

TO THE READER

Progress Publishers would be glad to have your opinion of this book, its translation and design, and any suggestions you may have for future publications.

Please send your comments to  
21, Zubovsky Bldg  
Moscow, U.S.S.R.



Library

IAS, Shimla

614.49 P 814 S



00014850

MARK POPOVSKY

# THE STORY OF DR. HAFFKINE



614.49  
P 814 S

614.49  
P 814 S





**INDIAN INSTITUTE OF  
ADVANCED STUDY  
SIMLA**

MARK POPOVSKY

THE STORY  
of  
Dr. HAFFKINE



DATA ENTERED

PROGRESS PUBLISHERS  
Moscow

CATALOGUED

TRANSLATED FROM THE RUSSIAN BY V. VEZEY

EDITED BY D. SKVIRSKY

DESIGNED BY V. LEVINSON

Марк Поповский

СУДЬБА ДОКТОРА ХАВКИНА

*На английском языке*



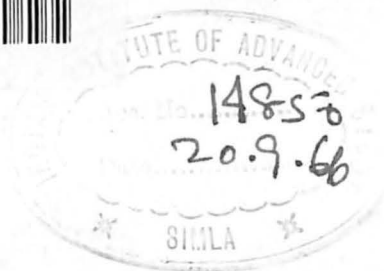
Library

IAS, Shimla

614.49 P 814 S



00014850



6/1  
614.49  
P814S

*Printed in the Union of Soviet Socialist Republics*

## Contents

Of Those Without Whose Aid This Book Could Not Have Been Written . . . . .	5
Cheerless Dawn	12
The Prince and the Pauper .	29
The Yellow Flag Comes Down .	56
Bombay, Hotbed of Plague .	79
The Poona <i>Kesari</i> and the British Lion .	107
Epilogue	. 126



Vladimir Haffkine, bacteriologist of the Indian  
Government (1895)

"The world and we in India in particular owe a great deal to Dr. Haffkine. He helped deliver India from cholera and plague, its two most dread epidemics."

*Rajendra Prasad*

## **Of Those Without Whose Aid This Book Could Not Have Been Written**

My name appears on the cover of this book; which is not quite fair, for I am by no means the only author; nor even the main one. In my files I have any number of letters from people in the Soviet Union and such places as Paris, Bombay, Bucharest and towns in America, and even in Australia, from people who considered it worth the time and trouble to assure that the biography of my hero contained as many interesting and truthful facts as possible. Scholars, librarians, archivists and curators all over the world sent in books, photographs, excerpts from documents and lists of books. They wished the writer success and shared recollections that might prove useful in his work.

What prompted all these people to such a spontaneous show of good will? What, indeed, has prompted the author to undertake a biography of Vladimir Haffkine?

One dreary morning in October 1955 as a correspondent of a Moscow newspaper, I arrived in an old town on the Volga to write an article about an institute which specialised in dangerous infectious diseases such as plague, cholera and brucellosis. In my mind's eye I see the sleepy lane strewn with autumn leaves, where I found my institute. I remember my first interview with the director, to whom I naively said:

"Do excuse me, but we have done away long ago with cholera and plague in the Soviet Union, haven't we? Why,



then look for weapons to fight an enemy which doesn't exist?"

Framed in glass, there hung on the wall of the director's office a document from the days of the Civil War of 1918-20, signed by M. I. Kalinin, President of the All-Russia Central Executive Committee. In it he wished the scientific institute, just set up in that Volga town, complete victory over the vicious epidemic diseases of those days.

"Yes," said the director, looking past me at the faded relic. "Yes, we've beaten the enemy as Kalinin wanted us to. But we can't afford to forget that beyond the narrow strip of land which we call the state frontier of the U.S.S.R. the tides of cholera and plague still come and go and that small-pox, brucellosis and leprosy are still rampant in the world."

He handed me the latest newspaper, pointing to a news item stating that the Soviet Union had sent a plane with cholera vaccine to an Eastern country where an epidemic had broken out. Two days later, wearing two smocks, rubber boots and rubber gloves, I stepped across the threshold of the "inner" laboratories. Before admitting me into the institute's *sanctum sanctorum* the director had once again cautioned me about the strict rules of personal safety.

"Incidentally," he had said in an off-hand manner, "to be on the safe side you'll have to stay here under medical observation for nine days after you have seen the laboratories."

There had been nothing I could do but comply, and here I was, distressed by my enforced idleness, in the institute's library, reading whatever I happened to pick up. This nine-day quarantine might have turned into the dreariest days of my life, if I had not pulled down from the book-shelf the 18th volume of Chekhov's works. It contained the letters written during the last years of his life. I do not know why—perhaps, because I had only recently come into contact with courageous and hazardous work of scientists studying plague—but I became particularly interested in Chekhov's answer, dated August 1899, to the enquiry of A. S. Suvorin, editor of the newspaper *Novoye Vremya*, who, clearly worried, asked what to do if the plague which was then rampant in India and had been discovered in a few places in Europe, would invade St. Petersburg. Was there any defence against the Black Death? In a big city, was salvation possible? "The

plague is not so terrible. . ." wrote Chekhov. "We have an effective vaccine which we owe to a Russian physician. I am speaking of Dr. Haffkine, one of the least known men in Russia, but long known in England as a great philanthropist. The life-story of this Jew, who was so hated by the Hindus that they nearly killed him, is truly remarkable."

These few words about Haffkine tell us of Chekhov's feelings about him and also about Suvorin, a reactionary journalist and bitter anti-Semite.

I learned from editorial comment on Chekhov's letters that Vladimir Haffkine (1860-1930), a native of Odessa, was a graduate of Novorossiisk University\* and had spent several years in India, fighting cholera and plague. I found some additional data in a medical encyclopedia. I wanted to know why Haffkine left Russia and turned up in India, how he came to be known as a great philanthropist, and why the people he tried to save wanted to kill him: but no one could give me the answers. With the aid of the library staff I dug through literature dealing with plague, India, and the bacteriology of dangerous infections, but it was only two days before leaving for Moscow that the chief bibliographer ran across a dusty booklet in English, containing a picture of a handsome man in a formal coat and immaculate stiff collar. There was an air of quiet dignity about the face with its deepest thoughtful eyes. The caption read: "Vladimir Haffkine, first director of the Haffkine Institute, born at Odessa, March 3, 1860, died October 26, 1930."

Deeply moved, I went through the report of the Bombay Bacteriological Institute which bore the name of a fellow-Russian. It was published in the autumn of 1930, soon after Haffkine's death, and contained *inter alia* an obituary written by B. M. Naidhu, a prominent Indian scientist. I was struck by this biography of Haffkine, written by a man of a far-away land, every line of which spoke of deep affection and esteem for the doctor from Odessa.

"The Haffkine Institute, which owes its present activities to his genius, and the Grand Medical College, which had been the scene of his early researches on plague, were closed on October 27 to pay homage to his memory. . ." the obituary

\* Novorossiisk University was in Odessa, then the principal city of Novorossia Region.

ran. "India has special reasons to bemoan his loss; he had spent the best years of his life here fighting against the scourges of cholera and plague; he has saved many of her people from the ravages of these two diseases by his prophylactic inoculations . . . His interest in India and her people had remained unabated, and he was in communication with some of his Indian friends until his death."

The biography, with the obituary, revealed in some measure the milestones of Haffkine's life, but also suggested a number of points which needed to be cleared up. Chekhov wrote of the Indians' hatred for Haffkine, and the Bombay scientist of the deep affection which the peoples of India felt for the doctor from Russia: which of the two was right? The obituary makes no mention of Haffkine's childhood and youth, or of his studies at Odessa University: yet the chair of zoology in those years was occupied by I. I. Mechnikov, the great Russian biologist (1845-1916). What had been the contacts between teacher and student? And why—coming to the most important question of all—did Haffkine leave his native land, why did he never come back to Odessa?

When I left the Institute on the banks of the Volga I was firmly resolved to unravel Haffkine's enigmatic life-story. Yet the Bombay obituary, in translation, was long destined to be the only available record. Russian journals of the end of the past century and the early twentieth contained only fragmentary, often contradictory notes on Haffkine's life in Paris, London, Calcutta and Bombay. Three years went by during which the "Haffkine" file grew but slowly and sporadically. In Moscow, it is true, as also in Odessa and Barnaul some relatives had been found and letter had arrived from Barnaul with several old photographs of Haffkine's father, his mother, and Vladimir himself—in student uniform in an early photo, wearing a morning coat in a later one. The latter photo was marked "Calcutta" on the back and the handwritten legend read: "Arabian Sea, *en route* via Aden, February 18 (6), 1895". The "latest" of these photos dated nearly seventy years back. These family relics had been sent in by Haffkine's niece Lydia Savelyeva, a pianist by profession.

Then I had the good fortune of being received in his modest Moscow flat by Alexander Hast, Vladimir Haffkine's step-brother, now eighty-five years old. He was seriously ill, and speech was difficult for him, but he was glad to be of

help. His recollections of what had happened sixty years back were scanty, but they were events which he recounted with great conviction, as though they had happened only the day before.

"Vladimir was a political prisoner in the Odessa jail," he recollected, and when I showed some incredulity he went on: "Yes, yes, he was known at the University as a . . . as a . . . now, whatever were they called?" and here he surprised me by bringing a word out from the depths of the past: "A bomb-thrower."

Did Haffkine belong to the Narodnaya Volya Party?\* The old gentleman shook his head: alas, that was all he remembered, but he was emphatic about Vladimir's reputation as a bomb-thrower. His failing memory produced another interesting fact, however. It appears that in Paris (where Vladimir arrived in 1890) the two brothers attended a meeting in honour of an old Russian revolutionary, and Alexander Hast recollected hearing Jaurès, Bebel and Liebknecht among the speakers; also that some émigré Russian revolutionaries had come up to greet his brother.

Alexander Hast died two months after our meeting, and with him, it might have seemed, vanished the last possibility to learn something of Vladimir Haffkine's revolutionary activities; unless, perhaps, the Odessa archives might hold out a hope. Accordingly, I left for Odessa, on what I considered a hopeless quest. In the course of the past forty-five years there had rolled through the streets of the heroic city two wars and three revolutions. It had been occupied in turn by the French and the Rumanians, by the troops of the Kaiser and by Hitler's hordes. It seemed hardly possible, after all that had passed, to dig up any records relating to the 1880s.

For several days I roamed the city in the company of Fyodor Petrun, a professor at the University and a great lover of the city's past. Petrun, an experienced restorationist, removed all the accretions, and the rich commercial seaport of Odessa came to life again before our eyes, as it had been eighty years ago, with its Imperial University; the offices of the commandant; the students' restaurant; the Police

\* The Narodnaya Volya Party was an illegal organisation set up in 1879. Its members resorted to terrorist acts in their struggle against the monarchy.—Ed.

Department with its watch-tower and huge enclosed courtyard (it was here that the participants of student uprisings used to be brought); the Greek Square; one-storey porticoed buildings; groceries; and cheap cafés. On Primorsky Boulevard Professor Petrun pointed out the spot where, on March 18, 1882, Nikolai Zhelvakov, member of the Narodnaya Volya Party, executing the sentence passed by the party's Executive Committee, shot and killed Colonel Strel'nikov of the gendarmerie.

My hopes began to soar: those had been the days when Haffkine was in his third year at the University. It was quite possible that he had stood on the boulevard, at that hour, among the other students who had gathered—as I found out by reading on the subject—to help Zhelvakov escape after the shooting. Unfortunately, no one could tell me more than I had learned from Alexander Hast about the revolutionary leanings of the future bacteriologist. The sad conclusion that I would never know the truth was beginning to take shape in my mind, when quite unexpectedly (on the very next day, to be exact) Anatoly Bachinsky, a young specialist of the Odessa Regional Archives Office laid before me the authentic file on Vladimir (Marcus Wulf) Haffkine, student of the Imperial Novorossiisk University, together with a number of documents dealing with Haffkine as member of the Narodnaya Volya Party, Haffkine as a criminal and a convict. Alexander Hast, the old book-keeper, had been right, after all.

A great many Soviet men and women took part in the quest for the true life-story of my hero. As to our friends abroad, I was really touched by the help they offered. The *Unesco Courier* in its June 1958 issue published my letter asking anyone who had met or had any information on Haffkine to get in touch with me. I received numerous replies.

These communications were generally friendly and cordial. Men and women of many lands were eloquent in their praise of the Russian physician's valiant deeds and spoke of their feelings of friendship towards the Soviet people. H. Jhala, Director of the Haffkine Institute at Bombay, was kind enough to send me a biography of its founder, together with a list of his works and two albums, which the Institute had issued on its sixtieth anniversary in 1959.

M. Delarue of Paris, a professor of physics, had never heard of Haffkine, but that made no difference: this Russian

bacteriologist had been a man of the highest order of courage, he should receive his dues, and all possible information about him should be obtained. So professor Delarue cancelled his own programme and went to the library of the Pasteur Institute in order to compile, for the writer in the Soviet Union, a list of sources, French, English and even Russian. This list proved to be the most valuable item of all. Yet Delarue himself did not regard his work as a contribution of any value. "I hope," he wrote me, "that you have received many other communications to testify to the high degree of intellectual solidarity among nations."

There is one more letter, which I should like to give in full:

"Sir, as a specialist in bacteriology and one-time director of the Haffkine Institute, I welcome the work you are doing on a book about Vladimir Haffkine. I should be glad to help you with any advice or records you may require. Your book, revealing the friendship which existed between the scientist from Russia and my own people, will serve to promote mutual understanding and esteem between our peoples." This letter was signed by Dr. Sahib Singh Sokhey, Lenin International Peace Prize Laureate.

Dr. Sokhey brought with him to the U.S.S.R. and presented to me photographic copies of thirty articles culled from Indian and British newspapers dealing with the work of Vladimir Haffkine in India. New, hitherto unknown details of the scientist's life, particularly of his struggle against the colonial administration, came to light. A link between the historic past and the present was thus established, thanks to the contribution which a citizen of the independent Republic of India and a peace fighter had made towards the posthumous honouring of a Russian scientist.

Over sixty years have now elapsed since Chekhov referred to Vladimir Haffkine as "one of the least known men in Russia". Much has changed in the country since those days. We have learned to attach much greater value and honour to our historic past. The name of the intrepid bacteriologist, one of many wrongfully forgotten names, now honoured in the Soviet Union, has at last been given its rightful place. The time has come to write more fully about his life, a life at once simple, devoted and courageous.

## Cheerless Dawn

On Thursday, November 20, 1881, a scandal without precedent developed at the Imperial Novorossiisk University, when Dean Patlayevsky of the Law School was hooted out by a group of students. News never got stale in Odessa, so that by the next day all the details had got around, and on Deribasovskaya Street, where the gentry took the air before dinner, the University affairs were discussed in hushed tones, while in the port districts of Moldavanka and Peresyp\* people laughed uproariously, snapped their fingers and cheered the students.

Odessa loved the University. The thought that in their town they had a temple of learning every bit as good as the one in the capital filled the good citizens with a feeling of self-respect. The city's wealthy businessmen sent their sons to the Law School, and the poor pinched and scraped just so their sons might some day be doctors or teachers. The city took pride in its students, readily shutting its eyes to boisterous parties, street fights and even minor liberties in regard to the authorities, willing to let them sow their wild oats and to hope for the best.

Novorossiisk University had the reputation, back in the 1880s, of an exceptionally democratic institution of learning. Youths of very different social standing rubbed elbows in its lecture rooms—sons of the upper classes and sons of the lower middle classes, sons of the clergy and shopkeepers' sons. There was even some infiltration by youths of the peasantry. The medley of nationalities was just as complex. Armenians, Jews, Georgians, Poles, Moldavians, Greeks and

\* Deribasovskaya Street was the main, "aristocratic" street of the city; Moldavanka and Peresyp—its workers' suburbs.—*Ed.*

Bulgarians attended lectures side by side with Ukrainians and Russians. Noisy, multi-national, and full of social contrasts, the University was Odessa's own flesh and blood, mirroring the busy life of the seaport straddling the international trade routes.

That which took place in the University vestibule on that particular Thursday was unlike the sort of mischief in which the students were prone to engage: sixty first-year and second-year students demanded the dismissal of a reader by the name of Chizhov, who taught the philosophy of law, on grounds of incompetence. They whistled and booed under the very nose of the venerable dean and refused to disperse even after the pro-rector in person had taken down the names of those who had started the trouble.

Vague rumours had long been current in the city about disagreement among the University professors. It was said that Professor Posnikov, who taught political economy and enjoyed exceptional popularity among the students, insisted on a master's degree for a talented student named Gertsenstein, but Dean Patlayevsky had discerned certain seditious ideas in the student's thesis and was opposed to awarding the degree. It was also rumoured that Patlayevsky had set up a system of espionage in the faculty and was giving the police information on his students. The Chizhov affair was only a pretext, it was said, for getting even with the hated dean.

The people of Odessa are excitable, and so the events were heatedly discussed, some siding with the students, others with the dean, depending on their financial circumstances and social standing. The true nature of these events was best understood, however, on Spiridonovskaya Street, in a building whose gates the architect had adorned with two criss-crossing flags, symbol of the Russian gendarmerie.

Reporting to the Governor-General of Odessa on the student disorders, Colonel Pershin, chief of the city's gendarmerie, quite rightly underscored that the events at the University had coincided with the growing social-revolutionary movement in the city. The obstruction of which Patlayevsky had been the target was merely a reflection of the broader struggle developing within the walls of the Imperial University. The burning political issues of the day had percolated through the teaching staff and split that body into two hostile camps, reported Colonel Pershin. Some, he said, "those who



tended towards the conservative point of view, found support among people of a serious turn of mind and those of the administration", while others sought "support among the University students. There has been a tendency to play up to the students, and the current disorders are the result."

Who were they, these "seducers of our youth" who, according to the colonel of the gendarmerie, "act in direct opposition to the aims of the government"? Colonel Pershin's report gave a list of names.

"Those who have sided with Posnikov, professor of political economy, and whom I might call the liberal party, include: Mechnikov, professor of zoology, a radical, and not to be tolerated in any educational institution; Trachevsky, organiser of the Second Moscow Private Courses of Higher Instruction for Women, who has opened a new co-educational school in Odessa (he has been warned against it by the former Governor-General Count Totleben, if I am not mistaken); Umov, professor of physics, another radical, who has made fun of the requiem for the late emperor. . . ." The colonel's list was rather lengthy, but it is enough to give the first four names. Even now, eighty years later, they claim attention: Mechnikov—illustrious biologist; Umov—founder of the Russian school of physicists; Posnikov and Trachevsky, who professed progressive views. Those were the men under whose tutorship the Odessa students had elected to study.

The scandal in the University vestibule had been essentially a political demonstration, inexpert and senseless, perhaps, but reflecting the students' heartfelt, emotional hatred of reaction in all its forms. "Those of the administration" understood and became panicky. A few days later the University tribunal passed sentences on seventeen students. Three, who had been the chief instigators, were to be expelled; among them Vladimir Haffkine, second-year student of the department of natural science of the physical and mathematical faculty.

He was twenty-one at the time. A contemporary photograph shows him to have been tall and narrow-shouldered, with a candid and thoughtful expression in his wide grey eyes, a rather childish mouth, and a light down on his lips and chin, which utterly failed to contribute a sophisticated look to his boyish face.

He had always wanted to enter Odessa University. He had resolved to acquire a higher education in spite of the fact

that his father, Aaron Haffkine, a schoolteacher of Berdyansk, elderly and with a numerous family on his hands, could not spare a kopek on his youngest son's education. After much discussion his elder brother agreed to give Vladimir ten rubles a month while he studied, and the University undertook to advance him twenty kopeks a day to buy a meal. Life is hard when one has to accept such hand-outs, but there is nothing else to do when one is poor and it is the only way to education.

Haffkine did well in his studies. The natural sciences had claimed his attention while still at the Berdyansk gymnasium. In Odessa, Professor Mechnikov's laboratory became a second home. Professor Mechnikov fostered his students' interest in science. Thus, every experiment made by a student, every new development in biology in Russia or abroad became the subject of discussion or heated argument between teacher and class. Haffkine was particularly singled out by Mechnikov, whose constant companion he became in various zoological expeditions. It became apparent early in his University career that he was cut out for a zoologist and a researcher in marine microfauna.

Were his hopes now to be dashed?

Agitation caused by the expulsion of the three students continued at the University all through November 1881. Hardly was the sentence passed by the University tribunal, than several score of students gathered in the conference room to lodge a protest with the administration. The meeting lasted several hours. The resolute stand made by the students gained them, it seemed, the sympathy of the professors, and the Academic Council reversed the tribunal's decision by a majority of votes and demanded the immediate reinstatement of Haffkine and his fellow-students.

The progressive professors who had saved their students paid a stiff price for their action. Personal files were opened for many of them at the gendarmerie headquarters. Moreover, their action incensed the Minister of Education, who wrote a scathing letter to the University, which was read at the regular meeting of the Academic Council. "The government," wrote the Minister, "is entitled to expect that the teaching staff of the University serve it not only by reading lectures but also by teaching the students verbally and through personal example the immutable principles of high

moral behaviour and respect for law and order. Any deviation from this line of conduct may shake the confidence which the government places in the professoriate . . . and might put the government under the painful necessity of seeking the sources of these liberal trends not only among the somewhat overenthusiastic youths but also among the professoriate." This sounded like an open threat. Count Tolstói, the former Minister of Education, who was soon to reap his laurels as Minister for Home Affairs really did "show" the professors how to teach "respect for law and order".

Nevertheless, Haffkine's defence was successful on that occasion. Mechnikov himself pleaded his cause. Before being re-admitted to the auditorium, it is true, he had to sign something in the nature of a pledge or repentance (like the ones signed by repentant sinners in the Middle Ages) which read in part: "In connection with my re-admission as a student of Novorossiisk University I hereby undertake strictly to conform in the future to the rules of the University . . . I have been warned that any new infraction on my part will bring expulsion from the University."

On January 7, 1882, Haffkine was handed his matriculation certificate. With the little blue booklet, bearing on its cover the number 247, in his pocket he returned to the laboratory and his experiments, to the cheap meals at the student lunch-room, and to the daily duties of member of the Narodnaya Volya Party revolutionary study group.

Those who knew him at the time maintain that he was by nature least of all inclined to propaganda or revolt. He was rather taciturn and reserved, and would show a lively interest only when the conversation touched upon serious problems of science or philosophy. Then he would step into the argument and speak passionately, astonishing the others with the volume of the social and philosophic literature he had read.

At the gymnasium in Berdyansk\* he had developed a passionate love of books and discussions. The gymnasium had been founded in the middle '70s and had soon earned the reputation of the most liberal secondary school in the south of Russia. Seeking understanding to the cardinal issues of the day, the boys found the answers in the intimate study

\* Haffkine was born in Odessa, but his childhood and early youth passed in Berdyansk, where the family had moved for financial reasons.

groups organised in every class, rather than in the class room. Gathering in some garret in the evening hours, the group would read political literature, study the history of social movements, political economy or sociology. "Something is rotten in the state of Denmark" . . . that was clear to everyone. But what was to be done? The thought that a revolutionary struggle might be inevitable had already suggested itself to the searching young minds, who hoped to find a guiding word in the dense forest of sociologist formulas. There was no one in the little provincial town, however, who could have transformed a dim conception into a call to arms.

The chief administrative officer of the city and port of Berdyansk, who had issued Vladimir Haffkine, a petty bourgeois of Berdyansk, graduate of the gymnasium, a certificate of loyalty, might have been justified only to a certain extent. No, the boy had never been prosecuted in court, but as to "reprehensible" ideas—of these he had absorbed no small number. Eight years in the gymnasium had failed to inculcate in him either respect for autocracy or tolerance towards the reaction around him. With his graduation certificate (a sheet of Bristol board the size of a newspaper, adorned with grapevines, sun rays and only the highest marks) the quondam schoolboy carried to Odessa a good deal of scepticism and doubt. He was like freshly-made dough waiting for its leaven, ready to ferment with revolutionary vigour and break out of its narrow mould of "loyalty and good behaviour".

The "leaven" was soon found.

In the autumn of 1879 the first issue of the *Narodnaya Volya* reached Odessa. It was a sizeable journal. For an epigraph to the editorial the authors had chosen the words of a senator of Ancient Rome: "Carthage must be destroyed". This was a call to political struggle, to immediate action against the tsarist autocracy. "Political illusions destroy nations," said the editorial. "They also destroy parties. The main illusion which we must fight is the prejudice against political freedom and the fear of political struggle and politics in general."

Haffkine read the journal with Stepan and Gerasim Romanenko, his new University friends. It is probably too late now to find out what made the sons of a wealthy Bessarabian landowner strike up a friendship with the taciturn Jewish youth from Berdyansk. Seemingly, they were drawn towards

each other by their active interest in revolutionary ideas and by their faith in the common cause. Whatever it may have been, from the autumn of 1879 onward the names of Haffkine and the Romanenkos invariably appeared side by side in the letters of the gendarmerie and police.

The Romanenko brothers, students of the law faculty, had caught the attention of the police a long time ago. Though both were consumptives, they were nonetheless time and again at the root of student disorders. Vera Figner, the famous revolutionary, had a high opinion of Gerasim, who was later to become a member of the Executive Council of the Narodnaya Volya Party. In her book *Memorable Work* she praises Gerasim Romanenko's intellect and education and calls him a man of rare talent.

New ideas and new friends drew Vladimir into the vortex of the activities of the revolutionary Odessa of 1879, which saw the Narodnaya Volya movement at its peak. He came under the notice of the gendarmerie's spies almost at once. Colonel Pershin, whom the author has already introduced to the reader, personally made a notation on the list of Suspect Persons (compiled not later than January 1880) which read: "Classified by their political ideas, all of them (i.e., the students listed.—*M. P.*) belong to the so-called Chorny Peredel Party.\* This information has been gathered by our agent, but the source has proved its trustworthiness in the cases of Matveyevich, Haffkine, Romanenko and others."

For a while they left Vladimir alone, except that a dossier was opened on him in the files of Spiridonovskaya Street. However, the affair ripened, and by the close of 1879 matters came to a head. The Odessa students had organised a series of meetings and demonstrations to protest against the new University rules. These meetings were held at Haffkine's home, under the leadership of the Romanenko brothers, as had become usual. On a tip-off received by the gendarmes Stepan and Vladimir were arrested. Gerasim slipped out of the country. Searches and interrogations followed, producing a voluminous "investigation of the activities of Haffkine and Romanenko, students, accused of disloyalty". Romanenko was found to be in possession of a copy of Shevchenko's *Kobzar*, barred by the censorship and published in Geneva, and

\* Organised by the Narodniks.—*Ed.*

Haffkine—of two letters, written by himself, of a “suspicious and ambiguous nature”. It might have gone hard with them had not the Governor-General this time seen fit to limit disciplinary action to “police surveillance”.

This surveillance, successively prolonged, pursued Haffkine for nearly eight years in Odessa. It envenomed his youthful years. Contacts with colleagues, scientific work, friendship with Professor Mechnikov, in short, everything he did was observed and reported. The police poked into every nook and corner of his private life, read his letters and interfered with his travels in Russia. In this stifling atmosphere of invisible, relentless pursuit one could have easily given up in despair. Nothing, however, could deter our imperturbable student from doing that which he considered it his duty to do.

A bomb exploded in St. Petersburg on March 1, 1881, bringing the reign of Alexander II to an end: the Narodovoltsi\* had kept their word and executed the tsar, known, by the irony of fate, as the Liberator. Mass terrorism was the government's answer. Shootings and hangings of party members took place daily in the prison-fortress of Peter and Paul. The gaols of Moscow and St. Petersburg overflowed with prisoners. The provincial gendarmes did their best to keep up with their metropolitan colleagues, and political cases were being tried in Kiev and Odessa. As a result, there were not enough trains to take to Siberia those who were sentenced to exile or hard labour.

The government started the rumour that the Jews were behind the assassination of the tsar and were trying to seize power. A wave of pogroms swept across the southern and western provinces. In due time this abomination engulfed Odessa and terrorists stalked the streets, armed with picks and axes, plundering and destroying Jewish homes.

Anyone interested in what the Odessa authorities did to combat the pogroms is referred to the *Odessa News*, which accurately reported the attitude of those who could have stopped them: “A general,” it said, “and some other military tried to argue with the crowd, but that did not help matters.”

N. I. Pirogov, celebrated surgeon and one-time trustee of the Odessa school district, once said: “The University is our society's best barometer.” On Monday, May 4, 1881, that

\* Members of the Narodnaya Volya Party.—Ed.

barometer read "stormy". Hardly had the lectures begun than the members of the various revolutionary groups started organising the students into defence units. Arming themselves with whatever was handy, such as pokers and sticks, the students—Russians, Jews, Ukrainians, Moldavians, Bulgarians—threw themselves at the Jew-baiters and a regular battle ensued. Haffkine and Romanenko were in the thick of the fight. It was then that the sight of armed students in the street stirred the authorities into action. "Over one hundred and fifty persons were arrested by the police and military school cadets on Rybnaya and Reznichnaya streets. Some were hurt," reported the Odessa newspaper. A short time later it was learned that nearly eight hundred persons were taken into custody and put aboard some coal barges, which now rode at anchor in the outer harbour.

Haffkine, who had a gun when he was arrested by the police in the streets, was at first held, with all the others, at the procurator's office. Later the chief of the gendarmerie ordered him transferred to the jail. The gendarmes were bent upon charging him with organising an armed attack on the pogrom-bent mob; they had already succeeded in indicting several members of the student defence units on that charge. The investigation lasted a week. The students summoned as witnesses testified in his favour, and he was released. Once again the steel jaws of the police trap had been pried open.

The spring of 1881 was full of troubles for Vladimir. His two closest friends, Stepan Romanenko and Professor Mechnikov, slipped out of his life for what was to be a long, long time.

Stepan Romanenko applied to the authorities for permission to go to Italy for medical treatment. He was seriously ill with pulmonary tuberculosis. However Haffkine knew that, sick as he was, Romanenko intended to go not to Italy but to Berne, where he would find a large group of Narodovolsi and Sonya, his fiancée, who was taking a course in medicine.

Professor Mechnikov came down with relapsing fever shortly after Romanenko's departure. He had been coming to his laboratory for quite some time in a gloomy and dejected mood, and his lectures, usually so exciting, had somehow lost that quality in recent months. Something was obviously depressing him, and Vladimir knew what it was. The



Vladimir Haffkine as a student  
of Odessa University



professor often spoke to his students about politics, which were steadily infiltrating into the University and distracting them from their studies. He had repeatedly stressed that vast knowledge was required by people who wanted to engage in politics and reproached the students with having given up the auditorium to join illegal groups and exchanged their textbooks for prohibited pamphlets. "His boys", whom the talented but intolerant professor drove to distraction with his preaching of a science entirely divorced from politics, treated him with affection and tried to spare him, but refused to give up their revolutionary activities. They tried to avoid arguments. For everyone knew that at the meetings of the Academic Council, where he was looked upon as a "Red" and practically as an agitator, their professor spared no effort in defending student rights, freedom of instruction and independence in the field of research.

Then came the bad news that Mechnikov had contracted typhus. A little later his best friends learned that he had infected himself, for the sake of experiment, it was said, but to them it seemed plain suicide. His illness dragged on interminably. His friends and relatives tried to shut out the news of what was happening in the country following the assassination of the tsar, but he learned of the arrests made among his students, and of the pogroms, and also that the Minister of Education was approving for appointment only those professors who were "politically reliable" and was not at all concerned with their academic standing, if any. This sort of news (which was as often as not brought to him by his students) worsened his condition, and his wife finally refused to let any of the students see him. This deprived Haffkine of his last "safety valve".

May was on its way out when the professor, still pale and shaky, appeared in his laboratory. Haffkine submitted to him a report on his research on marine protozoa. Mechnikov liked the report, and a trip to the seashore was agreed upon by teacher and student, which, however, was to be called off. Private reasons obliged Mechnikov to leave for his home in the Kiev countryside. Haffkine, too, was forced to change his plans: he joined a scientific expedition to Bessarabia for research in an entirely different field. He wrote a despondent letter to his brother, saying he was compelled to postpone the experiments he had set his heart upon. As a matter of fact

events were about to occur which were to tear him away from his University studies for a whole year.

An elegant young woman who caused a stir in local society came to Odessa in the summer of 1881. Her name was Yelena Kolosova. A vivacious, interesting conversationalist, her home soon became a sort of literary and musical *salon*, which attracted people of very different background. Picnics followed home concerts and were in turn followed by literary quizzes: the attractive young woman turned out to be an accomplished hostess. They said she was a widow of means, and this whetted the interest of unmarried military and civil officials. In Odessa only three men knew that Kolosova really was Vera Figner of the Narodnaya Volya Executive Committee.

She was in charge of the party's work in the south of Russia. Secret meetings were held in her house late at night. Here travel documents were forged for party members who were urgently called out of town. Of the three who knew of Kolosova's identity, one was Pavel Annenkov, a professional revolutionary. Vera Figner had brought him from Kharkov to organise a student group for active aid to the Narodnaya Volya Party. Annenkov enrolled as a student at the University (this was the fourth educational institution that he had changed for similar reasons), and began cautiously to select candidates among his new fellow-students. One of the first to join the Annenkov group was Vladimir Haffkine. The members of the group raised funds for party members driven underground by police activity and those who were forced to flee from Odessa, and mimeographed political proclamations that were posted throughout the city.

The day soon came when Vera Figner gave the Annenkov group a much more responsible assignment. In the summer of 1881, General Strelnikov, procurator of the Kiev military district court and one of the tsar's most ruthless satraps, arrived "in Odessa by imperial order to investigate cases of high treason". He began purging the south of Russia of seditious elements. "He arrested scores of people who had nothing to do with revolutionary activity, systematically acting on denunciation," Vera Figner wrote later. "He was heartless and cruel, cynically derisive with his victims. When a mother pleaded for her son he would say 'Don't bother pleading—he will hang!' Once, when a prisoner attempted to escape, he

asked the guards: 'Did you kill him?' - 'No.' - 'Did you beat him up?' - 'No.' - 'That's too bad.' "

The Narodnaya Volya Executive Committee passed the death sentence on Strelnikov. While the right men to carry out the sentence were being lined up in St. Petersburg, the members of Annenkov's group made an exhaustive study of the general's habits, noting the places he frequented and the people with whom he associated. By January 1882 Vladimir and two of his friends were able to post Vera Figner on all the details of the general's character and habits, and it was this intelligence that was used by her to plan the attempt. Strelnikov was to be killed at 5 p.m. on Primorsky Boulevard, where it was his custom to take the air. It is possible that Haffkine would have played a more active role in preparing the attempt, but on February 15 he and Stepan Romanenko, who had just returned from abroad, were, to quote an official document, "arrested on orders from Major-General Strelnikov on a charge of treason".

We have, unfortunately, no record of the interrogations to which Haffkine was submitted in prison. Nor did he leave us any reminiscences of that period of his life. A rather detailed description of prison life has been given by those who, like Haffkine, had the opportunity to enjoy Strelnikov's "hospitality".

Among available documents was a proclamation "To the People of Russia," written in December 1882 by Pavel Annenkov apropos of hunger strike in the Odessa gaol. It is a terrifying document.

"The despotic rule of the authorities, which was essentially a refined type of torture, doomed the inmates to a slow and painful death," wrote Annenkov. "The regime was the same even for those who were seriously ill. The same solitary confinement, the same cold, damp and foul cell, the same sack of moulding straw on the chinky floor, the same dungeon threatening those who remained recalcitrant. . . . On one occasion a sick workman asked the prison physician, Rosen (a gendarme at heart, he called himself), to put him on a hospital diet, and the doctor, in a violent fit of rage, screamed back: 'You're a workman, and hospital meals cost seventy kopeks! You'll do without them!' Another time a student prisoner asked him for some medicine to treat a developing tumour: "Try sucking your tumour,' answered Rosen. 'You've

got plenty of time.' When the student expressed the wish to see another doctor Rosen answered: 'What you need is an executioner, not a doctor.' It was Rosen who, later, showed the executioner Borovitsky, who had lost his nerve, how to make a hangman's knot, and then, coolly smiling, personally helped him adjust it on Zhelvakov and Khalturin.

"The terrible regime did its work. Several prisoners went mad, others contracted nervous disorders. Pulmonary diseases became general: some coughed, others developed all the symptoms of the early stages of consumption, still others spat blood. The constant cold and dampness brought on rheumatism. There was failure of eyesight and hearing. Nor did their powerful physique and steel nerves save the jailed workmen: they, too, finally succumbed.

"The record in subjecting the prisoners to intolerable suffering was set by Superintendent Zubachevsky: when a political prisoner in the last stages of consumption asked him for a cot Zubachevsky ordered him transferred to a dungeon."

All that Annenkov described had been lived through a few months earlier by Haffkine. It is even possible that he had given the leader of the group the facts on the rule of terror that reigned in the prison. Like the other prisoners, Haffkine froze, starved and slept on the floor (beds were only for the "privileged estates"). Like the others, he was taken to a special cell where Strelnikov himself conducted the interrogation in an effort to draw him out on the subject of the underground organisation. Haffkine refused to betray his friends and did not breathe a word about the plot that was being hatched, though he knew that a Webley revolver and two daggers were concealed at the home of one of the group members, from where they were daily taken in the hope that chance might favour an attempt. In fact, he knew much more; but the general took him for very small potatoes, seemingly, and, moreover, Strelnikov was known to be a poor interrogator; he never could unearth an organisation and often let important intelligence slip through his fingers. He was not familiar with the Narodnaya Volya programme and did not know that in addition to the workers' subgroup, there was an intricate local organisation in Odessa. The gendarmes had no inkling, at the time, that it was not individual trouble-makers who were active in the University, but a regular

network of well-organised Narodnaya Volya groups. That is what saved Haffkine.

He was released in early spring, just a few days before the twenty-year-old Zhelvakov shot and killed the widely hated general on Primorsky Boulevard. The shot that the Narodnaya Volya members had expected for so long rang out on March 18, and by early April Annenkov's underground group had mimeographed the text of a proclamation received from St. Petersburg. It started with the words "From the Executive Committee", and read, in part: "The events of March 18, paid for with our comrades' precious blood, shall be a stern warning to those of the tsar's oprichniks\* who bar no methods in combating a revolutionary party."

While the reign of terror instituted by the police was at its height, and the enraged gendarmes were hanging Khalturin and Zhelvakov in the Odessa gaol without trial, Haffkine and his comrades posted the proclamation on the walls and fences of Odessa. He may have had his shortcomings, but a lack of courage was certainly not one of them. In the underground workshop he continued forging passports, and went on raising money to finance the activities of the Narodnaya Volya Party. Nevertheless, his sympathies for the party began to wane. He was disappointed, probably, in the methods employed by the party rather than in its aims. It is doubtful if he understood that in political struggle terrorist action against individuals was ineffectual. But he was a faithful follower of Professor Mechnikov and so thoroughly imbued with his teacher's humane ideas that bloodshed in any form was abhorrent to him. The shot fired on Primorsky Boulevard was, for him, a kind of disaster. The Annenkov group continued to favour terrorist methods, and Haffkine, unable to accept them, inevitably began, step by step, to draw away from the Narodnaya Volya Party.

At the University, matters were once more coming to a head. The new University by-laws completely delivered the students and professors into the hands of the police. Back in the autumn of 1880 two hundred and forty Odessa students had sent the Minister of Education a letter in which

\* The name given to Ivan the Terrible's household troops, who strengthened the autocracy in Russia by wholesale terror and executions.—Ed.

they complained about their conditions. In part it read: "We are deprived of the right to gather to discuss our needs. . . . We are not permitted even to hold meetings on purely scientific problems. . . . We are subjected not only to the University inspectorate but also to a special form of police supervision. . . . A complete lack of funds stifles our energy and is a source of general hardship for the students. . . ."

By the spring of 1882 the oppressive measures of the reactionary regime became intolerable. In the Academic Council the "reliable" elements were now on top. The Minister of Education even scented subversion in the drive to raise money for a wreath to be laid on the tomb of Charles Darwin, and categorically forbade the students to demonstrate any veneration of his memory. Every day the police plucked new victims from among the students. Among the professors, those of the highest standing, who enjoyed the affection of the student body, tried to help these victims. Thus, Professor Kovalevsky, the noted embryologist, and Umov, professor of physics, petitioned the authorities to let the arrested and deported students return to the University, and Professor Umov went so far as to furnish bail to the amount of 2,000 rubles for one of his students who was a member of the Narodnaya Volya Party. This drove the stool-pigeons and bigots among the professoriate to extreme fury, and the democratic elements headed by Professor Mechnikov decided to leave the University. Learning of this decision, the students made another attempt to halt the final spiritual and academic debasement of their University, and on May 2 two of them delivered a letter at the home of Rector Yaroshenko.

"Dear Sir," the letter ran. "A year has elapsed since you assumed the administration of the University, during which there have been numerous misunderstandings and troubles. Under your guidance matters have reached a point where some professors, who are the pride of the University have been forced to resign. All of us . . . have been seriously concerned with the decision of Preobrazhensky, Posnikov, Mechnikov and Gambarov to leave. . . . Your administration is harmful for the University and we therefore expect you to relinquish your post as Rector so that the loss of the best professors, which would be a great disaster, can be averted. . . ." The initiators of this protest warned everyone who wanted to sign it to weigh the consequences. It was

generally realised that Yaroshenko, who had been given his appointment because he fawned upon those in authority, would never forgive such an offence. So only ninety-five out of a possible two hundred signatures were affixed to this letter, which was formally perfectly polite yet so intransigent in its demands. Among those who signed were N. D. Zelinsky, who was to become an Academician and a famous chemist, N. I. Andrusov, a future Academician and celebrated geologist, Professor A. A. Manuilov, subsequently Rector of the University of Moscow, and Vladimir Haffkine.

Haffkine must have known that he would be expelled, because he had signed a pledge not to violate the University rules on pain of expulsion. Collective petitions to the Rector were considered a heinous crime. Yet he had not hesitated. His signature, he had felt, was that last sacrifice that a pupil could make for his teacher. The axe fell almost immediately. Seven students, including himself, Andrusov, Zelinsky and Manuilov, were expelled, and seventy-eight received reprimands. A week later Professor Mechnikov tendered his resignation and left the University, never to return.

## The Prince and the Pauper

One autumn morning of 1889 the chief librarian of the Pasteur Institute, 25, rue Dutot, sat in his office talking to a pale young man in a shabby coat. The young man had been taken on the library staff on the recommendation of Monsieur Mechnikov himself, and the librarian, being somewhat pedantic and respectful towards his superiors, was not very sure of the attitude he should adopt in regard to this modest, perhaps over-serious newcomer from Russia. The position of assistant librarian was all Professor Mechnikov had been able to secure for Vladimir Haffkine.

"If the young man shows that he is deserving, we shall consider ways to make things easier for him," Professor Roux, acting director, had promised Mechnikov.

The post of assistant librarian had little to offer. The pay was that of a stone-breaker. To Haffkine the insignificance of both job and pay was a matter of indifference. These things were unimportant in comparison with what had been gained, for here he was, working in the world-famous Pasteur Institute side by side with Mechnikov, Roux, Ducleux, and Pasteur himself! This was something he would not have dared to dream of a year ago.

Eight years had passed since Haffkine left Novorossiisk University in Odessa. Expelled from that school, he had sought admission to the University of St. Petersburg. An exchange of information followed between the two universities, which lasted several months. The Rector at Odessa informed his counterpart in St. Petersburg of all the "crimes" of his late student. The trip to St. Petersburg fell through, though for another reason. In June 1882 Haffkine applied to the Governor-General of Odessa for permission to move to another town. The Governor-General asked the Chief of



Police for his opinion of the applicant, starting another round of letter-writing. The applicant himself was passed on from one bureaucrat to another, and the case finally landed in the lap of the public prosecutor. The latter advised Haffkine to take his case to the Minister of the Interior. Up from the depths of the archives floated his personal file with a list of his transgressions, and finally, late in autumn, the Governor-General of Odessa received from the Police Department a resolution contained in five lines: "The special conference convened in conformity with Article 34 of State Security Regulations, having considered a report on Vladimir Haffkine, former student, at present under police surveillance at Odessa, has resolved to extend such surveillance for three years."

This resolution, bearing the number 9304, arrived in Odessa when things were at their worst for Haffkine. Depending on occasional jobs, he was close to starvation. His landlady talked of eviction. But that was not the worst: word came daily of friends seized by the police, or dying. Stepan Romanenko was slowly dying of consumption: six months in the clutches of Strelnikov had made him a complete invalid. In November it became known that Gerasim Romanenko, member of the Narodnaya Volya Executive Committee, had been arrested in St. Petersburg. Stepan wanted to go to the capital to see his brother in gaol, but was refused permission. These endless reverses and losses strengthened the friendship between Haffkine and Stepan Romanenko. Even police reports mention their friendship and frequent meetings in the small flat on Nezhinskaya Street, where Romanenko lived after his release from prison.

Early in January 1883 the police arrested the entire Annenkov group. Word that the group had been betrayed spread through the city. An informer had betrayed not only the Odessa members of the Narodnaya Volya Party but Vera Figner (known to the police as Vera Filippova) as well. It was a miracle that Haffkine remained at liberty, which was probably due to the fact that he had been busy looking for work during the last few months and had done practically no work of the party, though still more probably because Annenkov and his other comrades in the group had not mentioned his name at interrogations, and the gendarmes had forgotten about him after their great round-up (late in 1882 they

М. В. Д.  
ОДЕССАГО  
ГРАДОНАЧАЛЬНИКА

Исполнитель  
№ 2

18 мая 1884 г.

№ 2223

ОДЕССА

25/2084

№ 2  
С. 1  
13 мая

Всего 2223  
в 11 экземплярах по 100  
копий по 100 копий  
по 100

14 мая

С. 1

Почти все население  
и в особенности Франкии  
среди других - французская

13 мая 1884 г.

Продолжением в Одессе  
судебный процесс о  
убийстве Франкии  
Франкии судились  
с женой Франкии с  
матерью и матерью  
матери и матерью  
матери и матерью  
матери и матерью  
матери и матерью

Судебный процесс  
крупный и в настоящее  
время находится в  
руках французского  
суда. Судебный  
процесс в 1879 г. судили  
Франкии. Франкии  
и Франкии. Франкии  
и Франкии по обвинению  
в преступлении.

had traced a large Narodnaya Volya organisation and seized an underground printshop in Odessa).

The years 1883 and 1884 saw the final destruction of the Narodnaya Volya Party throughout the country. Nearly all of the people implicated in the Strelnikov shooting in Odessa were given hard labour. The investigations into the case of the Annenkov group were brought to a close in August 1884. The author of the proclamation "To the Russian People", which contained, according to the indictment, "a shocking threat to the person of His Majesty the Emperor, displayed obstinacy and non-repentance in his testimony". Upon the personal order of the tsar, the leader of the group was exiled to Siberia for four years.

The break-up of the party, the death or exile of his comrades and his own expulsion from the University made Haffkine more reserved and morose than ever before. His poverty made him despondent. He was able at long last, however, to find tutoring jobs in a number of well-to-do homes, so that now he tutored during the day and studied in the evening. His entire attention was now focussed on obtaining a higher education. His persistence, apparently, finally broke down the wall of official indifference and ill will, and in March 1884 the name of Haffkine appears again in the official reports of the Novorossiisk University. When he passed his examinations with eminent success and maintained his thesis, the Academic Council unanimously awarded him the degree of bachelor of science and "requested the Department concerned to exempt Mr. Haffkine from taxation".

Was this a victory? In that spring of 1884, after passing his exams, Haffkine, formerly twice expelled from the University and now a bachelor of science, may have experienced a feeling of exultation: after all, he had come through a battle which only few might have won. Very soon, however, the municipal, University and police authorities took pains to make it clear to him that basically nothing had changed and nothing would change so far as he, personally, was concerned. Novorossiisk University, where many chairs were vacant year after year, did not desire to give Haffkine an instructor's job. Would they entrust the education of their students to this socialist? Under no circumstances! The best he could get was a purely technical job in the zoological museum. But there

was another humiliation in store for him before he was to take up his job in the museum.

The University administration asked him to submit a certificate of loyalty. The period of police surveillance had ended, and he filed an application with the office of the Mayor of Odessa, in the hope that it was a matter of mere formality. It developed, however, that it was not so simple to throw off the yoke of police surveillance. Hardly was the period of open surveillance over than a secret surveillance was established over him. The Mayor's office was in a quandary: how to refuse without divulging the reason for the refusal, which "stemmed from secret correspondence". The Mayor consulted the Governor-General, but a long time passed before the latter found a suitable reason for refusing to issue a loyalty certificate. A document, which was a clever combination of absolution and indictment, was finally compiled. It opened with a statement on Haffkine's loyalty, continued with a list of his sins, and ended by mentioning that he had been under police surveillance for a number of years. Any tsarist official would regard a document like that as a certificate of disloyalty rather than loyalty.

Holder of a minor job in a small museum, cut off from men with similar interests in the field of science and politics, Haffkine seemed destined to waste away in the provincial morass. Novorossiisk University, which had only recently been the focal point of active scientific thought, had, after the departure of its leading professors, turned into an arid desert, to quote one of the students. Students and instructors alike were expelled by Rector Yaroshenko for any infraction, however trivial.

During the muted 1880s\* many people who favoured revolution fled abroad. Others tried to drown in wine the shame of their helplessness before obscurantism and ignorance. Those who remained sober had to keep their mouths shut, for spies were everywhere—in the streets, offices, lecture rooms and churches. Pistol shots resounded in the gloomy silence over Russia: suicide had become the last resort of intellectuals driven into a blind alley.

Haffkine was twenty-four at the time. Drink held no

\* The 1880s were years of unrestrained reaction in Russia. Repressions and the curtailment of democratic freedom followed the assassination of Alexander II by the Narodnaya Volya Party in 1881.—*Ed.*

interest for him. His was a spirited nature, and nothing was farther away from his thoughts than taking his own life. He had set his mind on scientific work. He had by no means forgotten the sacrifices that his friends had made, but he saw more and more clearly that the Narodnaya Volya Party, which had lost contact with the masses and chosen a blood-stained road that led nowhere, was already foredoomed. The Party's political concepts were withering, and there were no new concepts to replace them. Professor Mechnikov, meanwhile, held out to him the ever-beckoning wonders of science. Both were particularly interested in the zoology of protozoa. These hardly discernible deep-sea organisms were an unknown world in themselves. Mechnikov chided Haffkine whenever they met, and for good reason, for he had been a professor at that age and the author of a dozen books. It was then that Haffkine decided to devote himself entirely to science. In 1885 the *Annales des sciences naturelles*, Paris, published his thesis on the astrasia, a species of protozoa inhabiting the Black Sea. A year later the same journal published a second article by Haffkine, dealing this time with the green euglenas. His name appeared in the roster of speakers at the Novorossiisk Naturalists' Society. His papers were beginning to evoke argument. One such debate occurred on April 30, 1887, when in a paper on heredity in unicellular organisms Haffkine attempted to deny the value of Darwin's theories. Most people present were ardent Darwinians and Haffkine was utterly routed. If Mechnikov had attended the meeting, he would have probably given his pupil a sterner upbraiding for going too far. However, he was elsewhere at the time: hounded by the authorities, he was concerned with one thing only, and that was to get out of Russia. Fortunately Pasteur, who had just established his institute, suggested that Mechnikov should come to Paris. The offer was eagerly accepted, and Haffkine remained alone. With Mechnikov's departure, in 1888, life in Odessa became increasingly pointless for Haffkine. Moreover, he had completely lost interest in his work at the museum. So the idea occurred to him to follow Mechnikov to France.

He knew German and French and closely read the biological journals published in both countries. He was thrilled by the accounts of the work of these far-away laboratories. A new subject called bacteriology had developed out of clas-

sical zoology and it was very much like discovering a hitherto unknown continent. Physicians, zoologists, microscopists, and livestock-breeders were daily learning astonishing new facts concerning the life of bacteria, which until then were little known and of interest to no one. Hardly had Pasteur discovered a means of combating *Bacillus anthracis*, than Koch discovered the microscopic tubercle bacillus, and a year later the cholera vibrio (the terms "microbe", "bacillus" and others were just beginning to be introduced into technical language). Another sensational development followed in 1884: Pasteur, working in Paris, undertook the treatment of rabies by inoculation. How wonderful it would be to participate in this worldwide search for the organisms causing infectious diseases!

An unknown Odessa zoologist could hardly expect, of course, to join the staff of any of these famous institutes, where this exciting hunt for the invisible enemy was carried on. The alternative was to undertake bacteriological research of his own. That, however, meant submitting to the attacks of the ignorant municipal authorities, such as had been launched against Mechnikov and Gamaleya, who were later to organise the first Pasteur Centre in Russia. If Professor Mechnikov himself had not found the strength to continue the endless disputes with the tsarist officialdom, a modest museum assistant could hardly expect to do better. The only way out was to go abroad and try to get a job--any job--in a foreign laboratory. Haffkine applied for a teacher's job at the University of Lausanne in Switzerland. Professor Schiff, of the School of Physiology, who was acquainted with Haffkine's papers, offered him a reader's position. He spent a year at the University of Lausanne, which, however, brought him no nearer to the fulfilment of his purpose than he was before. It was not for the sake of a high salary that he had left his homeland. The trouble was that his work under Professor Schiff was mere routine, the same traditional zoology as before with all its trivial detail. Professor Mechnikov's letter from Paris determined his future.

Mechnikov had nothing much to offer, for there were many indeed who wanted to work with Pasteur. Yet he was ready to help him get something. Would he accept a junior librarian's job? To Alexander Hast, his step-brother, who was in Paris in the autumn of 1890, Haffkine gave the following advice:

"You must leave for Russia right away, before your passport expires. Otherwise you will lose the right to return and you will be as homesick as I."

But when his step-brother offered to help him obtain permission to return to Odessa, despite his expired passport, Haffkine sadly replied:

"It's too late now. I should prefer to die of homesickness than leave my scientific work."

On another occasion he told his step-brother that he was ready to work as a lab assistant under Mechnikov or Pasteur.

He really would have been prepared to wash test-tubes at the Pasteur Institute, for it was there that important research was conducted. To the people at 25, rue Dutot, this librarian seemed to be satisfied with his place in life, extremely reserved, even somewhat stern. Mechnikov alone, possibly, knew what was in Haffkine's mind: he was thirty and had accomplished practically nothing. His debts weighed on him: his debt to his family and friends and to science. He wanted to rally his faculties in order to make up for lost time. He could have well repeated the words of Pasteur: "If I should pass a day without working I would feel that I had stolen something."

In order to put in some work at the laboratory before the library opened he had to get up at the break of dawn and be at his desk at seven. He was back in his laboratory when the library closed in the evening. One wonders if he had the chance to see Paris during those years. Outside his books and the small circle of Russian émigrés, with whom he associated, his only recreation was the violin which hung on the wall of his poorly-furnished room in the rue Vaugirard. Mechnikov also arrived in the laboratory in the early morning hours, when he could be heard singing as he worked.

That first year in Paris did not bring success. Science required something more than industriousness and good intentions. To achieve outstanding success one had to set oneself commensurate targets and operate with commensurate concepts. Monsieur Voldemar, as they called him in Paris, continued to experiment with protozoa (he had begun these experiments in Odessa), but his contributions to the Institute's *Annales* passed unnoticed, and he felt that he was swimming far outside the mainstream of science. In search of a theme, he carried on at Mechnikov's request his observations of

isolated phagocytes and his study of diseases common to protozoa. Mechnikov repeatedly noted the accuracy and ingenuity of his experiments. But Haffkine himself saw no reasons for satisfaction.

A change came into his life finally on a September day of 1890. He had been using the laboratory of Émile Roux for his experiments. A friend of Mechnikov and one of the oldest members of the Institute's staff, Roux had welcomed the young man from Odessa. Still, there had been no assistant's vacancies at the Institute, until, quite unexpectedly Yersin, assistant to Roux himself, received an offer to transfer his experimental work to Indo-China, where a plague epidemic was then raging. Yersin accepted the dangerous assignment. Roux was away on vacation at the time, but Yersin decided not to wait for his return, left him a note, packed his bags and hurried off to Marseilles to catch a boat for Saigon. This was quite in keeping with the traditions of the Pasteur Institute, where there was nothing extraordinary about leaving Paris for two or three years, and hopping off to Algeria, Egypt, India or Indo-China, to disappear without a trace somewhere in the East only to turn up again with some brilliant discovery.

Roux learned from the note that his assistant would be gone for two years and that he thanked his teacher for his training. There was a postscript stating that he had briefed Haffkine on the work to be done and shown him where each article belonged in the two rooms of his laboratory. This postscript changed the course of Haffkine's life, for Roux took him on as his assistant and he became a full-fledged researcher of the Pasteur Institute. It was shortly thereafter that in the course of his work the problem that was to win him world-wide fame suggested itself to him.

There was an outbreak of cholera some years back, when Haffkine was writing his master's thesis in Odessa. It developed into the century's fifth pandemic, spreading to all continents and all countries. Originating in the historic endemic areas of India and Indo-China, the disease spread to the Arabian Peninsula and thence to Syria and Egypt, while in its eastward movement it invaded China and Japan. In 1884 the first cases of cholera were observed in Spain and a number of other European countries. The disease spared no one: abdominal pain was accompanied by violent diarrhoea,



agonising thirst, collapse, and within a few hours the disease literally drained the life out of the unfortunate victim's body.

Europeans first encountered cholera in the autumn of 1823, when the disease unexpectedly struck Astrakhan, claiming several hundred victims, only to disappear, as suddenly as it had appeared, with the arrival of cold weather. The Russian doctors were given no opportunity to realise that it was an epidemic, to say nothing of taking steps to combat the visitor from India. The medical authorities in Astrakhan reported that the cases of cholera had been due, in their opinion, "to unusual changes in the weather". Six years later the infection was once again carried into Russia. This time it hit the city of Orenburg, where it was brought by a caravan of merchants from Bokhara. The Russian frontier guards, aware that some sort of epidemic was ravaging Bokhara, halted a caravan in the steppes on the approaches to Orenburg. To check if the merchants were carrying any "cholera poison", Lieutenant-Colonel Tsiolkovsky, representing the authorities, made them open up their bales of wool and cotton and chew some of it. The entire caravan was fumigated, a rifle volley was fired over it and it was allowed to proceed to Orenburg. Five weeks later a violent epidemic broke out in the city.

The second cholera epidemic was incomparably worse. The disease invaded all the provinces of the Russian Empire and then most of Europe. During the eight years that the country was in the grip of the epidemic the death toll reached 250,000. The Orenburg experience seemingly indicated that the disease was contagious, so that quarantine was introduced and road-blocks were established. However, neither fumigation nor the washing of travellers stopped the spread of the epidemic. The debate was resumed among the medical profession: was cholera contagious or not? No reasonable answer could be found, naturally, until the microbic origin of the disease was discovered. The third and fourth pandemics followed, but even then only a few scientists spoke of specific organisms being the source of infectious diseases. Like the chief surgeon at the Golitsin Hospital in Moscow, most of them considered that the spread of cholera was due to the "adverse state of atmospheric electricity and changes in terrestrial magnetism".

In the meantime, the deadly disease continued its incursions into Europe every six to nine years, occasionally

prolonging its stay to as much as ten years. Sometimes it invaded Russia from Iran, sometimes it was carried to Marseilles via Africa, and occasionally it penetrated the European continent from the Middle East. But the source of infection was always the same: the province of Bengal in India.

When the fifth pandemic swept across Europe, Pasteur's theory that micro-organisms were carriers of infection was becoming firmly established in medical circles. "I have taken up the study of literature on micro-organisms," wrote Sergei Botkin, the brilliant Russian therapist, in 1885. "These micro-organisms are literally overpowering me; I am forced, at my age, to switch my mind to a new track." In the 1880s and 1890s scientists and physicians the world over were turning their minds to the micro-biological track. Nevertheless, when the fifth pandemic struck, the new science of bacteriology, which had already conquered hydrophobia and anthrax, had nothing to offer for cholera control.

It might be mentioned parenthetically that in its early stages the fifth pandemic was not considered especially ominous.

In the beginning, victims in Europe were counted by the scores and hundreds, whereas in the East the toll of lives had risen to hundreds of thousands. It was clear to all, however, that this situation would not last much longer. The beast was at large, and no one could predict its next move. Several international cholera conferences were convened in succession. Doctors and diplomats put their names to conventions, though in reality they were equally helpless, before the epidemic, since no one knew who or what the cholera carrier was, or how the disease spread, or generally what the nature of the infection was. "With science at its present level," wrote the most prominent French physicians, members of the Cholera Commission, in 1883, "there is nothing that can stop the epidemic once it reaches any point in the European continent."

Action in this desperate situation was initiated by Robert Koch, the famous German bacteriologist, who went to Egypt, then to India, and was soon able to report that examination of the bodies of cholera victims invariably disclosed the presence of comma-shaped bacteria. These were evidently the pathogenic organisms sought. Koch was long unable to prove his theory, however. His experimental animals would not contract the disease no matter how many millions of bacteria

they were made to swallow. Later, his discovery was confirmed by a tragic misfortune when one of the physicians who had assisted in the cultivation of the bacteria contracted cholera in heavy form upon arrival in Berlin, where the epidemic had not yet broken out, and died. Yet even his death failed to convince Koch's opponents.

Von Pettenkofer, the Austrian scientist and his collaborator Emmerich, of Munich, set out to disprove Koch's discovery by drinking a dilution containing millions of comma bacilli. Theirs was a brave but pointless deed. Neither von Pettenkofer nor Emmerich died, but time showed them to have been grossly mistaken. The dispute between the two bacteriologists was taken up by the French, the English and the Italians. Over a brief period seven men of learning ostentatiously swallowed excreta of cholera cases, which proved their fortitude but added exactly nothing to medical knowledge regarding infection. In the 1880s, as in the preceding centuries, physicians could neither treat nor prevent infectious diseases.

That which had been expected and dreaded happened in the spring of 1892: the epidemic burst through the cordons established on the Russo-Persian frontier and soon spread through seventy-seven provinces and regions of the Russian Empire. In the course of a single summer 600,000 cases, including some 300,000 fatalities, were registered in Russia. Meantime a westward surge had brought the epidemic, in the summer of 1892, to the very doors of the great capitals of Europe. It was at this period that Haffkine began experimenting in the hope of obtaining an effective vaccine against cholera.

It must be mentioned in all fairness that Haffkine had a predecessor. In 1884-85, when a cholera epidemic brought from Africa was ravaging Spain, a physician by the name of Jaime Ferran was the first to attempt to produce a cholera vaccine. He based himself on Pasteur's hypothesis that injection of killed or attenuated pathogenic microbes into the human organism induced resistance and immunity to that strain of microbes. When Ferran began his experiments there were only two known vaccines, one against anthrax and the other against hydrophobia. Both had been developed by Pasteur. By employing in backward Catholic Spain the newest method of treatment, the physician from the little town of Tortosa in the province of Tarragona showed unquestionable

courage and energy. Moreover, he did not merely repeat Pasteur's technique: it was learned later that he obtained a pure culture of cholera vibrios, which he injected subcutaneously into uninfected individuals without either killing or otherwise transforming the vibrios in advance. He maintained that the bacillum, penetrating into the stomach or intestines, invariably infects the victim, whereas if driven deep into the skin it is unable to exhibit the same vigour, and will only produce immunity to subsequent infection.

According to many scientists, who were acquainted with Ferran's works, Ferran had an inadequate knowledge of the fundamentals of bacteriology. His procedure as well as his microscopes were antediluvian. Most important of all was that he had little knowledge of dosage and his inoculations often caused infection. In one of the nunneries of Valencia, for instance, forty out of seventy inoculated nuns contracted cholera, while the ten that had not been vaccinated escaped infection. The Church, of course, immediately made good use of the incident to argue the helplessness of science, which dared oppose diseases sent by the Lord.

The bacteriologists who visited Ferran found his secrecy vexatious. He refused to admit them to his laboratory and grew uncommunicative when the conversation turned to the method of obtaining vaccine. It was said that he was not indifferent to money and he hoped to cash in handsomely on his discovery. All of this turned public opinion against his inoculations. In a report to the French Government Pasteur wrote: "We have no proof of the practical value of Ferran's vaccine in Spain." Kleine, in England, sarcastically remarked that Ferran was more a Don Quixote than a Jenner. Pfeiffer and Wassermann, the two eminent German bacteriologists, went farther and took a stand against cholera vaccines in general as being of no practical value. The idea of vaccines had been definitely given up when Haffkine decided to give it another try.

It is difficult to establish new concepts in science, but it is doubly difficult to defend anything that has already been rejected. Even though Haffkine did not duplicate Ferran's work (he developed his own approach to vaccines), the mere mention of a cholera vaccine immediately stirred up in scientific circles irritating memories of the disappointments

of 1885. This widely publicised Spanish episode was later to prove very damaging to Haffkine.

In the spring of 1892, when he was infecting his first rabbit he thought least of all of Spain and Ferran. The attention of the Russian scientists at the Pasteur Institute was focussed on the tiny Kaakhka Railway Station in Turkestan, where on May 12 the local doctor had recorded the first forty-three cases of cholera. It was reported soon after that the disease had travelled along the Transcaspian Railway, reached the sea, and crossed by water to Baku. The population of that big city had begun to flee, carrying the infection across the Caucasus to Astrakhan and the Don. Haffkine worked fast. The deadly tide, though still distant, was rolling inexorably westward and only a vaccine, his vaccine, could stop it. He slept and rested by snatches, making every effort to complete his research sooner.

The main requirement was that the vaccine should not be dangerous. The physician who administers the vaccine must know its virulence. Haffkine started with that premise: he looked for a fixed virus, an unaltering fixed cholera toxin, a given dose of which would invariably kill a rabbit within a strictly definite time. To obtain such a toxin required a great amount of effort and patience. The cholera bacilli had to be transferred thirty or forty times from animal to animal. Each experiment took over a month. During this period the lethality of the cholera toxin achieved a twentyfold increase and, more important still, the researcher now held a test-tube with a bacterial culture which worked like a properly wound mechanism. When he injected a cubic centimetre of this cholera toxin into a rabbit's hip muscle Haffkine could tell to within an hour when the animal would die. In this way he learned to dose cholera infection, and the deadly toxin acquired the primary properties of a medical drug.

Rabbits and pigeons perished by the hundred in the laboratory of Professor Roux. This made it possible for his assistant to embark on the next round of experiments. Haffkine began to inject the lethal doses of cholera toxin subcutaneously instead of intramuscularly. The vaccinated spots became scarified and necrotic, but the animals survived. The toxin remained constant, though it was still too potent to be used as a vaccine. Its potency had to be reduced. This could be done best of all by subjecting the bacilli to temperatures

they cannot withstand. Haffkine placed his test-tubes containing cholera cultures in a thermostat and heated them to 39°C. Heat and fresh air attenuated the comma-like bacilli and they no longer caused necrosis when administered subcutaneously to rabbits. Moreover, after they were injected with a virulent and an attenuated toxin, the rabbits became completely immune to cholera infection. Haffkine fed the long-suffering rabbits huge doses of cholera bacilli with their meals, doses that would have felled an elephant, but they calmly went on nibbling their carrots. He repeated the experiment on guinea-pigs and pigeons, with the same results. In all the experimental animals the cholera bacilli encountered an insurmountable obstacle in the shape of the absolute immunity produced by the vaccine.

On July 9 Haffkine made his first report to the members of the Paris Biological Society.

The report was modestly entitled "Asian Cholera in Guinea-pigs". It was followed a week later by a no less modest paper on experiments with other animals. From the new report the Parisian biologists learned that the Pasteur Institute had obtained a culture of the most virulent cholera, then ravaging the Indian province of Assam, as well as cholera bacilli from Indo-China and Ceylon. Haffkine had given a super-dose of this toxin to his previously inoculated rabbits and guinea-pigs. The animals had swallowed it and hadn't turned a hair. The vaccine had proved fully effective. At this point of the report the members of the Society began to applaud the young assistant, in contravention of established custom. The meeting was presided over by Dr. Laveran, the famous epidemiologist, who was very astute in bacteriological matters. He saw no cause for breaking the established tradition of the Biological Society. "Science," he told the excited audience, "does not tolerate foreign emotional displays. Objectivity and mutual respect are all we are entitled to within these walls." The chairman's remarks caused ill-concealed irritation in the audience, and not without cause, for it was a Saturday and many of the people present had just seen the newspaper report that the disease had broken out in Paris.

On July 23, 1892, the magazine *L'Illustration* carried immediately below the list of cholera victims a news brief headed *Vaccine Against Cholera*. "Unfortunately," the item stated, "it is a matter of inoculation for guinea-pigs, nothing

more. However, there is no doubt that Dr. Haffkine's experiments, which have established the vitality of this vaccine, will become the focus of attention here. It is now quite clear that experiments with human beings are essential. . . ."

This advice by *L'Illustration* was offered five days after Haffkine had begun these experiments.

Soon after Haffkine's guinea-pigs and rabbits, protected by inoculation, had demonstrated complete immunity to cholera, a somewhat unusual conference took place in the Pasteur Institute's laboratory of technical microbiology, of which Professor Roux was in charge. Haffkine introduced three friends to his chief. They were Georgi Yaveyn from St. Petersburg, Georgi Tomamshev from Tiflis, and Ivan Vilbushevich from Moscow. We do not know whether Haffkine told his professor that the three men were opponents of the tsarist government. Haffkine shared their political and public interests, he had brought them to the Pasteur Institute with a definite purpose: it was time to begin testing the vaccine on human beings, and all four, prepared to test the vaccine on themselves, came to Professor Roux to obtain his permission.

No record is available of the details of the argument which ensued between the four ex-members of the Narodnaya Volya Party and Professor Roux, whose talent and efficiency coexisted perfectly with extreme caution and pedantism. Some time back the professor, who had worked out the technique of Pasteur's inoculations against hydrophobia, had resolutely opposed any hasty transfer of laboratory experiments to human beings. When Pasteur, impelled by the thought of suffering children, announced his sovereign remedy, Roux refused to administer the vaccine.

Perhaps one should not generalise, but it seems that the attitude of Professor Roux, an outstanding scientist who enjoyed the respect of his contemporaries, was determined by his being a physician (the only physician on Pasteur's staff, it might be added). In the nineteenth century the training they received in the medical schools developed in the physicians a caste intolerance of anybody who undertook to cure without having taken the Hippocratic oath. This is not surprising in the light of the fact that it was only early in the nineteenth century that the physicians, after lengthy argument, admitted surgeons into their fraternity. Physicians headed

the opposition to Pasteur and his inoculation techniques. Indignant at the intrusion of a chemist into a field which they had always considered beyond the comprehension of anybody who had not graduated from a medical school, the physicians poured vituperation and calumny on the great scientist. "I shall never believe a chemist is capable of promoting medicine; when I die let there be written on my tombstone 'He fought against the chemists,'" declared Dr. Charles Peter, a prominent Paris physician in a speech directed against Pasteur.

It is noteworthy, however, that the outstanding achievements in medicine in the late nineteenth and the twentieth century belong to men who never held a medical diploma. Biologists, chemists and physicists stretched a helping hand to the sick over the doctors' heads. After Pasteur came Ilya Mechnikov, a zoologist, with his theory of inflammation and immunity. Paul Ehrlich, a biochemist, gave the world his brilliantly conceived idea of the magic bullet—the drug which strikes at the disease without harming the organism. Then there were Gerhard Domagk, the German bacteriologist who discovered the sulphonamide drugs, Professor Röntgen of Würzburg, Sir Alexander Fleming, the London scientist who discovered penicillin, and Zalman Waksman of Odessa, who in America discovered streptomycin. None of these benefactors of mankind had ever treated a single patient.

Let us go back, however, to the consultation between Professor Roux and the four men from Russia. Here again the Professor was his usual cautious self. We do not know what considerations made him unwilling to permit the experiments, but the Paris press of those days really gave him, faithful friend and collaborator of Pasteur that he was, plenty of reasons for being wary. In 1892, it is true, the papers no longer called Pasteur's methods "the same kind of quackery as Ferran's cholera inoculations", yet even then, four years after the establishment of the Pasteur Institute, the *Paris Medical Journal* of June 19, 1892, saw fit to attack the inoculations and to express satisfaction on learning that the Pasteur centres in many countries were allegedly in disfavour.

Professor Roux argued that to permit another mistake in the circumstances would mean inviting serious attacks against the Institute. The four Russians, on the other hand, were prompted by reasons of their own. The cholera epidemic was



sweeping unchecked through their country. From Astrakhan in the Volga estuary it had jumped to Balaklava in the Crimea and travelled up the Volga to Saratov, Khvalynsk and Nizhny Novgorod (now Gorky), then spread to Moscow, Voronezh and St. Petersburg. The helplessness of the medical profession and the authorities caused a loss of faith in medicine among the population. Monstrous rumours spread from village to village and from town to town. It was reported that there was no such thing as a cholera epidemic and that the doctors were simply exterminating the population and burying people alive. In Astrakhan a crazed mob dragged the patients out into the street and sacked the hospital. The doctor was beaten to within an inch of his life and his assistant killed. At Saratov the cholera hospital was burned and the homes of six doctors plundered. On June 28, 1892, the inhabitants of the little town of Khvalynsk dragged their young physician, Dr. Molchanov, out of his cab and beat him to death. His body lay in the middle of the road for hours, while boys made fun of the "poisoner" and women spat in the face of the man whose entire short life had been devoted to the health of his fellow-townsmen.

And what, one might ask, did the authorities do? They promptly sent soldiers to quell the disorders and spent a fortune establishing quarantines around the residence of the imperial family. That summer French papers published telegrams from Russia to the effect that despite the protests of doctors the police were allowing religious processions for "salvation from cholera".

Under such circumstances, to delay experiments with human beings would have been to betray the hundreds of thousands who were dying on the banks of the Volga, the Moskva, the Neva, and on the banks of the Seine, for that matter.

Professor Roux gave in. He was evidently vanquished by the report of cholera in the suburbs of Paris (tragic figures had appeared in the papers: the summer's death toll at Nanterre, Aubervilliers and Courbevoie had reached 400). Mechnikov was out of Paris at the time (he was investigating cholera in Brittany, on the Atlantic coast). There was no one else to consult, and on July 18, 1892, Haffkine, in deep secrecy from all other colleagues, took the first (attenuated) subcutaneous injection of the cholera vaccine.

The dose injected was many times greater than he had been administering to his experimental animals. His temperature went up immediately, a headache developed, followed by indisposition and fever. Nevertheless he stayed in his laboratory. Six days later Dr. Yaveyn injected into his right side a second vaccine, this time a virulent cholera toxin, a colony of live cholera "comma bacilli". The temperature mounted higher, but the indisposition lasted this time only a little over 24 hours. By the evening of July 25, Haffkine knew beyond doubt that the vaccine was harmless for human beings. Yaveyn, Vilbushevich and Tomamshev had received their own cholera shots by then. Among all four, Tomamshev's reaction was the most serious, his temperature rising to 39°C, but it dropped to normal less than 12 hours later.

Addressing the Biological Society on July 30, Haffkine stated with conviction: "These experiments lead me to the conclusion that inoculation with my two cholera vaccines, whose prophylactic effect has been definitely established by experiment, is not harmful for human health and may be made without the least risk. At the same time, I believe that six days after the second inoculation a person acquires lasting immunity to cholera infection."

The report was published only in the medical journals. However, word of the courageous experiment to which the four Russians had submitted themselves soon reached the general press. The Paris papers had long been appealing to scientists and physicians to find a remedy against the epidemic (which, however, did not prevent them from running advertisements, such as "If down with cholera, drink Rickle Alcohol Solution and get well"). Now, at long last, they could announce science's great achievement. "We have learned of the excellent results of Dr. Haffkine's courageous experiment with inoculation with attenuated cholera vibrios. . . . Let this example be the beginning of an effective campaign on behalf of a cholera vaccine. Bravo!" wrote *L'Illustration* on August 20.

Within a week the modest researcher and erstwhile librarian had become a celebrity. Scientists and reporters, men of note and the openly curious began to flock to his laboratory. Newspapers practically the world over, Russia included, ran reports about the Haffkine vaccine. There were also

those, however, who wanted to make capital out of the achievement of others. A correspondent of the American newspaper *The New York Herald Tribune* named Stanhope, for instance, announced that he, too, would be inoculated with Haffkine's vaccine and would then go to Hamburg, which was in the grip of the epidemic, to convince himself of the effectiveness of the new preparation. The press gave a good deal of publicity to the fearless newsman's "self-sacrifice", but the Russian medical journal *Vrach* commented quite reasonably on all this publicity in the following words: "We are willing to grant that Mr. Stanhope's intentions are of the highest order, but, regrettably, we cannot expect his experiment to lead to any conclusive results. Even if Mr. Stanhope fails to contract the disease while at Hamburg, it will not be enough for any conclusions whatsoever, since it is widely known that morbidity is by no means universal in localities invaded by the epidemic. As to Mr. Stanhope's decision to inoculate himself with the attenuated cholera toxin, it is impossible to regard this as at all extraordinary after the innocuousness of such vaccinations has been proved by the experiments of Haffkine himself and our fellow-countrymen Yaveyn, Tomamshev and Vilbushevich."

Tides of fame rolled over the threshold of the technical microbiology laboratory. Professor Roux congratulated Haffkine on behalf of himself and Pasteur, who, seriously ill, was seldom seen in the rue Dutot but kept abreast of all new developments in the Institute with the same keen interest as before. Congratulations from the great Pasteur and the warm appreciation expressed by Mechnikov could not fail to fill the young scientist with emotion. At long last, at the age of thirty-two, his strenuous efforts had borne fruit. That he had embarked on this quest for a prophylactic remedy against cholera was not the result of blind chance. He had been a member of the Narodnaya Volya Party and a pupil of Mechnikov, and he saw the epidemic as a national disaster which required him to do his part, not only because he knew the secrets of the microcosmos, but also because it was the duty of every educated individual to wage war for the life and happiness of his people. It was precisely this unique variety of faith that Mechnikov the atheist had tirelessly preached to his students in Odessa and in which he continued steadfast subsequently during his life in Paris.

The cholera vaccine was thus, for Haffkine, both his first tangible scientific achievement and his first contribution to the welfare of Russian society. Perhaps this achievement served Haffkine as a measure of self-justification as he looked back upon the fate of his friends of the Narodnaya Volya Party. Whatever else it may have done, the completion of his laboratory tests of the vaccine was naturally a consoling experience for him in the lonely life he led in a foreign land. On July 19, i.e., 24 hours after injecting the first dose of the cholera toxin, Haffkine informed Roux and, through him, Pasteur that in case of success he intended to pass on to Russia, gratis, his method and experience with the preparation of the cholera vaccine and asked their permission.

Professor Roux, ever cautious, promised to inform the director of his request. A day later, when it was clear that the cholera vaccine, which safeguarded animals, had neither killed nor infected Haffkine, Professor Roux brought to the laboratory a letter signed by Pasteur. It was addressed to Prince Alexander Oldenburg, a nobleman of St. Petersburg, who was in charge of Russian science. The letter was full of praise for Haffkine's research work and suggested that the cholera vaccine might be used in the Russian provinces invaded by the epidemic.

Still another day later an envelope was mailed by the Institute to St. Petersburg containing, besides Pasteur's letter to Prince Oldenburg, a letter of recommendation from Professor Roux and a memorandum in which Haffkine, M. Sc., Novorossiisk University, confirmed his readiness to leave immediately for St. Petersburg to demonstrate his technique of cholera inoculation to the Russian doctors.

A bacteriologist who had obtained, in the 1890s, support and a recommendation from Louis Pasteur might have been envied by any scientist in our times. It would be difficult to find among the scientists of the twentieth century one commanding such undisputed and universally accepted authority as did the founder of microbiology. Koch alone occasionally questioned Pasteur's opinions on the basis of his own experiments and observations. Given to doubt as he was, Koch did not question Haffkine's technique: the Russian bacteriologist's vaccine was based on Koch's own discovery. For Haffkine in his Parisian exile a return to his native land had finally become probable and close at hand. It remained for him to

pack his valises. Prince Oldenburg was bound to break his silence sooner or later.

To Prince Alexander Oldenburg, a hair-brained, unbalanced descendant of German princes who had settled in St. Petersburg towards the end of the eighteenth century, belonged a unique role in the development of Russian science. He had commanded a regiment and, later, a division during the Turkish campaign. Tiring of marches and parades, in his old age this infantry general quite unexpectedly became a patron of the sciences, with a particular leaning towards medicine, which, in the 1890s, was both fashionable and sound politics. The fame of Claude Bernard, Pasteur and Lister had reached the Russian court. A political and military alliance with France and England was in the offing, and official St. Petersburg meant to show that they were no "country hicks", after all. Alexander III, who robbed the universities of their freedoms and whose policies in the field of science and education had led to the emigration of Professors Mechnikov, Vinogradsky and many others, donated three million rubles to finance the building of the Pasteur Institute. Not to be outdone, Prince Oldenburg, who was a relative of the tsar, founded the Imperial Institute of Experimental Medicine in St. Petersburg.

It must be admitted that in the beginning the Institute attracted a number of leading scientists, such as Ivan Pavlov, the great physiologist, the microbiologists Vinogradsky and Omelyansky, Nentsky, the biochemist, and Kravkov, the pharmacologist. In the firmament of science these names are still, many decades later, stars of the first magnitude. For the prince they were simply employees of "his" Institute, drawing their pay out of his largesse. This semi-contemptuous attitude of the nobility towards the scientist or scholar was aptly depicted by a contemporary cartoonist: clad in all ill-fitting suit, burdened with books and instruments, bespattered with ink, pale from overwork and sleepless nights, and short of breath, the scientist plods along the road to truth. . . . It never occurred to Prince Oldenburg to see an equal in the seedy lot.

A mediocre scientist named Shperk was put in charge of the Institute; he was known for his servility before those in power. Shperk went through the motions of directing, but the important decisions were made unilaterally by the princely patron.

The letter from Paris put Prince Oldenburg in a quandary. All questions relating to the invitation of scientists or scholars from abroad were dealt with by the Ministry of Foreign Affairs in consultation with the police department. Despite his exalted position the prince had no desire to transgress, and he therefore postponed his decision on the matter until he had consulted the proper authorities. It is possible that he knew nothing of Haffkine's political past. Not so the Foreign Ministry, which kept a detailed record on all Russian subjects leaving the country and could therefore produce Haffkine's life-story at a moment's notice. The Ministry quickly established that the protégé of the Pasteur Institute was none other than a former member of the Narodnaya Volya Party, thrice arrested and with an eight-year record of police surveillance, a person, moreover, who had broken the rule regarding foreign passports (Haffkine had failed either to return to Russia upon the expiration of his passport or to call at the Russian Embassy to give an explanation). The Paris agents of the Russian police were equally aware of Haffkine's friendship with revolutionary émigrés and, what was more "dangerous", with French leftist politicians. In short, so far as the proper authorities were concerned, political considerations made the admission into Russia of Vladimir Haffkine, 32, native of Odessa, of the Jewish faith, extremely undesirable.

In all probability it would have been possible to argue with the gendarmerie clique, to insist that the country, with its single year's 300,000 cholera death toll, should welcome the coming of the man who had created a vaccine against cholera; and that it could not afford to ignore a letter of recommendation from Pasteur himself. Prince Oldenburg, however, was least of all cut out for a fighter for the advancement of science. He felt no inclination to start an argument with the police department over a mere trifle. It would be enough to observe the required decorum and to produce a sufficiently plausible reason for refusing Haffkine without offending Pasteur. The spade-work was left by His Highness to Shperk, and it must be said that the efficient director carried out his chief's instructions in a superb manner.

On July 29 a small but illustrious assembly met in the conference hall of the Institute of Experimental Medicine for the purpose of imparting a show of legality to the gen-

darmerie's order to refuse Haffkine entry into his native land. Shperk had done a masterly job of selection: generals' uniforms rubbed elbows with the morning coats of privy councillors of medicine. Remmert, physician to the imperial family and chief military medical inspector, was honorary chairman. Pediatricist to the imperial family Rauffuss sat next to him. Smaller fry were also present: the director of the medical department, the St. Petersburg medical inspector, the head physician of the municipal hospital. But the leading role in this mock trial *in absentia* was given to a man who did not belong to the officialdom, though he was reasonably well known in scientific circles. He was Dr. Rapchevsky, microbiologist by profession.

Dr. Rapchevsky had gone to see Ferran in 1885, but had found his experiments disappointing, a fact which he had seen no reason to conceal. His report had been blunt: "Ferran's method of cholera inoculation should be considered definitely harmful to public health." He compared the inoculations with the medieval practice of selling indulgences. His Spanish experience had cost him his faith in inoculation in general. Like many bacteriologists of his day, he believed subcutaneous vaccine injections incapable of preventing oral infection.

It is possible that Dr. Rapchevsky was unaware that he was helping act out a farce in which everyone knew his role beforehand. Yet it was precisely on his part in it that Shperk reckoned more than on any other. The conference began with the reading of the letters received from Pasteur and Roux. The French scientists "had the highest praise for the method recommended by Mr. Haffkine" reported the *News and Bourse Gazette*. This was followed by a reading of the letter from Haffkine himself. After that Rapchevsky took the floor. "Dr. Rapchevsky," wrote the reporter quoted above, "pointed out that the problem of preventive inoculation was not new inasmuch as such inoculation had been carried out seven years ago by Dr. Ferran in Spain on a very wide scale, in view of which there is insufficient ground to test such inoculations on human beings. . . . For the present, laboratory tests should be sufficient, and experiments on human beings might be made only in localities where cholera is epidemic, as in Siam, for instance."

Dr. Rapchevsky's report was full of contradictions. Why should Ferran's experiments have precluded the testing of



Russian scientists who worked in Mechnikov's laboratory at the Pasteur Institute.  
First row, second from right—Mechnikov. Second row, extreme left—Haffkine



Haffkine's vaccine? To what ends and how long was it necessary to confine the tests to the laboratory? And finally, why was it necessary to go to Siam when the whole of Russia was being ravaged by the epidemic? Nevertheless, with Shperk to prod them, the high assembly rubber-stamped the resolution suggested by Rapchevsky. And this happened in a country where the number of cholera cases over a century has been conservatively estimated at nearly five million and the number of deaths at two million!

The self-same St. Petersburg newspaper that ran the article on the conference at the Institute of Experimental Medicine published long lists of towns and villages hit by the epidemic. Entirely unchecked, cholera wrought havoc in Voronezh, Ryazan, Moscow, Penza, Perm, Nizhni Novgorod, Tobolsk and Uralsk. Hundreds of thousands of nameless townsmen and peasants died in their towns and villages. Scores of obituaries daily reported the death of statesmen, public figures, scientists, artistes, and men of letters. Chaikovsky, Russia's greatest composer, succumbed to the disease in 1893.

Having disposed of the vaccine, Shperk turned his guns on its creator. The assembly was invited to comment on the expedience of inviting Professor Roux and Haffkine to St. Petersburg. Another nonentity was put on the platform, who, under the guise of scientific objectivity, was to steer the medical dignitaries towards the decision needed by Shperk. "We are able to conduct laboratory experiments and clinical observations ourselves, without Roux and Haffkine," said practitioner Sokolov—and the assembly agreed, signed the minutes, and went home. And that was the finale of the Russian version of the story of the Prince and the Pauper. His Highness obtained a perfectly valid pretext for refusing Mr. Haffkine's service: he needed only to refer to the venerable scientific gathering.

Even the St. Petersburg journalists (invited to the conference by Shperk not without a purpose, evidently) found the decision reached within the walls of the Institute disappointing. "The conference arrived at the decision that the problem of inoculation with attenuated cholera vaccine is, for the time being, one purely for the laboratories," commented the *Vrach*, sarcastically underlining the words "for the time being". The *News and Bourse Gazette*, a journal of the commercial circles, without going too deeply into the scientific aspect of the

affair, stated rather sharply that the St. Petersburg rhetoricians had nothing but verbiage to offer in answer to the substantial research carried on by Western scientists.

Did Haffkine understand that he had been, at St. Petersburg, the object of a shameful comedy? Did he guess the real reasons for the refusal that was received from Prince Oldenburg? Probably he did not. Even twenty years later, in a book which he wrote when he was at the peak of his fame, he stated: "My offer was rejected for the reason that the previous tests in Spain, in 1885, had been unsatisfactory. Most eminent bacteriologists shared this viewpoint."

He never understood how undeservedly and deeply the Russian officialdom had wronged him. He ascribed his failure to the fact that his cholera vaccine had not received adequate approbation. It was necessary, evidently, to verify the effectiveness of the vaccine in field conditions, and then, perhaps. . . . Far from home, he had forgotten the hatred and suspicion of tsarism that his friends of the Narodnaya Volya Party had taught him.

The files of the Foreign Ministry still contain a document, which was forwarded from Paris to St. Petersburg at the time Haffkine wrote his letter to Prince Oldenburg. Baron Morenheim, the Russian ambassador in France, wrote the Foreign Minister as follows: "M. Cluset, a French citizen, has offered a medicine of his own invention, which should help completely cure the ailment from which His Imperial Highness the Grand Duke Georgi Alexandrovich is suffering. I am enclosing a case containing the medicine and a letter of instructions concerning its administration."

The letter bears the following inscription in the Minister's handwriting: "What instructions may it please Your Majesty to issue in regard to the case received?"

The tsar's reply, in blue pencil: "Send the case to me, and thank him warmly."

Shortly after the Russian embassy handed M. Cluset a cheque for a handsome amount. It was a truly royal largesse.

## The Yellow Flag Comes Down

It has been said that the history of medicine is a three-thousand-year history of lost illusions. That is true only to a certain extent. Before faith is lost it is necessary that it should first be acquired. Mankind has been carried away innumerable times by real or seeming achievements of medical men. Thus, the "elixir of life" capable of prolonging human life "indefinitely" has been discovered over and over again. Articles describing a "radical" method of curing cancer may be found in the journals of the 1890s. The experiments of Mesmer and Count Cagliostro, the Voronov graftings and "gravidan" (a drug compounded of the urine of pregnant women) have, one after the other, seized the imagination of men. Until the middle of the nineteenth century practically every decade saw a new theory of the origin of diseases. The same holds true for the means of curing disease. The medical world confronted the patients with legion upon legion of bottles and vials of infusions, decoctions and drops, and hordes of pill boxes and jars of ointments. The medieval pharmacopoeia was as fantastically diverse as the dress worn by physicians and pharmacists. In the sixteenth century, among the numerous very popular ointments especially recommended for the treatment of burns was the so-called puppy ointment, which was made from puppies boiled in the oil of lilies with several different ingredients.

The methods of treatment were incredible. In Paris, Professor Bosquillon began his lectures as follows: "What shall we do today? Let's do this: give a purgative to the left side of the ward and bleed the right." This causes us to smile, but in those days, in the middle of the enlightened eighteenth century, Edouard Bosquillon was an outstanding medical

authority and lectured in the Hôtel Dieu, then the most famous hospital in Paris.

Mankind had certainly had a great many illusions in the field of medicine, and it is hardly surprising that in the long run this had produced a sort of inflation of faith in the healing power of medicine.

Nor had this tide of disappointment spared the medical profession itself. An attitude of suspicion in regard to new drugs and new methods of treatment had become general among medical societies and academies and remained until the middle of the nineteenth century. Even such diagnostic techniques as auscultation and percussion, now universally accepted, had been regarded by medical men with suspicion. Doctor Auenbrugger of Vienna who, in 1761, suggested percussion was declared unbalanced by his colleagues and subjected to persecution, and the method he had suggested was forgotten until more than sixty years later. A somewhat similar fate overtook the French physician Laënnec who, in the 1820s, introduced into medical practice a wooden tube for examining the thorax. And in Berlin and Vienna twenty years later stethoscope enthusiasts were still the objects of derision.

The famous physician and physicist Hermann Helmholtz recounts that in the middle of the 19th century even so harmless an innovation as the ophthalmoscope, an instrument indispensable to the modern ophthalmologist, was regarded with misgiving. A German surgeon told him that he would never take upon himself to use the instrument because "it is very dangerous to direct a bright beam of light into a diseased eye".

It was not surprising therefore that the new science of bacteriology, which was born in the late 1870s, and its new agents, i.e., vaccines and sera, drew nothing but abuse and ridicule from the entire medical world. When Pasteur offered the idea of preventive vaccination at the London Congress of 1881, Koch, the noted physician and bacteriologist, called the idea "too good to be true", and his comment became the slogan of the opposition to vaccination.

Pasteur's discovery did, indeed, seem to be "too good to be true" to the medical profession, which had been unable, over the centuries, to treat any of the several hundred infectious diseases. Koch's sceptical dictum was pounced upon by physicians in all parts of the world. In all of its further

development, microbiology was beset by countless doubts and misgivings. In 1883, after Pasteur's success with the anthrax vaccine and Koch's discovery of the cholera and tuberculosis bacilli, a prominent physician by the name of Peter continued to maintain, in the Paris Medical Academy, that micro-organisms, "those curiosities of natural science, are interesting, perhaps, but practically of no significance for medicine".

In time, Pasteur's irrefutable achievements forced the medical world to concede the value of vaccination; but it took a long time for the medical profession to drop its scepticism.

It is noteworthy that the sceptical evaluation, prevalent among medical men, of the achievements of their own colleagues seemingly began to increase as science accumulated more and more trustworthy and important discoveries and inventions. Thus, it took Mechnikov nearly twenty years to obtain recognition of the phagocytosis theory; while Landsteiner's statement that human red blood cells are divisible into several groups met with a dubious reception among his contemporaries. Soon after the discovery of X-rays, a professor of medicine of Würzburg University said in public: "We've known all along that this fellow Röntgen is a crackpot, but now he's gone completely crazy: he says he's seen the bones of his own hand."

And here is a more recent occurrence: Fleming, Nobel Prize winner and creator of penicillin (without which modern medicine is hardly conceivable), spent fifteen years trying to get the medical profession to endorse his preparation for clinical use, while hundreds of thousands died of suppurating and other infections which could have been cured so simply with penicillin. But the medical profession remained suspicious. If it had not been for the Second World War with its millions of casualties and urgent need of medicaments, Fleming might not have lived to see his preparation accepted.

Let the impatient reader bear with the author in this rather lengthy digression: perhaps the foregoing pages will help him realise what a difficult task Haffkine took upon himself that autumn of 1892.

It was an autumn replete with exciting events and unusual encounters. On November 20, 1892, Pasteur wrote to his friend, Professor Grancher: "Haffkine . . . has been in London for the past eight days. He is trying to obtain from the

British authorities permission to go to Calcutta, where he wants to conduct the experiments which he had planned to make in the Kingdom of Siam. M. Harmand, French Resident Minister in Cochin-China, has told him that his vaccination project in Siam would run into insurmountable difficulties that the local population would set up, while in India he would have no trouble in carrying them through. Moreover, he has given Haffkine a letter to Lord Dufferin, who in turn has referred him to his friends in London."

He was accorded a civil reception in London: word of the cholera vaccine had reached the city. The renown of the Pasteur Institute with which he was connected was another favourable factor.

Lord Dufferin, British Ambassador at Paris, former Under-secretary for India, was the first to conceive the notion of turning the achievements in bacteriology to the use of the British colonial policy. His letters of recommendation to Lord Rosebery, the British Foreign Secretary, served as an impetus to a regular avalanche of such letters. These crisp envelopes, sealed with wax, were initially the main contents of Mr. Haffkine's modest luggage. Her Majesty's Principal Secretary of State for India wrote to His Excellency, the Governor-General of India; the Director-General of the Medical Office at London wrote to the Surgeon-General of Her Majesty's Armed Force in India; etc., etc. The gentlemen smiled suavely and signed in the hope that Mr. Haffkine would be off for Bengal with his rabbits and test-tubes.

It is doubtful if the writers of the letters of recommendation ever gave a thought to the risks that the young scientist was to face. Yet he was going into the very lair of the epidemic, knowing well that over a period of thirteen years (1877-90) cholera had taken a toll of more than a million lives in Bengal, that cholera killed one out of every two who contracted it, and that no remedy was as yet available to the medical profession.

More than anything else Haffkine feared that in England he might be refused permission to make this voyage. He had already had two such refusals. After the discouraging reply received from St. Petersburg he had offered his services to the French Government at a time when the cholera epidemic was increasing in Paris. The municipal authorities, however, who had been doing their best to hush up the epidemic, had

preferred to lose a few hundred citizens without attracting too much attention, rather than proceed with experiments which might have scared away tourists or damaged trade. The records on the unfortunate experiments of Ferran in Spain had been produced again and it had been suggested that Haffkine might go to Indo-China. Haffkine had written to Siam, only to get a negative answer from the French Resident Minister.

Late in August the epidemic hit the city of Hamburg with terrible force. The very first week took a toll of five hundred lives and thereafter the number of victims began to run into thousands. The authorities closed the port, prohibited gatherings in churches and shops, but flatly refused to allow vaccination. Only a short while ago, when he inoculated himself and his friends, Haffkine had thought that he had overcome the prejudice against his cholera vaccine; yet now, when the three biggest countries of Europe suffering from the same disaster obstinately refused his help, he saw how stubbornly the medical profession continued to mistrust his method.

Haffkine's position was rendered all the more difficult by the fact that the bacteriologists themselves did not see eye to eye in the matter of the specific organism of cholera and how infection occurred. Koch had advanced the simple suggestion that cholera was caused by the "comma bacilli" which he had found in the sources of water supply and in the bodies of cholera patients, but this suggestion had been under attack from all quarters. Von Pettenkofer, in Vienna, maintained that Koch's "comma bacillus" was incapable of directly infecting a human being. It first had to "mature" in the soil, according to von Pettenkofer, and only the soil would then become the carrier of the disease. Therefore, the epidemic was to be fought with measures of sanitation and hygiene and not bacteriology. A sanitary condition of the soil, the premises and the body would vanquish the epidemic.

Mechnikov was among those who cast doubt on Koch's conclusions. He had obtained a number of cholera cultures with which he had tried to infect experimental animals. However, his rabbits and guinea-pigs had refused to become infected. It was then that Mechnikov had tried to infect himself and his colleagues. They had taken cholera dilutions several times, but these had also failed to produce the diarrhoea characteristic of cholera. This had led Mechnikov to the

conclusion that the "comma bacillus" was not virulent in its pure form. In order to infect a human being or an animal it was necessary that it should enter the digestive tract in the presence of certain other micro-organisms, which activate the cholera toxin.

In spite of the fact that no confirmation was subsequently found for this theory, Mechnikov held to it for many years. Stubbornly, though vainly, he searched for the associated micro-organisms in the intestines of rabbits in an effort to discover the association "cholera bacillus plus associate micro-organism" which finally causes infection. His letters of those years bear witness to the perseverance with which he sought a solution of the cholera problem. These letters, still awaiting publication, give us an insight into the tremendous effort that is required to prove any assumption in science. "My research in cholera convinces me every day that it is fully as difficult to study the disease as it is to control it. Each step requires tremendous effort, and the end results are negligible," he wrote his wife on May 18, 1893. Three days later he wrote: "I feel brisk and energetic the greater part of the day, and these qualities help in my cholera research. I make an incredible number of experiments and tests of all kinds, but the results do not compensate the effort involved. However, that is unimportant. I am really glad that I have undertaken this work, because I have at least learned a lot from it."

During the period from 1892 to 1894 Mechnikov actually did make quite a few interesting observations on cholera. They led him to the conclusion that vaccine, introduced subcutaneously, cannot protect a human being from cholera bacilli entering the organism orally. Many of his pupils failed to share his theory. One of his favourite pupils, named Zabolotny, challenged him in defence of the vaccine. Nevertheless, it took his pupils nearly twenty years to refute their teacher's theories. The last act of this controversy was played out in 1909, when Mechnikov, now a Nobel Prize winner, arrived in St. Petersburg. He was given an exuberant welcome by the Russian biologists and physicians. Meetings arranged in various scientific institutions were turned into celebrations in his honour. However, the festive atmosphere did not deter Zabolotny, Zlatogorov and a large group of scientists from arranging a public debate on the problem of cholera inoculation. A vast amount of facts, assembled primarily by



Russian scientists, was adduced to prove to Mechnikov the usefulness of inoculation in cholera control. (The mass inoculation against cholera undertaken during the First World War decisively proved its value as a means of prevention.)

The debate at St. Petersburg took place in 1909, but in 1892 Mechnikov's theory regarding the cholera vaccine was still accepted by the majority of bacteriologists as incontrovertible. Even Pasteur, it seems, showed some doubt in regard to inoculation, despite the fact that he had recently recommended it to the Russian authorities. He was no longer in close contact with the Institute's laboratory research by then, and could not verify which of his two colleagues was right. Nevertheless in one of his letters he commented favourably on Mechnikov's conclusions. "Haffkine will be surprised when he learns about this," he wrote in the same letter. Nor was he mistaken. Haffkine was both surprised and pained. The news reached him after he arrived in London. It was the first time that he and Mechnikov found themselves in two different scientific camps and failed to share the same point of view on a vital problem.

Haffkine had always treated Mechnikov with profound respect and affection, but he would not have hesitated to oppose him in this battle over the cholera vaccine. "Plato is my friend," Socrates once said, "but truth is more precious to me"; and ever since pupils have often challenged their favourite masters.

Their differences in scientific theory had not cooled the friendship of the two fellow-townsmen from Odessa. The past held too much in common for both. In later days, Mechnikov spoke approvingly time and again of Haffkine's work, and the latter declared that he owed his discoveries to his teacher, who purposely used to raise general philosophic problems and "exerted a tremendous influence on his pupils' ideology".

It is essential to take note of these deeply humane Mechnikov principles if one is to understand Haffkine, his experiments upon himself, his desire to go to the regions invaded by the epidemic, or Mechnikov himself, who swallowed cholera dilutions in order to prove or disprove a scientific theory. An unusually keen sense of duty is, perhaps, what characterised more than anything else the "ideology" of those who had got their schooling from the Odessa professor. His pupils could never have agreed with von Pettenkofer.

who tried to prove that "science is not concerned with any possible immediate benefit, any possible immediate practical application...". The actual conditions in Russia were too horrible, what with the filth, the scourge of disease and the incredible mortality, to allow any honest Russian doctor or any biologist in possession of a remedy to turn away from the practical job in hand in favour of "pure" science and laboratory work. It was these "general philosophic problems" that had brought Haffkine to London and were driving him to hasten his departure for Calcutta.

The writing of the letters of recommendation and the discussion of the rights and duties of the future state bacteriologist in India required time, and Haffkine profited by the occasion to make some pleasant and useful acquaintances in London. The first was with Almroth Wright, an English biologist. Wright, who was practically Haffkine's age, held a professorship in the military medical academy at Netley, where Haffkine was to demonstrate his experiments with the cholera vaccine before leaving for Calcutta. An admirer of Mechnikov, Wright was happy to meet one of his pupils, and they were frequently seen together during that autumn of 1892. Haffkine, slight of build, with the pale handsome face of a young Frenchman, looked small by the side of Wright with his hulking figure, big head, unusually big hands and feet. Wright wore glasses, and his bushy and very expressive eyebrows sprouted above them. Friends used to say jokingly that he could almost talk with his eyebrows. He was a bit difficult to get along with, but his colleagues liked him for his talent and his dedication to science. Common interests favoured the friendship between him and Haffkine. "The physician of tomorrow will be an immunologist," Wright used to say, referring to the achievements in inoculation and Mechnikov's works in immunology. Few people dared to make such an assertion in the 1890s, only thirteen years after Pasteur's first experiments.

Incidentally, for Wright his acquaintance with Haffkine turned out to have a special significance. Haffkine, carried away as he was by the idea of disease prevention, suggested to Wright typhoid inoculations along the lines of his own experiments to immunise rabbits against cholera. Wright was enthusiastic, and four years later tested his first typhoid inoculations on human beings. His vaccine gained world renown.

Twenty-five years later, when he was 62, he learned Russian, and on one of Haffkine's subsequent visits to London was able to thank him in his own language for the fortunate suggestion made in 1892.

Another scientist with whom Haffkine was to be in friendly association for a long time was William Simpson, chief sanitary officer in Calcutta. In the autumn of 1892 he was in London on leave. He was invited to come to Netley to comment on the Haffkine vaccines, and declared himself very much in favour of cholera inoculation. An administrator rather than a scientist, Simpson promised Haffkine that he would have the small Calcutta laboratory at his disposal. This was his first advance welcome to India, so far a distant and alien land for Haffkine. He could hardly imagine at the time that a few years later his name would become a household word in all the palaces and huts of that vast country and that the grateful people of India would call him the "great white healer" and name a great scientific institution after him. Before recognition came, however, a good deal of fortitude, patience and effort would be required of Haffkine. Especially effort.

The departure from London, which had been scheduled for December, was postponed for a fortnight, then for a month, then for another two weeks. The inexplicable delays played on Haffkine's nerves. It was finally hinted that the delays had been caused by some sort of inquiry received from the Russian Embassy in London. Nothing could be worse than that: would the St. Petersburg officialdom upset his plans again? Early in January 1893 Haffkine received an invitation to call at the Embassy. During the five years that he had lived abroad he had had no dealings whatever with representatives of the tsarist government, and it was quite natural, therefore, that he expected an unpleasant interview. All the greater, therefore, was his surprise when an obsequious first secretary showed him into the office of Ambassador Baron de Stael himself. The conversation which followed must have seemed like a dream to Haffkine. The ambassador made no mention of such illegalities as expired passports and in general refrained from touching on his past. Instead, he repeatedly said that Russian science was proud of him as a prominent bacteriologist and that as His Imperial Majesty's ambassador, he was prepared to assure the British Government that in

going to India the Russian subject Haffkine was pursuing highly humanitarian aims.

The reason behind the Russian ambassador's mysterious behaviour was quite simple. When the London newspapers published favourable comment on Haffkine and his vaccine Baron de Stael made an inquiry, through diplomatic channels, into the past of this Russian subject. His inquiries were somewhat embarrassing for the English, for Anglo-Russian relations were far from excellent at the time. There may have been a fleeting suspicion in London that Haffkine's mission might be political. De Stael found himself in a false position. Moreover, the London papers hinted that here was a Russian subject going to fight the cholera epidemic in India while his own country was also being ravaged by the same disease. De Stael asked St. Petersburg for instructions. After long vacillation, St. Petersburg decided to put a good face on a bad job, as the saying goes, and instructed its ambassador to bestow favours on Haffkine and recommend him to the British Government. Hence the last of the series of letters of recommendation, which finally sent the impatient bacteriologist on his way to India.

\* \* \*

Haffkine got a preview of cholera even before he set foot on Indian soil.

As it approached the piers of Calcutta (the city is situated in the mouth of the Hooghly, a deep navigable river) the ship had to sail past a group of vessels flying a yellow flag, showing that they were in quarantine. A boat was pulling away from one of these ships, escorted by a military launch. Haffkine had another glimpse of the same boat while disembarking. A man lay on the planking, and Haffkine noted classical cholera symptoms on his face: the eyes were sunken and the cheeks hollow, the corners of the mouth were sorrowfully yet sardonically turned down. He had seen cholera patients in the suburbs of Paris, and heard their rasping, strained voices. There, however, in the clean white-walled quietness of the Parisian hospital, human suffering had not seemed so cynically repulsive as here, in the port of Calcutta. The shrivelled man in the boat, wallowing in his own excrement, was, to judge from his clothes, a poor sailor off a

coaster, or, perhaps, a pilgrim bound for the holy places. Two policemen wearing leather gloves picked him up and tossed him without more ado into an ambulance, which took off at once with its passenger more dead than alive.

During the two years that Haffkine was to spend in India he would come to realise the symbolical nature of the scene in Calcutta harbour. He would see thousands of cholera cases. Death, represented for centuries as an eyeless skeleton armed with a scythe, was quite familiar with the social structure of that British colony. His mowing was usually done among the families of the poor: nine out of every ten cases were invariably among these. This social selectivity of the epidemic was especially marked in Calcutta, which was then the capital of India. The water-main brought thoroughly filtered river water chiefly to the southern and centre districts of the city, where the European businessmen and civil servants built their bungalows in shady gardens near the stone walls of Fort William. Cholera was practically unknown in these districts. Things were different in the northern outskirts, where hardly a day passed without funeral processions bearing away fresh victims. Northward, farther away from the centre, the streets were narrower, the dwellings seedier, with hovels and mud huts prevailing. Filthy, stagnant ponds—collectors of sewage—served for the evening ritual bathing and washing of clothes; they were also a source of drinking water.

Little had changed in the northern districts of Calcutta in the ten years that had passed since Koch discovered cholera vibrios in one of these ponds. As before, women washed the clothes of the sick and the dead, while outbreaks of the disease struck at random the clusters of dwellings using the same source of water supply.

In Europe endless arguments went on regarding the nature of the cholera vibrio ("a sphinx, whom we still do not know, that terrifies us with its deadly glance," wrote one of von Pettenkofer's adherents in 1893); but Haffkine definitely sided with Koch and his theory regarding the "comma bacillus". In Calcutta he came to the final conclusion that water was the commonest medium of infection. The simplest solution would have been to fill up all these infection-breeding ponds with earth; to pipe water to every city block, if not into every house; to arrange for sewage disposal; and to

introduce hygienic measures in the markets, where fruit and vegetables usually lay on the ground. In England, where they had not grudged money, such measures had prevented an epidemic. In India, however, the colonial authorities would not even think about such expenses. So far as the officials at Calcutta (and London) were concerned, inviting a bacteriologist was a cheap way of ending cholera. But they were very wrong.

Cholera inoculation meant that the battle against the bacteria was to be transferred from the vast environmental battlefield to the narrow confines of the human body. But that would not make the battle either less difficult or less costly. Vaccine causes specific substances called antibodies to form in the inoculated organism, making the blood a lethal environment for the cholera bacilli, and the organism itself an invincible bastion. To drive the disease entirely out of a country, or at least to block it within one country it would be necessary to inoculate millions of people, to create in millions of organisms absolute immunity to cholera, which would starve it to death, so to speak.

Haffkine knew that besides a great deal of money, this would call for a well-organised national apparatus for producing the vaccine and effecting the inoculations. His own task, would be to wind this mechanism, to set an example for the doctors and officials to follow, to inspire them to carry through the greatest and noblest task ever undertaken in India. Far from expecting a cheap and easy victory over the disease, he planned a serious campaign for many years ahead, aimed at the final extirpation of cholera in India. Neither Lord Landsdowne, Viceroy of India, nor Her Majesty's Secretary of State for India could approve such a costly undertaking. Thus, quite unintentionally, Haffkine found himself out of favour with the colonial administration. Unfortunately, he also found himself out of favour with those whose lives he intended to save.

Many years later the authors of articles and obituaries were to call Haffkine "the apostle of prophylactic inoculation". Indeed, to the end of his days he was an enthusiastic advocate of mass inoculation as a means of delivering the world from infectious diseases. As to his being an apostle, in the spring of 1893 he was also stoned, just like the apostles of old.

The stoning took place a few days after his arrival in India. The production of cholera vaccine had just been organised in Dr. Simpson's little laboratory, which proudly called itself the Health Service, when word was brought that cholera had broken out in the small village of Kattal Bagan near Calcutta. Accompanied by several doctors and laboratory workers Haffkine at once set off for the stricken village. He was in a hurry. In Bengal the epidemic did not advance along any definite front; rather, it behaved like a man-eating Bengal tiger: it would lie in wait for weeks near a hamlet, then make its leap and carry away two or three victims, after which it would keep away for another several weeks, maybe months. Like a tiger hunter, Haffkine would have to hurry to the spot to save the people from the next attack.

Haffkine and four Indian doctors, Chowdri, Chatterji, Dutt and Gows, riding in two horse-drawn carriages with boxes containing their inoculation equipment, resembled a group of hunters. These "talented and affectionate people", as Dr. Simpson calls the Indian physicians in his memoirs, soon took a liking to Haffkine and wholeheartedly enlisted in his plans. On that March morning when the vaccine was to leave the laboratory for its first mass test the doctors somewhat nervously checked and rechecked their equipment to assure themselves that they had brought with them everything needed for the inoculations and to verify whether they were aware of all the possible consequences of inoculation. They could scarcely have foreseen, however, that in this first battle of science with cholera they would be called upon to exhibit not only their knowledge but personal courage as well.

Kattal Bagan turned out to be a cluster of straw huts, with holes in lieu of doors and windows, crowding on a narrow stretch of ground with rice paddies on either side. In one of the huts the doctors found two cholera cases, but all they could do was to diagnose cholera: in the condition they were in hardly anything could be done to aid them. For that matter it was clear that it would be difficult to prevent the infection from spreading.

The peasants, who had gathered on the square near the little temple, were entirely unimpressed by the explanation given by one of the doctors. They were firmly convinced that God knew better who should and who should not fall ill and die. No one had invited the English doctor to come and



Haffkine inoculating peasants against cholera in Bengal in 1893



it would be better for him to get out of their village as quickly as he could. The Indian doctors tried to calm them and make them listen to reason. At this point the crowd began shouting threats and throwing stones, one of which hit the box with laboratory equipment. Hearing the crash of broken glass the crowd grew excited and it began to look as if violence was unavoidable. The doctors, seemingly, were left no choice but to retreat, when unexpectedly, amid the din, the white doctor began to peel off his clothes.

He quietly took off his coat, pulled out his shirt and bared his right side. One of his Indian colleagues, guessing his intention, immediately got out a syringe and plunged it into Haffkine's back. This was done so swiftly and unexpectedly that the excitement went down. Haffkine then began to vaccinate his colleagues, with the villagers silently looking on. Perhaps the process recalled to them the performances of their own fakirs or the rituals connected with religious holidays, but whatever it was, angry excitement began to transform into a business-like interest, and when at last it became clear that the injection carried no danger Doctor Dutt translated a short speech made by Haffkine and added that the white doctor was "Rusi", not "Inglis". A few volunteers stepped forward after that, willing to brave a bit of pain in order to gain immunity against cholera. In the end, out of the 200 inhabitants of Kattal Bagan 116 were inoculated. There were subsequently nine more cholera deaths in the village, but not a single one of the people inoculated by Haffkine contracted the disease.

In India, where eight out of every ten people were illiterate, rumour spread more rapidly than newspaper reports. Soon the Calcutta Health Service laboratory began to receive requests from even the remotest regions of the country. The Russian doctor's help was needed in villages somewhere in the jungles of Northern Bihar and in the small mining towns of Chota-Nagpur. It became necessary to leave Calcutta and to set out on an expedition which was to last nearly two and a half years, twenty-nine months, to be exact.

In the towns the inhabitants knew about the Anglo-Russian political differences and purposely demonstrated their friendly feelings towards "the man from the North". In Agra 42 persons, including two women, allowed themselves, following a brief lecture, to be inoculated in public in order to set

the rest an example and show their trust in the Russian doctor. This public inoculation brought 900 other volunteers. Each such event was followed by a flood of invitations from places where there had been a fresh outbreak of the disease.

By train, by cart and on horseback Haffkine's group worked their way slowly but stubbornly along the Ganges and its tributaries, crossing India where the width of the subcontinent is greatest, travelling through Bengal, Assam and into the North-West Frontier Province, beyond the upper Ganges, finally reaching the source of the Indus and the borders of the two great provinces of Punjab and Kashmir. The group's itinerary was determined by the route which the epidemic took: it was from here, in the North, where the great rivers of India had their sources, that the tide of the epidemic rolled into Bengal and into the provinces of Baluchistan and Sind. In November 1893, six months after the expedition set out, the *British Medical Journal* reported: "Haffkine is following the pilgrims from the north-east provinces of India as far as Kashmir, making cholera inoculations and keeping careful records of all those he inoculates. He works day in and day out, taking his rest only when travelling." The journal listed scores of towns and villages where as a result of Haffkine's visit the inhabitants were no longer in fear of infection and death. "In Almora he inoculated 235 persons, in Ranikhet 375, in Dwaragar 252, in Cawpore 155. . . . Several thousands have been vaccinated by now. The future will show how much immunity these persons have acquired."

This was the most important question to which the leader of the expedition meant to find the answer. It was for this that he had travelled thousands of miles, spending night after night in village huts, despite the fact that the Government of British India had specifically authorised him to lodge in quarters provided for officers. Does or does not the Haffkine vaccine give human beings immunity to cholera? That was the question. Setting out upon his difficult journey over the Indian roads Haffkine was filled with doubt. "I could not conceal that I was proposing merely a test, harmless in itself, but of uncertain value," he subsequently wrote. "Moreover, the test was physically painful and kept people from working for several days. . . . I had to grope my way in the matter of determining dosage, the threshold of immunity, etc.

That would have taken years to establish, and then only by trial and error, to borrow an English expression."

Imbued with the scepticism of nineteenth-century science, he demanded proof even in regard to the things which others considered to be facts. To him the only criteria were time and countless tests. Nevertheless, a year after the expedition began, when nearly 25,000 persons had been inoculated (two-thirds of them twice), it was definitely established that inoculation was helpful: it greatly reduced the risk of infection, even in the midst of a violent outbreak of the epidemic, and in case of infection removed, as a general rule, the risk of death.

In Lucknow, where the epidemic among the English and Indian troops was particularly severe, two regiments were inoculated by Haffkine. When the epidemic struck the city a year later it was found that in these two regiments morbidity and mortality rates were lower than in other regiments, which had not been inoculated. There were many other facts, besides, directly or indirectly proving the effectiveness of the new preparation. The beneficial effect of inoculation, manifested itself in the villages and towns on the expedition's itinerary long before any official figures were issued. Indian newspapers carried reports of crowds gathering to express their gratitude to Haffkine, while the *Bombay Gazette* reported in one of its July issues that "the inhabitants of Lucknow and Aligarh presented Mr. Haffkine with a silver cup of local make and a purse containing 15,000 rupees".

The great fame which Haffkine was earning in the northern regions of the country was evidently not to everyone's liking in India. Hoping to undermine his reputation, one of the Calcutta papers started a rumour that Haffkine was a Russian spy. The authorities immediately began an investigation. The pro-British press recalled the "strange" note from the Russian ambassador in London, who had requested—not without design, of course—that the British Government admit Haffkine to the army billets in India. The investigators were very soon obliged to announce, however, that they considered Haffkine's aims to be "exclusively scientific and humanitarian". That put an end to the canard.

In September 1893, when the expedition stopped at Lucknow on its way back from Kashmir (in Lucknow the vaccinations had given the most tangible results), Haffkine learned

of another attempted stab in the back. It appeared that one Hopewood, member of the House of Commons and noted in England as an opponent of vaccination against smallpox, had asked the British Government to explain "on what grounds and by whom had Haffkine been permitted to use cholera dilutions in India to poison the soldiers, who deserved a better fate". The author has been unable to learn what Her Majesty's Government replied to this amazing query, but he did see a report which describes how the inhabitants of Lucknow and the garrison commanders fêted for several days the man who spared neither health nor effort to protect thousands of the city's inhabitants, civil and military, against the risk of infection.

Pin-pricks of greater or lesser severity dogged Haffkine's expedition to the very last day. High and minor officials wrote that the effect of the inoculations on the epidemic was "too weak", that the percentage of those who could be definitely considered immune was low, and so forth. Not one of them, however, dared to challenge the reliability of the report which was published by Haffkine in the summer of 1895 in Indian and European journals. Before publishing his figures, however, Haffkine undertook another distant expedition.

After his return from the northern regions in the spring of 1894 he set out from Calcutta in the company of Dr. Simpson and several Indian doctors on an expedition up the Brahmaputra, the third greatest river in India. Travelling through Assam and Lower Bengal, the expedition reached the Burmese frontier. Their journey lasted over a year; twenty thousand new inoculations were made. "We visited 98 communities," Haffkine wrote. "The farthest of them was thirteen days travel from Calcutta. There were communities which we were obliged to visit a second and even a third time. It was hardest of all for us in the valleys of Hindustan in midsummer, and in the paddy fields of Assam during the monsoon season."

These few lines cannot describe, of course, the conditions in which the small group of physicians and biologists worked in the remote jungles of North-East India. Haffkine kept no diary; neither did his colleagues. From scattered notes in the official reports and sundry newspaper items we may gather that they had to put up with hunger and thirst and struggle through muddy roads running with the water of the monsoon rains. Worst of all, they had to overcome the stub-

born resistance of the peasants. In the remotest places the Indians refused to be inoculated either for religious reasons or simply because the fever and lassitude brought on by the inoculations kept them away from their fields for a day. Some of the poorest of the peasants had to be paid before they could be induced to come to the cholera control centre.

A contemporary document gives a vague report that in a certain village some hostile Mohammedans (the inhabitants of Eastern Bengal are mostly Mohammedans) attempted to poison Haffkine and his companions. They allegedly resorted to an ancient Indian method, which consisted of throwing a fabric saturated with snake poison over the intended victim while he slept: presumably, the victim would scratch himself believing he had been bitten by a mosquito, and the poison would penetrate into the blood vessels through these scratches and kill him before he awoke. Haffkine himself disliked to talk about any shows of hostility among the Indians, but the newspapers eagerly seized upon reports of that sort. It is possible that it was this report that Chekhov had in mind when he wrote his letter to Suvorin.

Yet nothing could prevent the small group from pursuing its "apostolic" way; it was indeed apostolic. Ten years had passed since Haffkine's friends of the Odessa revolutionary groups had gone to their Siberian exile. As to Haffkine we would have searched in vain for a trace of his old hatred of social injustice or of his old desire to reshape the world: at 34 as a bacteriologist he had found another faith: science. Only science, which carried enlightenment to all without exception, would be able to eradicate the evil of poverty and organise mankind as it should be organised. The lists of the inoculated, kept by Haffkine himself, contain the names of powerful maharajahs and the most menial of their servants, soldiers of British garrisons and prisoners in the British gaols, pilgrims bound for the holy city of Dharwar across the hills and generals of the British army: for all were equal before science, the new divinity. Haffkine was convinced that poverty and hunger would disappear among the Indians as soon as enlightenment reached every nook and corner of the land. Thus the "bomb-thrower" of the eighties became, in the nineties, a peaceful "apostle" of enlightenment.

Many of the members of the dispersed Narodnaya Volya Party living abroad went through a similar evolution, and

quite a number of them turned to science in the 1890s. What they sought in science was the moral support they had not found in political struggle. With the old gods cast down and the revolutionary concepts of the Russian proletariat as yet hardly discernible, there remained the illusion, old as the world, of minor good deeds.

Haffkine took his medical mission in India very seriously. He considered that science had no right to remain idle in the face of human suffering; also, that the inoculations were the best form of propaganda for enlightenment and culture. He spared no effort to achieve the highest possible percentage of inoculations in every village stricken by the epidemic. On many occasions the money which was paid to the villagers for allowing themselves to be inoculated came out of Haffkine's own pocket.

On the author's desk stands a photograph taken nearly seventy years ago during the Brahmaputra expedition. It shows Haffkine administering his vaccine to a little Indian girl, with a poor village hut, made of grass, in the background. The child had most likely been brought by her grandfather, a lean old man, bared to the waist, with a flowing white beard. Men, women and children, equally lean, sit on the ground or stand around watching the procedure. Everything bespeaks abject poverty and a complete lack of the amenities of civilisation.

Haffkine spent February-May 1895 in Assam, which travellers call the most beautiful part of India, a land of green valleys, clear mountain streams and waterfalls. He knew, however, that in this north-eastern corner of India, where tea plantations stretched for miles and 40 per cent of the world's tea crop was picked by a million workers, the annual rainfall reached 400-500 inches in certain localities, due to the south-westerly monsoon, which in the period from July to September turned the fields and roads of Assam into an unbroken morass. The number of malaria cases in this region was second only to that of cholera victims, striking particularly hard the coolies working on the tea plantations. There was a saying in India: dying like coolies in Assam.

In the 1890s mortality among the coolies was so high that even the plantation owners began to feel alarmed. The planters' association invited Haffkine to come to Assam and asked him to start mass inoculation against cholera. Haffkine and

his bacteriologists reached the coolie villages of Kalain and Duguber in the beginning of February, when the cholera epidemic was at its worst. Three thousand workers, or half the inhabitants, received two inoculations each, the rest refusing to be treated. By May the epidemic was practically blocked. In July the *Indian Medical Gazette* summed up the results of this new success as follows: "Among those who refused inoculation, morbidity was 1.43% (47 cases) and mortality 0.16% (20 deaths). Among those who had been inoculated there were three cases (0.1%) and two deaths (0.06%), one death having been caused, in all probability, by an attack of bloody flux. The planters are well satisfied with the results and intend to introduce inoculation for all the coolies, because illness and death among them are harming the work."

In the summer of 1895 a sizeable volume entitled *Report of Dr. W. M. Haffkine, State Bacteriologist, on the Results of Two and a Half Years of Work in India* was published in Calcutta. The vaccine against cholera had undoubtedly justified the hopes that had been placed in it. It is true that immunity did not follow in every case, but death, as a rule, was prevented. Forty-two thousand persons had been inoculated, two-thirds of them receiving two injections. All those who were inoculated had acquired immunity within four days. The death rate had been reduced by 72 per cent. This meant that whereas among those who were not inoculated the death rate was 11 per 1,000 of population, among those who were vaccinated it did not exceed 3.

Thus ended one of the greatest of the nineteenth-century tests of anti-bacterial agents. "By consistent effort Haffkine has succeeded in overcoming all difficulties and giving us the first fully substantiated report on the value of prophylactic inoculation for humanity," wrote Prof. Besredka of the Pasteur Institute, who had been one of Mechnikov's pupils. In Germany a high opinion of the Haffkine experiment was given by Koch and Pfeiffer. The two sceptical Germans even announced that they had given Haffkine's data a double check. Koch and Pfeiffer inoculated many Berlin doctors and students with cholera vaccine received from India in order to test how human blood influenced cholera bacilli. It was established that the blood (or, more precisely, its liquid constituent, i.e., serum) of inoculated persons acted on cholera

bacilli 200 times more effectively than the blood of people who were not inoculated.

The deserved praise from the world's greatest microbiologists did not at all mean that cholera had been vanquished in India. The epidemic continued to take a toll of lives both among the European and the Indian population. In Calcutta's outer harbour the yellow flag continued to flutter in the wind. Yet something important had happened. Man was no longer a defenceless creature at the mercy of the disease. For the first time in history medicine now had an effective and trusty weapon with which to fight the disease. Science had done its bit. It remained for the bacteriologist to surrender his functions to the officials so that mass inoculations might be started throughout the land. *The Times* and, following its cue, many medical and non-medical papers in England and India congratulated the man who had already saved thousands of lives and would save millions. Unfortunately, the recipient of this stream of eulogy was unable to appreciate it at the time, for in his room at the Calcutta hotel, in August 1895, he was flat on his back, prostrated by an attack of malarial fever. The Brahmaputra expedition had had a bad end: the fever had got him in the swamps of Assam. The doctors told him he would have to leave India, but he kept putting off the day of departure in the hope that the fever would go and he would be able to finish his job. He considered that he still did not have enough proof of the vaccine's absolute value and, therefore, that he had not done his duty to the end.

Weeks passed. September came, which in India is one of the hottest and worst months of the year for Europeans. Haffkine was very ill. The attacks of the fever came with killing regularity. Departure became imperative. Worried about the fate of his experiment, Haffkine sent the following message to the Indian Government: "Owing to ill-health I intend to leave India in a few days, yet I am convinced that the problem of cholera inoculation has not been completely solved. As soon as my health permits I shall make every effort to solve this problem. I should like, with the permission of the Indian Government, to visit this country again."

Anticipating events, we may say that Haffkine kept his promise. Six months later he returned to India and made 30,000 more inoculations. He would probably have continued



to fight his doubts a good while longer if ill-health had not forced him to return to Europe.

On September 28, 1895, Pasteur died. His death came as a shock for Haffkine. To him Pasteur had been not only a great chemist, who had given medicine and biology a new trend, but first and foremost a teacher in the broadest and truest sense. It was at the Pasteur Institute that the concept of a cholera vaccine had been born. It was there that Haffkine's own scientific principles had taken shape. "On the day when I came back from my expedition to India, I found my former chief, Monsieur Pasteur, lying on his bed of death," he wrote in a memorandum to the British Medical Association. "Whatever might have been his appreciation of the work done in India, there can be only one desire on my part, that all the honour for the results which may possibly come out of my efforts should be referred to him, to his sacred memory."

"When a learned man dies, the world dies," says an Indian proverb. For Haffkine, a priceless world of ideas, emotions and events died with Pasteur. A stage of his own life-story came to an end. Before going on with Haffkine's story, however, let us look back to the day in late April 1895, when Pasteur, desperately ill, came for the last time to the Institute, and Professor Roux placed a microscope before him. He showed the great scientist a plague bacillus (recently discovered by Yersin and the Japanese bacteriologist Kitasato). The venerable scientist took a long look at the enemy, which had at last been trapped, and even smiled with pride at his remarkable pupils. "There is no longer any doubt," he said, "that the day is coming when the preventive measures that one of my pupils will take will halt bubonic plague and yellow fever, the dreaded scourges that have ravaged mankind."

These last words uttered by Pasteur at the Institute proved to be prophetic. Eighteen months later Vladimir Haffkine created the first plague vaccine in history.

## **Bombay, Hotbed of Plague**

The Calcutta-Bombay express, which left the coast of the Bay of Bengal over twenty-four hours before, was approaching its destination. It had sped westward across the subcontinent, leaving behind it the humid forested plains of Bengal, groves of the giant feathery bamboo and clusters of unknown liana-entwined trees. The vast Deccan plateau, arid and dusty, with its golden-yellow fields framed in green palm groves, had been left behind. The steep descent from the plateau down to the west coast through the denuded rocky canyons, through tunnels and across viaducts, was over, and Bombay, the second greatest city in India, with its port facilities and factories, the gateway through which the West has penetrated into India for the past two centuries, lay ahead.

The passengers, overpowered by the oppressive heat and dust, were already anticipating the fresh breezes of the Arabian Sea, but the general feeling of relief was tempered by the increasingly alarming rumours that plague had broken out in Bombay. The English papers said nothing about it, but the east-bound trains were chock-full of refugees. The dreadful truth became apparent when the express, after speeding past the frowning cliffs of the Western Ghats, slid down to the coastal strip. The crowds of refugees here were still more numerous. They were in the grip of fear and indecision, they did not know where they were going, their minds were set on fleeing as far as possible from the condemned city where a hundred, even two hundred were dying every day. The bodies of the dead were thrown out as the trains from Bombay stopped at the stations. The plague spared no one, but preferred to visit the poor. It turned a perfectly healthy person into a corpse in 48 hours. It left

hardly a mark on its victim: there was a slight swelling of the glands of the neck, the armpits or groin, and dark patches appeared on the skin. The inhabitants of Bombay ascribed the mysterious disease to dates imported from Syria, or the wheat that came from the interior, but most of all to the foreigners: it was not for nothing that the European districts were hardly touched by the disease.

There was only one individual in the Calcutta-Bombay express who knew the real cause of the situation in Bombay. The young man (one might have given him no more than 35) had pleasant though somewhat enigmatic features, and did not appear anxious to engage in conversation with the English officers who were his fellow-travellers. He wore a sober black coat and his starched collar seemed impervious to the heat. Moreover, he was immersed in his books: for all his fellow-travellers knew he might have been a missionary.

Tunics unbuttoned, the officers played at cards and cursed the Service, India, the heat and this new outrage—the plague. When the vocabulary of vituperation regarding “this damned India” became exhausted they switched to endless discussions of cricket, golf and promotion in the Service. Deep down in their hearts they scorned the “missionary” and his books, as they scorned civilians in general, for that matter. No one was curious to find out what it was that the odd bird in the black coat was reading, though it so happened that his books were about that very plague which had alarmed everyone. If the warriors in pith helmets had been a bit more curious and a bit less conceited, Mr. Haffkine, bacteriologist of the Indian Government, might have told them about the activities of the “black death” in the past and explained why the plague was ravaging Bombay that autumn of 1896.

Thucydides, the Greek historian, who was the first to give us a description of plague, was not only an observer of the epidemic that struck Athens during the second year of the Peloponnesian War (431-404 B. C.), but also its victim. Three hundred years before our era the “black death” became known in Egypt. During the sixth century A. D. it was apparently carried from Africa to the Byzantine Empire, where it remained endemic for 50 years and became known as the plague of Justinian. “There were mourning and tears everywhere,” wrote a contemporary. “Entire cities were depopulated, the inhabitants fleeing to safety; nature’s most sacred

ties were broken. The land looked like a desert, men's dwellings were taken over by wild animals."

In Russia, the first mention of plague was made by the chronicler Nestor, who recorded that in 1090 a toll of 7,000 lives was taken by plague within the space of 40 days. In the Tsar's Chronicle for 1230 it is recorded that in the city of Smolensk 22,000 people perished within a few days.

The fourteenth century was marked by plague in Europe. Gabriel de Mussis, a learned lawyer of Piacenza who lived in the Crimea in 1346, tells of a disease that killed practically the entire population of the steppes along the Black Sea coast. The Italian colonists fled to Italy. A number of ships from Kaffa (Feodosiya) reached the shores of Italy, bringing the epidemic to Western Europe. "Of the thousand persons who had come with us," writes de Mussis, "scarcely a dozen survived. Our relatives, friends and neighbours came down to welcome us. Alas! We had brought death-dealing arrows with us: every word we spoke spread the deadly poison."

With the speed of lightning the disease spread over Italy, 60,000 people dying in Naples, 100,000 in Genoa and 100,000 in Venice.

Of the 1,350 members of the Venetian Grand Council only one-third survived, and only four of the 24 physicians in the city remained alive. History's first quarantines appeared in Venice. They were houses where all people arriving from plague areas were held for 40 days. Hence the term, from the Italian "quaranta" meaning 40. But the quarantines did not help. According to Boccaccio, in Florence the death toll reached 96,000. A few months later the plague swept into France, where two queens were among the 80,000 who died. Some fantastic conjectures were made by the Paris medical faculty concerning the nature and origin of the disease. For example, physicians sought the causes of the epidemic in the influence of the moon and the stars, or suggested that the wells were being poisoned by the Jews out of hatred for the Christians (it should be recalled that in many countries outbreaks of the epidemic were accompanied by Jewish pogroms). On the Iberian Peninsula the epidemic killed four-fifths of the entire population. King Alfonso XI was one of its victims during the siege of Gibraltar.

On August 1, 1348, the plague reached London, where it

took a toll of 100,000 lives. In Poland half the population perished over a period of seven months.

In the middle of the fourteenth century the plague returned to Russia. It engulfed Ryazan, Moscow and Kolomna, then travelled down the Volga and the Don and ended by vanishing in the same regions whence it had begun its death-dealing journey.

Pope Clement VI received a report, according to which over 40 million people died throughout the world during the plague pandemic of the fourteenth century, 25 million of them in Europe.

However, the "black death" had not disappeared from Europe for ever: it returned to the continent time after time during the fourteenth, fifteenth and sixteenth centuries.

It reaped a particularly rich harvest early in the seventeenth century. In 1602, in Moscow alone, 127,000 people were buried at government expense. An official of the name of Moshnin reported to Tsar Alexei Mikhailovich that one-fourth of the boyar and nobles' households in Moscow had perished to a man. The fear-crazed inhabitants fled from the city despite the sanitary cordons, and carried the disease to all parts of Russia. Some 50 years later the black wings of the plague once more hovered over all the larger Russian towns.

During the nineteenth century a plague epidemic spread through Africa and visited Syria and Constantinople. All in all, in the steam age the world was apparently spared from plague although there were pandemics of cholera.

The ensuing calm was thought by some physicians to mean a final victory over the "black death". "In our day," wrote Professor Ravich of the Military Medical Academy in 1874, "a Russian must be a cow or a pig to contract plague. Thanks to the present cultural level man has entirely lost the capacity of contracting plague." However, in the autumn of 1878 an outbreak of plague carried away 445 lives, or one-fourth of the population, in the town of Vetlyanka on the lower Volga. Six years later it appeared in Canton and Hongkong in the south of China. In order to estimate the number of victims, the Chinese emperor turned to the coffin-makers, who reported that they had sold 60,000 coffins during the epidemic.

"Science has suffered a loss of prestige and a lasting defeat," wrote the French author Vincent Brunetière in 1895, commenting on the events at Hongkong. At a time when

bacteriology was making great progress, however, such ominous predictions were somewhat incongruous. Hongkong became not only the scene of man's helplessness in the face of the plague, but also the spot where science registered its first success in discovering the nature of the disease. Yersin, of the Pasteur Institute, and Professor Kitasato, of Japan, succeeded finally in isolating and studying the murderous plague bacillus: a short, broad coccoid. These bacilli were discovered in great numbers in the lymph nodes, or buboes, of the groin of plague cases. In Hongkong, moreover, the scientists had noted an epizootic among rats, which had developed some two or three weeks before the epidemic.

The dismal mystery of plague which had oppressed mankind for thousands of years had begun to recede. Yersin occupied himself with the preparation of a plague serum. However, when the disease unexpectedly appeared in Bombay in July 1896 no one as yet knew how to check or treat it. It will be recalled, moreover, that Bombay had already been visited by a similar epidemic in 1690. The city had been captured by the Portuguese shortly before, and the epidemic had turned their camp into a desert: only 50 of the 1,800 Portuguese had remained alive.

In the Calcutta Health Department, Haffkine learned about the events that had transpired in Bombay in the course of the summer. As instructed by the government, the newspapers remained silent about the spread of the epidemic in this city with its 800,000 population. It appears that during July a number of cases of a mysterious disease, which had swiftly ended in death, had been observed by physicians in the congested and filthy slum districts along the eastern shore of the island on which Bombay is situated. Two fresh cases were registered on August 15. A high fever was observed in the patients, and the physicians diagnosed pneumonia. Two days later the patients died. Their death puzzled the local physicians. They were able to establish that the two men had recently returned from a trip to another town, where they had had dealings with some tea merchants from Canton, also that quite a few dead rats had been observed in these merchants' shops. The picture seemed clear: the rats had contracted the disease brought from China, and infected the goods, from which the infection had spread to people. Yet no one took the danger signal seriously. Another 40 days

passed before a Bombay physician named Wygas finally established the presence of plague in Bombay. Nevertheless, even after that finding the colonial authorities, fearful of damage to foreign trade, which was channelled primarily through the port of Bombay, continued the conspiracy of silence in regard to the spreading epidemic. Even when in the overpopulated dwellings of dockers and textile workers 10 or 12 persons were coming down with plague and more than half of these were dying, the Anglo-Indian officials replied to official Russian inquiries that "plague was present in a light form, recognisable only through microscopical analysis". And this when something like 2,500 lives were being claimed by the epidemic in the city every month!

The facts being suppressed, the most absurd rumours began to spread in Bombay. One Solomon Ijji, who claimed to be a holy man, announced the approach of the millennium, by which time the world would be cleansed of all sinners with the aid of the plague. Alarmed by the prophecy, 400,000 inhabitants, or nearly half the city's population, fled inland, never stopping to reflect, apparently, why it was that the disease, which was working such havoc among the Indian workers, spared the European districts, leaving practically untouched the principal "workers of iniquity".

Of the first 10,000 plague cases recorded in Bombay, only 23 cases (including two deaths) occurred in the Esplanade district, populated by Europeans, while in the adjacent Indian districts morbidity and mortality were 10-20 times higher over the same period.

The inhabitants no longer trusted either the doctors or the officials. They scrambled over the dams that linked the island to the mainland, left by boat in the direction of Karachi and the south of Hindustan, or simply afoot, with no set aim, carrying their few belongings on their backs. The disorderly flight of tens of thousands of fear-crazed people made the authorities think, and one of the measures taken by the government in Calcutta was the dispatching of Haffkine to check the epidemic.

He arrived in Bombay on October 7, 1896. The process of depopulation was in full swing. The streets in the native districts were empty. Shops and bazaars were closed. Servants were fleeing, and many Europeans were being forced to move to hotels.



Vladimir Haffkine, founder of the Bombay Laboratory

Within 24 hours of his arrival a laboratory had been placed at Haffkine's disposal in the Central Medical College. The premises consisted of a room and a verandah, the staff—of a scribe and three technical assistants. He took up his quarters on the premises of the college, hardly bothered about the modesty of the provisions. "It is not the marble halls which make for intellectual grandeur—it is the spirit and brain of the worker," Professor Fleming, discoverer of penicillin, was to say nearly 40 years later. Haffkine had perceived that truth early in his career. The verandah was soon cluttered with cages containing rats and rabbits; tables were installed in the room, with row upon row of test-tubes and flasks upon them. On the third day the laboratory began its tests.

Haffkine had arrived in this plague-infected city with a prepared programme. Whereas Dr. Yersin, his colleague of the Pasteur Institute, had been trying to treat the disease



with a plague serum, Haffkine, the biologist, looked for an agent that would protect the healthy and prevent the infection from spreading. He worked on the same assumption, made by Pasteur, that had led to the discovery of the cholera vaccine: that is, if a small number of attenuated or killed bacilli were introduced into the organism of a healthy individual, that organism would produce antibodies capable of combating the infection within it. Immunity would be acquired even in respect of live and active agents introduced in powerful doses.

However, it was one thing to theorise and quite another to produce a preventive plague vaccine which had never hitherto been obtained. Endless problems required solution. Strangely enough, the plague bacillus, which had taken millions of lives, proved to be an exceptionally frail and weak creature. It took a great deal of effort to preserve specimens for study and experiment. Before learning how to kill it, therefore, it became necessary for Haffkine first to learn to preserve and reproduce the plague bacillus. He succeeded in establishing that the plague bacillus did very well in ordinary beef broth. The question now was, how to attenuate it so as to turn it into a vaccine.

In the tiny laboratory of the Central Medical College, cultures of the plague bacillus were subjected successively to the most extreme forms of treatment, which included the administration of chloroform and phenols, as well as heating and desiccation. Attempts were made to produce vaccines out of the organs of infected experimental animals. The desiccated tissue of rabbits, that had died of plague, should have seemingly furnished a good material for injections, but it was discovered that live bacilli remained occasionally buried deep in the tissue. Such instances were rare, but the bacteriologist could not take the risk even if the chance of infection were one in a million.

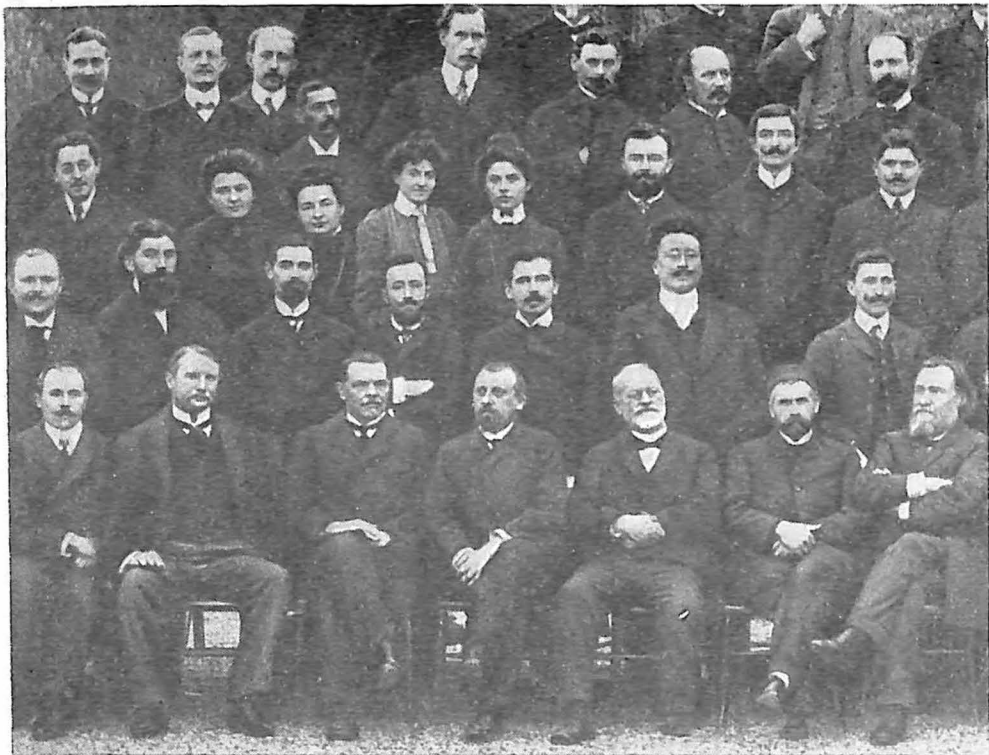
Desiccation had to be given up. It took a long time to discover the cause of failure with heating as well. Heated to 65°C, cultures of plague bacilli did not confer immunity on experimental rats. Haffkine was unable to discover the reason. Cholera vaccine, when heated to the same temperature, retained its immunising properties perfectly. What was to blame for the fact that heated plague vaccine did not communicate immunity to the experimental animals? Was it

the bacilli? Or the rats? Or was it the researcher himself, through some error or other? The answer was found a few months later, after experiments with human beings were begun. It developed that the reaction of the human organism to a given preparation is different from that of the animal organism. The heated plague culture, which failed to immunise rats, produced excellent immunisation in human beings.

The approach to experimenting upon human beings, it must be said, was long and beset with difficulties. Before proceeding it was necessary to decide a great many questions. What doses, for instance, did people of different build and weight require? The effect of a vaccine is determined not only by its own properties but also by the nature of the individual to whom it is administered. During the three years spent by Haffkine in India he had seen how weak and emaciated most of the peasants, servants, coolies and dockers were. Even according to official data the weight of an adult Indian workingman averaged between 85 and 97 pounds. The problem which puzzled Haffkine in his laboratory became, a year later, the topic of an article written by the prominent Bombay publicist B. Malabari, entitled *India, 1897*. "The poor in India are underfed," he wrote. "They are emaciated and lack the strength to withstand the attack of diseases, in particular that of plague, which practically never touches those who are well nourished and have plenty of everything."

Haffkine had, besides, to determine what the results of vaccination would be in terms of pain, temperature and indisposition. If the reaction should prove too overpowering it would breed fear of inoculation among the people.

It was hardly probable that anyone was really interested in the small laboratory which was preparing the salvation of the gigantic panic-stricken city in those autumn months of 1896. It was many years later that Professor Khanolkar, the prominent Bombay scientist, who made a study of the development of medicine in his native town, devoted a few lines to the story of how the plague vaccine was produced, "The epidemic continued to spread. Dr. Haffkine was pressed for time. Besides working on his vaccine he read many lectures on plague control before practising physicians. This reserved and taciturn gentleman could wax remarkably eloquent when it came to instructing anyone in the technique



A group of bacteriologists of the Pasteur Institute.  
First row, second from left—Vladimir Haffkine. Sitted next to him from left to right are  
Dr. Nicolle, Dr. Mesnil, Prof. Laveran, Prof. Roux and Prof. Mechnikov

of plague control. He worked 12-14 hours a day. One of his assistants developed a nervous breakdown. Two left, unable to stand the strain and overcome their fear."

These few lines show under what pressure Haffkine had to work. Only a thin panel of brittle glass stood between the staff and the millions and millions of deadly doses of plague swirling in the test-tubes and flasks of the laboratory. Seemingly inevitable death menaced Haffkine and his assistants at every stage. It could have appeared as a hair-line crack in the wall of a flask, or as the bite of an infected rat, or as any one of a hundred different accidents, which it would have been impossible to foresee or guard against. There was reason enough for fear. Haffkine, however, feared only one thing: it was taking the vaccine too long a time to hatch. It must be said in all fairness, nevertheless, that the first preventive agent against plague in the history of the world was developed by Haffkine in the space of only three months.

The vaccine was virtually ready in December 1896. A dark closet contained rows of flasks filled with the broth that served as nourishment for the plague bacilli. In order to force this host of bacilli to multiply more rapidly Haffkine had resorted to a simple and very effective plan: he dripped some cocoa-nut oil or mutton fat on the surface of the broth, and the oily yellow spots acted as a sort of support for the growing colonies of bacilli, for, clinging to these oily pontoons, the bacilli hung suspended, reaching down to the bottom of the flask in the manner of stalactites in a cave. Haffkine had established that this stalactite-like manner of development was a sign that the bacilli colony was getting on splendidly. From time to time the flasks were agitated. The stalactites would then settle on the bottom, and new plague icicles would begin to develop from the surface. In six weeks this hellish brew was heated. The bacilli died, and the greyish suspension of millions of dead bacilli and their toxins was transformed into a life-saving vaccine.

Its life-saving properties, however, were yet to be proved. Late in December, practically on New Year's eve, 20 healthy rats newly caught on a ship in from Europe were delivered at the laboratory. Half these animals were given a plague inoculation and put back in the cage with the others, together with a plague-infected rat. The experiment was over in 24

hours: the nine healthy rats were dead, killed by the disease, but of the ten that had been inoculated not a single one had contracted the plague. Further experiments with animals would have yielded no new information. It was now necessary to find out whether this vaccine would communicate immunity to human beings, to determine the dose suitable for human use, and to establish what effect in terms of suffering it would have. To do all that it was necessary to inoculate a human being. The problem was to find someone who would be the first to risk the injection of a preparation which, while free of any living bacilli, contained nevertheless the deadly plague toxins. A person might possibly have been found among the Bombay poor who would have been ready to submit to the operation to earn some money. On the other hand, the principles which guided Haffkine in his personal life, as in the field of science, did not allow him to gamble with another person's life. So he did what others who fought infection had done so many times: he tested the effect of the plague toxin on himself.

The test was made early in the morning of January 10, 1897, in the laboratory of the Central Medical College, where Haffkine had made his first experiment exactly three months before.

Secrecy surrounded the event. Only two people knew about it. They were Dr. Surveyer, who was to make the injection, and the Principal of the College, who had been invited as a witness. Wishing to ascertain the harmlessness of high doses, Haffkine asked for an injection of 10 cu.cm. of the strongest solution available in the laboratory; which meant a tremendous dose of the toxin. He was thus given a dose at least four times greater than that given subsequently to the inhabitants of Bombay when mass vaccination got under way. Dr. David Masters, the English physician and author, left us the following description of the historic event:

"The brave scientist bared his left flank, the hypodermic needle penetrated his flesh and the deadly injection was made. The needle was withdrawn, the right flank bared, and another injection made.

"Then the hero dressed and awaited his fate with a calm courage beyond all praise. In an hour or two he was beginning to feel feverish. He detected the well-known plague symptoms. In just under nine hours his temperature had

soared to over 102°F. He stuck to his work, told no one of what had happened. The next morning he could hardly rise from his bed, so painful were the places where the injections had been made. The sites were all inflamed and badly swollen; he felt very sore under the left arm, but in spite of everything he got up and attended a most important meeting with the Director General of the Indian Medical Service.

"As Haffkine himself remarked: 'I was able to take part in the meeting, and until my symptoms had entirely disappeared, scarcely anyone knew that I had been inoculated.' It is an historic instance of a man doing good by stealth. . . ."

True enough, a few more days were to go by before people found out about Haffkine's experiment. Perhaps it might never have come out if it had not been necessary to enlist volunteers to continue the experiment. To convince the physicians that the vaccine was not dangerous, Haffkine read before the staff of the Central Medical College a paper giving a detailed description of his observations upon himself starting with the inoculation itself. It had to be admitted that the experiment had been difficult. According to Haffkine, he felt "as though he had been given injections in 16 spots simultaneously, and each had been painful".

This painful reaction to inoculation was, of course, a regrettable supplement to the merits of the vaccine. Yet it was hardly worth a second thought in a city where hundreds continued to die daily of the plague and where inoculation was the only remedy that could check the epidemic. Responding to Haffkine's appeal, the instructors and students of the college, Indians and Europeans, offered themselves for inoculation. Several hundred residents from among the educated classes of Bombay followed their example. Still, all these volunteers came primarily from the Esplanade, that is, the wealthiest and most cultured district of the city. The problem was to get a response from the millions who inhabited the congested districts of Parel, Baiculla and Mandvi, to breach the wall of indifference surrounding the municipal government and make the latter set up inoculation centres for those who, in one way or another, came in contact with the sick.

An unexpected turn of events forced the municipal authorities themselves to come to Haffkine for assistance. An outbreak of plague occurred in the British Reformatory in the district of Baiculla, where several inmates died of the disease.

On January 30, 1897, Haffkine and a group of doctors were admitted in the stone-flagged inner court of the gaol. Alarmed by the outbreak, the superintendent and the prison physician suggested that all the inmates should be inoculated to a man, regardless of their wishes. This Haffkine rejected. Baiculla was the first locality where the populace as such was to be inoculated rather than Europeans or individual educated Indians. The effect of the vaccine had not been as yet fully determined. There was no telling what effect it might have in conditions of mass inoculation. All this meant that forcible inoculation would, in case of an adverse effect, scare away the thousand beyond the walls of the prison. Haffkine spoke to the 337 prisoners, most of whom were young men. When the interpreters finished translating his address into Hindi, Marathi and Urdu, the Indian doctors inoculated each other in front of the prisoners, after which one of the doctors called for volunteers. One hundred and thirty-four stepped forward.

It is possible that this experiment required as much courage from Haffkine as the one he had made upon himself. It was here, in the court-yard of the house of correction, that the most important experiment was to be carried out. In fact, it would have been hard to conceive more suitable conditions for it. Within the restricted confines of the prison, where inoculated, and uninoculated were placed in the same conditions, all the pros and cons of the new preparation were, of necessity, bound to manifest themselves. Haffkine, who had been invested with special authority for the duration of the inoculation, remained in the prison for a week without once leaving the premises. The first night was particularly dreadful. Two Indian youths developed inflammation of the lymphatic glands of the groin two hours after they were inoculated. It was impossible to save them because the vaccine was unable to stop infection that had already begun. During that night the ominous symptoms of plague appeared in all the other men who had been inoculated. They developed a fever and suffered pain, but it was impossible to tell whether they had contracted the disease or were simply reacting to the inoculation. It became clear only at the end of the week that the vaccine had saved many lives. Apart from the two who died before immunity had had time to form in their bodies, only one of the 134 volunteers contracted the disease but even

he was soon back on his feet again, while the 177 who had refused inoculation paid a high price for their refusal: 13 came down with the plague and seven of them died.

That anxious week answered many of Haffkine's questions. The dosage which he had determined theoretically was right, after all. The heating of the vaccine also turned out to be justified. The correctness of his theoretic calculations was no less a success for Haffkine than the practical results of the inoculations. The fact is that the physicians of the Bombay municipality had doubted his predictions about the effect that the inoculations would have. Few in India knew of the theory of infectious disease control developed at the Pasteur Institute. During the lectures which he read before the local medical profession, Haffkine had had to listen to numerous ironical remarks, and on one occasion he had been reminded of the old Indian proverb: "A philosopher who makes an erroneous prediction should remain silent for the rest of his life." Now, however, after what had taken place in the prison, he could speak about his plague vaccine positively and without fear of ridicule, which was all the more necessary since the prisoners had been inoculated when the epidemic had reached its peak: in January and February 1897 the monthly death toll in Bombay was approximately 3,000. Refugees from the city had carried the disease to all parts of the north-west coast of India, so that it was now raging over a territory the size of France, with a population of 18 millions. Reports of death by the hundred were coming in from Karachi and Hyderabad, Poona and Palampur; Sind, the granary of India, had been invaded, as well as a number of other north-western states. It was no longer possible for the government to conceal the epidemic. Public opinion both in India and in Europe was insisting on urgent measures to combat the epidemic, and these measures were taken.

On March 5, 1897, it was announced that a Plague Control Committee had been set up. It was headed by Brigadier-General Gatacre, in command of the garrison, who was given dictatorial powers by virtue of Ordinance No. 3 concerning epidemic diseases. The general did not bother to ponder the origin of the epidemic, but acted as he was in the habit of acting in a conquered country: he resorted to soldiers and rifles. He divided Bombay into districts, and every morning a detachment of two policemen and four sepoy's started out



on an inspection of the city. On discovering a sick person the "plague control" detail would load him on a hand-cart and take him to the nearest hospital, while all the other inhabitants of the dwelling would be taken to one of the isolation camps outside the city and the dwelling would then be disinfected.

In the official reports which the English newspapers now published without delay, the activity of the Plague Control Committee was made to appear very laudable. Indeed, the sick were hospitalised, the suspects were isolated from the population, the premises in question were disinfected; what more could be expected? On the other hand, here are a few reports of eye-witnesses, describing the Bombay hospitals and the so-called isolation camps.

"A visit to the Karch-Mandy Hospital leaves a painful impression. It accommodates 120-140 critical cases, with 20-30 dying daily. The facilities are primitive, for the hospital has taken over the premises of an inn. The staff is insufficient: the four nurses are overworked, the doctor is at his wits' end. A bed is occupied by one patient in the morning and by another at night. It is impossible to examine a patient, let alone keep a record of the case. There are no medicines, and no means of treating the patients. Pitiful groans are heard on all sides, and the flies have a field day assailing the eyes and ears of the sick. It will take a long time to forget what one has seen there," wrote Professor Vysokovich, a prominent Russian epidemiologist, who arrived in Bombay in February 1897.

"Disinfection", as understood by General Gatacre, was also of a rather peculiar nature. The dwellings were drenched with liquid disinfectants. "They used fire-hoses for carbolic acid and hand-pumps for mercuric chloride," reported Dr. Levin, who had been sent to Bombay by the Russian Government to observe the development of the epidemic. "Disinfection was tremendously simplified by the fact that the majority of Indians among the lower classes own practically no furniture or household equipment. Some clothing and a few kitchen utensils are usually all an Indian day-labourer has." In the villages the soldiers simply pushed over the roofs of the huts so as to let the sun do the disinfecting.

Another Russian visitor to India in those years was the historian Novitsky, who stopped in plague-ridden Bombay

for a while in March 1898 and then went on by train to Calcutta. This is how he described the trip: "Here and there plague isolation camps are to be seen, filled with natives. They are a sad enough sight, viewed against the background of the luxuriant vegetation. Naked, half-starved, hundreds of Indians languished under straw thatch, waiting to be released from their necessary but cruel imprisonment."

The imprisonment which Novitsky wrote about was not only cruel, but often senseless as well. People were herded into these camps indiscriminately, including those who had had contacts with plague cases and those who had not, but happened to be on the spot. According to Dr. Levin a 10-11 day stay in such a camp was a terrible hardship for the Indians. "On one occasion," wrote Dr. Levin, "75 men escaped simultaneously from a camp with a population of about 300. That this sort of thing did not happen more often should be ascribed to the exceptional submissiveness and obedience which are characteristic of the Indians."

However, Dr. Levin himself destroys the myth of the Indians' "exceptional submissiveness" when he describes the attitude of the inhabitants of Bombay towards General Gatacre's detachments. "The people did their best to hide their sick so as to save them from hospitalisation. . . . All sorts of tricks were used by the family. While the inspection squad was on the premises the sick were hidden in trunks, where some suffocated; or they were concealed in the remotest garret corners with a lot of trash piled on top of them. There was the case of an old woman on the verge of death, who was made to sit facing the window, while her daughter continued to comb her hair, until the inspectors finished their search." Soon after the inspections were begun, General Gatacre started getting letters from the inhabitants, complaining of the rough treatment at the hands of the inspectors. Trouble was brewing in the city. The general then took personal charge of an inspection squad, which had been assigned to a particularly troublesome neighbourhood. The general's authority was backed by a company of armed soldiers. In March 1898, however, even bayonets were not enough to save the Committee. A strike protesting against the Committee's high-handed actions was staged by 15,000 dockers and railway workers. It was generally felt that the Plague Control Committee was helping to spread the plague rather than

combat it. Cart-drivers and shopkeepers joined the strike, and transport and trade came to a standstill in the big city. "They expressed dissatisfaction over the fact that while they were at work their friends and relatives were herded into segregation camps and their dwellings and property destroyed," wrote *The Times of India* on March 12. The strikers forced the government to discontinue the more brutal practices. The disorders recurred later, however, and in the city of Garchankar the authorities took recourse to arms, with the result that eight people were killed and 27 wounded. In the village of Bengal resistance to the authorities was offered by the peasants who were unable to stand the heat of the open camps, where they had been put as a precautionary measure.

And now let us return to Haffkine and see what he thought of the situation.

\* \* \*

In his youth Darwin once said to his friend Lyell, the British geologist: "What a good thing it would be, if every scientific man was to die when sixty years old, as afterwards he would be sure to oppose all new doctrines."

Perhaps Haffkine may have recalled that piece of melancholic humour when official business required him to attend conferences in General Gatacre's office, especially since the general was very near to that critical line. The general was not a scientist. His broad powers as chairman of the Plague Control Committee seemed to convince him, however, that he was as much at home in medicine and biology as any of the specialists. He considered it beneath him to argue with the creator of the plague vaccine, and he regarded preventive inoculation as something akin to the invocations of Indian fakirs. He was also firmly convinced that drenching the walls and floors of dwellings, where plague cases had been found, with carbolic acid and mercuric chloride solution would finally destroy all the plague bacilli. Why shouldn't it? In short, the commanding officer of the Bombay garrison was certain that victory over plague would be won on an advanced battlefield and that everything would depend on the sepoy's doing their duty and on the number of containers of carbolic acid available.

Haffkine held the opposite theory, which, naturally, did

not promote friendship between him and the chairman of the Plague Control Committee. He had understood back in the autumn of 1896 that the Indian plague was a disease in regard to which it was hardly possible to limit the area of active infection or kill the infection at its source. Unlike smallpox and hydrophobia agents, the plague bacillus lived not only in an infected human organism, but developed also in the soil, in buildings, in the bodies of the animals and insects which surrounded human beings.

In the conditions which prevailed in this great congested city, it would be senseless to launch a frontal attack against the plague; it would be much more sensible to protect people from getting infected by inoculating them.

Haffkine lectured extensively in Bombay and its vicinity, explaining his theory in a popular manner. "There are numerous phenomena in nature," he told the inhabitants of Poona, "which we are unable to control. But we can either avoid them or protect ourselves from them singly. To illustrate this, I might refer to our inability to check the heat in India. Nevertheless, some can easily escape it by going to the hills, while others, those who are unable to leave, can provide themselves with a good punkah. In the same way, you might be unable to destroy the mosquitoes in rivers and swamps, but you can protect yourselves individually by wearing a mosquito net."

By means of these analogies even people with no knowledge of science could be made to understand the basic idea behind Haffkine's plague vaccinations. Unfortunately, General Gatacre would listen neither to lectures nor to advice. Rifle-carrying sepoy and policemen still made the rounds of Bombay houses every morning, while lumps of sulphur burning in large dishes in the middle of the streets emitted clouds of suffocating smoke: the city air was being "purified" of the infection in accordance with the instructions of the Plague Control Committee.

Had Haffkine been a physician he might have applied to the activities of the British authorities in Bombay the well-known Latin saying *ut aliquid fiat videatur*. That is the formula doctors use when they prescribe some rose-tinted water for a hopeless patient. But even without being a doctor Haffkine understood that sanitary measures alone were not enough. He had become convinced of this while visiting

Mandvi, one of Bombay's infected districts, at the invitation of the authorities. The poor in Mandvi lived in five- and six-storey tenements, and Haffkine had had to do a good deal of climbing up the stairs and groping along endless stuffy corridors with hardly any light to see by. One room visited by him and his companions presented a particularly depressing sight: it had an area of not more than 30 square feet and no windows, like the corridor, but several families lived in it. In this box, deprived of light and air, eight or possibly ten people were living. It was the same in the room next door and in the neighbouring tenements. This monstrous congestion and poverty bred filth and disease. Indeed, what question could there be of cleanliness when there was not a kitchen in the building and only one faucet to every floor!

"When they showed me a row of buildings which housed between 700 and 1,000 people and told me that there had been plague cases in similar buildings throughout the district, I saw at once that there would be no point in carrying through the measures decided upon by the municipal authorities. (This was before the setting up of the Plague Control Committee.—*M.P.*) Nevertheless I gave my approval to everything that was being done, including the burning of sulphur in the middle of the streets: I wanted proof of the fact that the executive authorities were powerless to check the spread of plague in Bombay. . . ."

There was another reason why Haffkine did not oppose these sanitary measures. Being utterly uncompromising in matters concerning scientific conclusions, he intended to verify the mechanics of the vaccine's effect in such a manner as to leave no doubt of its efficacy. He continued to mistrust his own observations even after the inoculations in the Baiculla prison and even after he had registered 8,200 inoculations among the city's inhabitants during the month that followed. Scores of physicians had been instructed in the techniques of inoculation and a large supply of vaccine was available at the laboratory, but Haffkine still refrained from joining the issue with Gatacre and his system. This was not cowardice: six months later he was to come out very strongly against the "rose water" conception. Most probably what he needed during the spring and summer of 1897 was moral support, a word of encouragement from one of his competent colleagues. Microbiology did not have a sufficient

personnel at its disposal, and there was no one to represent it in Bombay at the time of the epidemic. Nevertheless, the long-awaited word of encouragement did come, and it was spoken in Russian.

In 1897, the governments of a number of countries sent their medical officers to Bombay to observe the epidemic. In Germany, Italy, France and Russia it was expected, and not without reason, that an outbreak of the "black death" was imminent in one or another European port.

The bacteriologists sent to India were instructed to gain all possible experience in plague control. Three Russian plague specialists arrived in Bombay in March, among them Vysokovich, a Kharkov professor, and Dr. Zabolotny, who subsequently became an academician. Dr. Zabolotny visited Haffkine's laboratory on the very day of his arrival. Other Russian physicians were to come to India in the years that followed (e.g., Vigura, Levin, Kashkadamov), but this first meeting with his fellow-countrymen after nearly ten years abroad made an indelible impression on Haffkine.

For all his reserve, Haffkine could not conceal how happy and encouraged he was to meet his countrymen (all three of whom were Ukrainians). It was the first time that Russian and Ukrainian were spoken at the Bombay Medical College, and it was also the first time in years that Haffkine heard himself called by his name and patronymic: Vladimir Aarovich. The Russian group was made very welcome in Haffkine's laboratory. Vysokovich and Zabolotny were given the fullest information on the nature of the epidemic and the methods of treatment and prevention. When they expressed a desire to test the effect of their own plague vaccine, Haffkine organised these tests in the largest and most modern hospital in Bombay.

Their personal friendly feelings towards their countryman did not prevent the new arrivals from assuming in the beginning a definitely sceptical attitude towards the plague vaccine, which they referred to among themselves as "Haffkine's lymph". In a letter home on April 30, 1897, Dr. Zabolotny wrote regarding the Haffkine vaccine: "The English physicians still feel sceptical about this method." The events that were to follow a month later, however, induced the new arrivals (and others) to re-evaluate the scientific and practical activities of Vladimir Haffkine.

Late in February word was received in Bombay that plague had broken out in Daman, a small Portuguese colony comprising three villages and completely surrounded by British territory. In Daman the disease had the same effect as everywhere else: of the 10,000 inhabitants 2,000 fled in all directions, after which Portuguese troops surrounded the villages, and the British troops, following suit, threw a second ring around the colony. The double ring of troops effectively stopped all traffic, and the 8,000 inhabitants who remained were left no choice but to patiently await their fate.

Into this besieged plague spot Haffkine sent two of his most trustworthy assistants with a supply of the so-called "lymph". Inoculation went on for two months. A careful record was kept of the inoculated, the uninoculated, the plague cases and deaths (the dead were counted by the cemetery guards posted by the governor). Towards the end of May 1897, striking statistics appeared in the Bombay newspapers. Of the 6,000 persons who had refused to be inoculated 1,482 had died, whereas of the 2,200 who had been inoculated only 36 had succumbed. "The death rate among the uninoculated is fifteen times higher than among those who consented to be inoculated," wrote the Russian physician Dr. Vigura in his report. "The numbers are sufficiently large to exclude the element of chance."

A new outbreak of plague came in July, this time deep in the interior of the subcontinent. The epidemic hit the small locality of Lanauli. Braving the summer heat and the bad road conditions, Haffkine and Dr. Levin reached Lanauli, high up in the mountains of Deccan. A complete check of the inhabitants was undertaken, but inoculation was voluntary. Haffkine spent day after day carrying his equipment from house to house, examining, persuading and inoculating. "Unfortunately, I do not have the exact figures thus early, and speak only from personal observation," Dr. Levin wrote in his report. "During the three weeks from the commencement of inoculations to my departure from Lanauli a total of 487 persons were inoculated. There were five cases and three deaths among them during this period, whereas among the uninoculated 10-12 persons were struck down by the disease daily and no less than three-fourths of them died. Thus my personal experience at Lanauli fully agrees with the figures on Daman."

The merits and faults of the "Haffkine lymph" were most clearly seen at Daman and Lanauli. The preparation did not give complete immunity but substantially increased the chances of those who were inoculated to escape infection in a plague-stricken environment. Most important of all, it saved lives. The death rate among plague cases previously inoculated decreased by 85-90 per cent. The Russian doctors did not fail to report the success of the "lymph" to St. Petersburg. The prophylactic effect of Haffkine's vaccine was especially obvious when compared with the therapeutic sera of other bacteriologists, who were conducting tests in Bombay. The plague sera of Yersin, Lusting and Galeotti saved no lives.

The oral and written reports of the Russian doctors had important consequences, which were to affect the future of the "lymph" and its creator. On the one hand, St. Petersburg made inquiries regarding the details of vaccine production, and, on the other, public opinion in Bombay was insistently demanding the replacement of General Gatacre's cruel and aimless "hygienic" system with a more flexible system which would include mass inoculation in the plague spots. This public action coincided, in the winter of 1898, with a new increase in the incidence of plague. Hundreds were dying every week. Funeral processions became more and more frequent, and more and more frequently they were stopped by the police: a new government ordinance gave the authorities the right to stop any funeral procession and require the relatives to produce a certificate indicating the cause of death. There were frequent clashes between the population and the police at the Christian cemetery, the burning ghats and the "tower of silence" where the Parsee fire-worshippers buried their dead. In this strained atmosphere *The Bombay Gazette* published several rather sharp Letters to the Editor, in which the writers insistently called attention to Haffkine's vaccine.

"Sir," wrote a reader on January 9th. "I, in common with many citizens, have been asking the question: 'Is everything being done to drive out the plague by the constituted authorities?...' I see vast sums being spent and much labour expended in enforcing quarantine on arrivals into Bombay. As Bombay is simply reeking with plague I ask myself the question: 'What is the use of such quarantine for such arrivals at this time? How can anyone arriving in Bombay further



endanger our common safety?...' The last question I have to ask is the most important of all. 'What has been done to stamp out the plague by means of Professor Haffkine's method of inoculation?' The answer is, nothing or virtually nothing. It has now been abundantly proved I think that the system of inoculation is most efficacious, and that if everyone were inoculated the plague would die out at once. Have the authorities taken any step to avail themselves of this remedy in Poona, Sholapore, Surat, and Bombay? I leave it to the public to answer that question. . . . It is not a question of expense. Lakhs should be spent sooner than allow this state of things to continue, notwithstanding the Government of India may think this is a good time to indulge in unnecessary frontier wars. In nearly every street there should be an inoculation shed or room with proper persons to carry out the work. Poor persons should be paid to be inoculated, especially when they become ill with fever after the inoculation. Native lecturers should be employed to lecture on the subject and handbills should be distributed explaining the efficacy of the system. Doctors should make a house-to-house visitation for the purpose of inoculating the inmates. To Professor Haffkine we should turn our attention. Bombay owes a deep debt of gratitude to this gentleman, and his name will be written large on Bombay's scroll of fame."

The high evaluation of the vaccine by foreigners and the success obtained in Daman and Lanauli raised Haffkine's prestige among the Indian population. For a long time any application of Pasteur's method in India was firmly opposed by Dr. Bahadurjee, one of the oldest and most respected physicians in Bombay. But here the author has before him the minutes of a meeting held on January 13, 1898, at the Bombay municipality, where the problem of plague control became the subject of a violent discussion by the foremost physicians and the representatives of the administration. Prophylactic inoculation encountered practically no opposition. On the contrary, unanimous approval was accorded the speech made by Dr. Bahadurjee, who remarked that the question of prophylactic inoculation against plague seemed to be approached by the authorities in a halting and hesitating manner; if they did not believe what had been claimed for inoculation, it was their clear duty to declare their disbelief; but if they believed that inoculation did no harm, and

was capable of doing good, an immense amount of good, the course they had hitherto pursued was altogether inconsistent. . . . If, then, such was the case, it would be possible by vigorous measures for inoculation to practically stamp out plague in a fortnight.

Doctors Kavasjee, Kharmusjee, Katrak, Fasubhoy, Visram, who were members of the municipality, and others unani- mously agreed to open as many inoculation centres as possible throughout the city. The meeting requested the govern- ment representative to assist the population in obtaining the plague vaccine; to address a circular letter to all the physi- cians of Bombay "suggesting that they promote in every possible way the general use of Mr. Haffkine's inoculation method"; and "to publish in the local dialects and circulate in the city the results of the verification to which Mr. Haffkine's method has been subjected".

Let not the reader begrudge the author these lengthy quotations from the newspapers and official reports, for they bear witness and constitute recognition of the fact that twelve months of combat waged against both plague and human prejudice had not been in vain for Haffkine. It must have been very difficult for him, coming as he did from a far-away land, to gain respect and trust in that huge alien city with nearly a million inhabitants with their diversity of languages, faiths and castes. Political, economic and religious contradic- tions were here intertwined in a complex knot which it would have seemingly taken ages to untangle. Yet Haffkine was able to win the affection of thousands in this tempestuous maelstrom. It was a matter of neither political oratory, nor bribery, nor hypocrisy, nor deception. A strong character, will-power and science were the sole means whereby he won the affection of the Indians. He gave people their most precious possession—life—and asked nothing for himself. He continued to live in the same small room back of the labor- atory, and though he was a prominent government official (bacteriologist of the Government of India) he walked instead of riding, because he had given the horse and carriage assigned for his personal use to the laboratory, where the plague vaccine tests were conducted for its needs.

The year 1898, a year of hard-won and well-deserved victories for the little laboratory, was drawing to a close. The word "little" no longer described it, for a wealthy Indian,

who had had his six hundred servants inoculated in the beginning of the epidemic and had been convinced of the efficacy of these inoculations, had placed one of his villas at Haffkine's disposal.

The Plague Control Committee, which had thoroughly compromised itself, closed definitely in July, and General Gatacre resumed the duties of garrison commander, to which he was much more habituated. Inoculation centres were being opened one after another throughout the city and by mid-year there were over fifty of them. The few articles which Haffkine contributed to the newspapers and journals were read with lively interest in India and in Europe. By now Haffkine could speak of 82,000 inoculations. Since the early days of bacteriology there had not been an inoculator who had done a similar service to so many people.

The plague epidemic was now receding, but it was still dangerous and continued plucking out victims here and there. In Bombay, Dr. Manser died of pneumonic plague. He transmitted the disease to his nurse. In Vienna, an employee by the name of Barish died; he had been working in a laboratory which was engaged in the study of plague. Dr. Muller, who had treated him, also died, as did his nurse. In Lisbon, a doctor named Kamara Pestana became infected when anatomising the body of a plague victim, and died a week later.

Haffkine, who was working in plague-infested localities day in and day out, ran more risk of infection, perhaps, than anyone else. He did not refrain from inoculating people in neighbourhoods where the disease had been killing one inhabitant out of every two. It was his faith in the immunising effect of his vaccine, to a great extent, that gave him the courage to do this. When he came to London a year later he was asked by a *News Chronicle* reporter:

"What about yourself? Did you come down with plague?"

"I had a case of swollen lymphatic glands, but it did not last long," admitted Haffkine.

"You didn't succumb to the disease, then, thanks to the effective action of the vaccine?"

Haffkine smiled.

"There is no telling..." he said, adding after a pause: "I suppose that is so, because there was not a single death in Bombay among the Europeans whom we had inoculated. Not one."

In the autumn of 1898 the Bombay Medical Association, with a membership of several hundred Indian physicians, organised a debate on the subject of Haffkine's activities. These physicians had long refused to notice the success of the inoculation campaign, and some of them had even tried to persuade their patients not to "poison" themselves with the "English infection". To tell the truth, these Indian doctors had in the beginning regarded Haffkine as a competitor. When it developed, however, that none of the drugs known since the days of the Yajurveda\* were of any use against plague, they adopted a rational attitude. The Association passed a resolution which was to be binding on all medical practitioners in Bombay. It said: "In view of the favourable reports on the preventive action of Mr. Haffkine's inoculations, they are to be strongly recommended as being a positive safeguard against plague." This meant the capitulation of the last opponents of Haffkine's vaccine.

Meanwhile, Haffkine and his staff of assistants kept hurrying off to whatever spots had recorded the greatest number of deaths according to the weekly reports, such as the summer residence of the Governor of Bombay at Poona, or some remote village in the state of Baroda, or perhaps the prison in Dharwar. Like the vaccine that saved people from cholera, the vaccine which safeguarded against plague was available to everyone who needed it, without discrimination: convicts and peasants, soldiers and generals, aristocrats arriving on vacation and their servants.

By December Haffkine's vaccine had taken all the hurdles and captured all the prizes. Thousands of doses of the "lymph" were being shipped weekly from Bombay to England, France, Portugal and elsewhere. Momentary outbreaks of the plague occurred now and then in Lisbon, in Marseilles, in Oporto. Nevertheless, now that ampules containing the "Haffkine lymph" were available to physicians, such outbreaks of the "black death" were no longer so dreaded as before. Then term "to Haffkinise" began to appear in British medical journals. The Bombay Municipal Council adopted a resolution expressing gratitude to Haffkine. Queen Victoria bestowed upon him the Order of the Indian Empire. Yet

\* One of the four Vedas, books forming the oldest literature of the Hindus, written in prose and verse before the advent of Buddhism, i.e., before the sixth century B.C.—*Ed.*

another, and, perhaps, still more joyful event came to him on the last day of the year 1898.

In the evening of December 31, he received a call from Dr. Kashkadamov, a Russian physician, who had come to Bombay to replace Levin and Vigura. Since his arrival a few months before, Dr. Kashkadamov had developed a real friendship for his famous fellow-countryman, and his *Letters from Bombay*, which appeared weekly in a Russian hospital journal, contained many warm references to Haffkine's scientific exploit. That evening Dr. Kashkadamov brought Haffkine tidings from Russia. He had just received a letter from Dr. Vigura, who had only recently returned home. Among other items of Russian news, Dr. Vigura wrote that a plague laboratory had been set up at the St. Petersburg Institute of Experimental Medicine. It was located on an isolated island near Kronstadt, on the premises of the dismantled Fort Alexander I. Within the thick walls of former gun emplacements plague serum and the "Haffkine lymph" were now manufactured. In the battle against plague it had already won the first round. Towards the close of the year a plague epidemic had broken out among the inhabitants of Anzob, a mountain village not far from Samarkand, in Central Asia. By the time the doctors reached Anzob only 150 of the 387 inhabitants were alive. Inoculation with the "Haffkine lymph", treatment with the serum and sanitary measures saved the rest from certain death. "Whatever the fate of the 'Haffkine's lymph' in the future," wrote Dr. Vigura, "the name of that indefatigable researcher will be for ever remembered by scientists as of one who saved countless lives."

The December night in Bombay was fragrant with the scent of flowers. Outside the laboratory the Indian winter was at its height, and very much like the month of May in Russia. Their thoughts had carried the two Russians far away. Up north, beyond the Himalayan ranges, a gigantic land was getting ready to usher in the year 1899. In their mind's eye they saw Moscow, with snow falling and the temperature well below zero; the icy waves of the Baltic breaking against the silent walls of the plague control fort; and heard the high mountain wind whistling over the huts of Anzob, where a group of physicians had remained to continue observation.

## The Poona "Kesari" and the British Lion

In the summer of 1899, there must have been hardly a newspaper in London which did not devote at least a few lines to the arrival of Dr. Haffkine, the well-known bacteriologist. Articles were published on the plague in India and on the results of the fight waged by Haffkine for nearly two years against the epidemic. Despite their political and sociological differences *The Times*, *News Chronicle*, *The Liverpool Mercury*, *The Westminster Gazette*, and many others, unanimously called the creator of the preventive vaccine "a benefactor of mankind" and "a great philanthropist". His personal qualities were praised as well as his scientific achievements.

"This is veritably an age of young men," wrote one paper. "Although Dr. Haffkine has already done so much for the prevention of disease, he is not yet forty years of age. And, being a fair man, of medium height and slight build, he looks even younger than he is. There is nothing in the least Semitic about his features; he is the last man in the world whom one would take for what he really is—a Russian Jew. His English is excellent, though he speaks it with hesitation, as if he were translating from his native tongue as he went along. His manner is quiet, serious, and characterised by that modesty which is the hall-mark of true greatness." "The expression of his face is extremely intellectual," added another newspaper.

There could have been no doubt about the feelings of good will of the Englishmen who wrote to the papers to express their appreciation and gratitude to Haffkine for his exploits. No less sincere, undoubtedly, were the medical journals, such as *The Lancet* and *The British Medical Journal*, in which the English bacteriologists summed up with a sense of satisfaction

the results of the first battle that science had given to cholera and plague.

On the other hand, while expressing recognition of Haffkine's personal merits and carrying on a serious discussion of the future of inoculation, the newspaper articles of those days were literally satiated with maxims to the effect, for instance, that by fighting infection "the empire of the white man in tropical countries can be permanently established" (*The Westminster Gazette*), or "the natives should understand that they are indebted to the white man for all these benefits" (*The Daily Chronicle*), etc.

This colonialist agitation, raised in connection with his person, could hardly have been to Haffkine's liking. In the Bombay laboratory, where all the workers, Indians and Europeans alike, were daily exposed to the same risks, any reference to inequality was out of the question. The warm sincerity with which he treated the Indians had gained Haffkine many friends in India, particularly among the local medical profession. He liked the people of India. To a relative who visited him in India he once confessed that the sufferings of the Indian people under the English yoke reminded him of the fate of his own people in the empire of Alexander III and Nicholas II.

Much to the displeasure of official London, which kept harping on the alleged opposition of "ignorant Indians" to inoculation, Haffkine maintained that the difficulties of mass inoculation "were not exceptionally great, inasmuch as inoculation as a measure of disease prevention had been practised in India several centuries before it became known in England". He was equally insistent on mass inoculation in the colonies, though the economy-minded English, apprehensive of the costs involved, held that it was simply impossible to undertake the inoculation of 300 millions. This was merely a political subterfuge, for plague prevention did not at all require the inoculation of the entire population of a city or a village: it was necessary to blockade, by means of the vaccine, the nearest approaches to the focal area.

On June 8, 1899, the entire English press carried a detailed report of Haffkine's lecture before the Royal Society of London at Burlington House. With Lord Lister, famous surgeon and President of the Society, presiding over the meeting, all the prominent British scientists gathered to hear

Haffkine speak on preventive inoculation. He was frequently interrupted by applause, and in the discussion which followed his sophisticated audience heartily endorsed both the idea of inoculation and the way in which that idea had been implemented. Lord Lister thanked the speaker on behalf of the Royal Society for his work in India.

Particularly interesting was the speech of Professor Wright. Between the professor, who was somewhat blunt and sharp of judgement, and Haffkine rather complex relations had long been established. During his first stay in London, back in 1892, Haffkine had suggested to Wright the concept of a typhus vaccine, which later became famous. That did not keep Wright from joining the government Plague Commission, which went to Bombay in 1898-99 to find out just how properly the inoculation campaign was being carried on in India. With perfect impartiality Professor Wright put 25 researchers to work to study the vaccine. The verification went into all the details, even to the extent of looking into the method of packing the vaccine. It was Wright, as a matter of fact, who pointed out, after questioning Haffkine closely, that the vaccine did not have a uniform effect on human beings, a factor which detracted from its preventive properties. Nevertheless, the government Plague Commission found Haffkine's work in India deserving absolute confidence. The government report stated that although Haffkine's research was not based on a new scientific principle, it had resulted in achievements of great practical value in preventive medicine. Now Professor Wright was more explicit: he stated that Haffkine had done a very real service to the entire problem of inoculation and his work had been so well based on experiment that inoculation could now be applied to every disease once its germ had been discovered.

This statement, coming as it did from one of the most eminent bacteriologists and immunologists of his time, was the most exact evaluation of Haffkine's contribution to science. Haffkine had discovered no principle of controlling pathogenic micro-organisms other than the one discovered by Pasteur (unlike those who were to discover antibiotics). Yet he had not merely implemented the ideas of others. His vast practical experience and the innumerable tests he had made in India showed the way to those who, years later, were to apply mass inoculation in controlling many infectious diseases.



The six months that Haffkine was on leave in England were a continuous round of lectures, talks and conferences at scientific institutions and societies. Each lecture served to raise the prestige of the budding science of bacteriology and underscore its great future. Haffkine described the successful application of vaccine in cholera and plague prevention, argued the merits of inoculation against typhus, which public opinion had refused to recognise, and maintained that sooner or later all infectious diseases would be conquered by inoculation.

A dinner given in one of the London clubs in Haffkine's honour had a particularly good press. Among the speakers was Lord Lister, whose address was reported by the papers throughout the world (*The Odessa News* reprinted it from the *Berliner Tageblatt*, and *The Bombay Gazette* from *The Times* of London). "Mr. Haffkine is as modest as he is gifted," said Lord Lister to tumultuous applause. "For years he has heroically fought plague without sparing his strength and his health and continuously risking his life." Coming from a man who had transformed surgery long before the therapeuticians understood the value of Pasteur's discoveries, Lister's praise was, to Haffkine, every bit as precious as that of Pasteur himself.

The summer of 1899 saw the high tide of Haffkine's fame. On August 10 the Haffkine laboratory in Bombay was officially opened, the ceremony taking place in the former magnificent residence of the governor, in the district of Parel. Dr. Kashkadamov, who was present at the ceremony (carried out with much pomp with the participation of the Governor of Bombay and the prominent physicians of the city), reported to St. Petersburg as follows: "The laboratory staff now comprises eight physicians, fourteen medical assistants and secretaries, one special engineer and twenty-one employees. The 'lymph' has hitherto been shipped to Ceylon, Cyprus, Zanzibar, Madagascar, Natal, the Cape Colony, the Island of Mauritius, Hongkong, and many localities in India. Large orders have lately been received from London, Spain and Italy. The laboratory has a capacity of 10,000 doses daily. . . . A tremendous job lies ahead, inasmuch as it will now be necessary to ship the vaccine throughout the world."

While he was taking his vacation Haffkine was appointed to the post of Director of the Bombay Laboratory.

It would be interesting to give a character-sketch of Haffkine, depicting him at this, possibly the happiest time of his life. Unfortunately, little is available that might throw light on his spiritual life. Contemporary London newsmen complained about his reticence. His public utterances dealt only with technical topics. His contemporaries are unanimous in remarking upon his modesty and restraint. His face on contemporary photographs wears an introspective, even haughty expression, and we are unable to fathom the reality behind it or to divine the feelings of this researcher, who had made the difficult ascent of the peaks of science and achieved full recognition of the services he had rendered.

His loneliness was what surprised Londoners in Haffkine. At 39 he was still unmarried. His relatives lived in Russia, which remained barred to him. Wright and Simpson were, perhaps, his closest friends in London. But even they were fellow-scientists rather than intimate friends. Current among the doctors and biologists was a phrase dropped by Professor Wright: "I would say that Haffkine owes his success in India to the fact that he hasn't married, more than to anything else." Wright was a well-known woman-hater and the author of a book against suffrage for women. An outstanding scientist, Wright could talk for hours to prove that love nearly always owed its origin to bacterial toxins and quote disparaging remarks about the weaker sex from the ancient classics. No one, naturally, attached any significance to his opinions on questions of matrimony.

Alexander Hast told the author how he had asked Haffkine back in 1892 why he did not marry. Haffkine, who was then working at the Pasteur Institute and preparing to make a test of his cholera vaccine on his own person in a few months, answered: "Marriage would interfere with my scientific aims." Dr. Halevy, the Rumanian physician who saw Haffkine in Paris in 1923-25, recalls that the latter had confided to him upon one occasion regarding his feelings towards a certain young woman. The marriage had not taken place because Haffkine "did not dare to expose the young woman to a life of hardship in the colonies, where she would hourly run the risk of becoming a widow". These two quotations reveal to some extent the spiritual world of the man whom

many considered incapable of any feeling. Science was, true enough, the main interest of his life, but his heart had remained capable of love, and of renouncing that love.

The expression of aloof politeness, which was characteristic of Haffkine in the presence of others, occasionally deceived even those who were close to him. A nephew of his once came to India from Odessa. Unable to gain admission to Haffkine's office, he managed to send in a card on which he had scribbled the fictitious name of a Dr. Vishnevsky from Russia, whereupon he was admitted, only to find his uncle in conference. The conference was lengthy, and the young visitor, to whom no one paid any attention, was sure that his uncle did not recognise him. When the others were gone, however, Haffkine turned to him and asked him in Russian: "Well, where are you stopping?"

The nephew gave him the name of his hotel, and Haffkine, without changing his expression, called a servant and had him show "Dr. Vishnevsky" to his own house and transfer his luggage from the hotel. The young man was given a room. Dinner was served and supper followed, but the host did not arrive. He showed up in his nephew's room late at night. And what a change had come over him! He wore a dressing-gown, and it seemed that along with his austere black he had discarded the mask of aloofness, which he had worn during the day. "He was altogether a different man," his nephew recollected later. "He asked me to forgive him his behaviour that morning, and with great emotion, even with tears in his eyes, talked of the native land which he had left, wanting to know all about his brothers and sister. Next morning at breakfast he was once more offishly polite, discouraging any attempt at familiarity, so I thought. . . ."

This episode, now over half a century old, was related to the author by the nephew's daughter Yanina Havkina, M. Sc. and teacher on the staff of the Odessa Medical Institute. The episode hardly requires any comment. One may only guess at the shocks the man must have experienced to make him withdraw into his impenetrable shell.

One such shock (possibly the heaviest of all) came in the autumn of 1902. The clouds, of course, had begun to gather considerably earlier. His return from England in the autumn of 1899 had been widely acclaimed in India. The Indians had

had their reasons for that. A protest had been developing in the colony against the "sanitary measures" which had recently been introduced. The herding of people into isolated reservations totally unfit for living had begun again. When the quarantine was over townsmen and peasants found their homes in a dilapidated condition, as a general rule, damaged by the explosion of dynamite charges or burnt out, or else so thoroughly soaked with carbolic acid as to render them uninhabitable. Thus, in one of the districts of Bombay the authorities had caused 3,000,000 gallons of carbolic acid to be poured over some 150 small dwellings.

In the beginning of August 1899 General Rodgers, one of the advocates of "stringent measures", wrote a letter to *The Times* in which he accused Haffkine of obstructing the government's sanitary activities. He qualified Haffkine's attitude as "dangerous, if not disastrous, for India". Haffkine replied in a few polite lines. "When an epidemic has already broken out," he wrote, "and when the sources of infection are not known, and the available staff and funds are insufficient for a wide application of sanitary measures (as was the case in India—*M. P.*), then inoculation becomes more expedient."

In England the controversy did not receive much attention, but the Indian newspapers jumped to the defence of the vaccine and its creator, reflecting the widespread resentment over the methods of plague control recommended by General Rodgers. The situation was particularly played up in the Poona newspaper *Kesari*. "Kesari" is Marathi for "lion". The paper was published by B. G. Tilak (1856-1920) a prominent leader of the Indian national liberation movement. A Left-wing democrat, Tilak considered that in fighting against colonialism any weapons were permissible, violence included. His newspaper made a name for itself by its sustained attacks on the colonial regime. After the Russian revolution of 1905 Tilak urged the Indians "to adopt the methods used by the Russian people in their struggle for freedom". We do not know whether Tilak was personally acquainted with Haffkine, but after the successful inoculations at Poona (early in 1898) the *Kesari* campaigned vigorously for mass inoculation of the population in all the focal areas of plague. It was quite natural that support of the inoculations, coming from Tilak "the mutineer", should have created many enemies for Haffkine among the masters of India.

There was yet another factor which made for worse relations between the colonial authorities and Haffkine. Popular uprisings had become rife along the northern frontier of India in the 1890s. Like volcanic eruptions, discontent repeatedly burst through the thin crust of bayonet-enforced calm. A particularly big uprising occurred in Bengal in September 1897, when 40,000 people engaged in battling the British troops. Lord Curzon, Viceroy of India, spent practically all his term in office (1899-1905) fighting costly wars in the North. He tended to seek the roots of all anti-British outbreaks in "Russian machinations". His administration stopped at nothing. It spread reports of alleged preparations for a Russian armed invasion of India, and an anti-Russian hysteria seized not only Calcutta, but London as well. "Everything Russian continues to get a hostile reception," wrote the tsarist diplomat Lessar in his report to St. Petersburg. "They create difficulties wherever they see a chance, as, for instance, with the appointment of new consular officers, the import of sugar into India . . . so-called sanitary measures designed to hamper our trade in livestock, etc." Dr. Kashkadamov wrote in a similar vein in his *Letters from Bombay*: "Our Russian group was not permitted to settle in Lahore to test the effect of its serum. Reason: English mistrust. Many of them ask us questions which make it clear that they regard us as spies," he wrote.

Those who had started the anti-Russian campaign were frantically looking for facts that might be suitable for provoking trouble. As a result of their efforts, some Anglo-Indian newspapers, seeking to aid them, called attention to the activities of "Mr. Haffkine, a Russian subject, in Bombay". Haffkine, it must be said, had never seen fit to conceal his nationality or his friendly feelings towards any Russians arriving in Bombay. This last factor was considered particularly incriminating, and the following formula was fabricated, which was as senseless as it was insulting: "Haffkine is a Russian. Therefore he is administering poison in order to promote distrust of the English Government among the Indians, injure the health of the Indian people and reduce it numerically, thereby hoping to facilitate the conquest of India by the Russians."

This second deliberately provoked incident (the first had been the "revelations" published in the Calcutta papers at the

time when Haffkine was carrying out cholera inoculations in the northern provinces) ended in failure. The services rendered by Haffkine to the Indian people were too widely known. Some English papers then began to play up the allegedly harmful effect of the inoculations on the human organism. A number of writers came forward to contend that the vaccine stimulated latent diseases and aggravated tuberculosis, rheumatism and syphilis. Such suggestions led to political conclusions. The attack was planned in the hope that no one would publicly refute a viewpoint sanctioned by the authorities. As a matter of fact, there were few in India who dared to challenge the authorities openly. As the Russian consul wrote from Bombay: "The native press has been substantially kept in check by the new law on official secrets and by the strict application of the law on revolutionary propaganda."

Once again the Poona "Lion" showed no fear in standing up for a righteous cause. "The publisher of the *Kesari*," wrote Dr. Kashkadamov, "took a very serious view of the question. He sent Dr. B. Krishna, a well-known and talented Bombay physician, a list of ten questions, asking him to answer them as fully as possible. Dr. Krishna enlisted the aid of many physicians and prominent officials, who supplied him with all the information available. It was on this material, duly analysed and arranged, that he based his answers to Tilak's questionnaire."

It would be superfluous to give all the numerous data contained in the answers to Tilak's questionnaire. The conclusions arrived at by those who took part in this medical enquiry are sufficiently clear-cut without them. Having studied the cases of 120,000 inoculated persons, a score of physicians established that morbidity and mortality were 7 and 10 times lower, respectively, among those who had been inoculated than among those who had not. There may be "harmful effects", it is true, chiefly abscesses due to unsanitary conditions. "In the first place," it was pointed out in the findings, "such cases are numerically negligible in comparison with the great number of inoculations, and, in the second place, a consequent condition need not be ascribed to inoculation just because it happens to follow it."

The findings end with the following categorical statement: "It is now clear that if India is to be delivered from plague

we must use the only effective method, which is the general inoculation of the population." Thus fell through the second calculated attempt to start a quarrel between Haffkine and those whose lives he stood to save. The Poona *Kesari* had proved stronger than the British lion.

For a while the enemy lay low and calm reigned. But a calm surface is often deceptive, and before two years had passed a turbulence once more appeared upon that surface. Over four million people had been inoculated in India by that time, with the inoculation campaign covering vast and distant regions. Haffkine, naturally, was unable either to make all these inoculations himself or to supervise closely the work of the various inoculation teams, and this began to tell on the quality of the work. Disaster struck on October 30, 1902, at the Punjab village of Malkowal, where 19 of the 107 villagers inoculated against plague contracted tetanus and died. An inquest was started, and a few days later the specially appointed government commission reported that the tetanus bacilli had penetrated into the vaccine flask before it was unsealed in the village by the inoculators. It followed that the blame should be placed on Haffkine's laboratory, where the glass containers were improperly sterilised and insufficient precautions were taken in transferring the vaccine from the large bottles to the flasks.

The Calcutta officials, who served on the commission, were not biologists and they were not disposed to listen either to Haffkine, who tried to show that the vaccine could not have been contaminated in the laboratory, or to Dr. Elliot, who had made the inoculations in Malkowal, and who testified that the cork stopper had repeatedly dropped inside the flask and dipped into the vaccine. Dr. Elliot's testimony might have provided a simple explanation of the tragedy at Malkowal, but the commission were not interested in establishing the truth. They were expected to make a certain finding and they intended to make it. So finally they arrived at the conclusion that the accident had been produced by Haffkine's culpable negligence in failing to use carbolic acid in the preparation of his vaccine. Therefore, the entire responsibility for the Malkowal disaster should be put on the Director of the Bombay Laboratory.

The inquest dragged on and on. Removed from directorship of the laboratory, Haffkine spent over a year in efforts to

induce the authorities to make an impartial study of the technique of vaccine production. The letters he wrote were never read. The case was submitted to London. The Indian authorities wanted to obtain an indictment against Haffkine by a scientific body in England. The Lister Institute, however, evaded the issue. Although it refused to consider Haffkine guilty of the death of the 19 Indians, it would not say definitely that he was innocent.

Haffkine continued to fight. "Despite the great strain to which he was subjected he was never discouraged," writes B. Naidhu, the Indian scholar, describing this period of Haffkine's life. Nevertheless, the uncertainty of his position apparently weighed heavily on him. In April 1904, he was definitely relieved of his duties as director of the laboratory and found himself unemployed. After 11 years of toil and struggle he had to leave the country of his adoption, sailing for London early in May to the immense satisfaction of his enemies.

Hardly anything is known of the next three years of Haffkine's life. B. Naidhu wrote: "During his absence from India, Haffkine spent a most anxious time visiting the famous laboratories of Europe and placing his contentions before several unprejudiced scientific men and eminent bacteriologists, who unanimously exonerated him from all blame."

This was written in 1930, that is, after Haffkine's death, and pictures him left alone and lost during the years of his disfavour. Paging through *The Times*, *The Times of India*, *The Lancet* and sundry French publications covering 1906 and 1907, however, the author has been able to establish facts throwing a different light on the matter. Haffkine was quite definitely not left all alone in his hour of trial. As a matter of fact he carried on his crusade, never lost his renown as an international authority in the field of science, and continued to enjoy the support of quite a number of honest scientists.

In 1906 *The Times of India* launched a campaign for Haffkine's full rehabilitation. Its weekly supplement of November 17 contained an article, whose author chose to remain anonymous, which ran in part as follows:

"Since Haffkine's prophylactic first demonstrated its amazing properties, inoculation is the only way along which safety



lies. Day by day the evidence in its favour accumulates. We published the other day figures from Karachi showing that the prophylactic brought a saving of ninety-six per cent in the mortality. The records of the Bombay Corporation show that amongst their own bigaries last year an equally large percentage enjoyed freedom from plague by virtue of the prophylactic treatment. It is hard to conceive how—any man whose judgement has not been warped by ignorance or prejudice can reject the testimony now put before him. Nevertheless to preach inoculation now is to raise a voice in the wilderness. We prefer to be that unregarded voice rather than share the responsibility of those leaders of public opinion who having eyes see not, who having ears hear not, who deliberately reject the safeguard science has placed within reach of the people. . . .”

Men who were ready to stand up for truth soon came forward in London as well. The most ardent and uncompromising of them was the well-known Professor Ronald Ross, winner of the Nobel Prize, who had discovered the carrier of malarial infection. He had made this discovery in India back in 1897, the year when Haffkine made his plague vaccine available. An army doctor, Ross had found it just as difficult to win recognition as did Haffkine the bacteriologist. Using a nondescript microscope, he had spent several years studying various species of mosquitoes in the hope of finding the one that was responsible for communicating malarial fever to human being. Every time he had been on the verge of success the army medical service, indifferent to science, had packed Major Ross to some god-forsaken hole where any scientific work was ruled out for months and years. Roland Ross more than anyone else was justified in making the following statement:

“The country lagged years behind other countries in the scientific study of disease. Laboratories and workers were few. . . . Medical and sanitary administration were in the hands, not of men of distinguished scientific ability, but of ordinary officials climbing upwards by seniority. . . . Discoveries made . . . in connection with cholera, typhoid, malaria . . . and other diseases which cause a fearful amount of suffering among the teeming Indian populations, were looked upon with easy scepticism or even contempt, no adequate public measures being taken to verify or to utilise them.”

In the long run Ross was able to break down the barrier of indifference set up by the colonial administration, and his discovery gained world-wide recognition. Then one day this ardent champion of science took up the cudgels in Haffkine's defence. In a letter to *The Times* of March 11, 1907, he gave a full review of Haffkine's activities from the time he first arrived in India in 1893 down to his expulsion from that country in 1904.

"It is impossible to estimate the number exactly, but more than six million doses of the prophylactic have been issued in India alone; and where it is used during an epidemic it tends to reduce the mortality by about 85 per cent. Perhaps no one except Jenner has saved so much human life."

What, asks Ross, was Haffkine's reward for this brilliant work? The answer he is obliged to give is far from satisfactory.

"Every year sees pensions and orders bestowed lavishly on judicial, military, and administrative officials, on rich traders, and even on political wirepullers; but when we come to ask exactly whom it is they have benefited, and what exactly was the benefit they have conferred, it is sometimes difficult to answer. But here is a man who (not without risk to himself) has saved the life, perhaps, of hundreds of thousands of his fellows. What official, what humanitarian, what man of courage, has done so much? Well, he was certainly rewarded. He was made companion of an Indian order, was paid, and was given a laboratory. . . . Now he has left his laboratory, and the scene of his labours."

Professor Ross completely refuted the allegations of Haffkine's enemies that he was to blame for the infection of the plague vaccine with tetanus bacilli in the Bombay laboratory. Referring to the statement made by several scientists Ross expressed his firm conviction that the tetanus bacilli had penetrated into the flasks containing the vaccine in the village through the fault of the local officials.

". . . But even if the bottle had been polluted there, why was the director, Mr. Haffkine, punished? Were the authorities so absolutely ignorant of science as to suppose that the director of a large laboratory, engaged daily in producing hundreds of doses of a prophylactic made by a complicated process, can do all the work with his own hands—can, by any amount of care and foresight, guarantee that not a single dose

will ever go wrong? . . . it is like punishing a man who has given us a million pounds because one of the coins turns out to be spurious!"

Professor Ross, a one-time lecturer on tropical medicine in the University of Liverpool, was by no means the only one to be deeply incensed by the dirty game started by the Anglo-Indian officialdom. "Some scapegoat is always required on these occasions, and the principle appears to be to choose the person least to blame," wrote Albert Grunbaum, professor of pathology and bacteriology in the University of Leeds, in a letter to *The Times* a week after the appearance of Prof. Ross' letter to the editor. Prof. Grunbaum was even more uncompromising: "If Professor Ross' incisive and convincing letter does not move authorities," he wrote, "we ought formally to petition the Indian Government on the matter."

In Paris, writing in *La Presse Medicale*, a leading journal, Dr. Nageotte-Vilbouchevitch came to Haffkine's support. "The French medical profession cannot pass over in silence this episode of the battle against plague fought by one of Pasteur's most distinguished followers," she wrote. As her English colleagues had done, the French physician analysed the circumstances surrounding the Malkowal tragedy and also reached the conclusion that the director of the Bombay laboratory had not been at fault. "Haffkine does not merit and cannot acquiesce in the commission's censure and the misgivings of the Lister Institute. One can only join Professors Simpson and Ross in admiring the tenacity with which Haffkine continues to fight for the official recognition of a scientifically demonstrated truth," wrote Dr. Nageotte-Vilbouchevitch.

What was accepted by specialists as an incontrovertible truth, however, was entirely unacceptable to Haffkine's enemies. In a letter to *The Times* one Arnold Lapton declared himself against any and all vaccinations; he did not trust either Pasteur or Jenner; for him, no vaccine could end small-pox, cholera or plague. Sanitary measures, according to Lapton, were the only means of ending epidemics. As a matter of fact, he said, in cholera and plague control vaccination was only a "poisoning of the blood".

The author does not know the social standing of Mr. Lapton of 7, Victoria Street, but Mr. Frederic Lilly, who seconded his opinion a week later in *The Times*, signed with

apparent pleasure as a Member of Parliament. Lilly had been a British official in India in his time, seemingly, for all of his arguments are a word for word repetition of what Haffkine had heard time and again from his Indian superiors, namely, that an Eastern people was unable to comprehend and accept vaccination, and that sanitary cordons, disinfection of dwellings and deportation to "isolation camps" in the wilds were much more readily accepted by the Indians.

This war went on for nine months in the pages of *The Times*. Nor was it dropped by the technical journals. Through *The Times*, however, Haffkine's enemies tried to discredit him in public opinion, and most shameful methods were used to that end. It was recalled, for instance, that Haffkine did not have a medical education. "He is not a member of the medical profession. He is merely an outsider who has had the presumption to save many thousands of lives," wrote F. Lilly in another letter.

Ross and other fair-minded scientists, however, refused to let the reactionary clique have their way. Ross wrote three indignant letters to *The Times*, and small wonder, for India, having refused to accept the Haffkine vaccine, was having 20,000 plague deaths every week; yet her rulers entertained no thought of calling the creator of the life-saving vaccine back to Bombay. "The whole story is one which moves us to the warmest indignation. Unless ... our administration becomes more scientific, we shall as a nation inevitably go to the wall ..." wrote Ronald Ross.

It was Ross, incidentally, who first pointed to an aspect of Haffkine's life-story which is of particular interest to ourselves.

"When Mr. Haffkine invented his plague prophylactic, he refused to patent it, as he well might have done, and gave away his rights in it to the Indian Government for the common good. Since then the government have issued ... six or seven million doses, and still continue the manufacture. Taking the royalty which he might have charged at the rate of a shilling a dose ... we shall be able to form some estimate of the actual pecuniary value of his generous gift..." Prof. Ross went on to say that despite the valuable gift received from Haffkine, after the Malkowal incident the Indian Government cut Haffkine's salary in half and even suspended it

for an entire year. In this connection Ross considered that the government must make amends for their blunder: they must either reinstate Haffkine in his position or else "to discharge their debt to him by offering him a reasonable royalty on the millions of doses of his prophylactic which they have used in the past, or may use in the future."

Knowing Haffkine, one may be quite sure that the second alternative had never occurred to him. He had been concerned about the millions who were daily exposed to danger back in India, rather than with financial gain; so that when the argument begun in the pages of *The Times* made him take up his pen he made no mention in his letter to the editor of any injury to his feelings or to his unsettled condition, limiting himself to a dry, precise and detailed recounting of scientific facts.

In June 1907 the British Parliament published a rather voluminous report on the Malkowal disaster. A group of leading scientists made a careful study of the various documents contained therein, such as records of interrogation, vaccination certificates, etc., and arrived at the conclusion that the evidence assembled is entirely insufficient for bringing any charges against Haffkine. It was then that a letter was published in *The Times* over the signature—this time—of ten leading medical specialists. The list of signatories was indeed imposing. They were, besides Prof. Ross: R. Tenner Hewlett, professor of pathology of King's College, of London; W. J. Simpson, professor of hygiene of the same college; Prof. Albert S. Grunbaum of the University of Leeds; R.F.C. Leith, professor of pathology of the University of Birmingham; William R. Smith, President of the Royal Institute of Public Health; G. Sims Woodhead, professor of pathology of the University of Cambridge; E. Klein, lecturer on advanced bacteriology; C. H. Stewart, professor of public health of the Edinburgh University; and their American colleague Simon Flexner, laboratory director of the Rockefeller Institute of New York. The scientists unanimously stated: "We should like to express our approval of the stand which Mr. Haffkine is making to obtain justice in this affair.... We sincerely trust, therefore, that the Government of India will see fit ... to exonerate Mr. Haffkine publicly from the imputations made against him."

Yet nearly half a year was to pass before the slowly turning wheel of justice brought about his official rehabilitation. In the interim his enemies made several more attempts to cast doubt on the usefulness of Haffkine's vaccinations.

Thus did justice triumph in the end. On October 24, 1907, the Indian Government, unable to win the support of scientists in their campaign of calumny, informed him that all charges against him had been withdrawn. He was invited to return to India, where he could have the directorship of any scientific institution he might choose. It was hard for Haffkine to make up his mind. He had a yearning to go to India, where hundreds of thousands were inoculated year in year out with his vaccine, and where his life-work was bearing fruit. On the other hand, he felt a repugnance at placing himself once more under those who had made such cynical use of him in the dirty game of politics. "The sufferer in a prolonged dispute who obtains a verdict in the end is never repaid for his anxiety," wrote *The Lancet* commenting upon Haffkine's feelings in connection with his exoneration.

He made the right decision by following the advice of his friends. As soon as the news of his official exoneration was published, congratulations began to pour in from all quarters of the globe, from scientists, from political and public figures of East and West, from people ordinary in India and Russia. Most of them expressed their conviction that he would return to India to carry on the noble work he had begun.

He wrote to the Secretary of State of the Indian Government that he was prepared to return. However, there was another pin-prick in store for him: it appeared that the post of Director of the Bombay Laboratory was no longer vacant. Haffkine agreed to work in Calcutta. He was becoming indifferent to things. He returned to India broken-hearted and disappointed, according to his Indian biographer, inclined to solitude and self-effacement.

The years flew by, and it might have seemed to an observer that nothing was changing in India: plague and cholera took their toll of lives as before, and the colonial regime subjected the country, as before, to poverty, famine and ignorance. Nevertheless there had been changes. Thus, Tilak, publisher of the *Poona Kesari*, was now in gaol, serving a six-year hard labour sentence. Before, such a sentence would have driven the democrats into submission. But this was 1908, and the

workers of Bombay retaliated to this punishment of their national hero by the first political strike and street fighting in the history of India. India had had enough of patient suffering.

Plague and cholera continued to ravage the country, north and south, but with diminishing force. The inoculated now ran into millions, rather than thousands, and formed a bulwark against the spread of infection. In India alone the number of people inoculated with Haffkine's plague vaccine had risen to more than 8 million by 1909 (to 35 million by 1940, and double that number at the present writing). Dr. L. Beales, the American physician, who worked in the State of Satara just before the First World War, writes: "I watched huge crowds milling around the inoculation centre, tearing each other's clothes in frantic efforts to reach the doctors. To think that there was a time when it was necessary to pay the poor two days' wages for the same thing."

Haffkine observed the development of this new India, of course, and its first strides towards political and cultural independence. At the same time, he could not but observe the famine, poverty and ignorance that still ruled the land. The thought may have haunted him that here was his vaccine, saving the wealthy for a life of joy and the poor for a life of misery. Whatever he may have thought, his contemporaries tell us that the passing years saw him grow increasingly reserved and even sullen. In the autumn of 1915 he reached pensionable age and left India. He could be well satisfied with the legacy he left behind. "... His vaccine, when used in an epidemic, tends to reduce mortality by 85 per cent. What this means when we consider the millions of doses that were issued in India can hardly be conceived," wrote *The Lancet*.

Back in Europe, Haffkine, now 55, was once more called upon to deal with the problem of inoculation. In the autumn of 1915 Great Britain was planning to send against the Germans an expeditionary force composed of Indian soldiers and troops drawn from the Mediterranean area. The greater part of the Allied armies had been inoculated against typhoid by that time, but not against paratyphoid A and B. It was planned to start inoculation with this expeditionary force of several thousand, but in the General Staff opinions differed sharply on this score. The conference of leading British

medical officers and military, which met at Milbank in November, decided to call in Haffkine as an "impartial consultant". After a study of the problem he came to the conclusion that it was essential to inoculate the troops arriving in Europe, but recommended that the vaccine be tested on 300 persons on the spot, in Milbank, in order to make sure that the inoculation would not have any disabling after-effects. Haffkine's authority was sufficient to overrule the opposition of a group of generals, and in January 1916 the paratyphoid vaccine was tried for the first time throughout the fighting area.

When the war was over it was decided to confer upon Haffkine some sort of decoration, and the Indian Government made an attempt to locate its bacteriologist, but failed, for Haffkine had disappeared.



## Epilogue

"It takes a set of extraordinary circumstances for the name of a scientist to pass from the field of science into the history of mankind," wrote Balzac in one of his moments of melancholy, and not without reason, for history, which is chock-full of the names of kings, generals and ministers, had retained in his time very few names of the men who had been concerned with providing us with more food and clothing, better transportation, wider knowledge and range of vision, and easier means of gaining a livelihood. It was difficult for a man of science to find a foothold amid the glittering galaxy of potentates. Still shorter was the list of those whose efforts had been directed to saving life and health, our most precious possessions.

Who, indeed, were the great physicians of the past? How many does each of us know? Perhaps even our modern physicians could name no more than a dozen. Is this another case of injustice? Let us see what we can make of it.

In the past (including the recent past) historians were prone to occupy themselves with personalities of rank. There is no doubt about that. The treatment of the medical profession was somewhat peculiar. Come to think of it, there have been so-called great doctors who did not know that most human diseases were caused by living micro-organisms; who knew nothing about the diseases of the blood and metabolic disorders; and who were powerless against any disease, with few exceptions. Those who as late as the 1870s tried to treat cholera with electricity, plague with an extract of horse manure, and typhoid with hot baths—how many lives could they possibly have saved? Should it be surprising, then, if the names of those medicos have been forgotten?

It is difficult to decide whether pre-Pasteur medicine did more good than harm. Bleeding, for instance, which is used

today with utmost circumspection on account of its dangerous nature, was for centuries looked upon as a cure—all contagious diseases included. Boileau knew what he was talking about when he wrote of the sad fate of the sick in his times (eighteenth century): "One dies with all the blood drained out of him, another dies filled to the brim with Alexandria senna." Reading about the methods used by the doctors of old one stands aghast at human resistance: there had actually been those who survived such treatment!

An atmosphere of cynicism was characteristic of medicine in the old days. Realising that their drugs were of no avail, physicians tended to become hack-doctors and sometimes mere money-grubbers. "You study the macrocosm and the microcosm only to leave things to the will of God in the end," flung Mephistopheles sarcastically at the medieval doctors, nor was the situation very much different when Goethe wrote his *Faust*. With nothing to hope for and believing in nothing, pre-Pasteur medicine produced few outstanding figures. Even so noble and dauntless a nature as Pirogov, the famous Russian surgeon, reflecting on the staggering mortality in hospitals, wondered which was more surprising: the state of things in the hospitals or the fact that the patients still continued to trust the doctors.

Solution of the problem of infectious diseases and the development of effective means against germs were not the only contributions of Pasteur and his followers to mankind. They instilled optimism into medicine, inspired physicians with confidence in their own powers and created a remarkable cadre of scientific workers. Roux and von Behring, conquerors of diphtheria, Ross, who discovered the carriers of malaria, Zabolotny, discoverer of the endemic area of plague, the American Ricketts and the Czech Prowazek, who sacrificed their lives to discover the secret of spotted fever, are but a few of the men whose names are indelibly written on the scrolls of history. The risks they took and their very death were never devoid of hope: the subsequent creation of new life-saving vaccines and sera confirmed Pasteur's theories. Vladimir Haffkine, who led a fearless fight against plague and cholera, rightfully belongs in the ranks of these famous bacteriologists.

Men of science earn their fame in different ways, some through personal courage, others through years of hard work,

still others by a talent for observation. There is one essential requirement for all, however, and that is that they must have been of real service to mankind. Speaking of the value of Haffkine's work, Professor Wright once said that his experiments as such had been more valuable than their results (i.e., the thousands of lives saved), because they had led to the development of the inoculation theory and suggested to scientists the idea of creating bacterial preparations against other infectious diseases. Wright's words may seem paradoxical, yet they are true for all that: the lives saved by Haffkine were not only the lives of those who were inoculated with his own vaccine but also the lives of those who were inoculated with Wright's typhoid vaccine and of those numerous others who lived on because the idea of inoculation had won.

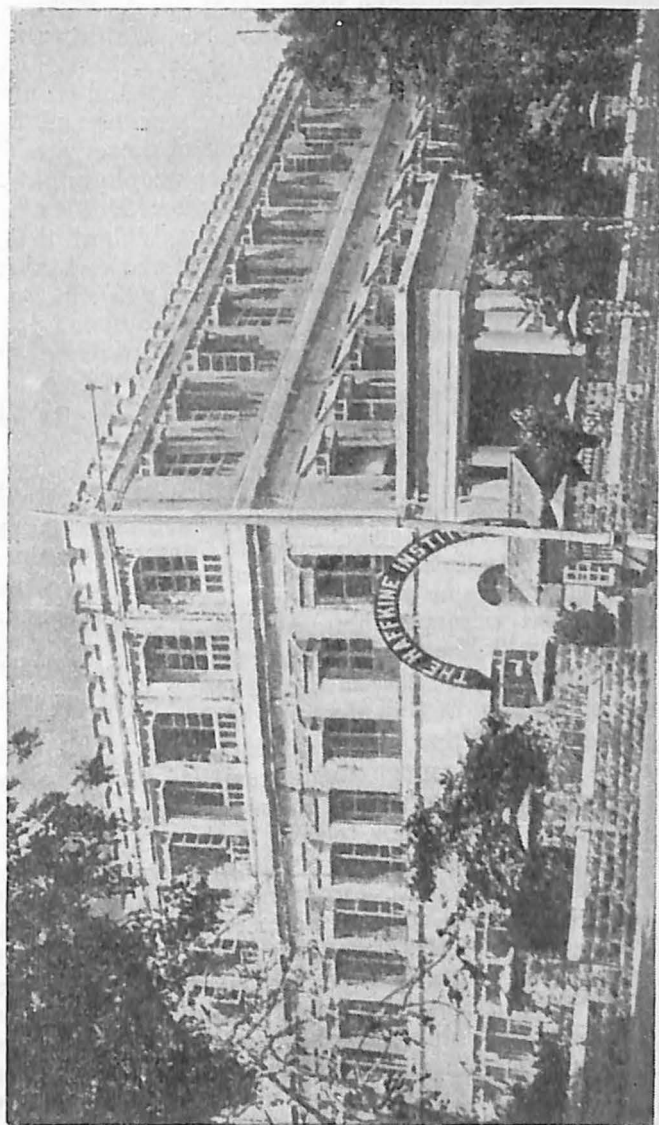
\* \* \*

There is, in Odessa, a seaside boulevard where the pavements are lined with chestnuts and where on fine mornings the old men are wont to gather to sit on the benches, taking in the familiar scent of the sea and the distance-muted sounds of the busy docks.

It was on a September day in 1927, when the first ripe chestnuts were falling on the pavements with a popping sound, that a handsome grey-haired old man appeared on the boulevard, found an empty bench under the trees and sat down with his face to the sea. It was at once perceived that he was a stranger, and the elegant cut of his clothes together with his outlandish walking-stick gave him away unmistakably as a man from abroad. It would have been difficult even for his former friends to recognise in this distinguished foreigner Vladimir Haffkine, who, as a youthful student, last sat here nearly forty years ago.

He had lived in France for the past twelve years, in the little town of Boulogne-sur-Seine. There is a letter in the Mechnikov archives, from which two things may be deduced: first, that in the autumn of 1925 he lived in a small house of his own at 17, rue Victor Hugo; and, second, that he was a member of the board of a charity fund in those days.

His was a very lonely life in France, after he had finally abandoned his work in science. Europe had forgotten all about him. For the men and women of the 1920s in France



The Haffkine Institute in Bombay

and England the exciting epoch of the campaign against plague and cholera twenty-five years before seemed already remote and insignificant. To India, however, Haffkine was still a hero and the saviour of millions of lives. In 1925, at the request of the group of scientists working at the Bombay Bacteriological Laboratory that institution was named The Haffkine Institute, "so that the name of one of those who had been of invaluable service to India and her people might be immortalised", to quote Haffkine's biographer, Dr. Naidhu.

That was a precious reward, perhaps the highest that a real scientist could have wished for towards the end of his life. "I gave the best years of my life to my work in Bombay," Haffkine wrote in a letter to India. "I am unable to recount all the fond memories that are associated for me with those years. My very best wishes to the Institute in its efforts to promote public health in India, and to the members of its staff."

India had by no means forgotten her benefactor. In 1935, several years after Haffkine's death, when plague broke out in the Gujarat region, the Institute was visited by Mahatma Gandhi, a native of that region and the "greatest mutineer in the history of India", as he was called by the colonial authorities. Gandhi came seeking some means of saving his countrymen, who were perishing of the epidemic. He was received by Dr. Sokhey, Major-General of the Medical Service and Director of the Institute. Dr. Sokhey gave us the following account of this meeting, 27 years later:

"We were anxious that Gandhi, that great man of India whose word meant so much to the entire people, should support the effort we were making in the fight against the epidemic. However, we knew that he was a fervent believer in Hinduism, which prohibits the killing of animals. It was doubtful that he would consent to promote Haffkine's inoculations, since the vaccine is produced from plague bacilli nourished on beef broth. Nevertheless, I invited him. The day before we were to meet I was visited by two of his most fervent followers, who insisted that the great Mahatma should not be shown the Institute's work, particularly our experiments with animals. They thought that it might pain him."

Nevertheless, Dr. Sokhey decided to pursue his plan. Upon Gandhi's arrival at the Institute the director brought him to his office and, using figures and graphs, explained to him



Haffkine on his visit to the U.S.S.R.

Haffkine's theories. He stressed the role of rats in spreading plague and even demonstrated the most effective method of catching and killing the animals.

"All this must have been very disturbing for a true Hindu, but I was convinced that even a great man had no right to dispute that which had been verified and proved by science," Dr. Sokhey recollected later.

Gandhi listened and watched attentively, without evincing any disapproval even when several hundred rats were killed before his very eyes. Presently, the meeting was over, and Dr. Sokhey saw his guest to his car. Gandhi betrayed no emotion whatever in regard to what he had just seen, and Dr. Sokhey thought that his plan had fallen through: religious feelings had evidently prevailed. Quite unexpectedly, however, when they had already reached the car, Gandhi suggested that they should return to the office, and, sitting in the same chair where he had listened to Dr. Sokhey's exposition, he repeated that exposition word for word. "I did this," Gandhi explained to Dr. Sokhey, "in order to make certain

that I have understood you correctly," and there and then expressed the desire to be inoculated.

Less than twenty-four hours later Gandhi addressed a vast gathering at Barsad, in Gujarat, urging the people to submit to plague inoculation and to exterminate rodents with all available means. Thus had Haffkine's life-saving work once again scored a victory over the taboos of religion.

Haffkine was 65 years old when he conceived the idea of visiting India and Russia; especially Russia, possibly because expatriates are increasingly drawn to their native land as they grow older. So he arrived in Odessa, the city of his youth.\* We have already followed him to a bench on the seaside boulevard, where he sat gazing at the port. In May 1881, he recollected, several barges had been anchored outside the breakwater, with prisoners in their holds. He himself had been among them, for a policeman had caught him in possession of a loaded revolver. Running out of money, he had frequently worked as a stevedore in that port. It is hard to tell what thoughts ran through the old man's mind; whatever they were, he did not show them, for he had never liked to demonstrate his emotions to others. He had kept his reserve, his mistrust of people, his preference for the solitude which was for him a bulwark against the injustice that seemed to prevail in the world. When he took his walks in the city streets he did so alone, except occasionally, when he was accompanied by the sixteen-year-old son of his old acquaintance Dr. Bardakh.

Haffkine was by no means talkative, but on the occasions that he went out with the boy he asked many questions and required exact and explicit answers. His deep-set eyes took in everything, sometimes even things hardly worth noticing. An American freighter caught his attention at the water-side. It was unloading tractors, and when his young companion mentioned that the Soviet Union would soon be producing tractors of its own, Haffkine turned on him in disbelief: Was it true? Did he know for sure? How could the boy help but know, however, when all the papers were writing about it!

Once he stopped to read a poster in Hebrew. It appeared that here was the headquarters of an organisation which dis-

\* His stay in Odessa was described to the author by his grand-niece, Y. A. Havkina, and the son of Dr. Bardakh, who taught in Odessa University.

tributed land, free of charge, to Jews who wanted to take up farming, and also helped them obtain the necessary equipment. Years later Haffkine's youthful companion was to learn that horrible pogroms used to take place on that self-same street before his time. On that day of September 1927, however, the boy might have wondered what made Haffkine examine the poster so attentively and ask in such detail about the rights of the various nationalities in the new Russia. So far as the boy was concerned, what difference did it make whether a man was a Jew, a Russian or a Moldavian?

Haffkine took his meals with the Bardakh family. Forty years ago Dr. Bardakh had taken part in setting up a Pasteur Centre in Odessa. Haffkine was able to relax in the old doctor's hospitable home, which had welcomed Mechnikov, Zabolotny and Gamaleya in the old days. He and Dr. Bardakh relived the bygone days, recalling the names and events long since a part of history. The building next door housed the Pasteur Centre once upon a time, and looking out of the first-storey window, back in 1886-87, Haffkine used to see Mechnikov's head with its shock of hair, bent over his microscope. He himself, as a student, used to live just round the corner, at 38, Koblevskaya Street. It was there that the friends of his youth used to meet: the Romanenko brothers, Andrusov, the future geologist and academician, Zelinsky, who was also to become a member of the Academy. What had become of them? Stepan Romanenko had perished, Andrusov had died abroad, Zelinsky now lived in Moscow. Among the younger men had been Zabolotny: he was now president of the Ukrainian Academy of Sciences.

At the request of the doctor and his wife, Haffkine recounted some of the events of his life in India.

"But weren't you afraid?" exclaimed the doctor's wife when he came to the first test of the plague vaccine.

Haffkine smiled: perhaps for the first time since his arrival.

"Of course I was, and very much, too," he said. "But I happened to remember your husband, who was the first in Russia to be inoculated with Pasteur's hydrophobia vaccine."

True enough, the name of Dr. Bardakh headed the 1886 list of patients of the Odessa Pasteur Centre.

Leaving Odessa, Haffkine travelled to Moscow and Barnaul, where the rest of his relations were living. For a while he got rid of the feeling that he was a guest in the country.



Seemingly, he almost began to feel at home. He was keenly interested in the life of the Muscovites and the Siberians and he was wont to fall into conversation with his fellow-travelers in the trains. He saw much during the three weeks that he spent in the U.S.S.R. Half a year later, his relatives received several issues of a French magazine with his articles on his trip through the Land of Soviets. The articles were written in the academic manner, yet the reader could discern through the somewhat dry narrative the author's satisfaction with what had taken place in his homeland since the Revolution. He wrote of the warm feelings of the people for their government, the far-reaching plans of industrial and scientific development, of his personal satisfaction with the fact that anti-Semitism was unknown in the country. In this record of his trip there is neither the crabbing characteristic of the émigrés nor the condescension of the "civilised westerner" among the "natives". The Soviet Union, 1927 model, busy repairing the damage made by two wars, brightly hopeful and planning its future, had nothing in common with the country Haffkine had left four decades ago. To him Russia was like a man who had come out of a long and serious illness and was now well on his way to recovery.

There was another thing that Haffkine had understood, however. He was now an old man; he had left his homeland long years ago; and it hardly seemed possible that he could, at this stage, re-integrate himself with the life of the new socialist state. It is painful to feel homesick, yet it is still more painful to experience the feeling of loneliness, of being a stranger, which is the lot of those who return to their native land after too long an absence. The thoughts, the feelings, the reaction to various events of his own kin were different. There was no one to blame for the breach. It was simply that the years and what they had brought: the Revolution, the Civil War, the birth and development of the new social system, had come between Haffkine and his kinsmen. Haffkine envied them, those who had remained at home and who now felt more secure than he himself was able to feel. Nevertheless, he did not find it in him to step over the barrier that history had set up during the forty years of his absence.

He did not go to India. A sick old man, he returned to France and to a still greater seclusion than before. During the

last years of his life he seldom left the cottage in the rue Victor Hugo. Yet, after all, death overtook him away from home.

On October 26, 1930, Reuters reported the death at Lausanne of Dr. Haffkine at the age of 71. He had died in a hotel room, the only home he had known for years in various lands.

Medical journals throughout the world carried obituaries. Friends and enemies alike were given another opportunity to proclaim their feelings towards the deceased. It turned out that he had more friends than enemies. His old colleague, Professor Simpson, had some heartfelt words to say. The newspapers of Delhi, Calcutta and especially of Bombay grieved over the death of India's friend. In Bombay October 27, 1930, was proclaimed a day of mourning.

The world's great depart, and their memory remains with us, though its nature may be different. In Paris, in July 1904, when the monument to Pasteur was being unveiled near the Hôtel des Invalides, a speaker pointed to the near-by tomb of Napoleon and exclaimed:

"Among the different kinds of fame, that which belongs to Pasteur is the noblest and purest."

That is undeniably true, but, unfortunately, it is also undeniable that those who deserve such noble fame seldom live to see it recognised. Monuments remain to be erected to most of those who fought disease, such as the doctors who perished during epidemics, the microbiologists who infected themselves for the sake of experiment, the röntgenologists who became the victims of X-rays, etc. Vladimir Haffkine is one of them, though he was much more fortunate than some of the warriors whose equestrian statues adorn the squares of the world's great capitals, for a living monument to him is the Haffkine Institute of Bombay.

In 1959, when the institute celebrated its sixtieth anniversary, the author was presented with two commemorative albums. They contained a portrait of the founder and a brief biography, but what is more important, they contained a detailed description of the evolution of the laboratory since it was set up by the Russian scientist at the close of the past century. Today the Haffkine Institute is one of the great research centres of South-East Asia. It comprises eleven departments and has a staff of 100 researchers and 520 technical

assistants. The vaccine department, which is one of the most important, produces millions of doses of plague, cholera and typhus vaccines. Its activities include testing the vaccines produced by other medical institutions, training scientific personnel, and carrying on a profound study of immunity. Over the sixty years of its existence, the Haffkine Institute has distributed 270,000,000 doses of plague vaccine, and it is worth noting that the production techniques originated by the founder have remained virtually unchanged to this day.

Officially, the bacteriological laboratory was established in August 1899, but the Indians date its existence from January 10, which was the day when Haffkine first tested the effect of the plague vaccine on himself. More than two thousand persons attended the commemorative meeting held on January 10, 1959. Greetings came from many countries and many public and political figures, including Vice-President (now President) Radhakrishnan and the late Premier Nehru. The founder's name was repeatedly mentioned in the address of President Prasad.

"Dr. Haffkine," said the President, "has set us an example of unstinted service for the benefit of mankind. The eminent bacteriologist's noble character determined the future trend of the scientific work of the laboratory in which he worked. The Institute has inherited his high principles in the field of research." In closing, Dr. Prasad repeated: "The world and we in India in particular owe a great deal to Dr. Haffkine. He helped deliver India from cholera and plague, its two most dreaded epidemics." Thus did the President once again voice India's veneration of a great friend of the Indian people.

The Haffkine Institute continues to develop and prosper. We in the Soviet Union regard it not only as a monument to the courage and humanism of Vladimir Haffkine. Like the Bombay Polytechnic Institute, which was equipped for India by the Soviet Union, and the Bhilai Steel Works, the Haffkine Institute stands as the embodiment of the age-old feeling of mutual friendship of the Russian and Indian peoples and proof that true friendship never dies.



15

**INDIAN INSTITUTE OF ADVANCED STUDY**

Acc. No. \_\_\_\_\_

Author \_\_\_\_\_

Title : \_\_\_\_\_

Borrower	Issued	Returned