

**Special  
Feature**

# Laboratory Medicine in the Panama Canal Zone: Past, Present and Future

by Ardath K. Huffaker, M.D.

The creation of the Panama Canal was an event of signal importance in the history of medicine. Within a few years a notorious killer environment was transformed into one of the healthiest places in which to live. The role of the Canal Zone Laboratory in this event was paramount, and is one of the best examples of the effectiveness and creativity of the American medical tradition.

## Early Laboratory Development

The development of the laboratory in Panama was directly linked to the work of the father of American pathology, Dr. William H. Welch. Dr. Welch set up the first pathology laboratory in America in 1878 at Bellevue Hospital, after returning from a period of study in Germany where he was exposed to the scientific approaches used by Virchow, Ludwig, Johnheim, Koch, et al.<sup>1</sup> At that time no other medical school in the United States had a laboratory, and this development at Bellevue marked the beginning of modern scientific medicine in America. Because of his achievement Dr. Welch became the first appointee to the new Johns Hopkins Hospital in Baltimore. In 1904, when the Americans took over the French holdings in Panama, Dr. Welch was the dean of Johns Hopkins, and President Roosevelt personally asked him to recommend men to head the medical work in Panama.<sup>2</sup>

At the same time, Dr. William C. Gorgas was appointed chief sanitary officer of the Panama Canal Commission, with the specific directive to rid the Canal Zone of yellow fever and malaria. Dr. Gorgas had been in charge of U.S. Army sanitation measures in Havana during and after the Spanish-American War, where he had successfully combated these diseases.

President Roosevelt felt that medical matters had precedence even over engineering, since it was known that the enormous morbidity and mortality in the French effort was a major factor in their failure. Fully one-third of the French workers were sick at any one time, and it is estimated that 20,000 workers, one-fourth of the entire work force, died in the active period of French excavation from 1883 to 1889. Mortality was even higher for those admitted to the large French hospital (Fig. 1) than for those who did not go to the hospital. This seems to have resulted from the placement of water around all plants (to keep leaf-cutter ants away) and around all bedposts (to keep insects off the patients). As Dr. Gorgas said, "If the French had been trying to propagate yellow fever, they could not have provided conditions better adapted for the purpose."<sup>3</sup>

The French hospital appears not to have had a laboratory. In the American effort, by contrast, laboratory work was given top priority. The first physician to accompany Dr. Gorgas was Dr. A. B. Herrick, who was designated as the company pathologist. He was accompanied by a microbiologist, Dr. Arthur Kendal. Both of these men had been pupils of Dr. Welch at Johns Hopkins, as had Dr. Gorgas himself during his internship at Bellevue in 1878. Thus, in the Canal Zone as at Johns Hopkins, laboratory work was given the highest priority.

## Laboratory Work During Construction Days

Because of Dr. Herrick's abilities, he was quickly promoted to chief of staff, although in addition to his administrative duties he nominally remained one of the pathologists until he left in 1915. Thus a new chief of pathology was required during that first year, and Dr. Welch was again asked to suggest a candidate. He recommended another one of his pupils, Dr. Samuel T. Darling, who served as chief of the laboratory from 1906 to 1915. He had a staff of

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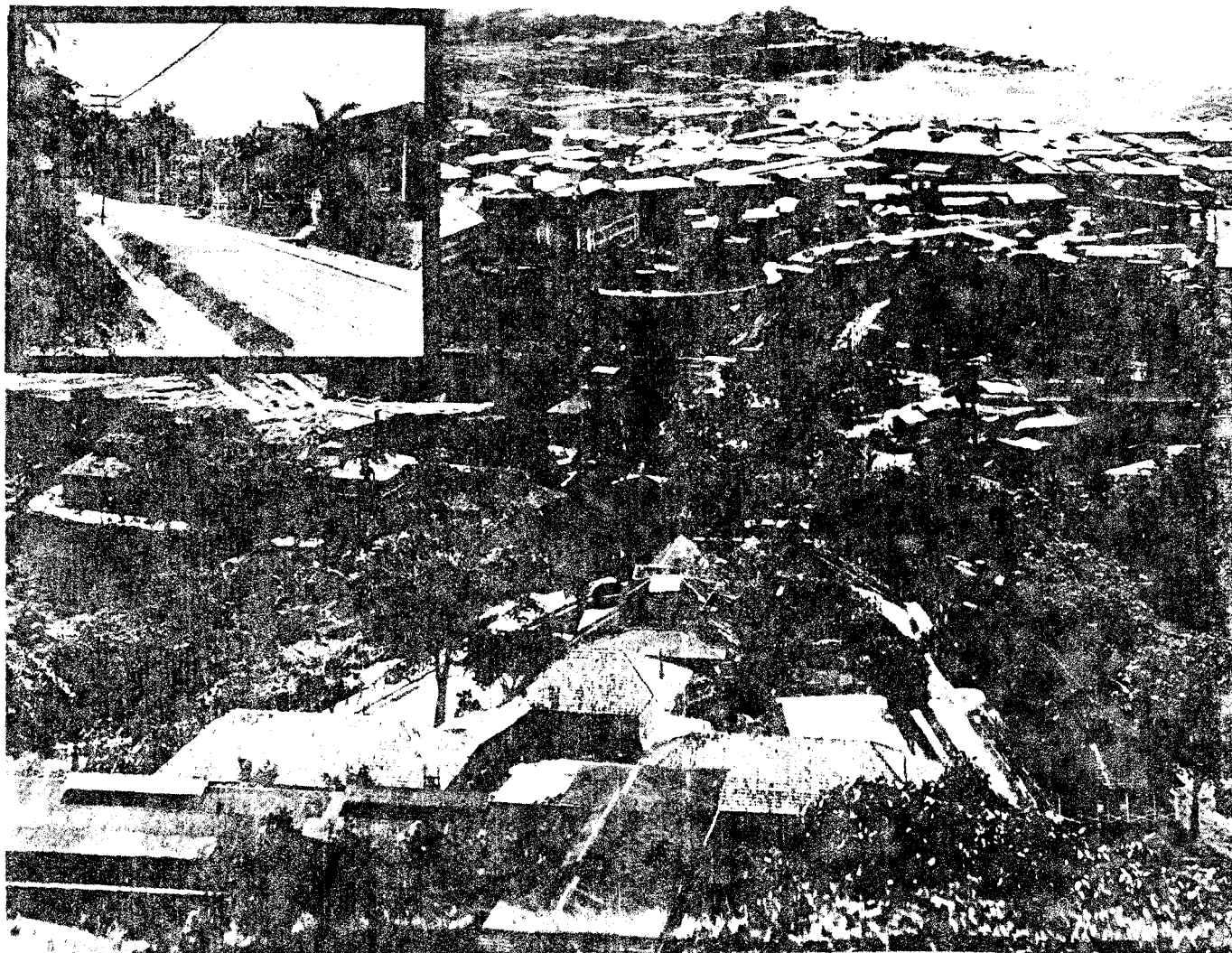


Fig. 1. In the foreground is the original French hospital as it appeared shortly after the American takeover. New buildings can be seen on all sides of the hospital, including a hotel built by the Americans. The insert shows the French building that was converted into the laboratory after the American arrival.

two other pathologists, a chemist, a microbiologist, an entomologist and various laboratory aides. One of the first staff pathologists to join him was Dr. G. H. Whipple, who went on to win the Nobel prize in medicine for work performed after leaving Panama. The other pathologists assisting him during this time were Dr. Herbert C. Clark and Dr. Lewis B. Bates, both of whom remained for 50 years on the Isthmus and contributed significantly to the knowledge of tropical disease.

The first laboratory (Fig. 1) was established at the main Canal Zone hospital, which the French had called "L'Hôpital Central du Panama." It was called "Ancon Hospital" by the Americans but was later renamed "Gorgas Hospital" to honor Dr. Gorgas for his role in ridding the Isthmus of yellow fever within two years of his arrival. The laboratory itself was called the "Board of Health Laboratory," and served

not only Gorgas Hospital but the entire Republic of Panama. The laboratory work at Santo Tomás, Panama's largest hospital, was directed by the pathologists at Ancon Hospital for 25 years.

These first pathologists worked at a feverish pace and produced an impressive contribution to the literature. Dr. Darling himself published 75 papers during the 10 years he was on the Isthmus. This large contribution was due primarily to the fact that little was known of tropical disease endemic to Panama. Under such circumstances, any finding was of importance and represented a distinct contribution to the knowledge of the day. Dr. Darling's work included the discovery and naming of *Histoplasma capsulatum*<sup>4</sup>; the emphasis on species-specific mosquito control of malaria<sup>5</sup>; the finding of a cyst stage for *Amoeba histolytica*, although he at first thought it was a different species<sup>6</sup>; and the finding of the first

case of cutaneous leishmaniasis out of Brazil.<sup>7</sup> He also probably described the first case of human toxoplasmosis, although he mistakenly called it the third human case of sarcosporidiosis.<sup>8</sup>

### Development of Research Laboratories

The Canal Zone Laboratory had a broad responsibility; it not only analyzed clinical specimens but monitored the quality of local milk, food and water. It speciated mosquitos and determined whether they were infected with malaria organisms. The laboratory chemically prepared larvicides, vaccines and antileprosy acids; it monitored the passing ships for plague, typhus, typhoid and other easily spread diseases. It collected and speciated snakes; in one year alone, 1500 snakes were brought in. Plants also were collected and described. One note in the 1925 annual report speaks of the common finding of marijuana and of its widespread use by the American soldiers (times may not have changed so much after all). The large laboratory and hospital of 1920 are seen in Fig. 2.

In the face of increasing knowledge and demands on the laboratory, it was impossible to continue to perform all these tasks. Fortunately, through the work of the early Canal Zone medical workers, others began to recognize the immense wealth of information that was available in Panama. In 1919, the U.S. Department of Agriculture began to use two rooms within the Canal Zone Laboratory and, with the help of the laboratory entomologist, started collecting and cataloging the flora and fauna of Panama. The new laboratory selected the largest island in the canal (Barro Colorado Island) and set it aside as a wildlife preserve. The Smithsonian Institute took over the laboratory in 1946 and now, in addition to the wildlife preserve, has set up marine biological laboratories on both the Atlantic and Pacific sides of the Isthmus. It also operates a lowland jungle research station in the Canal Zone. The Institute has studied extensively the possible marine changes which may occur with a sea level canal.

Another research laboratory, the Gorgas Memorial Laboratory (Fig. 3),<sup>9</sup> was set up in Panama in 1929 using former hospital laboratory workers. It was set up at the urging of the government of Panama, and was built on land donated by Panama and financed by the U.S. Government. The first director of the laboratory was Dr. Herbert C. Clark, who had been on the staff of the Canal Zone Laboratory with Dr. Darling. His successor was Dr. Carl Johnson, who took his pathology residency at the Canal Zone Laboratory. The current director is Dr. Abraham Bennison, a renowned epidemiologist, whose book *Control of Communicable Diseases in Man* is a standard text in most medical schools in the United States.

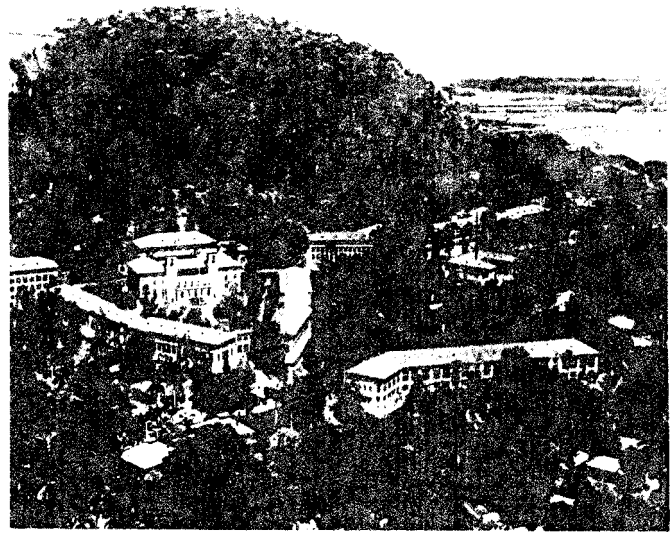


Fig. 2. By 1920 a new hospital had been completed on the location of the French hospital, retaining its pattern of construction. The relatively spacious laboratory building provided is shown on the right.

The contributions of this laboratory include new drug testing for resistant falciparum malaria; the finding of an arboreal jungle reservoir of yellow fever in monkeys; the discovery of monkey models susceptible to malaria; and the finding of the first cases of Q fever, murine typhus and Rocky Mountain spotted fever in Panama. One of the many current research projects is the identification of disease hosts by serological typing of insect blood meals.

Two other research laboratories were subsequently set up in the Canal Zone by the U.S. Army: the Middle American Research Unit for viral diseases and the Tropic Test Center for environmental research.



Fig. 3. The headquarters of the Gorgas Memorial Laboratory as it appeared when newly constructed in 1930.

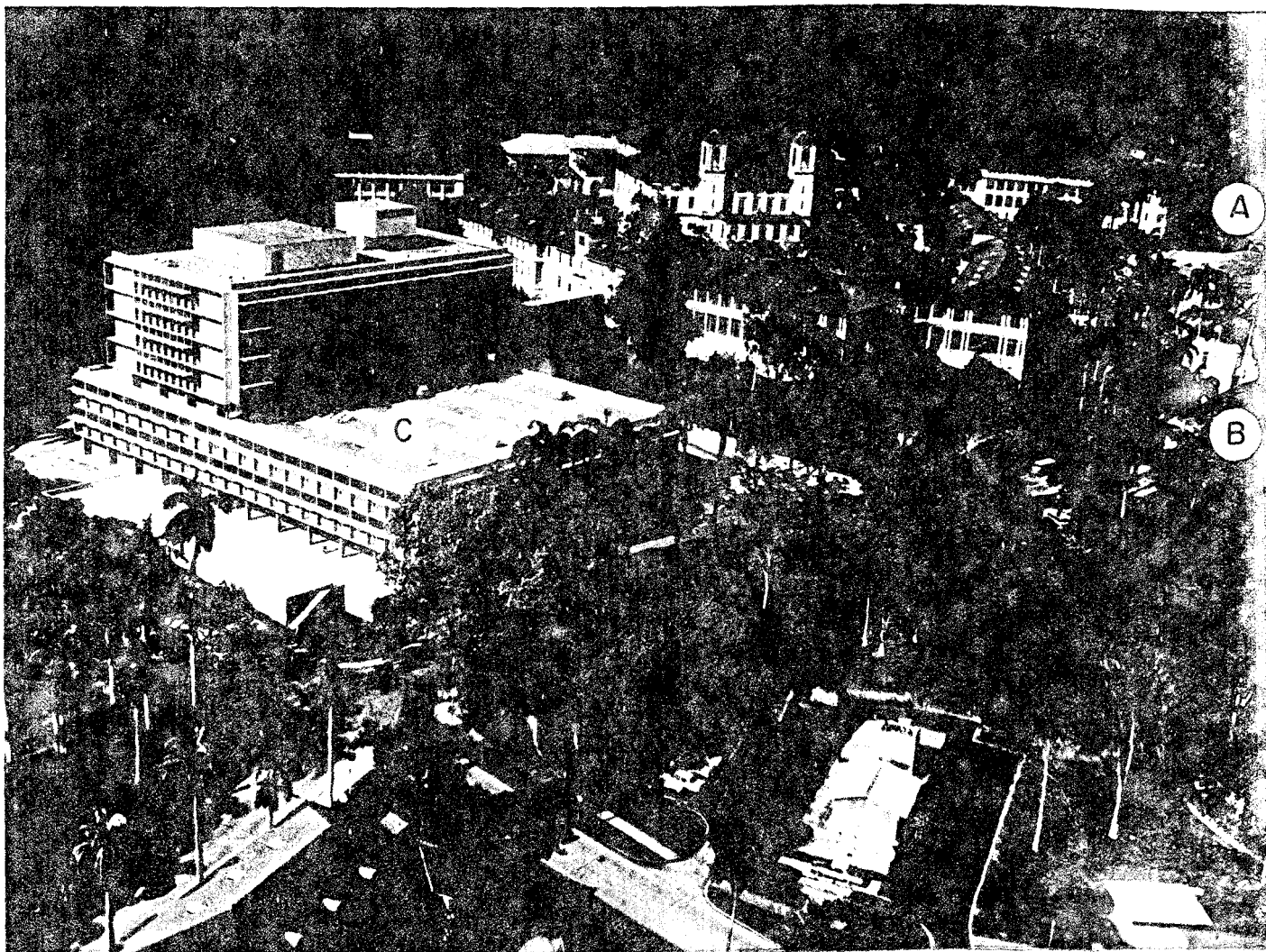


Fig. 4. The present day Gorgas Hospital complex. Parts of the Smithsonian Tropical Research Institute (A) and Gorgas Memorial Laboratory (B) protrude barely into the picture on the right. The hospital laboratory now occupies approximately one-fourth of the second floor (C) of the Gorgas Hospital buildings.

#### Present Status of the Canal Zone Hospital Laboratory

With the development of other laboratories, the burden of the Board of Health Laboratory gradually shifted almost completely into patient-oriented service pathology. The medical research functions were assumed by the Gorgas Memorial Laboratory, and the zoological and botanical functions went to the Smithsonian Tropical Research Institute. However, some minor involvement with these older functions continued; the laboratory workers in the hospital were called upon to speciate a snake when a bite victim came to the hospital. The hospital laboratory workers still contribute more than any other segment of the hospital to the literature, although on a much reduced scale as compared to earlier years. Examples of these later contributions are listed in the book, *Panama's Gorgas Hospital and Staff Doctors*, and include the establishment of the concept of chronic toxoplasmosis and congenital toxo-

plasmosis; the diagnosis of the first death on the Isthmus from Chagas' disease; the discovery of canine histoplasmosis; and the discovery of a high prevalence of histoplasmosis on the Isthmus.<sup>10</sup> The use of the silver stain for fungi, the Grocott methenamine-silver stain, was also developed in the laboratory.<sup>11</sup> The pathologist who diagnosed the first case of death from Chagas' disease went on to become Director of the Armed Forces Institute of Pathology, the second Canal Zone pathologist to do so.<sup>12</sup> The present laboratory and hospital are seen in Fig. 4.

In medical education, the Gorgas Hospital Laboratory has set the pace for the medical community of Panama. Internships were offered from the beginning, and in fact, Dr. Darling began as an intern. The internship program was accredited by the AMA in 1924. The Board of Health Laboratory established the first AMA-approved residency in Latin America in 1942. A school of medical technology was established

1950 in cooperation with the Canal Zone College. The school is accredited by the National Accrediting Agency for the Clinical Laboratory Sciences, and completion of the program leads to a B.S. degree in medical technology. In the last three years, only one out of twenty-four graduates has failed to pass the SCP registry examination.

The standards of performance of the laboratory have continued to meet the highest U.S. standards despite considerable logistical difficulty. In 1978 it became the first laboratory south of the U.S. border to be CAP accredited. The blood bank has been accredited by the AABB since the early 1960s.

### The Future

The future is not bright for the Gorgas Hospital laboratory. The Canal Zone will cease to exist in 1979, and all internships and residencies are to be phased out. By 1982 the only population served by the hospital will be U.S. military personnel and Department of Defense civilians. For 75 years American medical know-how has been funneled to Latin America through Gorgas Hospital. What the gradual phase-out of the laboratory and hospital will mean for Panama and the United States is difficult to assess, but it will clearly be a loss for both countries. The contribution of Gorgas Hospital to Panamanian medicine can be shown by the fact that the present chief of pathology at the University of Panama Medical School was selected from the Canal Zone Laboratory staff, and the dean of the medical school for the past 11 years was selected from the Gorgas Hospital staff.

Despite the loss of Gorgas Hospital and its laboratory, the two research laboratories set up in large part as a result of work by the early Canal Zone laboratory workers will continue to operate and are developing expanding roles in the Republic of Panama. The Smithsonian Tropical Research Institute has just completed a new headquarters building near the Gorgas Hospital, and the renowned Johns Hopkins International Center for Tropical Research is scheduled to move from Dacca to Panama where it will work in association with the Gorgas Memorial Laboratory. Americans can also take pride in the fact that just as Dr. Welch's laboratory in 1878 introduced scientific medicine to the United States, so the Canal Zone Laboratory at Gorgas Hospital introduced modern scientific medicine to Latin America.

### Acknowledgment

Only outside published sources have been referenced. Most of the information for this article was actually taken from the annual reports of Gorgas Hospital and the Panama Canal Health Bureau. Other

sources included unpublished writings from the files of the Gorgas Hospital library by Herbert C. Clark, Enrique Chaves-Carbello, J. D. MacLaren and Virginia Stitch.

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## Tech Talk

