

CURRENT LITERATURE

It is intended that the current literature shall be dealt with in this department. It is a function of the Contributing Editors to provide abstracts of all articles published in their territories, but when necessary such material from other sources is used when procurable.

DHARMENDRA. Leprosy in Japan. Leprosy in India **34** (1962) 249-266.

Studying the state of leprosy in Japan, the author relates that the number of known cases, which in 1906 was 23,815, had dropped to 11,588 in 1960; in 1961 there was a decrease in the number of new patients found annually from 433 to 274. The control measures have been applied with enthusiasm, and leprosy research is of a high standard and great volume. Although the disease is well under control, vigilance is still needed to detect the small number of cases that are still arising, and an augmentation of the case-finding program is needed. Education in leprosy of medical practitioners is still required; education in leprosy of the general public should be increased. It should be permissible to treat patients outside the leprosaria. Also, the opportunities for rehabilitation offered to discharged patients might be increased.—[From abstract by J. R. Innes in *Trop. Dis. Bull.* **60** (1963) 541.]

NISHIMURA, S. Transmission of *M. leprae* to mice and identification of increased bacilli in injected animals. *La Lepro* **32** (1963) 1-13 (in English).

The human leprosy bacillus was inoculated subcutaneously into 711 black mice of 4 different strains, but proliferation of the bacilli was not seen. Identification tests were carried out on 14 acid-fast bacilli which did proliferate, and these were found to be similar to the murine leprosy bacillus. The lepromin reaction was found to be the most simple and accurate for identification of the leprosy bacillus. Contamination by acid-fast bacilli was investigated in 396 healthy, uninoculated mice, and a high percentage—not only animals bred in the laboratory but some obtained elsewhere—were found to be contaminated. Inapparent infection by the murine bacillus was found among the healthy mice. In other words, a murine leprosy bacillus of mouse origin was discovered. The bacilli isolated in this study are believed to have originated from animals with inapparent infection. Measures must be taken to prevent contamination by such organisms in conducting investigations in animals, and the initial step following isolation of an organism should be to test for the lepromin reaction.—[From summary.]

FIGER, J., BERIĆ, B. and PRICA, S. Über die Bedeutung der Lepra in der Gynäkologie und Geburtshilfe. [The importance of leprosy in gynecology and midwifery.] *Ztschr. f. Geburtshilfe u. Gynäkol.* **158** (1962) 199-212.

The authors dealt with 50 female patients from the leprosarium at the University of Sarajevo, 33 lepromatous, 3 tuberculoid, and 14 indeterminate. Their ages ranged from 8 to 36 years. The 3 tuberculoid patients gave positive lepromin reactions. Forty-three (86%) were sterile. Pregnancy and childbirth were uncomplicated. About 20% were amenorrhoeic, but in only 1 case could this be attributed to leprosy. The group with irregular oligomenorrhoea was the largest, with 27 patients (54%), and these were all prepuberal leprosy infections and all were apparently sterile. The question of prenatal infection by leprosy bacilli is regarded as of special importance. The authors believe that the fetus can be infected during pregnancy and in the course of delivery. Inoculation of newborn infants of leprosy patients with BCG vaccine is recommended. This paper ends with a series of postulates: (1) Sterilization during institutional treatment is advocated. (2) The pregnancy should be terminated in the first 3 months (in mid-pregnancy this should be done only if there is activation of the disease); during the last 3

months the antileprosy therapy should be stepped up. (3) After delivery bacteriologic investigations become necessary, and various methods of disinfection should be undertaken. (4) The newborn child should be separated immediately from the mother, and the placenta and cord should be examined for bacilli.—[From abstract by P. Manson-Bahr in *Trop. Dis. Bull.* **60** (1963) 446-447.]

MUIR, E. Lepra reaction and the general adaptation syndrome. *Leprosy Rev.* **33** (1962) 240-251.

This is a significant contribution to the vexatious subject of lepra reaction. Muir applies to leprosy the ideas of Selye on the general adaptation syndrome, particularly in regard to the alarm reactions, the stage of resistance, the stage exhaustion, the specific adaptive reactions, and the stressor agents. He emphasizes the deleterious effect of inactivity and insufficient muscular exercise; of deficient, excessive, and unbalanced diets; and of accompanying and complicating conditions such as avitaminosis, ankylostomiasis, malaria, or filariasis. He regards lepra reaction not as a uniform response to one agent but as a response to a large number of differing agents, and distinguishes clinically between ENL and acute exacerbation. Regarding the prevention and treatment of lepra reaction, he discusses the application of graduated exercise, of constructive dietetics, and the use of corticosteroids. Certain lines of investigation are suggested: the effects of the sulfones on the adrenal cortex of animals; the effects of iodides on the adrenal cortex; the effect of thyroxine administration in lepra reaction; and the effect of sodium chloride administration. He asks if, after partial or complete suppression of the adrenals in animals, *M. leprae* could be successfully inoculated.—[From abstract by J. R. Innes in *Trop. Dis. Bull.* **60** (1963) 131-132.]

BEYTOUT, D. Les épisodes exanthématiques survenant chez les lépreux en traitement. [Exanthematous episodes occurring in leprosy patients under treatment.] *Bull. Soc. Path. exot.* **56** (1963) 137-149.

The author classifies the exanthems in leprosy, according to the treatment to be prescribed, as acute leprosy infiltration, erythema nodosum leprosum, reactional pseudoexacerbation, Lucio's phenomenon (erythematopurpuric reaction followed by necrosis), minor tuberculoid reaction, reactional tuberculoid leprosy, and borderline leprosy. In reactional pseudoexacerbation, corticosteroid hormones may be used, but with caution in order not to lose the immunological advantage in the reaction. In the case of acute lepromatous infiltration, and in reactivation, the doses of the sulfones should not be decreased, and low doses of corticosteroid hormones should be used, with progressive reduction of dosage. In erythema nodosum leprosum, treatment is much more disappointing and complex: sulfone treatment is stopped, and stibium derivatives, cortical hormones and ACTH, and synthetic antimalaria drugs should be used.—[From author's summary.]

BROWNE, S. G. and DAVIS, E. M. Reaction in leprosy precipitated by smallpox vaccination. *Leprosy Rev.* **33** (1962) 252-254.

The authors record observations on smallpox and on the precipitation of lepra reactions by smallpox vaccination in patients in Ekpene Obom, Eastern Nigeria. A patient with smallpox returned to the leprosarium and within a fortnight the disease began to spread, the disease occurring in 14 patients, an attack rate of 5%. Lepromatous patients were more susceptible to smallpox than nonlepromatous and those who succumbed to smallpox tended to suffer from lepra reaction. Lepromatous patients ran the risk especially if they had had a reaction previously. Vaccinations were then given to 254 patients. The reactions were in general mild and transient, leaving no sequelae and not interrupting clinical and bacteriologic progress. There was deterioration of their condition in patients vaccinated while already in reaction.—[From abstract by J. R. Innes in *Trop. Dis. Bull.* **60** (1963) 132.]

TRAN-VAN-BANG. Lépride maculo-tuberculoïde apparue au point d'une implantation placentaire. Hypertrophie des nerfs interosseux. [Maculo-tuberculoid lepride appearing at the site of a placental implantation. Hypertrophy of intercostal nerves.] *Bull. Soc. Path. exot.* **55** (1962) 329-331.

The author reports a case of hypertrophy of intercostal nerves in a tuberculoid leprosy patient, appearing three years after placental implantation, at the site of implantation, and discusses the role played by the cutaneous route in interhuman contamination.— [From Summary.]

JARDIN, C. Agents Thérapeutiques et Remèdes Traditionnels Contre la Lèpre. [Therapeutic Agents and Traditional Remedies for Leprosy.] Villers-les-Nancy: 10, Rue du Léomont, France, 1961, 422 pp.

This monograph of 422 pages, with about 3,500 references, is an exhaustive study of the medicaments used in leprosy in the recent past. Special features indicated in the subtitle are the general bibliographic review, the present-day orientation of research, and injectable "depot" preparations. After a study of experimental therapy, there is a thorough discussion of chaulmoogra oil and its derivatives and of DDS and derivatives, followed by sulfamethopyrazine, promizole, and thiosemicarbazones, the thiocarbanilides, the ethyl mercaptans, metals and their derivatives, oxidants, antibiotics, isoniazid, detergents, drugs in combination, drugs of animal and vegetable origin, sera and vaccines, and hemotherapy. Some problems of therapy are not evaded, and the reticuloendothelial system and nutrition in leprosy are carefully considered. There are several useful appendices, especially the study of "depot" suspensions mentioned in the subtitle. The author points out that "the treatments of leprosy are always of long duration."— [From review by J. R. Innes in *Trop. Dis. Bull.* **60** (1963) 542.]

TORSUEV, N. A., GOBUN, V. V., TORSUEVA, N. N., CHERNYAVSKAYA, G. Y. and SOKOLOV, V. V. Our experience in the treatment of leprosy with Etisul: a preliminary report. *Leprosy Rev.* **33** (1962) 222-239.

This group, working at a leprosarium at Rostov-on-Don and at the Upper Kuban Leprosarium, have made a trial of Etisul by inunction on 10 patients at each place, mostly with severe degrees of the lepromatous form. Smears from the nasal mucosa and skin were examined regularly, and the bacterial index recorded. At the Upper Kuban Leprosarium inunctions of 5 gm. were given 6 times a week for 3 months. The results as shown by the bacterial index were good. At Rostov-on-Don the patients got 5 gm. inunctions 3 times a week for 24 weeks, DDS being continued. The results were equally good: the nasal smears became negative in all but 2 cases. The authors regard as proof of therapeutic effectiveness the fact that in all cases the number of homogeneous forms of the bacilli decreased, while the granular forms increased. This granular index rose to a maximum in the middle of the course of treatment, but at the end it fell to a point lower than it was at the outset. Clinical and histologic improvement was also considerable. The authors think that the drug, which was well-tolerated, is most useful in conjunction with a standard drug such as DDS or Ciba-1906. Further study is needed to find out if it is usable in repeated courses.— [From abstract by J. R. Innes in *Trop. Dis. Bull.* **60** (1963) 130-131.]

LANGUILLON, J. Note préliminaire sur le traitement de la maladie de Hansen a forme lépromateuse par la Kamycine. [Preliminary note on the treatment of lepromatous leprosy by Kanamycin.] *Bull. Soc. Méd. Afrique Noire Langue Française (Dakar)* **7** (1962) 409-412.

Kanamycin, an antibiotic derived from *Streptomyces kanamyceticus*, has been tried by Japanese workers in murine leprosy. The author has tried it in 5 lepromatous patients with fresh lesions, giving 1 gm. intramuscularly every day for 3 months, then 3 times a

week for the 9 following months. [In the summary it is stated that 1 gm. was given daily for 9 months followed by 1 gm. 3 times a week for 3 months.] The clinical improvement in all patients was rapid and considerable, although nerve forms did not show equally favorable results.—[From abstract by J. R. Innes in *Trop. Dis. Bull.* **60** (1963) 448.]

LANGUILLON, J. Traitement de la maladie de Hansen par la sulfadiméthoxine. [Treatment of leprosy by sulfadimethoxine.] *Bull. Soc. Méd. Afrique Noire Langue Française* (Dakar) **7** (1962) 406-408.

A 12-month trial, in 10 untreated patients, of Madribon (2-4 dimethoxy-6-sulfanilamide-1,3-diazone), a long-acting sulfanilamide, is reported. The dose used was 0.75 gm. or 1-1/2 tablets every second day. The dosage was very well tolerated; no toxic effects whatever were seen. The results were very satisfactory, since 2 of the 4 lepromatous patients were rendered bacteriologically negative in both the nasal mucosa and the skin, and the condition of the other 2 was greatly improved. The 6 tuberculoid patients were also greatly improved; 3 of them appeared to be cured at the end of the year. The drug seems to have a definite action on neuritis treated in the beginning of its evolution.—[From abstract by J. R. Innes in *Trop. Dis Bull.* **60** (1963) 447-448.]

BROWNE, S. G. Desensitization for Dapsone dermatitis. *British Med. J.* **2** (1936) 664-666.

In an attempt to desensitize 52 leprosy patients under treatment who had developed sensitivity to Dapsone (DDS) as shown by generalized dermatitis, aqueous solapsone (Sulphetron) was given orally in increasing doses, followed by solapsone in tablet form and then by Dapsone. Forty-eight of them were successfully desensitized. Twenty-six had recurrences of dermatitis during the course of desensitization, which prolonged its duration. The desensitized state was apparently permanent in 43 patients. Four of the remaining 5 experienced recurrence of sensitivity and were successfully desensitized again by the same procedure as before.—[From author's summary.]

YOFFE, Y. L. [Conservative methods of the orthopedic treatment of deformities in leprosy patients.] *Trans. Leprosy Inst.* **8** (1962) No. 3, 35-42.

To treat deformities of hands and fingers in leprosy patients the author recommends a complex of conservative measures. These consist of heating procedures, medical gymnastics, splinting, intramuscular injections of vitamin E, and preparations containing hyaluronidase. With these he was able to achieve, to some extent, the elimination of muscular atrophies of the hands, functional improvement, partial restoration of pain sensitivity, increase of muscular strength, and improvement of oscillography indications. Especially good effects are observed in fresh cases.—N. A. TORSUEV

IDRISOV, A. S. [Surgical treatment of some complications after leprosy.] *Trans Leprosy Inst.* **8** (1962) No. 3, 30-34.

Since 1956 the author has performed 226 different restorative, corrective, and plastic operations on 194 leprosy patients. According to his observations, surgical treatment of hypertrophic neuritis eliminates the excruciating pains, and occasionally prevents the appearance of lesions and deformities. Corrective operations on tendons, muscles, and joints have not only curative but prophylactic significance for the prevention of ulcers and restoration of the lost functions of the limbs. To consolidate the success of such operations it is very important that orthopedic shoes be worn, which lead to correction of position and prevent the appearance of ulcers. Further rational physiotherapeutic treatment is also indicated.—N. A. TORSUEV

PICK, F. Répercussion de la lèpre sur les cristallisations biologiques de l'hémoglobine des malades. [Effect of leprosy on the biologic crystalization of the hemoglobin of patients.] *Bull. Soc. Path. exot.* **55** (1962) 331-334.

The author, studying the blood in healthy subjects, noted that the reaction of direct

biologic crystallization taking place in the intestine of Reduviid hematophagic insects regularly showed prismatic, oblong, and rectangular crystals. In such subjects the continuation of the direct biologic crystallization between slide and coverslip led to indirect biologic crystallization in the shape of a regular modification of some hemoglobin crystals into fine needles. Subjects with diseases were then studied, including 10 leprosy patients, 5 tuberculoid and 5 lepromatous. In all of these patients experimentally exposed to Triatomids there were marked changes in the hemoglobin crystallization. The prismatic crystals were absent, and in their place there were incomplete and irregular crystals; the most striking change was the appearance of slender straight needles in fan-shaped arrangement. A similar crystallographic picture was found in the blood of 37 patients with pulmonary tuberculosis. He thinks that hemoglobin crystallography may be of diagnostic value in many diseases, including leprosy, and that the influence of leprosy on the hemoglobin crystal formation may be pharmacodynamic. The change in all these diseases may be in the globulin of the hemoglobin.—[From abstract by J. R. Innes in *Trop. Dis. Bull.* **60** (1963) 445-446.]

✓ MIYATA, T. and SAITO, N. Enzymatic activities in the serum of leprosy patients. II. The enzymes of glycolysis and metabolic products. *La Lepro* **32** (1963) 141-148 (in Japanese; English summary).

The purpose of this report is to summarize the metabolic alterations due to the peculiarities of leprosy. This matter has been studied, in leprosy patients and normal individuals, by measurements of the following enzymes and products of metabolism: glucose-6-phosphatase, phosphohexose-isomerase, aldolase, lactic dehydrogenase, lactic acid, and pyruvic acid. The following results were obtained: Although the histopathologic pictures of leprosy resemble those of malignant tumors, the aspect of the enzymes in the serum of leprosy is different. Leprosy is a disease with muscular atrophy, but from the enzymologic point of view it is not myogenic but neurogenic atrophy. Leprosy has a fairly abnormal metabolic response for glycolysis, probably due to disturbance of oxidation caused by deficiency in oxygen of the tissues.—[From summary.]

✓ LIU, Tze-Chün, CH'IN, Kuang-Yü, WANG, Chin-Yung, and CHANG, Ju-Feng. Histopathologic lesions of tuberculoid leprosy. Their progressive and regressive changes and clinical significance. *Chinese Med. J.* **81** (1962) 502-510.

The authors studied histologically 297 skin biopsies from patients with tuberculoid leprosy, and found 5 progressive and 5 regressive types of lesions. The proportion of progressive and regressive lesions in a given skin biopsy provides an estimate of the general progress of the patient. They propose the following outline of the life cycle of the tuberculoid lesion. During *progression*, the primary indeterminate lesion assumes the form of the pretuberculoid lesion by the appearance of phagocytes, and then changes to tuberculoid by the appearance of epithelioid cells. Later, Langhans' giant cells appear. A stage may then occur, but not necessarily, of vacuolated epithelioid cells and central caseation. During *regression*, the stages are: Disintegration of the cytoplasm of the epithelioid cells leading to the appearance of reticulated cells, which may become empty with only the cell border persisting; and this may go on to complete disappearance of the lesion if the lymphocytes also disappear. The epithelioid cells may also atrophy and decrease in number while the lymphocytes persist, but if these finally disappear then the lesion disappears completely. The epithelioid cells may change into fibrocytes, and then the tuberculoid lesion becomes fibrosed and changed into a scar. In the case of the larger lesions, there may first be peripheral fibrous encapsulation, and fibrous tissue grows toward the center from the fibrous capsule.—[From abstract by J. R. Innes in *Trop. Dis. Bull.* **60** (1963) 37-38.]

- BRIEGER, E. M. and ALLEN, J. M. Cytopathological changes in lepra cells. *Exper. Cell Res.* **28** (1962) 438-440.

Lepra cells contain vacuoles, and electron microscopy shows that the fine structure of the well-defined osmiophilic cytoplasmic inclusion resembles closely that of the lysosomal bodies described by Novikoff and Essner in Kupfer cells in the liver. This structural analogy leads the authors to suggest that the inclusions in lepra cells are due to lysosomal action. Adjacent sections cut from lesions from 28 lepromatous patients and examined, respectively, for acid phosphatase and for acid-fast bacilli showed a close correlation between the distribution of the enzyme and the bacilli. According to de Duve the detection of acid phosphatase is the only histochemical method of detecting lysosomes, and the authors therefore maintain that this observation brings the host-cell-parasite relationship in leprosy into line with similar studies on phagocytosis in which lysosomes are known to be involved.—[From abstract by S. R. M. Bushby in *Trop. Dis. Bull.* **60** (1963) 541-542.]

- ABE, M., MAEDA, M., NAKAYAMA, T., YANAGISAWA, K., ASAMI, N., TACHIKAWA, N., OKAMURA, K., KOBAYASHI, S. and HAYASHI, K. Studies on the preparation, standardization and preservation of lepromin. II. Standardization by bacillary counting. *La Lepro* **32** (1963) 129-132 (in Japanese; English summary).

The reliability of bacillus counting for the standardization of lepromin was investigated, using undiluted standard lepromin and 1:2, 1:4, and 1:8 dilutions. A linear relationship was demonstrated between the degrees of dilution and the numbers of bacilli the dilutions contained. The sizes of the skin reactions in leprosy patients elicited by the different concentrations were compared. The reaction lesions became smaller with the degree of dilution. This made clear a parallelism between the potency of lepromin and the number of bacilli in it. It was found that when lepromin is prepared by the same procedure, using a pool of many lepromatous nodules, it contains from 150-160 million bacilli per cc.—[From summary.]

- ABE, M., MAEDA, M., NAKAYAMA, T., YANAGISAWA, K., ASAMI, N., TACHIKAWA, N. and OKAMURA, K. Studies on the preparation, standardization and preservation of lepromin. III. Influence of tissue component on the standardization of lepromin. *La Lepro* **32** (1963) 133-136 (in Japanese; English summary).

The influence of the tissue component upon the potency of lepromins defined by the numbers of bacilli was investigated. Three lots of lepromin were adjusted by dilution or concentration to contain the standard number of bacilli (160 millions per cc.), after which they were tested comparatively for potency in 157 lepromatous and 34 nonlepromatous cases. No statistically significant difference of potency was observed so far as concerns the early (Fernandez) reaction. In the late (Mitsuda) reaction, however, a lepromin prepared from newly-appeared nodules in untreated patients was somewhat lower in potency than the 2 other lepromins. This observation is reasonably explained by the fact that the bacilli in nodules from untreated patients are more concentrated than in those of patients under treatment, and that after adjustment to the same bacillus count the lepromin from the former had less tissue component than those from the latter, which may be responsible for nonspecific reactions. This observation suggests that the amount of tissue component should be made uniform if the potency of lepromin is to be defined by the number of bacilli contained in it.—[From summary.] [It is not stated that false positive reactions were seen with the suspensions with the more tissue component.]

- ABE, M., NAKAYAMA, T., TACHIKAWA, N. and OKAMURA, K. Effect of sonic vibration on the property and potency of lepromin. *Le Lepro* **32** (1963) 137-140 (in Japanese; English summary).

When standard lepromin was treated with sonic vibration (9.5 kilocycle/sec.) the

coarse tissue fragments were dispersed in fine particles, and at the same time the number of bacilli diminished exponentially. Under the conditions of the experiment about one-half of the bacilli were destroyed within 5 minutes. The complement-fixing capacity of the lepromin with leprosy serum was, however, increased by the treatment, showing that the active substance was not destroyed. Comparison of potency tests on leprosy patients showed that lepromin treated for 30 minutes elicited relatively weak early reactions, while there was no significant difference with respect to the late reactions. Consequently, it is believed that the late reaction may be caused not only by intact leprosy bacilli but also by mechanically destroyed bacilli.—[From summary.]

CHEKALINA, E. I. and KRASNOVA, V. P. [Mitsuda test in leprosy patients made by diluted lepromin.] *Trans. Leprosy Inst.* **8** (1962) No. 3, 46-47.

In Mitsuda tests with different dilutions of lepromin in 130 healthy persons, the ages ranging from 20 to 30 years, the authors obtained the results shown in the following tabulation.

Result	Dilution		
	1:20	1:100	1:240
Negative	6 (4.6%)	18 (13.8%)	20 (15.4%)
Doubtful	6 (4.6%)	15 (11.5%)	17 (13.1%)
Weakly positive	57 (43.9%)	82 (63.2%)	82 (63.2%)
Positive	52 (40.0%)	15 (11.5%)	11 (8.3%)
Strongly positive	9 (6.9%)	0	0

On the basis of these data, the authors conclude that the degree of lepromin dilution substantially influences the results of the Mitsuda test; as dilution rises, the percentage of positive reactions decreases while that of negative reactions increases.—N. A. TORSUEV

TATARINOV, Y. S. [Immunochemical studies of blood serum albumins in leprosy patients.] *Trans. Leprosy Inst.* **8** (1962) No. 3, 52-55.

By fractionation the author obtained electrophoretically pure albumin fractions of the sera of lepromatous patients and of healthy donors. A Kunkel-type apparatus with starch block was used, and control of the purity of the preparations obtained was by electrophoresis on paper. To determine the antigenic features of the albumin preparations obtained they were compared by Schneidegger's method of immunoelectrophoresis and Ouchterlony's method of double diffusion in agar. The albumin fractions isolated from both the donors and patients gave, in all points of the ascending portion on the precipitation curve, almost the same amount of protein in the specific sediment which is characteristic for the given antiserum. Immunologic differences among donors and patients did not exceed 2.5%. That is well within the limit to be allowed for the method, which is about 5%. Perhaps the albumins of both donors and patients possess one similar grouping which provides their antigenic properties. At any rate, the albumin preparations compared have had the same precipitation arc in gel by immunoelectrophoresis and also by the Ouchterlony double diffusion method. The author believes that the antigenic structure of the molecule of the blood serum albumin in lepromatous leprosy patients is unchanged.—N. A. TORSUEV

ROY, A. N. A study of haemagglutination reaction in leprosy contacts. *Ann. Biochem. & Exper. Med. (Calcutta)* **23** (1963) 1-4.

The author has studied hemagglutination reactions in the sera of 145 close contacts of leprosy patients, also 29 general contacts from a village in an endemic area, and 81 normal persons. A significant positive titer was shown in an appreciable proportion of contacts and in a high proportion of lepromin-positive persons. The reaction was positive in about 9% of normal adults. The author suggests the application of this test in epidemiological study, and in the early detection of leprosy, especially in children. In the test the positive diagnostic titer is taken as 1:8.—[From abstract by J. R. Innes in *Trop. Dis. Bull.* **60** (1963) 446.]

MERTSLIN, G. V. [Conditionally-specific antigens (rat lepromin and BCG vaccine) in our active modification of complement-fixation test with leprosy patients' blood sera.] *Trans. Leprosy Inst.* **8** (1962) No. 3, 48-51.

With the sera of untreated lepromatous patients the author's active modification of the complement-fixation test is always positive with rat lepromin used as antigen, and positive results were obtained with BCG vaccine as antigen in 12 out of 16 sera. The same reaction in treated lepromatous cases was positive in 70% with rat lepromin, and in 57% with BCG vaccine. In control sera the test was always negative with BCG vaccine as antigen, while with rat lepromin it was positive in 3 cases, and weakly positive in 2 of 58 cases. The results with sera of tuberculoid and indeterminate patients were indefinite, and these investigations should be continued with more sensitive antigens.—N. A. TORSUEV

SHEPARD, C. C. Immunity in experimental leprosy. *Bact. Proc.* pg. 76, 1962.

The question of whether immunity can be induced in animals with experimental leprosy is being studied with the foot-pad infection in mice. In a *reinfection* experiment, mice that had first been infected in the right hind foot—lesions developing typically six months later—were reinoculated in the left hind foot with a passage of the same strain. Previously uninoculated controls were injected at the same time. The reinfecting lesions developed as rapidly as did the primary lesions, and contained as many organisms. Reinfection lesions and primary lesions might coexist in the same animal. At the time of the reinjections the primary lesions contained about a million bacilli, and several times this number in the ensuing months, an antigenic exposure that might have seemed adequate. However, the foot-pad infection is localized, the regional lymph node only infrequently contains acid-fast bacilli, and further extension has not been found. In *vaccination* experiments mice were given intraperitoneal injections of 10^8 living BCG or heat-killed mycobacteria of several species, and later challenged by injection of about 5,000 leprosy bacilli into the foot-pad. In the BCG mice multiplication of the bacilli was delayed several months. There was also some delay in the other vaccinated groups, but in all cases leprosy bacilli were subsequently found in good number.—[From author's abstract.]

SHEPARD, C. C. Phagocytosis of microorganisms by HeLa cells. I. The use of bovine fetal serum for the study of mycobacteria and certain other gram-positive bacteria. *J. Immunol.* **85** (1960) 356-360.

Bovine fetal serum promotes the uptake of mycobacteria by HeLa cells and is superior to horse and chicken sera in the infection medium. The intracellular growth rate of tubercle bacilli is faster with it than with the other sera; the time required to "fill" the cells is shortened by about 20%. The phagocytosis of staphylococci and streptococci is also promoted by bovine fetal serum and by horse serum. Absorption with zymosan of the bovine fetal serum before its inclusion in the medium leads to more rapid intracellular growth of these organisms. Dilution of these organisms in broth, rather than salt solution, also increases the rate of their subsequent intracellular growth. A combination of two purified proteins, bovine fetuin and human albumin, also promotes the uptake of mycobacteria, staphylococci, and group A streptococci. A medium containing these two proteins appears to be the preferred infection medium for the growth of these organisms in HeLa cells. Bovine fetal serum promoted the phagocytosis of all mycobacterial species tried. Leprosy bacilli from the skin and from nasal washings of patients with lepromatous leprosy of these patients were also studied. The tissue cultures seemed to maintain themselves in better condition for longer periods (one to two months) with the bovine serum than with horse serum in the medium, but intracellular growth was not observed.—[From author's abstract.]

SHEPARD, C. C. Phagocytosis of microorganisms by HeLa cells. II. Serum activities resembling properdin. *J. Immunol.* **85** (1960) 361-367.

The activity of different species of animal sera in controlling the species of micro-

organisms taken up by HeLa cells may be divided into two types on the basis of stability to heat and absorbability by zymosan at 17°C. Activity promoted by bovine fetal serum is also promoted by some lots of horse serum and concerns mycobacteria, staphylococci and group A streptococci. The activity is duplicated by a combination of purified preparations of bovine fetuin and human albumin. Activities not promoted by bovine fetal serum are in most cases absorbable by zymosan or are heat-labile. Included in this type is the action of dog serum toward *Pasteurella tularensis*, and of guinea-pig serum toward *Brucella* spp. and *Histoplasma capsulatum*. A mixture of fresh and inactivated chicken serum promoted uptake of all the microorganisms. Following absorption with zymosan, the activity was limited to the species in the first group mentioned. The absorption to zymosan of the activity of dog serum for *P. tularensis* had requirements for temperature, ionic strength, and Mg^{++} that resemble closely those described for the reaction between properdin and zymosan. Treatment of dog serum by methods designed to destroy C'1, C'2, and C'4 caused loss of its phagocytosis-promoting activity. The chicken serum activity for *P. tularensis* and the guinea-pig serum activity for *Br. suis* had similar but somewhat different properties. Absorption of the guinea-pig serum with zymosan did not remove its activity for *H. capsulatum*, although it did remove that for *Br. suis*. Rendering the HeLa cell line free of PPL0 did not change its behavior in phagocytosing bacteria.—[From author's abstract.]

SHEPARD, C. C. and KIRSH, D. Fluorescent antibody stainability and other consequences of the disruption of mycobacteria. Proc. Soc. Exper. Biol. & Med. **106** (1961) 685-691.

When mycobacteria were broken open by vibration with glass beads, 90-95% of the protoplasm, and 70-80% of the bacterial mass, was released in a soluble state and could be separated by centrifugation from the sediment, which consisted largely of the cell walls of the disrupted bacilli. Intact bacilli of three of the more rapidly-growing species studied stained well with fluorescent antibody, but those of the five more slowly-growing species did not, although the disrupted bacilli stained brightly. This was interpreted as evidence that the outer surfaces of intact bacilli of these species are free of antigen. The soluble fraction contained the greatest amount of antigen, as judged by ability to inhibit staining of the disrupted bacilli. It could be used to absorb (inhibit) cross-reacting antibodies to render immune sera more specific in their staining of the disrupted organisms. The soluble fraction was a potent antigen in agar diffusion tests. In complement fixation tests it was also an effective antigen with helpful specificity.—[From authors' abstract.]

REES, R. J. W. and TEE, R. D. Studies on *Mycobacterium lepraemurium* in tissue culture. II. The production and properties of soluble antigens from *Myc. lepraemurium* in tissue culture. British J. Exper. Path. **43** (1962) 480-487.

M. leprae murium was grown in cultures of rat fibroblasts, the culture medium being changed every 10th day. The present study is of 36 individual or pooled culture filtrates from 5 continuous cultures which were examined for mycobacterial antigens by the Ouchterlony technique. Antisera from rabbits immunized by rat lepromas and against *M. tuberculosis* were used. Because the culture filtrates contained antigens derived from the rat fibroblasts, they were also tested against rat tissue antisera. Of these 36 filtrates, 23 produced 1 or 2 precipitin lines with both the *M. leprae murium* and the *M. tuberculosis* antisera, but the lines were less intense with the latter serum. The antigens were only slightly affected by heating at 65°C, and as they were unaffected by treatment with papain, and as the precipitin lines stained with periodic-acid Schiff reagent, they were considered to be predominantly polysaccharides. The filtrates also reacted with the antirat serum, but by absorption tests the precipitin lines produced with the anti-*M. leprae murium* serum were shown to be due to antibodies against antigens of the bacilli and not to antigens of the rat tissues. Comparative studies in which the bacilli were added in varying

concentrations to fresh culture medium showed that the antigen present in the filtrate could not have been derived from simple autolysis of the bacilli, but must have been due to active production by the living bacilli; 2×10^{11} bacilli per cc. had to be present in the cell-free medium to produce results similar to those of the tissue cultures which contained 2×10^7 to 2×10^9 bacilli per cc. [The authors were unable to explain why only two-thirds of the filtrates contained antigens.] Although the bacilli grew in the culture within the rat fibroblasts, none of the antigens could be detected within those cells. These filtrates also elicited intradermal reactions, comparable to 3 units of PPD, in guinea-pigs sensitized with BCG. This result suggests that the antigens contained some protein.— [From abstract by S. R. M. Bushby in *Trop. Dis. Bull.* **60** (1963) 231.]

✓ NAKAMURA, M. Growth of *Myc. lepraemurium* in mice transplanted with Ehrlich ascites tumor cells. *La Lepro* **32** (1963) 149-151 (in Japanese; English summary).

The growth and distribution of *M. leprae murium* in mice with transplanted Ehrlich ascites tumor cells, and the survival of mice with the tumor transplants influenced by inoculation of the murine bacilli, were investigated. The survival time of mice with the tumor cells was prolonged by previous inoculations. Slight enhancement of the growth and distribution of the bacilli by simultaneous transplantation of the tumor cells was observed.— [From summary.]

✓ RYZHOVA, N. Y. [Solusulfonum content in the organs and tissues of normal white rats.] *Trans. Leprosy Inst.* **8** (1962) No. 3, 56-60.

X The greater part of Solusulfonum (Soviet-made Sulphetrone) administered intramuscularly to normal white rats is excreted during the first 24 hours. As the number of injections increases, the amount of Solusulfonum excreted with the urine and fecal matter decreases, from 93% to 44.4% of the injected dose. No accumulation of the preparation was found in the organs of the animals. The most intense Solusulfonum concentration in liver, kidneys and heart was observed one hour after injection, independently of dosage and the number of the injections made. After the first injections the maximum blood concentration was found after 3 hours, and after the next injection the maximum was marked in an hour. After administration of 5-25 mgm. (from 25 to 125 mgm. per kgm.) of the drug no changes in their behavior were observed.—N. A. TORSUEV

✓ TCHERNYSHEVA, L. M. [Histopathologic changes in the site of administration of some antigens from acid-resistant mycobacteria; experimental study.] *Trans. Leprosy Inst.* **8** (1962) No. 3, 67-76.

Intracutaneous injections of normal guinea-pigs and white rats with different antigens prepared from mycobacteria result in the formation of infiltrates of cellular composition, without typical tuberculoid structure. The infiltrates are ill-defined and diffuse, and consist of histiocytes and epithelioid cells with an admixture of polymorphonuclear leucocytes, and sometimes giant cells of foreign-body or Langhans' type. Reactions to various antigens differ among themselves as regards the size of the infiltrates, their period of evolution, the number of epithelioid cells, the degree of inflammatory phenomena, and the time of disappearance of the mycobacteria. The most pronounced changes occur in guinea-pigs.—N. A. TORSUEV

✓ ALAMDAROV, I. N. [On changes of the peripheral nerves of the hind limbs by experimental leprosy in rats.] *Trans. Leprosy Inst.* **8** (1962) No. 3, 77-80.

X Twelve white rats were injected with *M. leprae murium*. When killed at eight months, all but one of the rats showed clinical signs of disease. Single acid-resistant bacilli and pronounced parenchymatous and dystrophic changes were found in 4 rats that were examined histologically, all changes being located in parenchyma and interstitial tissue of the tibial, saphenous, and ischiadic nerves.—N. A. TORSUEV