the tuberculoid patients only in the IgG class was an increase observed. It seems that the Rubino-positive group is probably more responsive or more stimulated by antigenic action than the Rubino-negative group.—Authors' English Summary

**Tiraboschi Foss, N., Pagnano, P. M. G. and Bechelli, L. M.** Transformation lymphoblastique de lymphocytes de malades de lèpre et de contacts, stimulés par la lépromine. Milieu de culture en sérum homologue. [Lymphoblastic transformation of lymphocytes in leprosy patients and contacts stimulated by lepromin. Homologous serum culture medium.] *Acta Leprol.* **66-67** (1977) 223-229. (In French)

The authors studied the lymphocyte transformation test in leprosy patients (40), contacts (17), and noncontacts (13), in the presence of lepromin and PHA. Lymphocytes

were cultivated in Eagles' medium with 20% homologous serum from a normal donor. The blastogenic response was assessed morphologically and by cellular incorporation of <sup>3</sup>H-thymidine.

In all patients, contacts, and noncontacts, the blastoid response to lepromin was low and apparently similar in all groups, independent of the lepromin reaction. With PHA the response was higher than with lepromin. Additionally, the response was higher in T minor than in T major (or T in reaction) and L, and similar in contacts, both lepromin positive and negative. The LTT with lepromin does not seem to be a good indicator of the immune responsiveness of leprosy patients and nonaffected individuals to *M. leprae* and cannot replace the lepromin reaction. It was also noted that when cultivated in homologous serum and stimulated with lepromin, the lymphocytes of L cases tend to react as those of T patients.—(Adapted from authors' summary)

## Microbiology

**Barksdale, L. and Kim, K-S.** *Mycobacterium*. *Bacteriol. Rev.* **41** (1977) 217-372.

This monumental, detailed and illustrated review is far too detailed and encompassing to permit a meaningful abstract. Its major headings are: taxonomy, mycobacterial cell, cytoplasmic membrane system, mycobacterial cell wall, mycobacteria growing *in vivo* (PHE I) and *in vitro* (PHE II), granulomas, *Mycobacterium* as antigen, immune response to *mycobacterium*, mycobacteriophages and mycobacteriocins.

Of the 1312 references listed, five are to the IJL and none are given to other leprosy specialty journals. Of the five from the IJL, two are references to *M. ulcerans*. This notation is not intended as a criticism but to indicate that this review is not a historical recitation or comparison of mycobacterial species and their diseases. It is a review of the "dynamics" of mycobacteria as a group, utilizing examples as suitable and available. The relative inattention to *M. leprae per se* reflects the lack of a generally accepted means of cultivation of this organism and consequent dearth of studies of the type that would be significantly contributive to the review approach. Perhaps studies now in progress

will help alleviate this dearth. In any case, this review is well worth the attention of those studying *M. leprae* and *M. lepraemurium* for suggestions and understanding arising from the study of mycobacteria as a whole.—Olaf K. Skinsnes

**Delville, J.** Acido-alcool résistance de *M. leprae* et valeur relative des divers procédés de coloration. [Acid-alcohol resistance of *M. leprae* and the relative value of different staining technics.] *Acta Leprol.* **66-67** (1977) 265-270. (In French)

Numerous biopsies of different types of leprosy from treated and nontreated patients have been examined using different staining technics. The author concludes that *M. leprae* does not always behave as an acid-alcohol-fast organism and changes its tinctorial characteristics during the evolution of the infection and as a result of chemotherapy. Different staining technics are discussed.—(Adapted from author's English summary)

**Dhople, Arvind M. and Hanks, John H.** *In vitro* growth of *Mycobacterium lepraemurium*, an obligate intracellular microbe. *Science* **197** (1977) 379-381.

By using an ultrasensitive technic to measure adenosine triphosphate in terms of functional biomass, we have confirmed that *Mycobacterium lepraemurium* (the agent of rat leprosy and a classical obligate intracellular microbe) grows *in vitro* in the Nakamura system. By using a sulfhydryl-containing medium that occupies 65% to 75% of the culture tube volume, together with the five supplements recommended by Nakamura, we have obtained growth rates some eight times above the original. The new physiochemical environment and the use of adenosine triphosphate as an index of energy status in the presence and absence of growth provide a basis for investigating the physiology and growth of other noncultivated microbes.—Authors' Abstract. [A classical obligate intracellular microbe grows in a cell free *in vitro* medium?—Ed.]

**Evans, Michael J. and Levy, Louis.** Failure of *Mycobacterium leprae* to incorporate tritiated thymidine administered *in vivo*. Lepr. Rev. **48** (1977) 27-34.

Tritiated thymidine ( $[^3\text{H}]\text{TdR}$ ) was administered to mice infected with *Mycobacterium leprae* in attempts to label the *M. leprae* *in vivo*; injections were made either intraperitoneally or locally into the infected foot pads. Although labeling of the tissue cells was heavy, indicating that  $[^3\text{H}]\text{TdR}$  was available to *M. leprae*, no labeled *M. leprae* were observed in either of the two studies conducted.—Authors' Abstract

**Khanolkar, S. R., Antia, N. H. and Ambrose, E. J.** Autoradiographic studies of *Mycobacterium leprae*. Lepr. Rev. **47** (1976) 267-273.

A method is described for the radioactive labeling of fresh bacilli of *Mycobacterium leprae* using tritium labeled *o*-dihydroxyphenyl alanine as a metabolite. A reasonably good correlation has been obtained between the Morphologic Index and the Labeling Index in the case of suspensions obtained from the nodules of a group of leprosy patients. A method for organ culture of the intact tissue of leprosy nodules has been developed. Thin sections have been prepared from these organ cultures for autoradiography using  $[^3\text{H}]\text{-DOPA}$ . With the aid of a polarizing vertical illuminator, the distribution of the metabolizing organisms within the tissues has been demonstrated.—Authors' Abstract

**Kondo, Eiko and Kanai, Koomi.** The relationship between the chemical structure of fatty acids and their mycobactericidal activity. Jap. J. Med. Sci. Biol. **30** (1977) 171-178.

The bactericidal activity of long-chain fatty acids on mycobacteria were examined by exposing the organisms to these acids at 0.04 mM in 0.05 M acetate buffer (pH 5.6). The lethal effect of saturated fatty acids was related to the chain length of the hydrocarbon,  $\text{C}_{14:0}$  being the strongest in activity and longer, and shorter fatty acids being less active. Unsaturation, isomerism and the presence of an  $\alpha$ -hydroxy group were found to be other factors governing the activity. The lethal effect was greater in the order of  $\text{C}_{18:3} > \text{C}_{18:2} > \text{C}_{18:1}(\text{cis}) > \text{C}_{18:1}(\text{trans}) > \alpha\text{-OH}$   $\text{C}_{18:0} > \text{C}_{20:4}$  was placed between  $\text{C}_{18:3}$  and  $\text{C}_{18:2}$  in this respect. Esterification of  $\text{C}_{14:0}$ ,  $\text{C}_{18:1}$  and  $\text{C}_{20:4}$  to methyl esters and cholesteryl esters completely abolished the bactericidal activity of these acids, suggesting the requirement of a carboxyl group for the activity. The relationship between the fatty acid structure and the lethal effect was discussed in reference to these observations.—(Adapted from authors' summary)

**Matsuo, Y., Tasaka, H. and Utsunomiya, S.** A culturable mycobacterium isolated from leproma of a leprosy-transmitted armadillo. Lepro **45** (1976) 63-67.

The acid-fast bacilli obtained from a leproma of an armadillo previously infected with *Mycobacterium leprae* were identified to be *M. leprae* by the mouse foot pad technic as well as by the pyridine extraction method. During the course of cell culture, the leproma was found to have been contaminated with *M. scrofulaceum*.—Authors' Abstract

**Murohashi, Toyoho and Yoshida, Konosuke.** Attempts to culture *M. leprae* on semisynthetic solid agar media. Acta Leprol. **65** (1976) 39-50.

Promising results obtained by the film agar culture led us to make attempts to culture *M. leprae* on the surface of semisynthetic agar slant of M-Y series that contained glucose in a concentration of 1%. Inoculation was carried out so as to put two to three loops, respectively, of the bacterial suspension onto a limited, narrow area at the middle

part of the slant, strongly pressing the loop against the agar surface. With the lapse of incubation time at 37°C, the inoculation site of the agar surface gradually dried and became lusterless, more or less increasing roughness. In the smears prepared by scratching these inoculation sites, large bacterial accumulations were repeatedly observed. And, at last, in the subcultures of both strains examined, white, tiny and solid heaps of submiliary size appeared at the above mentioned dry and rough inoculation site, and they were confirmed as large colonies with the same morphologic characteristics of those observed repeatedly in foregoing experiments. From these results, it can be said that the culture of *M. leprae* on agar slant was rather stable and favorable not only for the isolation but also for the maintenance of the strain.—(Adapted from authors' summary)

**Murohashi, Toyoho and Yoshida, Konosuke.**

Cultivation of *Mycobacterium leprae* using semisynthetic medium. Kitasato Arch. Exp. Med. **49** (1976) 121-130.

Since beginning the preliminary experiments, we have subjected 49 specimens of leprous nodule to cultivation tests. There is a significant difference in the results obtained before and after using sodium pyruvate. We were successful in the isolation and cultivation of *M. leprae* from leprous nodule homogenates which were considered to have a fairly low viable ratio particularly after sodium glutamate was added to the basic medium. Recently, our experiments have been aimed at improving the composition of the medium. Of the ketogenic amino acids, leucine seems to have a growth promoting effect (M-Y 16j). Increasing the sodium pantothenate content while omitting Na<sub>2</sub>HPO<sub>4</sub> (sodium monohydrogen phosphate) (medium M-Y 16d) also seems to improve the growth rate while the addition of hemin (M-Y 14e) seems to suppress it. These points require further investigation.—(Excerpted from text, pp 122, 124)

**Murohashi, Toyoho and Yoshida, Konosuke.**

Multiplication of *M. leprae* on film agar medium. Acta Leprol. **62** (1976) 23-28.

One percent agar medium as thin as a film was prepared by solidifying M-Y 11f basic medium that contained glucose in a concen-

tration of 1%. After confirmation of no contamination, a nodule homogenate was inoculated onto the surface of the film agar medium under the name of L-Feb-73 strain. After 15 weeks' incubation at 37°C, the surface of the film agar appeared lustlessly dried and rather rough, but nothing suggestive of colonial growth was observed by the naked eye. After acid-fast staining, however, very fine, pinhole size, solitary acid-fast dots appeared to the naked eye. Corresponding to these fine dots, many variously shaped large bacterial masses were observed under the microscope. They appeared to multiply closely, adhering to the surface of the film agar medium. These results suggest that the cultivation of *M. leprae* on solid agar medium is promising, provided that the oxidation-reduction potential of the medium is reduced to a certain extent by the addition of glucose and/or some other reducing agents.—(Adapted from authors' summary)

**Murohashi, Toyoho and Yoshida, Konosuke.**

Sensitivity test of *M. leprae* to the antileprous drugs using liquid culture media. Acta Leprol. **62** (1976) 5-21.

The sensitivity of *M. leprae* to the antileprous drugs *in vitro* was studied using liquid culture media. The first, L-Jul-74-1 strain was sensitive to both DDS and rifampicin, and the second, L-Feb-75 strain was also sensitive to DDS, rifampicin and isoniazid. The host patient of the former strain was treated with DDS and that of the latter with rifampicin, respectively, based on the results of drug sensitivity tests. The treatment results were satisfactory in both cases. By the use of liquid culture media, the sensitivity test *in vitro* to the antileprous drugs can be made rather quickly, i.e., as early as within three months' incubation at 37°C. This will facilitate the selection of the most suitable drugs to the concerned patients in the treatment of leprosy.—Authors' Summary

**Pares, Yvette.** Etude d'une souche diphtéroïde obtenue à partir d'une suspension bacillaire issue d'un léprome. [Study of a diphtheroid strain obtained from a suspension of bacilli derived from a leproma.] Acta Leprol. **62** (1976) 29-39. (In French)

A strain of "diphtheroids" isolated from a leproma were inoculated into nutritive media which permitted the study of the myco-

bacteria bacteriologic cycle. The microorganisms produced typical form 2 (sporules) or acid-fast bacilli but some clumps of diphtheroids sometimes remained in the culture. The diphtheroids should be microorganisms issued from a partial evolution of acid-fast bacilli to typical form 2 (sporules). At the present time it is not possible to establish the causes of this incomplete evolution.—(Adapted from author's English summary)

**Prabhakaran, K., Harris, E. B. and Kirchheimer, W. F.** Hypopigmentation of skin lesions in leprosy and occurrence of *o*-diphenoloxidase in *Mycobacterium leprae*. In: Pigment Cell, V. Riley, ed., Basel, Switzerland: S. Karger, 1976, vol. 3, pp 152-164.

*Mycobacterium leprae* contains a characteristic *o*-diphenoloxidase. The enzyme converts a wide range of phenolic compounds to quinones *in vitro*. The *M. leprae* preparations show no monophenolase activity. In the human body, the bacilli multiply at sites such as the skin and peripheral nerves where metabolism of DOPA or its derivatives is important. Hypopigmentation of skin lesions is a characteristic feature of leprosy. When suspensions of *M. leprae* are added to cultures of melanoma cells, formation of melanin pigment by the cells is suppressed. The utilization of DOPA, a precursor of melanin, by *M. leprae* could result in loss of normal pigmentation in skin lesions of leprosy. This unusual metabolic requirement of the organisms, not possessed by any other mycobacteria, might also explain the failure of repeated attempts at culture of *M. leprae in vitro*.—Authors' Summary

**Wood, Harland G.** Some reactions in which inorganic pyrophosphate replaces ATP and serves as a source of energy. Fed. Proc. 36 (1977) 2197-2205.

The dogma prevails among biochemists that inorganic pyrophosphate ( $PP_i$ ) is an end product of metabolism and not a useful source of energy. Many biosynthetic processes involve the formation of  $PP_i$ , and it is generally believed that by removing  $PP_i$  through hydrolysis, the anabolic reaction is rendered irreversible. However, the same favorable situation would prevail if  $PP_i$  were utilized, thus maintaining the concentration at a low level. The free energy of hydrolysis of  $PP_i$  under physiological conditions is less than that of ATP but is sufficiently high to provide an energy source for most synthetic reactions. In the past, there have been advocates, including H. Baltscheffsky, M. Baltscheffsky, R. C. Nordlie and K. L. Keister, who have presented evidence that  $PP_i$  does serve as a source of energy for biosynthetic reactions. This view has now been greatly strengthened by the discovery of two new pathways of fermentation, the one by *Entamoeba histolytica* and the other by *Propionibacterium shermanii*. From these two organisms, three enzymes (carboxytransphosphorylase; pyruvate, phosphate dikinase; and  $PP_i$ -phosphofructokinase) have been characterized that catalyze reactions in which  $PP_i$  replaces ATP. It has been shown that  $PP_i$  serves as a source of energy in these fermentations. The fact that the propionic acid bacteria yield an exceptionally high amount of cells per mole of fermented glucose may, in part, be because they utilize  $PP_i$ . The role of the enzymes in relation to these pathways of metabolism is reviewed.—Author's Abstract

## Experimental Infections

**Kohsaka, K., Mori, T. and Ito, T.** Lepromatoid lesion developed in nude mouse inoculated with *Mycobacterium leprae*. Animal transmission of leprosy. Lepro 45 (1976) 177-187.

Eight five-week-old nude mice (BALB/c-nu/nu) were infected with *Mycobacterium leprae* obtained from a case of relapsed lepromatous leprosy. They were kept under SPF (specific pathogen free) conditions in a

vinyl plastic-isolator to prevent wasting disease and other microbial infection. Three mice survived for more than 17 months after the infection and showed swelling of the foot pad at inoculation site. These three mice were sacrificed at the 17th, 19th and 22nd month after inoculation, respectively, and histopathologic and bacteriologic examinations were carried out. Histopathologically, lepromatoid lesions were not only observed

in the foot pad of the infected site but also in low temperature parts of the body such as eyelid, earlobe, tail and nose. Invasion of acid-fast bacilli into peripheral nerves was remarkable. The acid-fast bacilli increased in lepromatoid lesions and were identified as *M. leprae* by the following identification tests: 1) failure to grow on artificial media; 2) no granuloma formation in the normal mouse; 3) loss of acid-fastness by pyridine extraction; 4) positive D-DOPA oxidase activity; and 5) results of lepromin reaction with patients.—(Adapted from authors' summary)

**McKeever, P. E., Walsh, G. P., Storrs, E. E., Graber, C. D., Stillway, L. W. and Balentine, J. D.** The host-parasite relationship in experimental leprosy: cytochemistry, and biochemistry. Abstracts Ann. Mtg. Am. Soc. Microbiol., 1976.

The nine-banded armadillo is a susceptible host for *Mycobacterium leprae*, providing an animal model for the study of leprosy. Tissue from armadillos which developed disseminated leprosy two to three years following intradermal inoculation of  $10^7$  bacilli was fixed with cold glutaraldehyde for ultrastructural cytochemistry. Bacilli had infected phagocytic and parenchymal cells which contained lysosomal acid phosphatase but not cells with peroxidase. Within membrane bound vacuoles, acid phosphatase surrounded bacilli. Reaction product ended at a 15 to 40 millimicron thick electron translucent zone around the bacilli. Granular and membranous material morphologically similar to bacillary matrix was associated with disintegrating bacilli. The occurrence of this material additionally in unstained preparations distinguished it from reaction product. After homogenization and centrifugation of fresh lepromas, this granular material banded exclusively with *M. leprae* in sucrose density gradient. The isolated bacilli and granular material were resistant to treatment with hydrolytic enzymes *in vitro*. Results indicate that certain host hydrolytic enzymes encounter *M. leprae* without penetrating its capsule, while peroxidative enzymes rarely or never encounter bacilli.—Authors' Abstract

**Pattyn, Stefaan R.** The effect of the multiplication of *Mycobacterium leprae* of ir-

regular administration of dapsone to mice. Results of the total minimal inhibitory test. Ann. Soc. Belg. Med. Trop. 57 (1977) 175-179.

Dapsone in a 0.01% concentration in the food was administered to mice for one to six days a week every week, and every two, three, and four weeks. It was further administered daily for periods ranging from 4 to 28 weeks after infection. In all drug regimens dapsone was purely bacteriostatic, since multiplication started in some of the animals sometime after stopping treatment. It is concluded that human paucibacillary leprosy should preferably be treated with a more bactericidal drug and multibacillary cases during an initial phase with drug combinations.—Author's Summary

**Pattyn, S. R. and Saerens, E. J.** Activity of three new rifamycin derivatives on the experimental infection by *Mycobacterium leprae*. Ann. Soc. Belg. Med. Trop. 57 (1977) 169-173.

Three new rifamycin derivatives characterized by longer lasting serum levels were tested against *M. leprae* in the mouse model. Their minimal effective dose is slightly to moderately lower than that of rifampicin. Intervals of administration cannot, however, be increased over once every two weeks. On a weight basis, one of the drugs is eight times more potent than rifampicin.—Authors' Summary

**Rojas-Espinosa, O., Casoluengo-Mendez, M. and Villanueva-Diaz, G.** Antibody-mediated immunity in CFW mice infected with *Mycobacterium lepraemurium*. Humoral immune response in murine leprosy. Clin. Exp. Immunol. 26 (1976) 381-387.

A depression of antibody-mediated immunity (AMI) measured both in terms of circulating antibody and plaque-forming cells in the spleen was observed in CFW mice infected with *M. lepraemurium* when sheep red blood cells (SRBC) and human gamma globulin (HGG) were used as antigens. The impairment in AMI was evident only after 75 days of infection, thereafter the antibody response to SRBC antigen progressively decreased until the last day of experimentation (135 days). Within the first 60 days of infection no alteration in AMI was observed with



the HGG antigen, while the response to the SRBC antigen was significantly higher in the infected animals than in uninfected controls.—(From Trop. Dis. Bull.)

**Shepard, C. C., Van Landingham, R. and Walker, L. L.** Immunity to *Mycobacterium leprae* infections in mice stimulated by *M. leprae*, BCG and graft-versus-host reactions. *Infect. Immun.* **14** (1976) 919-928.

Infections of mice with *Mycobacterium leprae* in one rear foot pad immunized them against a second infection in the other rear foot pad. Purified bacilli harvested from the first infection also produced immunity when injected into the foot pads of previously uninfected mice. Injections of BCG afforded similar protection, but had no adjuvant effect on *M. leprae*. *M. duvali*, a cultivable mycobacterium that is reported to be more

closely related antigenetically to *M. leprae* than BCG is, provided much less protection against *M. leprae* challenge than BCG did. Moreover, when *M. duvali* was mixed with BCG, it was not any more effective than BCG alone. Graft-versus-host reactions, induced by injections of parental spleen cells into F1 hybrids, provided no protection against *M. tuberculosis* and *M. marinum* challenge. They gave moderate protection against *M. leprae* in one experiment but not in another with a different schedule. Allogenic spleen cells had a protective effect when injected locally into the infected foot pad. The effect produced by these injections of spleen cells was a delay in the appearance of bacterial growth; however, there was no decrease in the rate of logarithmic growth when it did appear and no reduction in the eventual plateau level.—(From Trop. Dis. Bull.)

## Epidemiology and Prevention

**Bennett, N. McK.** Diagnosis of leprosy in Victoria—a nonendemic area of Australia. *Med. J. Aust.* **2** (1977) 349-351.

There have been at least 70 cases of leprosy in Victoria since 1950; the occurrence of 40 of these in the last seven years indicates that the disease is no longer rare in this state. The diagnosis was delayed in most patients, the average period of time between development of symptoms and diagnosis being 28 months. The most common presentations among these patients emphasize the point that a diagnosis of leprosy should be considered in patients who are suffering either from chronic skin diseases which are atypical and have not responded to therapy, or from localized disturbances of skin sensation.—Author's Abstract

**Boughton, Clement R.** Leprosy in Sydney. A brief account. *Med. J. Aust.* **2** (1977) 351-353.

Individuals with leprosy and those incubating the disease continue to enter New South Wales from endemic areas. With early diagnosis and treatment, the prognosis is good. The diagnosis should be considered in any patient who has lived or worked in a leprosy endemic country and who presents with an unusual or persistent skin eruption

(especially if there is associated hypoesthesia) and/or mononeuritis or mononeuritis multiplex. Occasionally the disease presents in other guises; biopsy of the appropriate tissue and staining for acid-fast bacilli, as well as with hematoxylin and eosin will usually indicate the correct diagnosis.—Author's Abstract

**Filice, G. A., Greenberg, R. N. and Fraser, D. W.** Lack of observed association between armadillo contact and leprosy in humans. *Am. J. Trop. Med. Hyg.* **26** (1977) 137-139.

In 1971 it was discovered that the nine-banded armadillo (*Dasypus novemcinctus*) could be infected in the laboratory with *Mycobacterium leprae*, and would manifest disease similar to the lepromatous form of leprosy in man. In 1976 several wild armadillos captured in Louisiana were found to have a disease identical to the *M. leprae* infection in laboratory animals. To determine if there is a significant association between contact with armadillos and presence of leprosy in humans, the armadillo contact of persons with indigenous leprosy in Louisiana was compared to the contact of matched controls. No difference in the nature or frequency of contact was found. If this infec-

tion of wild armadillos is of recent onset, an association with human leprosy in enzootic areas may not be detectable for several years.—Authors' Abstract

**Ibanez de Aldecoa y Arroyo, Rafael.** Resumen estadístico de la lepra en España (1851-1975). [Statistical review of leprosy in Spain (1851-1975)]. Fontilles **10** (1976) 5-291. (In Spanish)

This comprehensive review of the statistics of leprosy in Spain first presents figures beginning in 1910, though one comprehensive graph presents the number hospitalized on a yearly basis from 1862-1966. There are numerous tables relating to sex incidence, types of leprosy, etc. Tables are given for each province, some going back to 1898 and one beginning as recently as 1954. The leprosy types, even for early years, are broken down into current tuberculoid, lepromatous, dimorphous and indeterminate nomenclature.

If the figures for new cases are recalculated for five year intervals beginning with 1915 they come out as: 1915-19 = 302; 1920-24 = 49; 1925-29 = 84; 1930-34 = 198; 1935-39 = 302; 1940-44 = 439; 1945-49 = 1597; 1950-54 = 1330; 1955-59 = 1347; 1960-64 = 1174; 1965-69 = 883; and 1970-74 = 531. The pattern here demonstrated is compatible with that seen in other countries and discussed in an editorial in the IJL (IJL **43** [1975] 145-148).—O. K. Skinsnes

**Leiker, D. L.** On the mode of transmission of *Mycobacterium leprae*. Lepr. Rev. **48** (1977) 9-16.

The finding that in patients with lepromatous leprosy much larger numbers of bacilli are released from the nasal mucosa and from the milk ducts of lactating mothers as compared with those present on the surface of the skin, suggests the possibility of transmission by droplet infection and by breast feeding and the consequent possibility that the primary lesions are located in the respiratory and gastro-intestinal tract and that the skin lesions are secondary lesions. Clinical and epidemiological evidence against this hypothesis is presented, and it is concluded that droplet infection via the respiratory tract is not a common mode of transmission, and the present trend of abandoning segregation and other restrictive measures against

leprosy patients should not be reversed.—Author's Abstract

**Mani, R. S., Gershon, S. and Chauhan, T. S.** Importance of systematic school survey in urban leprosy control. Acta Leprol. **63-64** (1976) 135-140.

It was found that in an urban area like Madras, where mass surveys cannot be employed as a case-finding method for all sections of the population due to manifold socio-economic and educational constraints, school surveys have come to be a very important case-finding method. In our experience a sizeable number of the total detected cases have been uncovered by school surveys. It is, therefore, suggested that periodic school surveys—at least once in two years—are necessary. Treatment of these cases is given in the schools. Additionally, school surveys indirectly help the health education program.—(Adapted from authors' summary)

**Martinez Dominguez, V. and Bechelli, L. M.** Prospects of controlling leprosy in tropical Africa. Acta Leprol. **66-67** (1977) 19-30.

The authors have made an attempt to assess the evolution of leprosy endemics in countries of tropical Africa, the impact of control measures up to date, and the prospects of controlling the disease taking into account present means and resources, and socio-economic changes in process after independence. Only some indicators could be used for the operational and epidemiologic evaluation. Up to now there is no conclusive evidence of any change in incidence. On the other hand, it was not possible to perceive any epidemiologic change affecting the trend of leprosy endemics in the countries under study.

As there is a very high proportion of tuberculoid cases, countries with a better socio-economic situation and/or an effective campaign would be able to stabilize and reduce the prevalence rate to a variable degree in a relatively short period. This would mainly be achieved through the T cases, treated and released from control, as well as by decreasing the load of infectiousness; the rate of L cases would continue at the same level during a certain period.

However, due to the adverse socio-economic, hygienic and sanitary conditions and also to the characteristics of leprosy, limitations of antileprosy drugs, irregularity of treatment, high proportion of out-of-control cases, lack of an effective vaccine, lack of health staff and their concentration in urban areas, deficient management, etc., the control of leprosy in many countries may be delayed for numerous decades, if not for centuries.

If control measures are not well applied and for very long periods, along with improved socio-economic and other conditions, leprosy control may indeed suffer a long-term setback.—(*Adapted from authors' summary*)

**Merlin, M., Carme, B. and Kaeuffer, H.** Bilan de 25 ans de chimiothérapie anti-lépreuse en Polynésie Française. Influence sur l'âge d'apparition de la maladie. [Report of 25 years of antileprosy chemotherapy in French Polynesia. Influence of age on onset of disease.] Bull. Soc. Pathol. Exot. **69** (1976) 412-422. (In French)

In French Polynesia the cases of leprosy are individually severe as in Asia, but the endemicity always remained at a relatively low level. A strong chemotherapy campaign has been conducted for 25 years. Unfortunately, actions taken to conduct systematic detection of new cases have not been sufficient and sanitary education is almost non-existent.

The territory is actually distinguished by extensive demographic and social changes, and chemotherapy used alone is not efficient enough to obtain a definitive decrease of the endemicity or to even avoid, for a long time, a new increase. However, a significant decrease of age of advent of the disease must be credited to the action of chemotherapy.—(*Adapted from authors' English summary*)

**Noordeen, S. K.** Leprosy in Lakshadweep Islands. Lepr. India **48** (1976) 244-257.

This territory, under the administration of India, was surveyed for leprosy in 1961 and again in 1965-67, when a prevalence rate of 24.4 per 1,000 was found, its features consistent with an active epidemic situation.

A fresh epidemiologic survey in 1974 by a very experienced leprologist is reported and indicates a continuing serious situation with a prevalence rate at 25.1 per 1,000, and with incidence among noncontacts similar to that among contacts. There are encouraging features, such as very few open cases and most new patients having only minimal disease, potentially unlikely to produce deformities.—T. F. Davey (*From Trop. Dis. Bull.*)

**Wkly. EPIDEM. REC.** Leprosy control. Volume **51** (1976) 389.

In 1971 a Leprosy Control Unit was established in Trinidad and Tobago, with the emphasis on an outpatient approach and on case-finding and case-holding. The intensification of case-finding efforts raised the average number of newly diagnosed cases from 46 per year for the period 1961-1970 to 92 per year in 1971-1975. At the end of December 1975 a total of 914 patients were on the registry. The prevalence is 0.86 per 1,000 population. There are ten clinics throughout the country. The disability rate fell from 70% in 1968 to 11% for the period 1971-1975. This is attributed to the maintenance of regular chemotherapy and to the prompt treatment of reactional episodes. Sixty percent of the cases diagnosed in the past five years were of the tuberculoid type.—F. I. C. Apter (*From Trop. Dis. Bull.*)

**Wright, E. M.** Leprosy villages—are they all outdated? A survey of two leprosy communities. Lepr. Rev. **47** (1976) 307-311.

A medical and social survey is reported on two villages in India composed originally of rejected leprosy patients and developed over the past 30 years, near a large leprosy hospital. The results are surprising. These communities pose no leprosy problem to the adjacent population, thanks to the concern of the hospital authorities. The general economic standard is low, with begging an important factor, but the level of child health and nutrition in these communities was found to be superior to that among the local population, while residents have developed a sense of community responsibility which replaces that lost from their homes and has created a reasonable degree of stability.—Author's Abstract

## Rehabilitation

**Ranjitkumar, J. H. and Fritschi, Ernest P.** Domiciliary rehabilitation (preliminary report on an experiment in self employment of disabled exleprosy patients). *Lepr. Rev.* 47 (1976) 295-305.

An experiment in the rehabilitation of patients on the verge of displacement from their families due to economic stringency, is

described. The principle is that the patients are enabled to remain in their homes and, as far as possible, resume their previous trades or take up new trades.

The early results of this experiment are presented. On the whole domiciliary rehabilitation justifies its continuation while greater accumulation of experiences will further reduce the failure rate.—Authors' Abstract

## Other Mycobacterial Diseases and Related Entities

**Acocella, G., Hamilton-Miller, J. M. T. and Brumfitt, W.** Can rifampicin use be safely extended? Evidence for nonemergence of resistant strains of *Mycobacterium tuberculosis*. *Lancet* I (1977) 740-741.

Data on the incidence of primary resistance to rifampicin in *Mycobacterium tuberculosis* strains have been collected from various countries. Strains isolated from those countries where rifampicin is used for both tuberculous and nontuberculous conditions (Italy, Argentina, Brazil, and Spain) did not show a higher incidence of primary resistance than did strains from other countries (France, U.K., and U.S.A.) where rifampicin use is confined to tuberculosis. It is concluded that there is no evidence to justify fears of an increased incidence of resistance to rifampicin in *M. tuberculosis* if rifampicin were used discreetly for treating nontuberculous infections.—Authors' Summary

**Anatoly, S. A.** Effect of hyaluronic capsule as one of the factors of hemolytic streptococcus pathogenicity. *J. Microbiol. Epidemiol. Immunobiol.* 2 (1977) 22-27. (In Russian)

Experiments were conducted on albino mice. It was shown that treatment of streptococci with testicular hyaluronidase or a single administration of the enzyme to infected animals failed to inhibit the infectious process. Injection of hyaluronidase solution every three or four hours depressed the development of the process and increased the percentage of surviving animals during its first stages. A marked intensification of the hyaluronidase action inhibiting the infectious process was observed under conditions of a moderately active or passive immunity

and also in the case of preliminary treatment of streptococci with homologous immune serum. The data thus obtained permitted regarding the hyaluronic capsule in the hemolytic streptococci as one of the pathogenicity factors of this microbial species providing survival of the causative agent after its entrance into the macroorganism.—(Adapted from author's English abstract)

**Doleckova, V., Viklicky, J., Sula, L. and Kubecova, D.** Fatal generalized BCG histiocytosis. *Tubercle* 58 (1977) 13-18.

An infant was vaccinated at the age of three days with BCG vaccine. At the age of three years and ten months he developed an infection by *Salmonella typhimurium*. The infection persisted, with recurrent episodes of fever, perinephric abscess, abscesses of lymph nodes, hepatomegaly, splenomegaly and paravertebral and retroperitoneal abscesses, from which *Salmonella* were isolated. At the age of six years and two months mycobacteria were cultured from a lymph node. The child died two months later. At post-mortem examination there were widespread histiocytic nodules in many organs, from which *Mycobacterium bovis* BCG were cultured.

One previous case has been reported from Czechoslovakia. The mother of that child was the sister of the father of the child reported here. It was not possible to investigate the possibility of abnormalities of humoral or cellular immunity in the family.—Authors' Summary

**Folb, P. I., Jaffe, R. and Altmann, G.** *Nocardia asteroides* and *Nocardia brasiliensis* infections in mice. *Infect. Immun.* 13 (1976) 1490-1496.

A model for *Nocardia asteroides* and *Nocardia brasiliensis* infections in Swiss white mice has been established without the addition to the inocula of any form of adjuvant. Serial histopathological studies revealed that these two actinomycetes cause lesions that are quite different in their features. An acute suppurative abscess characterizes the lesions of *N. asteroides*. In the case of *N. brasiliensis* infections a granuloma is produced in which a striking feature is the presence of large numbers of foam-laden macrophages, although occasional exceptions to this pattern were noted. Electron microscopic studies demonstrated that these macrophages contain within their cytoplasm organisms in varying stages of degeneration. Repeated mortality studies in mice failed to demonstrate differences in mortality rates produced by *N. asteroides* and *N. brasiliensis*. Thus, despite relatively trivial biochemical and antigenic differences between these two species of *Nocardia*, the local pathogenic response is quite different. The presence in the "brasiliensis lesion" of foamy macrophages with intracellular organisms is reminiscent of the histopathological features of lepromatous leprosy and of disseminated *Mycobacterium bovis* infection when this occurs in the immune suppressed situation. It is possible that *N. brasiliensis* infection produces a depression of cellular immunity that modified the local host response to the organism.—Authors' Summary

**Gulevskaya, S. A., Katz, L. N., Vulfovich, Yu. V., Mikhailov, A. B. and Konstantinova, N. D.** Study of the L-forms of streptococcus in the scanning electron microscope. II. Structural elements of the L-colonies at different growth phases. *J.*

*Microbiol. Epidemiol. Immunobiol.* 2 (1977) 18-22. (In Russian)

The method of scanning electron microscopy showed that the L-colonies of streptococcus were formed by spherical structures 0.1-1.5  $\mu\text{m}$  in diameter, elements of polygonal shape (large bodies) 10-30  $\mu\text{m}$  in size, filamentous structures 1-7  $\mu\text{m}$  in diameter and structureless matrix. A regular replacement of one form by another was observed in the process of the L-colonies development. Thus, the spherical elements appeared in the lag-phase, and polygonal elements were found mostly at the initial stages of the L-colonies formation; as to the filamentous structures—they were present at all the developmental stages, but their diameter increased, and their structure and number changed at different growth phases. The spherical elements of the L-colonies formed evenly both on the structureless depth matrix of the colonies, on the filamentous structures in the form of buds on the "large bodies," and the disintegration of the latter. The role of the filamentous structures in development of the L-colonies is discussed.—Authors' English abstract

**Hirsh, Fred S. and Saffold, Oscar E.** *Mycobacterium kansasii* infection with dermatologic manifestations. *Arch. Dermatol.* 112 (1976) 706-708.

A patient with cutaneous lesions as a manifestation of systemic infection with *Mycobacterium kansasii* is described. To our knowledge, this is the fourth reported case of a patient with dermatologic lesions secondary to *M. kansasii* infection. A brief review of the classification and clinical presentations of atypical mycobacteria is given.—Author's Abstract