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THE MUTUAL STIMULATION OF SCIENCE
AND TECHNOLOGY: UNFAILING OR INTERMITTENT?

A 19th Century Case History

When my research into the life of Waldemar M. Haffkine (1860-1930) convinced me that he pioneered in medical bacteriology at the Pasteur Institute in Paris, where in 1892 he created the first successful anticholera vaccine, it did not seem likely that he would require unusual laboratory apparatus or equipment. That break-through resulted in the British Ambassador's invitation to him to substitute Bengal for Siam to test his vaccine on humans under epidemic conditions, the very first such test in history. The Pasteur Institute was able to meet his laboratory apparatus needs since Metchnikoff was also working there on cholera, although along a different line of approach to the problem.

During the years 1893 to 1895 that Haffkine spent in India, going from village to village where cholera struck, accompanied by two doctors, a few laboratory assistants,

and two horse-drawn carriages with inoculation equipment, inoculating only all who volunteered - a condition the Government of India insisted upon - he kept careful records of his subjects, including their physique, age, race, religion, sex, and caste. Modifications in dosage depended on all those factors. In those two years, 45,000 persons were inoculated, most of them twice, and the death rate from cholera was reduced by 70%. He was keenly aware, however, that he was still unable to evaluate the degree of immunity or how long it lasted.

He fell ill with malaria in 1895 and had to leave India to recover his health, returning to Calcutta in March 1896. Six months later rumors of bubonic plague in Bombay - along with the usual newspaper denials - caused him to be reassigned to that city. He improvised a laboratory in a corridor of Grant Medical College, earlier known as the Framji Dinshaw Petit Laboratory, and with a staff of one clerk and three servants, began experimenting on laboratory animals. By December he was convinced that the vaccine he had created and used on animals was effective.

On January 10, 1897, a doctor agreed to inoculate him in secret with his anti-plague vaccine. The Principal of the College agreed to be a witness. The dosage was four times greater than was later used - which was the case also with the anti-cholera vaccine with which he had injected himself before using it on other humans in India, in order to spare them from the possible risks.

The anti-plague vaccine was in great demand in Bombay and its environs, as well as in the Far East, Africa, and other parts of the world, as the epidemic spread. Not only were his quarters and staff insufficient, even after several expansions, but some of the apparatus and equipment he required was hard to find among the manufacturers in Paris,

London, or Germany. Finally, he decided to design a culture flask to meet his needs. It had a long, narrow neck that joined with wide-curved sides, wide enough from side to side to provide a large flat internal surface for seeding the culture medium, and deep enough from the widest point to the flat bottom to accommodate the stalactite growth of the seeded culture that was the basis for the anti-plague vaccine. The design of the flask was unique. I tried to establish that it was original, not to be found earlier than 1896.

Inquiries sent to manufacturers of glass laboratory apparatus in many countries failed to yield descriptions or photographs of a similarly shaped flask before 1896. Among those to whom I wrote were: The Corning Museum and Glass Works in New York. The Director who is also Editor of the Journal issued by that Museum had never heard of Haffkine, or his anti-cholera and anti-plague vaccines, and did not know anything about culture flasks in use before 1896.

Nor was any glimmer of help forthcoming from the Smithsonian Institution. The Society for the History of Technology could give me no help, and, in fact, encouraged me to write an article when I find some answers to my questions.

The Deutsches Museum in Munich had nothing to offer and suggested that I write to Dr. Eyer, Director of the Max-von-Pettenkofer Institutes für Hygiene und Medicine und Mikrobiologie, in Munich. Nothing came of that. The Librarian of the Joint Library of Glass Technology, Sheffield, England, suggested that a book by Dr. Hovestadt, "Jena Glass and its Scientific and Industrial Applications," may say something about designs or flasks, but it did not. The British Laboratory Ware Association, Ltd., London, was no help. The Glass Manufacturers Federation, London, referred me to an encyclopedia published in Paris, which describes types

of glass for scientific and industrial use, but says nothing about designs.

I have searched libraries for illustrations in trade catalogues published before 1896, but nothing of consequence came of that search. An inquiry sent to the Laboratory Section of the American Public Health Association brought me a quantity of xeroxed pages with photographs of flasks dating back to 1884 and 1885, none of which resemble the Haffkine Flask, and the text deals with the technology of bacteria and methods of cultivation, micro-organisms, etc.

The New Products Manager of James A. Jobling & Co., Ltd., Staffordshire, England, could not help but he was kind enough to turn my inquiry over to the British Glass Industry Research Association, Sheffield, from whom I learned that the Journal of the Society of Glass Technology, 1916-17, published a note saying that "several companies around the turn of the century were making laboratory glassware from glass compositions designed to give better chemical durability..." but, again, said nothing about design, only about glass composition.

However, the Jena Glaswerk Schott & Gen., Mainz, was mentioned as the firm that would be most likely to supply Haffkine's design. Three years ago when I wrote to Professor Dr. Erich Schott he replied that his entire enterprise, along with the archives had been taken over by another company, whose name he did not know, and suggested that I write to that firm. But how was one to find the name and address of that firm?

The Confederation of British Industry in London was suggested as a way to trace the firm name, but that came to nothing.

Zeiss House in London gave me the name of Works Archive V.E.B. Schott Genossen in Jena, German Democratic Republic

lic, to whom I wrote at once, July 20, 1972, from London, asking for answers to the following questions:

1. Did Jena Glaswerk Schott, Mainz, supply Haffkine with the culture flask of his design in 1897 and for how long thereafter? Was such a design made by that company before 1897?

2. If so, have you orders, requisitions, invoices, shipping tickets, to show quantities shipped; details of the first and last shipments, and can you send me photographs of these papers?

3. Have you illustrations of the flask you sent, and can you photograph it, stating its capacity?

4. By what steps did the Haffkine pattern flask come into the possession of Baird & Tatlock in 1920 when it began to be made of pyrex?

No reply to that letter has been received to date.

Some explanation for that Baird & Tatlock firm name is in order. I have extracted from Haffkine's hand-written diaries, to which I have been given access, the names of firms mentioned therein and have sent inquiries to most of them. The replies from those in France, England, and Germany run in the same vein, namely, "the wars have destroyed our archives and catalogues and we regret that we cannot be of help." In some cases, firms were merged with others, but even then, the story was much the same. Some xerox copies of laboratory equipment were sent to me from trade catalogues dated 1928 and 1930, but nothing appeared that resembles Haffkine's culture flask.

Baird & Tatlock sent me a photograph of their Interim Catalogue of 1940 showing "Culture Flasks, Haffkine pattern of Pyrex Glass" which first appeared in their 1920 catalogue.

Haffkine's diaries, numbering 25,000 pages, describe his difficulties in inducing manufacturers of glass

laboratory apparatus to supply his Laboratory in Bombay with quantities of the culture flask he had designed for quantity and speedier production of his anti-plague vaccine. It is more than likely that the British Government did not use its influence to persuade the manufacturers to fill his orders because the Health and Sanitary Department officials in Bombay were not convinced of the vaccine's efficacy and so reported to their Home Office. In fact, a Government note of February, 1898, when the plague in Bombay was decimating the population, written to the Under Secretary to the Government of India states: "...It will not now be necessary for me to write to His Excellency, the Governor-General. As however, the Surgeon General of Bombay is certain to resort to every means that his obstructiveness can devise to place difficulties in Haffkine's way, I think it might be well when issuing the orders (if they have not already been issued) to direct in them that he should report that he has complied with them." The title of the official friendly to Haffkine who wrote the note is not known.

After some time, just when it not clear, Haffkine modified his culture flask design, reducing the capacity from four litres to three litres, by reducing the degree of the side curves somewhat. The firm of Evans, Lescher and Webb supplied 5,000 flasks in July, 1899 but it is not stated whether these were Haffkine's own design or not. That firm was merged with Baird & Tatlock at some unstated date.

E. Cogit & Co. in Paris, shipped flasks in 1904, but further details are not given. In 1902 LeQueux of Paris, also shipped flasks; nothing more is known.

To explain the incomplete information, it must be noted that the Haffkine archives, consisting of seven crates full of papers of all sorts, had not been classified or

catalogued when I first consulted them in 1965. It was not possible, therefore, to isolate this, or any special items of information from the vast quantity of material, which included private letters to and from his family in Russia, copies of government documents, large numbers of photographs, certificates of honors conferred upon him by scientific and medical societies in many countries, the 25,000 pages of diaries, scientific note books, receipts for contributions made to various charities, and receipts for money, clothing, food, sent to his several relatives in Russia during World War I through Hoover Relief Administration channels, to mention just a few.

Classification has been undertaken since then, although in five or six visits made subsequently by me, the work had not yet been completed. This year classification has been completed, I have been informed. Perhaps it will be possible to find some answers to the many questions that still remain.

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