

**CHAPMAN H BINFORD, AB, MD, DSc(Hon)
1900–1990**

Dr Binford had a long and distinguished career in medical science. His career began in 1930 when he was assigned, as a Public Health Service Officer, to Harvard Medical School for training in preventive medicine. Then followed research in a leprosy laboratory in Hawaii, training in histopathology at NIH, and pathology service at several Marine hospitals. He was assigned to the Armed Forces Institute of Pathology in 1951. He retired from the Public Health Service in 1960, but continued to work at the AFIP until he retired for a second time, in the autumn of 1988. Dr Binford was a pioneer in leprosy research and had a special interest and dedication to research on the understanding of the spread of leprosy within the body. His knowledge and astuteness became known nationally and internationally and his opinions on leprosy and other infectious diseases were sought from all over the world. Even in his 89th year he continued to consult on cases of special merit and these included cases of leprosy, fungal diseases and some exotic tropical diseases.

At the AFIP, Dr Binford served as Chief of the Infectious Diseases branch (1951–60), as Registrar of the Leprosy Registry (1951–76) and in 1960 he established the Geographic Pathology Division, and served as its first chief (1960–63). His approach to ‘international medicine’, and in particular his approach to ‘geographic pathology’ is illustrated by the contacts and interactions he developed in the Third World. For instance, while chief of the Geographic Pathology Division, he established research units in Uganda, South Africa, the Philippines and Thailand, and he developed liaisons with mission hospitals in many developing countries. In 1963 he stepped aside as Chief of the Geographic Pathology Division to become Medical Director of the Leonard Wood Memorial (American Leprosy Foundation). He continued however to serve at the AFIP as chief of the Special Mycobacterial Diseases Branch (1963–76), and since then has worked closely with succeeding chiefs of the Geographic Pathology Division—which in 1970 became the Department of Infectious and Parasitic Diseases Pathology.

Until the mid-1970s, the American Registry of Pathology (ARP), although unchartered, was the AFIP’s link with civilian medicine. In 1975 a strong move surfaced in the Pentagon to eliminate the ARP, and to reform the mission of the AFIP along narrow military lines. At the time of this threat, Dr Binford worked tirelessly as a private citizen, serving as liaison between the AFIP’s professional staff and a representative of the Senate Health Subcommittee, in an attempt to save the traditional missions of the ARP and the AFIP. As a consequence the ARP received a Congressional Charter (1976), which made legal and protected the valuable liaison between the AFIP and civilian medicine. Dr Binford acted as Executive Officer of the ARP (1977–80), until a permanent Executive Officer was appointed. The mission of the ARP has grown steadily since 1976, and at present the ARP not only links private and military medicine but serves also as a resource for research and teaching in national and international medical science. As the scope and impact of the ARP grow, Dr Binford’s foresight is increasingly appreciated.

Dr Binford’s interest in the clinical and pathological aspects of leprosy began in the days before sulphone when he was assigned for three years to the Public Health Service Laboratory adjoining Kalihi Hospital in Honolulu (1933–36). There, on a daily basis, he observed and studied the clinical and pathological progression of the various types of leprosy. Since the mid-1950s Dr Binford has been a pioneer in the search for animal models for leprosy—first in an experimental laboratory at the Centers for Disease Control, in Georgia (1956–60), and subsequently at the Leonard Wood Memorial (American Leprosy Foundation) research laboratory at the AFIP (1960–72). It was Dr Binford’s long experience with the clinical and pathological aspects of leprosy that led him to hypothesize in 1956 (as recorded by Dr George L Fite) that ‘...the leprosy bacillus has a natural preference for sites of lower body temperature...’. This observation led to the discovery of the first animal model for leprosy—the mouse footpad (Shepard), now used to detect the viability of *Mycobacterium leprae*; and to the inoculation of *Mycobacterium leprae* into the armadillo (Storrs), an animal with a body temperature of 32–35°C. Dr Binford’s persistence in seeking animal models

for leprosy and his support and contributions to others seeking animal models was the sustaining force in an era that has witnessed a revolution in leprosy research—from a time when no models were available, to the present when armadillos and a variety of primates have led to rapidly expanding fields of leprosy research—an expansion which depends completely on experimental models.

Today armadillo tissues provide the only abundant source of *Mycobacterium leprae* for clinical and laboratory studies, and this abundance has advanced our knowledge of the immunology and pathogenesis of leprosy and of the physiology of *Mycobacterium leprae*. *Mycobacterium leprae* from armadillos led also to the Immunology of Leprosy Programme (IMLEP), begun in 1974 and sponsored by the World Health Organization. The goals of the programme were the development of a vaccine, and a method for identifying patients with subclinical infections. Studies with vaccines are now underway and significant advances have already been made in our understanding of the immunopathology of leprosy.

Dr Binford was also an expert on the histopathology of fungal diseases. He was coauthor of *Medical Mycology*, which is now in its third edition (1963, 1970 and 1977); and he also authored or coauthored articles on cryptococcosis, chromomycosis, cladosporiosis and histoplasmosis. Dr Binford contributed chapters to and co-edited *The Pathology of Tropical and Extraordinary Diseases* (1976) the definitive work in this field.

One of Dr Binford's great contributions was the formulation, over many years of teaching and consultation, of the criteria that enable pathologists to identify the microbial cause of infections in tissue sections. Perhaps only those who have worked with Dr Binford are aware of this contribution. Although simple in concept these criteria are profound in application for they enable the pathologist to identify by light microscopy, the organisms that cause infection. 'Binford's criteria' are especially valuable when the organism remains uncultured, thus precluding the more traditional evaluation using Koch's postulates. Binford's criteria state in general that infectious agents have a symmetrical distribution in the area of reaction, that they increase in number as the lesion expands, and vanish as the lesion resolves. These criteria enable the pathologist, who takes pains to apply them, to exclude spurious organisms as a cause of infection—such as contaminants and early growth of putrefactive organisms. The application of these criteria has led in recent years to the identification of many microbial agents as causes of human disease—including most recently the gram-negative bacillus that causes cat scratch disease.

In closing I must add a more personal appreciation of Dr Binford as a person, as a friend and colleague, and as a scientist. From his record it is clear that he was astute, but it is not clear that he was selfless in his promotion of his colleagues and that he was also very generous. He was tireless in promoting others, their projects and their welfare. His style was to train others then gracefully step aside when they were ready for increasing responsibility. When approached with ideas for research or diagnosis he was always supportive and strove to garner the best from the suggestions of his colleagues. He seemed always to be able to bring ideas into being and studies to fruition. He was always willing, and in fact frequently insisted on remaining anonymous, when collaborating on projects. Dr Binford's long and distinguished career as a consultant, researcher, educator, administrator, advisor and friend will continue to be a source of inspiration for all who had the good fortune to know him and to work with him.

DAMEL H CONNOR