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BOOK REVIEWS

Davidson, W. S. *Havens of Refuge.* Perth: University of Western Australia Press, 1978, 188 pp.

The former Commissioner of Public Health in Western Australia, Dr. Davidson, has written an exhaustive history of the origins and spread of leprosy in the region and the social history of the control program. He relies very heavily on selected records of the Medical and Public Health Department of Western Australia: 1) to write the text itself; 2) to be reproduced in the text as examples and evidence to substantiate the points he makes; 3) to be reproduced in their entirety in the eleven appendixes of the volume. He traces the probable introduction of the disease into this area by pearling boat crews from Southeast Asia or by Chinese workers. After initial cases among Chinese during the 1890s, the disease appeared in Aborigines, a susceptible population, among whom the current prevalence of the disease in Western Australia varies from 9.5 to 62.5 per thousand. Much of the text is devoted to tracing the opening of various centers during the first part of the twentieth century amid a wealth of bureaucratic entanglements concerning such matters as fees and contracts for transportation, the cost of telegrams, etc. A sympathetic account of the social impact of the disease and the vastly improved quality of care following the opening in 1936 of the leprosarium at Derby is provided. Profiles of the principal medical workers of the area are provided as well.

This book appears to presume some knowledge of the local geography of Western Australia, and its greatest appeal to the medical or lay reader may lie with those persons with an interest in this region. Further, the stated purpose of the book is to encourage physicians of Western Australia to consider leprosy in the differential diagnosis of a peripheral neuropathy or skin lesion; however, as the work deals almost exclusively with the history of leprosy in the area, little material to aid the physician in diagnosis is provided. Nevertheless, although the volume is frequently anecdotal, there is full documentation of the points made by the author in the statistical data presented in the tables as well as through the use of excellent relief maps tracing the historical incidence of leprosy in various sections of the region.—G. Gordon

Dharmendra. *Some Facts about Leprosy.* New Delhi: The Hind Kusht Nivaran Sangh, 1979, 45 pp., Rs.3/per copy.

As the author states in the Preface, "This small book is meant for health education of general public regarding leprosy. Another object is to impress the need on the patients for taking regular treatment, and to educate them about taking proper care in the use of their hands, feet and eyes, etc. keeping in view the limitation imposed on them by the loss of sensation to pain caused by the disease. The book has therefore been written in simple non-technical language so that the general public and the patients have no difficulty in following the subject.

This book has proved to be very popular as will be evident from the fact that it has become necessary to reprint it almost every year. Each subsequent edition has been a revised and enlarged edition to increase its usefulness. The present edition is no exception. As a matter of fact the additions and alterations made in this edition are more than made in any previous edition."

With characteristic clarity, the author outlines the basic information necessary for a layman to understand leprosy. Succinct chapters deal with microbiology, epidemiology, classification, transmission, control measures, and dapsone chemotherapy. Emphasis is placed on the need for comprehensive treatment of leprosy, including specific chemotherapy. Over half of the book's pages deal with areas of perhaps the greatest practical concern to patients, the prevention and minimization of disabilities. Chapters are devoted to deformities and ulcers and how they can be prevented. Practical instruction in the care of the eyes and the nose are provided. Socio-economic

consequences of the disease and their prevention are discussed as are rehabilitation principles. The book concludes with chapters on the National Leprosy Control Programme of India and suggestions to social workers and volunteers at all levels as to how their services can best benefit leprosy patients.

The book contains a wealth of practical information. Dr. Dharmendra is again to be congratulated for so ably meeting the need for an easily understood educational tool for laymen regarding leprosy.—RCH

Donaldson, S. R. *The Chronicles of Thomas Covenant the Unbeliever.* (Vol. 1: *Lord Foul's Bane*; Vol. 2: *The Ill-Earth Stone*; Vol. 3: *The Power That Preserves*.) New York: Holt, Rinehart and Winston, 1977.

In the vein of J. R. R. Tolkien's *The Hobbit* and *The Lord of the Rings* and C. S. Lewis' *The Chronicles of Narnia*, this lengthy (over 1,100 pages) trilogy is a work of epic fantasy employing the motif of the Hero engaged in a symbolic Quest. The protagonist, Thomas Covenant, is a successful writer who suddenly finds himself afflicted with leprosy. He seeks treatment, and after some months his disease is controlled, but during this time his wife leaves with their infant son and proceeds to divorce him. Back home, he encounters acute hostility from the people in his town who are fearful that he will infect them. He retreats into seclusion and for some months battles suicidal urges. Eventually, he realizes that he is determined to live but nevertheless succumbs to despair and hates his life.

At this point (early in Vol. 1) Covenant has an accident which leaves him unconscious, and he "awakens" to find himself in another world. It is a place in which the Life Force resides in all things, peopled by a race with love for the sacredness of life and an unyielding resolve to defend the Land from anything which could destroy its capacity to allow the Life Force to exist unchecked in its endless manifestations. In the Land, Covenant's leprosy disappears (e.g., he no longer has insensitive hands and feet), and the people do not even know of the disease. The leaders of the people of the Land explain that Covenant has been magically summoned to them because he is the only one who can save the Land from destruction at the hands of Lord Foul, a demonic Force of unassailable power, who wishes to destroy the Land and the spirit of Life that is in it. Covenant is told that he is their reincarnated ur-Leader who possesses a Ring (his white-gold wedding band!) which alone has the power to destroy Foul. Covenant protests, claiming that he is an "Unbeliever" who lacks the power to fight, believes the Land to be a chimera, and does not care whether the Land is destroyed even if it does exist.

Nevertheless, Covenant is impelled to begin the fight, and there follows an endless succession of perilous treks, battles, and adventures with non-human creatures. Gradually, Covenant's spirit begins to free itself of the Despair which made him uncaring, and he actively chooses to fight and overcome Foul. That commitment permits him when he eventually returns for good to his own temporal sphere to perceive his future with joy and hope in spite of neural impairment and the loss of two fingers on one of his hands.

Stephen R. Donaldson is the son of the late Dr. James R. Donaldson, the distinguished orthopedic surgeon who taught at the Miraj Medical College in South India and performed reconstructive surgery on numerous persons afflicted with leprosy. He lived in India with his family as a youth and clearly carried that experience with him into his writing career.

The Chronicles of Thomas Covenant the Unbeliever is a work which can be read with enjoyment by persons fond of the conventions of fantasy literature and the romantic evocations created through the use of hundreds of vaguely Anglo-Saxon and Nordic proper names. The work does not attempt to describe in any detail the current knowledge we possess about leprosy nor the promising future a person can have if his disease is diagnosed early. For this reason it contains nothing specifically of use for the person with a professional interest in leprosy but is a useful tool for all persons to remind themselves of the inner resources that anyone with a chronic disease must call on in order to live at peace with himself.—G. Gordon

International Symposium on Leprosy and Joint Chemotherapy Trial Meeting. Seoul and Anyang, Korea, 30 May–2 June 1978, Y. Yuasa, ed., published by the Sasakawa Memorial Health Foundation (Tokyo, Japan), 1979, 137 pp.

"In the face of increased awareness of the existence of dapsone resistant strains of *M. leprae* as well as 'persisters' among normal strains of the same organisms, both of which require a fresh look at our current strategy of leprosy control by existing chemotherapeutic agents, our Foundation, together with the Department of Health of the Philippine Government, sponsored the lst International Workshop on Chemotherapy of Leprosy in Asia in Manila early in 1977. One of the recommendations adopted at that Workshop stressed the need to have field trials of various new and hitherto little tried combination of anti-leprotic chemotherapy agents, such as dapsone, clofazimine, prothionamide/ethionamide or rifampicin, whose efficacy and side effects are fairly well known individually.

It is our Foundation's policy to accept and act on the recommendations, some of them at least, adopted at the meetings we ourselves sponsor, so that immediately after the end of that Chemotherapy Workshop our Foundation has started to plan to organize such field oriented trials of combined chemotherapy. Being one of the major suppliers of anti-leprotic drugs in this part of the world, we regard such an undertaking as our own responsibility. After some preliminary discussions, our Foundation succeeded in involving the Governments of Korea, Philippines and Thailand as well as a number of other institutions as equal partners, and now we are organizing 'Joint Chemotherapy Trials in Lepromatous Leprosy' to be conducted in these three countries by the doctors and other personnel engaged in leprosy work in these countries as well as in Japan.

The World Health Organization has already started organizing similar but more sophisticated trials as one of the main projects of THELEP (Therapy in Leprosy) which forms a part of an ambitious TDR programme (Special Programme for Training and Research in Tropical Diseases). From the start our Foundation sought their advice on how to plan and conduct our trials, and we are most grateful for their ready cooperation, but it must be made clear that our trials are not in the THELEP programme and therefore WHO is in no way responsible for our projects.

For the planning of the trials, we have first established the Chemotherapy Experts Committee of the Foundation in Japan in the spring of 1977, with eight well-known specialists in the field of chemotherapy in leprosy and its related field, particularly in mouse footpad testing. Meanwhile one or two key persons in Korea, Philippines and Thailand were contacted for initial planning. In October 1977, a 3 day meeting was held in Tokyo to which two experts each from these three countries as well as the members of the Chemotherapy Experts Committee were invited and they discussed in some detail the objectives and procedures of our trials such as the possible combined regimens to be tested and the method of evaluation including the footpad testing on normal and immuno-deficient mice. Further consultations were conducted until the time of the meetings in Korea, reported in this booklet.

Originally our idea was to have a simple and 'no frill' committee meeting type gathering such as the one we had in Tokyo as mentioned above. However, the people in Korea suggested that we should take an advantage of the presence of some leprosy experts, not only from the four countries involved, but also two world authorities, Dr. S. G. Browne and Dr. M. F. R. Waters. With a kind support from the Korean Government, it was decided to have the International Symposium on Leprosy, a public lecture meeting on leprosy, on the first day of gathering for interested medical and non-medical audience, and the meeting was auspiciously inaugurated by His Excellency the Minister of Health and Social Affairs, Mr. Shin Hyun Hwak. Using this opportunity our Foundation would like to thank the staff members of the Korean Leprosy Institute under Dr. Do-Il Kim, who spared no effort to make the meeting such a success.

The first portion of this booklet contains all the presentations of that Symposium *in toto*. The second portion is the minutes of the Joint Chemotherapy Trial Meeting com-

prising of two and a half days of discussion. A draft version of the Standard Protocol of our Trials is attached as an appendix for those interested (Appendix I).

That draft protocol spells out the details of our Trials quite clearly, but I would like to emphasize the importance our Foundation attaches to the second goals of our project, namely the training of medical officers and other personnel in the leprosy control work in the countries involved. Because of the high and uniform standard required for the trial of this nature, we are planning to engage only those personnel who have undergone a special training in one of the standardization workshops to be organized at least once a year, the first one to be conducted in Cebu, the Philippines in August this year, for the doctors and laboratory technicians. We feel that such training will make a useful and long lasting contribution by strengthening and upgrading the field capability of leprosy services in the countries concerned. We have chosen the three countries not only because of their needs but of their current capabilities. There are a number of other countries in East and Southeast Asia, Indonesia and Taiwan for instance, which will no doubt benefit from conducting a similar sort of chemotherapy trials, but still not quite ready primarily due to lack of adequate number of trained field personnel to support such a trial, without seriously straining their routine activity.

To monitor the worldwide emergence of dapsone resistant strain of *M. leprae*, establishment of mouse footpad testing facilities as strategic points throughout the world is regarded as one of the more urgent tasks facing us in leprosy work. In our part of the world there is one already well established in Cebu, the Philippines under the Leonard Wood Memorial Foundation and three more in Japan. One new center is being developed in Burma under the World Health Organization. Our Foundation is trying to establish one in Bangkok in collaboration with the Government of Thailand and the University of Osaka in Japan. One or two more possibilities are being discussed though no decision has been made.

As mentioned at the beginning, all these activities of the Foundation are examples of our efforts to implement some of the Recommendations of the Manila Chemotherapy Workshop. Our Foundation sincerely hopes that the countries, organizations and individuals involved in that Workshop, and all others who endorse that Recommendation, or the similar but perhaps more authoritative ones contained in the 5th Report of the WHO Experts Committee or in the Heathrow Report will take similar positive steps, otherwise we shall be failing in our duty to make the best possible contribution to our professed interest which is the control of leprosy and improved welfare of leprosy patients."—Y. Yuasa, Editor's Postscript

Leprosy: Cultivation of the Etiologic Agent, Immunology, Animal Models. Proceedings of the Workshop on Future Problems in the Microbiology of *M. leprae* (12–15 October 1976). Scientific Publication No. 342, Pan American Health Organization, 1977, 75 pp.

In recent years advances in the understanding of the disease process of leprosy—the action and reaction between the invading organism and the human host—have been occurring at an accelerating rate. Scientific study of the disease is at present conditioned by two principal questions: What is the current status of knowledge and what are the problems that investigators must address in the future with regard to the microbiology of leprosy. In an attempt to provide a framework for answers to those questions, the Pan American Health Organization, Regional Office of the World Health Organization, has projected the sponsorship of three workshops. The first of these was held at Johns Hopkins University School of Hygiene and Public Health in Baltimore, Maryland, from 12–15 October 1976. It consisted of papers and discussions on three critical areas: cultivation of the etiologic agent, namely *Mycobacterium leprae*; immunology—the development of diagnostic tests as well as antigens and vaccines; and animal models for leprosy research. The present volume is an outgrowth of that workshop.

Cultivation of the Etiologic Agent

The lack of *in vitro* techniques for the cultivation of *M. leprae* represents an im-

portant barrier to progress in leprosy research: cultivation attempts have proven unrewarding for over a century. Studies by Dr. John H. Hanks and collaborators on *M. lepraemurium* show that reduced oxygen tensions in culture media promote growth of the organism. On the basis of these observations, Hanks has defined some physicochemical conditions that should be controlled in attempts to cultivate *M. leprae* and concludes that oxygen tension, oxidation-reduction potential, and temperature are important. Control of these factors may be critical in converting obligate intracellular mycobacteria (noncultivable) to *in vitro*-adapted (cultivable) mycobacteria.

The need to restudy the etiology of the disease and to identify more precisely the acid-fast organisms in tissues from leprosy patients is emphasized by Dr. Lane Barksdale. Consideration should be given to the possibility of involvement of more than one infectious agent acting in concert, especially since several morphologically different microorganisms have frequently been identified in tissue from patients with lepromatous leprosy.

Discussion on the subject of cultivation includes a review of the results of Dr. Olaf K. Skinsnes' attempts to cultivate *M. leprae* in a medium supplemented by hyaluronic acid. While the organism he has isolated presents some features of *M. scrofulaceum*, Skinsnes explains that it also has enough properties (e.g., specific reaction with absorbed sera from lepromatous leprosy patients) that are consistent with *M. leprae* to warrant considering the organism a cultivable form of that mycobacterium. The matter of claims for the cultivation of *M. leprae* gives rise to the question of the validity of currently accepted procedures and criteria used for identification of the organism; the general consensus among the workshop participants is that these should undergo evaluation, particularly as new developments occur.

Immunology

In his presentation on vaccination protocols and standardization of antigenic reagents, Dr. Quentin Myrvik discusses a list of means of achieving immunity against leprosy and suggests promising points of departure for future investigation in the areas of vaccines, skin tests, and immunology in general.

The World Health Organization's Immunology of Leprosy (IMMLEP) Program has been established precisely for the purpose of resolving some of the problems in this field, as Dr. Hubert Sansarricq points out. The objectives of the program include development of: (a) simple tests for the detection of early or subclinical leprosy, including further studies on the lymphocyte transformation, immunofluorescence, and skin tests; (b) a vaccine—derived from killed *M. leprae* in an appropriate adjuvant or a killed or live mycobacterium that cross-reacts with *M. leprae*; and (c) immunotherapeutic methods such as use of diphtheria toxoid, BCG vaccination, allogeneic leukocytes, and transfer factor.

During the group discussion a note of caution is expressed in the use of vaccines and antigens, as the potential for enhancement of cell-mediated immunity in the patient exists, which could lead to damaging reactional states. In addition, the possibility of stimulation of suppressor T-lymphocytes is considered. Finally, the use of oils as adjuvants is discouraged, since all currently available oils are potential carcinogens.

Animal Models

The articles and discussion on animal models stress their essential role in such investigative areas as pathogenesis, chemotherapy, and vaccination, as well as in microbiologic studies as a source of organisms. In general, the use of such models is predicated on the same conditions that apply to experimental animals in other diseases, namely, the time required to produce clinical disease—ideally, useful information should be obtained within one year—and the cost. More specifically as regards research in leprosy, the choice of animals is restricted by the slow-growth factor and probable low temperature requirements of *M. leprae*. In addition, desirable features include genetic uniformity of the animal and freedom from other mycobacterial diseases. Moreover, animals bred in captivity are preferred to those caught in the wild. Although leprosy infections have been observed in a number of different species, of

the animals experimented with to date the most useful—given the above-mentioned considerations—are the mouse and the armadillo.—(Preface by W. M. Meyers)

RECOMMENDATIONS OF THE WORKSHOP

- Studies on the metabolism and cultivation of *M. leprae* should be encouraged and supported.
- The currently available set of widely accepted criteria for the identification of *M. leprae* should be critically evaluated and updated.
- Studies on the early diagnosis of leprosy by serologic and skin-testing methods should be encouraged and supported, because of their importance as essential elements in the development of effective programs for control of the disease.
- Vaccination and immunotherapeutic programs for the prevention and treatment of leprosy patients should be encouraged; however, greater understanding of the immunologic response of leprosy patients should be stressed in order to minimize the possibility of reactions that could be harmful to the patient.
- Since the armadillo is the only experimental animal that develops a recognized from of leprosy in man, experimentation with this animal model should be encouraged and supported.
- Because of their usefulness as animal models for specific studies, experimentation with the infant-thymectomized Lewis rat and the nude mouse should be encouraged.
- Despite the recognized suitability of the mouse and the armadillo, new animal models for experimentation in leprosy should be sought.
- A workshop on the armadillo should be convened at an early date.

The Armadillo as an Experimental Animal in Biomedical Research. Proceedings of a Workshop held at the Pan American Center for Research and Training in Leprosy and Tropical Diseases, Caracas, Venezuela (23–27 May 1977). Scientific Publication No. 366, Pan American Health Organization, 1978, 140 pp.

This conference was attended by 16 participants as well as a group of Venezuelan observers and dealt with experimental work on the armadillo model. The volume is divided into five parts:

I. Biology of the armadillo
II. Experimental leprosy in the armadillo
III. Natural leprosy infection in the armadillo
IV. Utilization of the armadillo in biomedical research; plans and programs
V. Future possibilities of the armadillo as an experimental model for biomedical research

A full text of the discussion among the participants at each session is provided as well as the papers themselves.

RECOMMENDATIONS OF THE WORKSHOP

In view of the differences in local facilities, species, and degree of development of research capacities, we have made the following general recommendations:

1. We strongly recommend that reproduction of armadillos under controlled conditions be given high priority in the immediate future. The armadillo must be bred in captivity before it can be utilized in biomedical research to its full advantage. This program should be carried out with different species of armadillos that have been demonstrated to offer particular promise for biomedical research.

2. We recommend that research on the immunology of the armadillo be pursued. In comparison with other animals, several species of armadillos (*Dasypus novemcinctus, D. sabanicola,* and *D. hybridus*) appear to have sluggish, cell-mediated immune reactions; the humoral response appears to be vigorous. It may be helpful to bring this observation to the attention of immunologists in general.

3. Use of the armadillo in experimental chemotherapy of leprosy should be encouraged because the armadillo has several advantages not possessed by other animal models. Such advantages lie in the lepromatous features of the experimental disease and the presence of very large numbers of viable *Mycobacterium leprae.*

4. Studies should be encouraged on the

pathogenesis of infection by *M. leprae* in various species of armadillos.

5. Studies should be continued on the indigenous infections that have been reported in *D. novemcinctus* with *M. leprae*-like bacteria in Louisiana and neighboring states. The geographic extent of the indigenous infection should be determined, and the possibility of such infections in other areas of the Americas and in other species of armadillos should be investigated. Exploration should be continued in various geographic areas in the Americas on possible infections by other mycobacteria of wild armadillos.

6. Investigations should be made of the suitability of the armadillo as an experimental model for other infectious diseases, particularly those caused by infectious agents whose temperature optima may be less than 37°C and for which there are presently no suitable animal models.

7. We recognize the hazards involved in work with infected armadillos. Conditions for breeding colonies are different from those for laboratories in which the armadillos are infected. The shipment of armadillos from one area to another should be carefully considered in light of the possibility of introducing infectious agents. The degree of infectious hazards of infected armadillos is unknown, so measures for the protection of the personnel should be carefully considered. Strict measures for the containment of infectious material would be necessary.

8. We reccommend that methods for determination of armadillo age be investigated, with consideration of the use of the eye lens and tooth laminae or other methods. We suggest that collections of eye lenses and teeth be started now from animals of known age and from important experimental animals.

9. Because of the confusion and overlap in common or local names of armadillos, we recommend that the scientific identifications of armadillos be used exclusively. In some instances it may be necessary to carry out further research on the taxonomy of armadillos.

10. In view of the differences among facilities, opportunities, and capabilities mentioned initially, all possible means of financial and other support should be sought, particularly for Latin America, where leprosy and armadillos are abundant but where facilities are sometimes deficient.

11. We strongly recommend that the Pan American Health Organization promote the publication and distribution of the highly useful atlas on the histology of the armadillo, *Atlas sobre histología del armadillo*, as presented at this meeting by personnel of the Pan American Zoonoses Center.—(*Adapted from* the publication)

Wheate, H. W. and Pearson, J. M. H. *A Practical Guide to the Diagnosis and Treatment of Leprosy in the Basic Health Unit*. Wurzburg: Germany Leprosy Relief Foundation, 1978, 26 pp.

As stated in the introduction, the "... aim of this booklet is to enable any member of a medical team to diagnose leprosy accurately, to distinguish it from other skin diseases, and to initiate treatment with confidence as soon as possible after making the diagnosis.

We expect that it is likely to prove of most value to paramedical staff working at village health post and village health centre level but are hopeful it will be of some use to doctors also."

The distinguished authors then proceed in fourteen chapters and twenty-six pages to succinctly and clearly outline the diagnosis and treatment of leprosy and its most common complications and sequelae. A wealth of practical information is contained in this pocket-sized publication, and a paramedical worker adhering to its teachings could be expected to efficiently and effectively deal with all but the most complicated of patients.—RCH