

## TRAVELS OF ALEXANDRE YERSIN: LETTERS OF A PASTORIAN IN INDOCHINA, 1890–1894

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Medicine today, in America and elsewhere, owes much to the microbe hunters of nineteenth-century Europe who established and propagated the germ theory. One of the lesser known but exceedingly versatile of these microbe hunters was the Swiss-born doctor Alexandre Yersin, codiscoverer of the diphtheria exotoxin and discoverer of the plague bacillus, whose genus is named in his honor [1]. This gifted physician—the protégé of Louis Pasteur and Emile Roux—left a legacy of nearly 1,000 letters, many over 10 pages long, which he had written to his mother. Detailing over 40 years of his life and work, the collection was discovered in Switzerland in 1970 by the doctor's descendants and donated to H. H. Mollaret, plague specialist of the Pasteur Institute of Paris. Dr. Mollaret made the letters available for translation by myself and publication in the United States. The following selections concern primarily the earlier biographical aspects of the correspondence, particularly those highlighting Yersin's remarkable experience as a ship's doctor, explorer, and cartographer in the Far East. The following letters have not previously been published.

Alexandre Yersin (see fig. 1) was a small, quiet physician whose slender stature rarely measured above the shoulders of many of his nineteenth-century European contemporaries. It is, perhaps, understandable that some of his professional colleagues tried to dissuade him

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from leaving a flourishing medical career in Paris in 1890 to pursue the rigors of exploration in colonial Indochina [2]. The 27-year-old physician had not once been to sea or traveled farther than to a few countries in Europe. The sketches of Paris he frequently sent to his mother in Switzerland were the only indication of the cartography skills he might possess for mapping the uncharted lands of which he dreamed [3].

Yersin was born in the French-speaking Canton of Vaud in Switzerland, on September 22, 1863. He came to Paris in 1885 to study medicine at the renowned Faculty of Medicine of the University of Paris. As a medical student, his decision to specialize in microbiology came to the attention of Louis Pasteur and Emile Roux, who became his in-



FIG. 1.—Alexandre Yersin, circa 1894, wearing the medal of “la Légion d’honneur” awarded by the French government for his discovery of the plague bacillus in Hong Kong in June 1894.

structors and mentors [3]. Yersin's doctoral thesis of 1888 described his work in experimentally induced septicemic tuberculosis, known later as "la tuberculose expérimentale, type Yersin" [3, p. 197]. Also in 1888, Roux and Yersin worked closely on a series of filtration experiments which led to history's first isolation of a bacterial toxin, the exotoxin of *Corynebacterium diphtheria* [3, p. 197]. In 4 of the 6 years that followed this discovery, Yersin traveled widely in Indochina as a colonial physician, explorer, and cartographer. He documented his journeys, and the days leading up to them in France, in biweekly letters to his mother in Morgès, Switzerland. His first-person accounts, as reproduced in the following passages, contribute to his biography, in particular to that 4-year period of transition and travel, 1890–1894, which prefigured his future medical career in Indochina and set the stage for his next major step in the field of microbiology, the discovery of the bacillus of the plague in Hong Kong in 1894.

Early in Yersin's career at the Pasteur Institute, Emile Roux was Yersin's closest friend and his steadfast advocate: Throughout 1889, the year after Yersin's graduation from the Faculty of Medicine, the two men continued their work on diphtheria and, at Louis Pasteur's request, taught the first microbiology course at the institute [3, pp. 199–200]. Students and physicians from the French colonies and the world over came to Paris to study at the new Pasteur Institute and must have enticed Yersin with descriptions of their countries. It was difficult for Roux to conceive of the 27-year-old Yersin's growing desire to travel. Yersin spent his free days on the Normandy coast, contemplating the steamships bound for foreign ports [4]. The fragrance of an imagined life at sea followed him back to Paris: "I miss the sea. In the stillness of the night, I often think that I can hear it surging. I think I'm in love with it" (letter from Paris, September 15, 1889).

As the prospect of a landlocked future loomed larger, Yersin, over Roux's objections, asked Pasteur for a 1-year leave of absence and permission to join the French merchant marine company, les Messageries Maritimes, whose extensive fleet of steam vessels transported cargo and passengers to France's colonies and to foreign countries throughout the world [4]. Pasteur approved and penned a letter of recommendation for him on March 5, 1890 [4, p. 18]. A new chapter in his life was about to begin. The motive for Yersin's momentous decision seems to have been tied to a deeply felt belief that his role in life would somehow be established in travels far from Europe. Clearly, he could have remained at the Pasteur Institute and collaborated with Roux on other experiments while enjoying the renown that had accompanied their discovery of the diphtheria exotoxin. As he tried to justify in a letter a year later to his mother, his reasons for leaving the institute dated back to his childhood: "You must remember that it has always been my innermost dream

to follow in the steps of Livingstone” (letter from Saigon, August 28, 1891).

So, with Pasteur’s recommendation letter preceding him in 1890, Yersin went to the Paris offices of the Messageries Maritimes to request a position as ship’s doctor: “On Thursday, I went with cousin Demole to see the administrator of the Messageries Maritimes. The certification from Mr. Pasteur had made an excellent impression. . . . The entire company will be at my service if I wish to do research on the diseases of foreign countries. . . . Mr. Metchnikoff is delighted. Mr. Roux continues to make his same grimace” (letter from Paris, March 9, 1890).

Yersin continued his work at the Pasteur Institute during the next several months while waiting for his assignment orders from the Messageries Maritimes. After his orders arrived in September, a note of insecurity appeared in his final letters to his mother before he boarded ship: “I received a dispatch telling me to arrive in Marseilles on Wednesday in order to embark on Sunday for the Messageries Maritimes’ outposts in Indochina. . . . I do not know in the slightest what I shall be doing over there” (letter from Paris, September 14, 1890). And, “It’s a little difficult this last day before isolating myself so distantly from all of those dearest to me. Happily, distances do not exist for thoughts and affection” (letter from Marseilles, September 20, 1890).

The next day, Yersin boarded the merchant marine steamer, *Oxus*, and embarked on a 3-week voyage to Saigon:

We have been at sea for three days! It is not too disagreeable. I find that Mr. Roux exaggerated in telling me of the terrible boredom that I would experience on board ship. [Letter from the Mediterranean Sea, September 24, 1890]

I slept on the bridge last night because the cabins were unbearably hot. Near one o’clock in the morning, we put down anchor at Aden and stopped quite a way from the shore. Soon, we saw some vague, torch-lit masses pulling away from the shore. A sort of rhythmic chant of several repeating notes arose from these rafts as they approached the *Oxus*. They were carrying the coal men coming to fill the fuel holds of the *Oxus*. Nothing can describe this remarkably strange scene. It made me feel so far away from Europe already. [Letter from the Indian Ocean, October 6, 1890]

When the *Oxus* reached Saigon on October 15, Yersin described his first hours in the new land to his mother and related his anticipated new assignment on the freight steamer *Volga* which shuttled goods and passengers across the south China sea between Saigon and Manila:

Our ship’s pier was situated just in front of the offices of the Messageries. Mr. Rolland, the principal agent, came aboard and told me that I was designated next for the *Volga*, which makes the run from Saigon to Manila. The next departure won’t be until October 22, so I have two or three days in which to acclimate myself a bit. I didn’t board the *Volga* to present myself because it was

anchored in the middle of the river, I didn't know how to reach it, I had none of the country's currency, and I felt extraordinarily out of my element. Fortunately, the captain of the *Oxus* was kind enough to authorize me to sleep one more night aboard the *Oxus*. He took me and one of the employees from the agency for an excursion. We left at eight in the evening, so it was quite dark, in a very fine carriage drawn by two small horses that never stopped trotting . . . trotting. We crossed a wooded country which, at night, appeared supernatural. I felt like I was dreaming. Our destination was Cholon, a Chinese village about 10 to 12 kilometers from Saigon. I won't tell you about it in detail today since I hope to go back there. Just imagine streets that are unlit where crowds of people with long-braided hair circulate and each person carries a small lantern in his hand.

My service on board ship is not supposed to be very complicated. At nine in the morning, my medical rounds will be announced and if there are any sick crew members, I will examine them. Before the ship's departure, I will have to go to the hospital for the required health papers so that we can avoid quarantine in Manila. And, that's about all. I certainly will not be lacking in free time. [Letter from Saigon, October 20, 1890]

It was perhaps Yersin's free afternoons on board the *Volga* that led him to begin seriously developing his skills in cartography. Tutored in navigation and mapmaking by the navigators of the Messageries Maritimes, Yersin drew many maps of the Philippine and Indochinese coastal waters which began to be appreciated for their accuracy and clear detail [1, 4].

In his day, Annam (capital, Hué) and Cochin China (capital, Saigon) were east-central and southern protectorates of French Indochina, administered jointly with Tonkin to the north and Cambodia to the west. Smallpox, cholera, dysentery, and rabies were problems that Yersin and his newly acquainted colleague, Dr. Albert Calmette, a colonial doctor and later codiscoverer of BCG (le bacille Calmette-Guérin) faced daily [5]. Calmette established Indochina's first Pasteur Institute in Saigon in 1891 as a vaccination center that Yersin helped him operate [2, pp. 117–124]. Annamese mariners were frequently crew members of the Messageries Maritimes ships. Yersin, as ship's doctor, took steps to improve communications with this large segment of his patient load: "I am beginning to pronounce, very badly, some words in Annamese. This is absolutely necessary for me because nothing is worse than to find yourself in front of a sick sailor and not be able to understand him or to be understood" (letter from Saigon, December 13, 1890).

As Yersin's enthrallment with Indochina grew, he acquired a full command of the Annamese language. When the Manila run was canceled in early 1891, he requested reassignment to ships based in Annam. His next duties were as ship's doctor on board the freighter *Meinam* and a few weeks later on board the steamer *Saigon*, both of which sailed between Saigon and Hanoi [4, pp. 23–24]. Yersin purchased a canoe and filled his free time with many mapping excursions on the Don Nai River

and its innumerable arroyos and waterways near Saigon. These excursions often obliged him to treat sick villagers along the remote inland waterways.

Although his appreciative patients usually repaid him for his care, Yersin, during his early years in Indochina, formulated a philosophy of medical practice, based on nonmonetary values, that he adhered to for the rest of his life:

I find great pleasure in taking care of those who come to me for help, but I do not want to make a *profession* of medicine. That is, I could never ask a sick human being to pay me for the care that I have given him. I consider medicine a ministry, as is the pastorate. To ask for money for treating the sick is a bit like telling them, "Your money or your life"! These are ideas which I know are not shared by many of my colleagues, but be that as it may, they are my ideas and I believe that I would have a hard time giving them up. [Letter from Saigon, January 30, 1891]

In another letter to his mother several days later, there appeared what seemed to be the first clue that he might not be interested in returning to Europe at the end of his year of leave from the Pasteur Institute: "One of my patients who had had a horribly ulcerated finger, which is now much better, gave me two small stuffed animals, a bird and a crawfish which are now hung above my door. I had noticed them in his hut and told him that I found them attractive. . . . I understand why it would be difficult, after living for a certain time in this country, to readjust one's self to the ways of Europe" (letter from Saigon, February 8, 1891).

Just how far Yersin had come from life at the Pasteur Institute can be appreciated in a passage relating a canoe excursion that he carried out near Hanoi in the spring of 1891, less than a year after his departure from Paris:

Now a word or two about those pirates in the Tonkin region that everyone is talking about. Today, they seem to be more numerous than ever . . . generally poorly armed but in great numbers. They seem to be more or less everywhere, at the mouths of rivers and streams, in the mountains, etc. Generally, they do not attack the French whom they know to be heavily armed, unless they are greatly superior in number.

My three Annamese sailors, for I have a third one on this expedition, began by demanding that I leave armed because of the pirates. . . . Although we were on the riverway to Hanoi, the capital of Tonkin, there were no boats, nothing. People were too fearful of pirates. As we entered the fork of the Phu Tai, we saw the cadaver of an Annamese man carried by the current. I wanted to get closer to it to see the cause of death, but my frightened sailors absolutely refused. Ten minutes later, we saw a sampan loaded with women and children leaving the right bank to cross the river. We asked where they were heading. They replied that pirates were close by in the mountains, so they were going to take refuge for the night on the other bank. Somewhat farther along, the river narrowed and

the mountains came right to the water's edge. I put my revolvers next to my hand. My Annamese guards sang to give themselves courage and to keep awake. [Letter from the China Sea, May 6, 1891]

Although the replies to Yersin's letters from his mother have apparently been lost or destroyed, it is fairly clear in one of Yersin's passages that his mother had felt that one year in Indochina, with its attendant dangers for an explorer, was sufficient for her son:

Dear Mother, . . . You speak to me about returning to the Pasteur Institute, telling me that I am missed there. My firm intention is to never again return to work at the Pasteur Institute. I spent enough time there to know it, and now that I am far away, I can judge it more objectively. Life in a laboratory there would seem impossible to me after having tasted the freedom and life of the open air. . . . Scientific research is very interesting, but Mr. Pasteur was perfectly correct when he said that, short of being a genius, one must be rich to work in a laboratory and avoid a miserable existence, even with a certain scientific reputation. . . . Your affectionate son, Dr. Yersin. [Letter from Saigon, September 6, 1891]

Yersin's tour of duty with the Messageries Maritimes came to an end that autumn. He requested his discharge in order to explore the inland full time. The colonial government asked him to begin preparations for leading a major mapping expedition the coming spring. The government agreed to supply and finance his travels during the next year. In return, Yersin charted much of the unknown area from Nha Trang, in central Vietnam, to the Mekong Delta, to Saigon, and to Phnom Penh.

I will start tomorrow morning. . . . I am taking three Annamese with me. My gear will probably be carried by elephants. I am armed to the teeth. . . . [Letter from Nha Trang, March 27, 1892]

I shall next head south to explore a totally unknown region near Phan Ry. . . . [Letter from the village of Mo-Kao, April 8, 1892]

I took readings of the longitude and latitude at every place I stopped. After advancing westerly for several days, I was forced to return here because of the ill will of several village chiefs. I tried another route to the south. Again, I failed. Today, I am going to attempt a third route. You can't imagine the difficulties and the trouble at each step of the way. I had every sort of problem with my Annamese interpreter who, after stealing a large share of my goods, abandoned me in the midst of a difficult situation. . . . [Letter from the village of Mo-Kao, May 13, 1892]

I completed my travels by arriving yesterday in the capital of Cambodia. My navigational readings by the stars were accurate. I have no more than a 1' error in longitude between Nha Trang and the Mekong. . . . Yesterday, I dined at the home of the chief colonial administrator. Everyone seems to think that I have made a very important trip. To me, there was nothing extraordinary about it.

They can't believe that it was possible for me to eat absolutely nothing else but rice for two months. The natives are satisfied with it, and when there's nothing else to eat, you have to do as they do. [Letter from Phnom Penh, June 16, 1892]

Yersin filed a request with the colonial government of Annam for a permanent commission as a physician and cartographer [2, p. 50]. Then he left for Europe to spend the winter of 1892 with his family in Switzerland and to gauge the response in Paris to his decision not to return to the Pasteur Institute. When Yersin arrived in Paris, he found that Roux had unexpectedly arranged for him to be honored for his expedition from Nha Trang to Phnom Penh by the French Geographic Society. His reception at the institute was warm, a contrast to the Paris winter:

Paris: The weather here is terrible, sad, and *cold*. For two days, I lodged in a hotel, then Mr. Pasteur authorized me to occupy a room at the Pasteur Institute to save me money. Yesterday, Saturday, Mr. Roux came to see me. He hasn't changed much in two years and is as friendly and devoted as ever. He asked me how much longer I intended to persist in traveling abroad. "Much longer," I told him. He could see that the urge to travel is still in my blood as much as ever. Tonight, I am dining with Mr. Pasteur, who takes great delight in the accounts of my voyages. [Letter from Paris, October 16, 1892]

Mr. Roux gives me his full moral support. What pleases me is that he has admirably understood the goal of my journeys and to him the goal is very important and necessary. What makes me even happier is, that for a long while, I have hoped for this understanding from a man whose spirit is so upright and honorable. [Letter from Paris, November 2, 1892]

In January, 1893, Yersin returned to Saigon to find that his request for a commission in the colonial government had been granted. Within a few weeks, he was preparing a series of overland mapping expeditions to Annam and a region in Cochin China inhabited by the Mois, a tribe of mountain people:

I am to be concerned above all with exploring the limits of the land of the Mois in Cochin China. . . . I have had to don a uniform. I don't know if you would recognize your son with his stripes. What is very annoying is that those with less rank must salute me, and that I must salute all my superiors. I can no longer go outside without being saluted every few steps by soldiers. I have to constantly avoid getting lost in my own thoughts so as not to pass in front of a colonel or captain without noticing him. [Letter from Saigon, January 29, 1893]

Calmette left Saigon for several days so I will probably not see him before my departure, and at my return I think he will be back in France. [Letter from Saigon, February 11, 1893]

I have crossed a completely unknown part of the country. The Mois here are much different than those I saw farther north last year. . . . The rain makes it difficult to walk. The slopes are steep and the paths are very slippery in these



mountains. I was able to cover a good part of the route on horseback . . . the elephant is for transporting the sick and the lame. I also captured about fifteen Annamese in the mountains who were more or less pirating the Mois. I sent them to the officials. [Letter from Tan Line, May 19, 1893]

I just finished an excursion in the La Gna River Valley, next to its junction with the Don Nai. This short trip was quite laborious because of the dreadful state of the paths. Either we waded in the waist-deep water of flooded plains or we climbed mountains which were swarming with leeches like I have never seen before. [Letter from Tan Line, May 29, 1893]

I was able to travel north to the source of the Don Nai River, whose location had been completely uncertain. They had figured it at a latitude far too north. Between the source of the Don Nai and the Se Can Kane remains a vast unknown countryside that I now have to explore. . . . I hope that the Swiss music boxes arrive in the next mail. They will help me to buy more elephants. . . . On June the 18th, there was a revolt in the prison at Phan Ry. Fifty-six escaped prisoners, led by rebel chiefs, tried to overthrow the province, fortunately without success. Then they left by the mountain route to try the same at Phan Rang. Being without any news from the coast, I was unaware of these events until I arrived at a village called Bo Kraan on June 24. I was told that a group of thirty of these pirates armed with machetes, spears, and rifles had camped in the village. Learning that I was coming, they had fled at night circling north. Their plan was to reach Phan Rang the next day and to murder the French and to take their weapons. Of course, I had to act. It would have been impossible for me to make it to Phan Rang in time to warn the French. So at ten in the morning, my three Annamese and I took out after the pirates. We didn't catch up with them until ten o'clock that night at a village called Pho Tan Ngam. It had been raining since six that evening. My plan was to take the chiefs as prisoners, since they were the only truly dangerous ones. And I would have done so if at the last moment, my own Annamese had not become frightened and run away. I suddenly found myself alone with the pirates, most of whom scattered and fled. I only had to fight the five chiefs. They were inside a hut and I blocked the door. If one of them had not had the brilliant presence of mind to place his finger behind the trigger of the revolver with which I was covering them, thus disarming me, I think that he would have been in serious trouble. During the fight, I took a blow to my right hand from a saber which made a deep gash (almost healed today), and also a blow from a rifle butt to my right leg, just below the knee, which made it impossible for me to walk for several days (also healed today). In conclusion, the pirates took my revolver and my Swiss rifle and fled, leaving me the master of the battlefield! . . . The day before yesterday, the Annamese militia arrested Thouk, the main chief, just outside of Nha Trang. He said that his band of pirates had scattered after my attack, each man running in a different direction. [Letter from Nha Trang, July 7, 1893]

Today, they cut off the head of Thouk. I was there and took several photographs. Beyond any doubt, it was a gruesome sight. His head fell after the fourth saber blow. Thouk did not even budge. These Annamese die with a truly impressive coolness. [Letter from Nha Trang, July 17, 1893; see fig. 2]

That expedition seems to have persuaded Yersin that it might be wiser to protect his future excursions in the mountains with a detail of guards.

His expedition in the north of Annam in the spring of 1894 justified his precautions: "You see that I arrived here on the specified date. This was not without difficulty, and without my fifteen guards, I would have never made it at all. I was forced to abandon nearly all of my equipment in a village called Pico" (letter from the village of M'siao, March 8, 1894).

And thus ended Yersin's first 4 years in Indochina, a chapter of transition that followed his training in microbiology with Louis Pasteur and Emile Roux in Paris.

Yersin's work in microbiology was minimal during this period of travel and exploration; it was, however, an interim which set the stage for his next major discovery, one which returned him to the field of microbiology: the plague bacillus, appropriately designated *Yersinia pestis* [1, 6–8].



FIG. 2.—The Nha Trang stockade: Some of the rebel pirates, including Thouk (unspecified), whom Yersin thwarted from attacking the French at Phan Rang. Photograph taken by Yersin on July 17, 1893, the day of Thouk's execution.

An outbreak of the plague had occurred in Yunnan, China, in the 1850s and spread to the port cities of China on a major scale in the 1890s [9, p. 15]. In early 1894, the plague erupted with violent intensity in Hong Kong, claiming an estimated 150,000 people. The British government requested the Pasteur Institute in Paris to send a bacteriologist to their Chinese city to study the unseen invader. Roux, in Paris, was one of the directors of the French colonial medical corps and responded by telegraphing an order to Yersin to leave immediately for Hong Kong [10]. Yersin's location in Indochina placed him just a few days away from Hong Kong by ship. When Roux's telegram arrived in Saigon, Yersin was ending his spring, 1894, mapping expedition in northern Annam. In his final letter to his mother from that April expedition near Hanoi, Yersin, without knowledge of the telegram that he would soon find in Saigon, paused in a remote village to write the following words: "You must not imagine that traveling cures the will to travel. On the contrary. . . . Your affectionate son, Dr. Yersin" (letter from the village of Kone Ketou, April 6, 1894).

On June 20, 1894, Yersin discovered the bacillus of the plague in the lymph glands of several plague victims in Hong Kong [1, p. 2577]. He isolated the microbe and sent samples of it to Roux at the Pasteur Institute in Paris, as well as a report of his discovery which was read before the Academy of Sciences [1, p. 2579]. Louis Pasteur, in his final visit to his institute before his death in 1895, viewed with pleasure a slide of Yersin's discovery [3, p. 201]. Yersin was awarded the *croix de la Légion d'honneur* for his finding [10].

After his stay in Hong Kong, Yersin returned to Indochina where he lived the remaining 49 years of his life in the coastal town of Nha Trang. There in 1895 he built a Pasteur Institute—comprised of a hospital, vaccination center, medical laboratory, and observatory—facing the sea [1]. In later years, he became the overseeing director for the network of Pasteur Institutes in Saigon, Hanoi, and Dalat as well as branch laboratories in Phnom Penh, Hué, and Vientiane [2]. He also founded the Hanoi School of Medicine in 1902 [2; 11, p. 79]. Yersin's continued interest in cartography, navigation, and astronomy led to many more land maps as well as a principal role in the colonial weather-monitoring service, *le Service météorologique d'Indochine* [1, p. 2575]. His charts and tide readings of the Annamese coastal waters were widely used in maritime navigation for many years and are still credited to him in the French maritime registry, *L'Annuaire maritime* [1, p. 2575]. His experiments in tropical agronomy resulted in the adaptation of a number of imported plants to Indochina, including the rubber plant, *Hevea brasiliensis*, and the cinchona tree, *Cinchona leidgeriana* [10].

On March 1, 1943, at the age of 80, Yersin suffered a fatal heart attack while checking the tide readings in front of the Pasteur Institute of Nha

Trang [10]. He was buried, as he had wished, near the institute. His letters are a fitting record of the evolution behind his accomplishments in several careers—medicine, cartography, and agronomy—that he combined with travels which took him far from Paris and the institute of his first influential teachers, Louis Pasteur and Emile Roux.

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