Alexandre Emile John Yersin (1863–1943), *Swiss/French Microbiologist*

The microbiologist Alexandre Yersin is credited with being the first to isolate successfully the bacillus responsible for the bubonic plague and produce a vaccine against it. Yersin was born on the shores of Lake Geneva in Lavaux, Switzerland. Yersin's father predeceased him, and his mother raised him while running a finishing school for girls. Though brought up a Calvinist Christian, Yersin eventually rejected all religion, but he did take up as a hobby the study of insects. As a young man he quitted the Academy of Lausanne, where he had finished a year of pre-medical training, going to Marburg, Germany, in 1884 to study botany. While there he switched his studies to human anatomy and pathology. In 1885 Yersin relocated to Paris, where he worked first in the Hotel Dieu hospital and then in the private bacteriological laboratory of André Cornil. While there he met the famed bacteriologist Louis Pasteur, at whose institute Yersin served first as a volunteer in studies of rabies and later as the assistant of Emile Roux in the study of diphtheria and tuberculosis. Yersin's work with tuberculosis led directly to his prizewinning University of Paris doctoral thesis of 1889. He spent part of the summer of this same year studying bacteriology even further in Berlin under Robert Koch, Pasteur's rival for preeminence in the field. Returning to Paris Yersin taught the institute's first course on microbiology, did further research on diphtheria, and was naturalized a French citizen. At the end of the year he decided to take a vacation.

During his one-year leave of absence he was to serve as a ship's doctor on a regular run between Manila and Saigon, in French Indochina. Once

in the region he took a profound interest in exploring the interior of Indochina: he mapped the landscape, collected plant and animal species, and studied the local people. Though asked to work as partner in a research laboratory with Pasteur-trained Albert Calmette, who later discovered the vaccine for tuberculosis, Yersin declined, deciding—for the moment—against a career in medicine. In 1893 he returned from Paris for further exploration and to conduct a census of diseases that were endemic in southeast Asia. Meanwhile, plague had broken out in China, and Yersin was determined to study it at first hand. Denied access to the mainland, he arrived at the British colony of Hong Kong on June 15, 1894. Immediately he enlisted the aid of the Italian missionary Father Vigano, who had spent thirty years on the island. On June 12, however, Shibasaburo Kitasato, the famous Japanese student of Robert Koch, had arrived with a great entourage and was presented by the British authorities with full access to all medical facilities and all plague corpses. Yersin lived in a bamboo hut and worked with corpses stored in quicklime that he obtained through Vigano's bribery of British sailors who were supposed to dispose of them.

Yersin reasoned that the buboes themselves should contain the organism responsible for the disease. He studied material drawn directly from buboes and found a very high density of previously unidentified bacilli. When he injected these into animals, they died. He had isolated the deadly agent after less than a week's work. On June 22 Yersin approached the authorities with these findings and obtained their cooperation and access to facilities and plague victims. Kitasato, meanwhile, had isolated a virus that he believed to be the culprit, and later a bacillus, but one that his own associates identified as probably a type of streptococcus. Kitasato's own teacher, Masanori Ogata, admitted that Yersin's find was genuine and unique. The bacillus was formally dubbed *Pasteurella pestis* (*P. pestis*), but, because Kitasato continued to press his claim to a share in the discovery, it was commonly referred to as the Kitasato-Yersin bacillus. In 1971 the formal name was changed to *Yersinia pestis* (*Y. pestis*). Yersin also discovered the relationship of the bacillus to the rat and the possible rat-human connection and that the bacillus can live in the soil on its own for some time, but he did not find the relationship of the flea to the bacillus' spread.

Although British authorities wanted Yersin to remain in Hong Kong, the French sent him to Madagascar to work on "blackwater fever," a

case he could not crack. In 1895 he returned to Paris to produce a vaccine from the cultured live bacilli. His experiments with live bacilli failed, but when he killed the organisms with 58°C heat and waited an hour, the resultant matter, when injected, protected a variety of animals, even as large as horses. He quickly returned to Viet Nam to produce serum at a research station at Nha Trang, which later became an official outpost of the Pasteur Institute. In the spring of 1896 the plague broke out again in Hong Kong. On June 26 the first human victim of the plague was cured: an eighteen-year-old Chinese seminary student. Over the next ten days, twenty-three victims were treated with the serum, and twenty-one lived. Interestingly, these results were not repeated in India during a massive outbreak the following year: a success rate of only 50 percent was achieved with the Indochinese formula. There was more work to be done. Though he made Nha Trang his home, Yersin shifted away from microbiology to cattle-raising and -breeding, growing rubber trees he imported from Brazil, and growing cinchona trees from which quinine is derived. He established a medical school there, but his native students were accepted by the French colonial medical authorities only as nurses, a development that disgusted him and led him to close the school. He last visited Paris on the eve of the German occupation in 1940 and died peacefully near Nha Trang, under Japanese occupation, in the winter of 1943.