

LePrince, Malaria Fighter

WITH HIS DEATH on February 10, 1956, at the age of 80 in Memphis, Tenn., Col. Joseph Albert Augustin LePrince ended his long fight against malaria and yellow fever. A Public Health Service sanitary engineer since 1914, he began his campaign against vector mosquitoes in 1901, in Havana, as a civilian assistant to Maj. Gen. William Crawford Gorgas. At a time when many still doubted the evidence adduced by Carlos Finlay, Dr. Walter Reed, Sir Ronald Ross, and others, LePrince insisted on all-out mosquito control. Thanks in large part to his pioneer services, malaria is no longer a disease of economic importance in the United States.

On learning of the death of LePrince, Assistant Surgeon General Mark D. Hollis, chief engineer of the Public Health Service, said:

"Joseph LePrince received many honors during his lifetime, but knowing him as I did, I am sure that his greatest pride came from the knowledge that his work helped to wipe out some of the deadliest scourges the world has ever known. He is a great and true inspiration to those who carry on his work today."

LePrince achieved international acclaim as the right-hand man of Gorgas in the control of tropical diseases in Cuba and the Panama Canal Zone while the canal was under construction. His name will be remembered in Mexico, Puerto Rico, and other parts of Central America as one who came to serve his fellow man and served him well. He was a practical humanitarian who left the world deeply in his debt.

Son of the man posthumously honored as the father of the motion picture, LePrince was born August 3, 1875, in Leeds, England. He came to this country at the age of 12. In 1901, 3 years after his graduation from Columbia

University with civil engineering and master's degrees, he boarded ship for Havana, Cuba, on a 60-day assignment that was to last 14 years. President Theodore Roosevelt had given Gorgas full power to make the mosquito-infested island safe for our occupation forces after the Spanish-American War.

In Cuba, LePrince directed the actual work that changed Havana from a death trap of yellow fever to a tourist mecca. Within 3 months, with 2 inspectors, and at a cost of less than \$5,000, he eradicated yellow fever by eliminating mosquito-producing sources. In the process, he conducted basic studies that were to serve generations to follow.

From 1904 to 1914, LePrince, as chief sanitary inspector of the Isthmian Canal Commission and as public health officer in Panama, applied his Cuban experience to rid the "Big Ditch" of tropical diseases. In an intensive 14-month engineering campaign, he and his field men charted rainfall curves, traced watercourses, drained waterholes, converted marshes, removed jungles, and attacked propagation areas with oils and larvicides. At the same time, he was busy organizing fumigation brigades and trying to win the cooperation of householders and local authorities.

A byproduct of the campaign was a series of brilliant ecologic experiments by LePrince on the flight range and breeding habits of the mosquito which contributed to the virtual elimination of the vector of yellow fever, *Aedes aegypti*, and of the anophelines, carrier of the malarial parasites.

LePrince discovered that anopheline mosquitoes will sometimes travel a mile though a half mile is their usual flight. He found that "Madam Anopheles," as he called his foe, seeks

shelter from the wind. When *Anopheles* enters a house, it nearly always enters from the leeward side.

He learned that malaria mosquitoes avoid sunlight, rarely bite in the daytime, and then only in the shade. Their larvae are easily frightened and for long intervals remain hidden under water.

He noted that the puddles in hoofprints of cows and horses were important producers of certain *Anopheles* species; that green algae on water surfaces harbored larvae; that some areas produced a species of *Anopheles* only at certain times; that thousands of mosquitoes traveled from the swamps to human settlements each and every night; and that the *Anopheles* seemed to know exactly where it wanted to go.

He disproved the theory that anophelines were brought into towns by strong winds blowing from the marshes. When traps set in a vacant house failed to attract mosquitoes, LePrince and his men, by sleeping there, proved that it was the mosquitoes' strong sense of smell and their liking for the odor of human perspiration that brought them to their victims. He observed that some people were more attractive to *Anopheles* than others.

He learned that mosquitoes were carried on the clothing of passengers who traveled for long distances in trains at night; that they would remain on a man's coat during a stiff wind; that they gained entrance to screened dwellings by being carried in on dark clothing, where they rested undetected.

Screening of dwellings in Gatun, Colon, Panama City, and elsewhere along the 40-mile stretch of the canal was carried out on a scale never before attempted anywhere. When LePrince ordered the headquarters of the Canal Commission screened, the architect, who was new to the tropics, joked about the fuss made over the screening and delayed following the order. A month later he was dead of yellow fever.

LePrince not only faced indifferent cooperation. He was ridiculed. His destruction of Santa Ana Park in Panama City aroused public hostility. He was called an insect chaser and a crackpot. But he permitted no obstacle to dampen his ardor for his task.

The long-awaited details of the yellow fever

and malaria campaigns were revealed to the world in 1916 when LePrince published "Mosquito Control in Panama." This report on what he had learned in the Canal Zone and Havana was to remain a bible for mosquito control workers for many years. It is still a classic guide on environmental controls for certain mosquito species.

In the introduction to LePrince's historic work, Dr. L. O. Howard, then chief of the Bureau of Entomology, United States Department of Agriculture, recalled a conversation with Gorgas and LePrince before they left for Panama.

Howard had asked the general whether he would send specimens of all Panama mosquitoes to the bureau for naming. The general replied: "I will assign Mr. LePrince to see that it is done." Whereupon, LePrince remarked, "I will have to do it soon, Doctor, for in a year or so there will be no mosquitoes there."

Another anecdote about LePrince was supplied by the renowned Public Health Service epidemiologist, Dr. Leslie L. Lumsden. Lumsden told of sitting behind LePrince at a meeting where someone reading a paper on malaria was quoting liberally from LePrince's book without attribution. Lumsden asked LePrince how he liked having his "stuff" used without credit. The old man's eyes shone. "Just fine, because then I know he thinks it's good."

LePrince was equally famous for his malaria successes in the United States. He continued his war against the mosquito from Public Health Service headquarters in Memphis. His brilliant achievements in the Caribbean had convinced the Service that malaria could be controlled economically in the continental United States.

During World War I, LePrince had charge of malaria control in 28 Army and Navy installations in the eastern and southeastern United States. His methods of mosquito control resulted in a malaria rate in the Army during World War I that was less than 1 percent of the rate in the Spanish-American War. The control achieved by LePrince and other Service engineers in the postwar period anticipated the industrial development of the southern States.

The Public Health Service loaned LePrince

to Mexico in 1923 to develop malaria control in the oil fields. In 1927 he directed malaria control activities in the Mississippi River area for the American Red Cross. In 1935 he became consultant on malaria control to the Tennessee Valley Authority. He was called back to the Caribbean area in 1938 to assist the Puerto Rican Government in a serious malaria outbreak. In 1940, a year after his retirement from the Public Health Service, he helped solve malaria control problems resulting from the building of dams on the upper Mississippi River.

As the world grew to appreciate his efforts, LePrince received many honors. He held the greatly prized Ross Medallion awarded by the London School of Tropical Medicine. He received an honorary doctorate of science from Southwestern at Memphis in 1945. In 1951 the National Malaria Societies chose him to receive the first Joseph Augustin LePrince Award,

named for him and bestowed on him because of his outstanding accomplishments in malaria control.

LePrince died in the Public Health Service Hospital in Memphis. He is survived by his widow, the former Julia Mercedes Lluria, of Havana, and by his son, four daughters, five grandchildren, and one great-grandchild.

LePrince closed his 1916 classic report with a prophetic statement, made in 1911 by James Bryce, Ambassador from England to the United States:

"In modern times most of the events of highest ultimate significance have been discoveries in the realms of nature or inventions in the realm of industry; and their magnitude is seldom known at first. Little was said of the discovery that mosquitoes are the carriers of yellow fever and the intermittent fevers, yet what immense consequences are already seen to flow from the determination of that fact!"

Training in Insect and Rodent Control

Training courses in insect and rodent control are being offered in Atlanta, Georgia, during September, October, and November 1956, by the Training Branch of the Communicable Disease Center, Public Health Service. These courses are based on the extensive experience of the Communicable Disease Center in investigations and operations in the vector control field and are primarily for personnel of Federal, State, and local health departments. Training in both the laboratory and the field is included, designed to give a working knowledge of the control of insects and rodents affecting the health and well-being of man.

A course in insect control, which gives principal attention to the control of mosquitoes, flies, and other insects occurring in and around homes and food-handling establishments, is scheduled for September 17-28, 1956.

Training in rodent control, October 1-12,

includes instruction in the control of domestic rodents and rodentborne diseases.

A course covering mosquito control will be given November 5-9, 1956.

A special advanced 2-week course in the biology and identification of arthropods of public health importance is scheduled for December 10-21, 1956. This course, which uses the extensive insect collection of the Communicable Disease Center, is particularly useful for entomologists and biologists and others interested in proper identification of arthropods of public health importance such as flies, fleas, ticks, and mosquitoes.

Other courses in insect and rodent control are scheduled for March, April, and May 1957.

Interested persons should apply through their organizations to the Chief, Training Branch, Communicable Disease Center, Public Health Service, 50 Seventh Street NE, Atlanta 23, Ga.