Great lives at Manguinhos

by *José Rodrigues Coura*

OSWALDO GONÇALVES CRUZ
☆ 5.8.1872 ✝ 11.2.1917

The life of Oswaldo Cruz coincided with a period of extraordinary world-wide transformations, starting in the second half of the nineteenth century, when he was born (1872), and continuing until the First World War, when he died (1917). The industrial revolution, Pasteur's work on microbes, Lister's asepsis, the development of sera and vaccines, the discovery that mosquitoes transmitted yellow fever. . . these are just a few of the far-reaching changes that transformed medicine, surgery and public health, and in so doing, transformed the world; changes that, without a shadow of doubt, had a decisive influence on the life, training and achievements of the father of public health in Brazil.

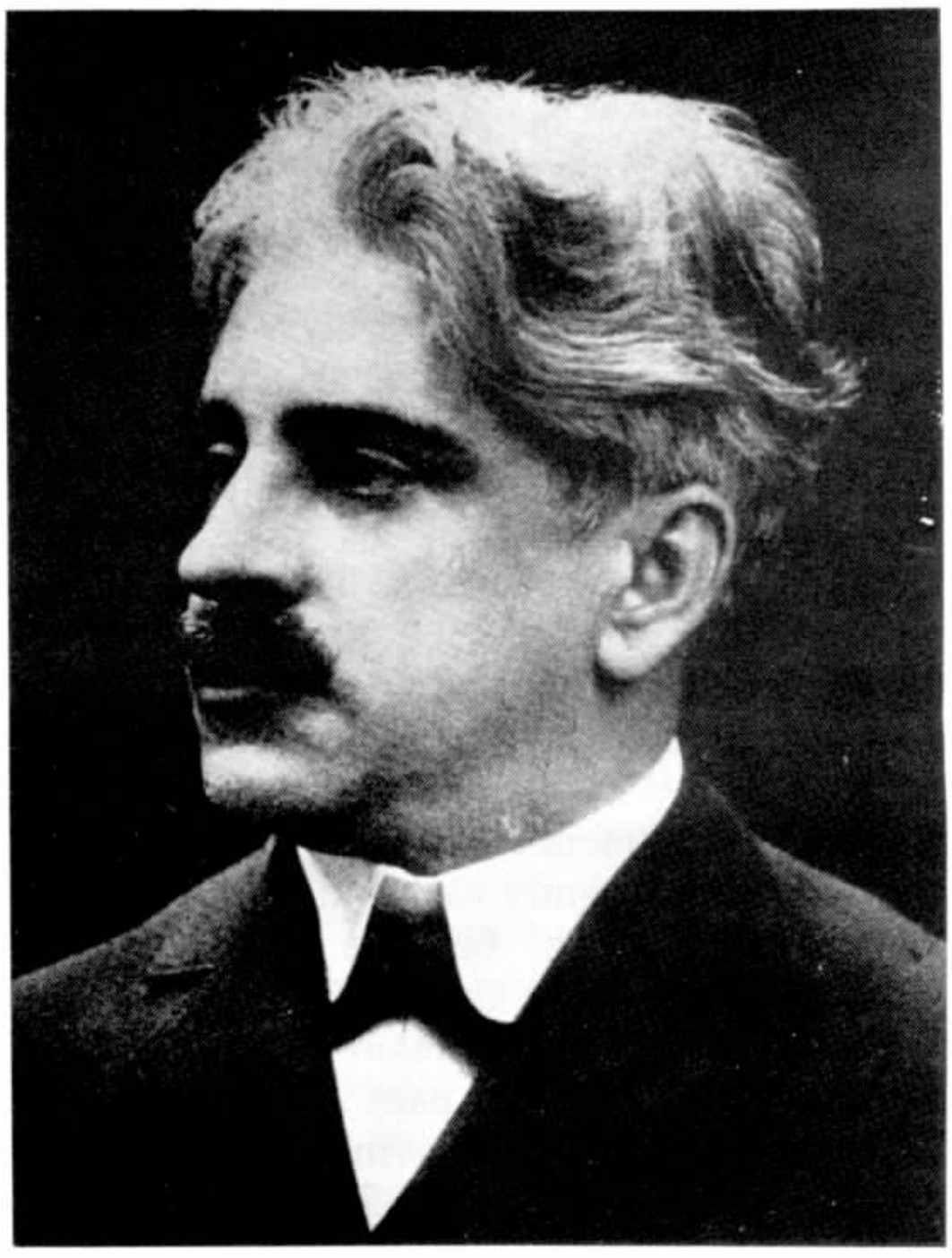
At the end of the last century, and at the beginning of this century, Brazil's public health was in serious crisis. Epidemics of yellow fever, smallpox, bubonic plague and malaria were decimating our population, preventing economic development and impeding trade with other countries. Shipping companies would not allow their vessels to stop in Rio de Janeiro, the nation's capital, because they considered the port to be a health hazard.

Oswaldo Gonçalves Cruz, son of Dr Bento Gonçalves Cruz and Dona Amália Taborda de Bulhões Cruz, was born on 5 August, 1872, in the small, peaceful village of São Luiz do Paraitinga, in the State of São Paulo. The village, located in the coastal hills between the sea-side towns of Taubaté and Ubatuba, was a staging post for caravans transporting minerals, coffee and cereals to the port of Paraty for shipment to Europe and elsewhere.

Bento Gonçalves Cruz, Oswaldo's father, had to overcome many obstacles on the road to becoming a qualified doctor. He only began to study after a period of military service in the war against Paraguay. Soon after, he was contracted as Second Surgeon in the Brazilian Navy, a position in which he earned a medal for good service. In 1870 he left the navy, and in November of the same year he defended his thesis. After receiving his degree, he set up a clinical practice in São Luiz do Paraitinga, and then, as soon as he was established there, he returned to Rio de Janeiro to marry his cousin, Amália Taborda de Bulhões, on 7 October 1871. They had six children, Oswaldo being the first-born and the only son.

The house where Oswaldo Cruz was born (today, the Oswaldo Cruz Museum) is situated in the upper part of São Luiz do Paraitinga, in a street called Oswaldo Cruz, close to the main square which is also named after him. It is a simple construction, built in the Portuguese style, with a high central door that is flanked by two large windows to the left and four to the right. Oswaldo Cruz was brought up in an atmosphere characterized by the simplicity and harmony of the relationship between parents and children; but, as in all good families, there were very clear rules. By the time he was five, Oswaldo's mother had already taught him to read and write.

In 1877, when Oswaldo was only five years old, Dr Bento Gonçalves Cruz moved with his family to Rio de Janeiro, to provide his children with a better education. He set himself up in the district of Jardim Botânico, working both as a doctor at the Corcovado Textile Factory and in



Oswaldo Gonçalves Cruz

The house were Oswaldo Cruz was born – São Luiz do Paraitinga, SP, Brazil.

his own private practice. In 1886, Emperor Pedro II nominated him as a member of the Central Directorate for Public Hygiene; in November 1890 he was promoted to the post of assistant to the Inspector-General for Hygiene; and in 1892 he himself became Inspector-General for Hygiene, only to die in office the same year, on 8 November, shortly before his son Oswaldo's graduation in Medicine.

In Rio de Janeiro, Oswaldo started his schooling at Laure College, and then went on to São Pedro de Alcântara College, before finally going to Pedro II (Official College) to do his university "preparatory exams". He entered the Faculty of Medicine in 1889, at the age of sixteen, and within the space of four years had already completed his medical studies, graduating on 24 December 1892, aged only 20, after successfully defending his thesis (compulsory in those days) on "The Transmission of Microbes in Water". He was not, however, a "brilliant" student in the conventional sense. Although extremely industrious and dedicated, he was handicapped by his shyness in oral exams, and went largely unnoticed by his professors, with the exception of two: Martins Teixeira, a professor of Physics, who took Oswaldo on as a "preparer's assistant" (a kind of student intern); and Rocha Faria, who gave Oswaldo the same position in the Bacteriology Laboratory of the Hygiene Department at the Faculty of Medicine, and who subsequently took him on as "laboratory assistant" at the Institute of Hygiene and Public Health, where Oswaldo did his thesis.

In the final written version of the thesis, immediately after the title page (reproduced here in facsimile) we find a moving dedication: "To the memory of my beloved father and best friend, Dr Bento Gonçalves Cruz". Next comes a preface, which starts as follows: "Since the day we were first able to wonder at the bewitching landscape that opens before our eyes on looking into a microscope containing a sample on a slide; since this marvellous instrument first enabled us to see how many living beings inhabit a single drop of water; since we first learned how to work with – to handle – a microscope. . . an idea has been firmly rooted in our spirit, namely that we will henceforth focus our intellectual effort on instructing ourselves, on becoming specialists, in a science that depends on microscopy".

DISSERTAÇÃO

Cadeira de Hygiene e mesologia

A VEHICULAÇÃO MICROBIANA PELAS AGUAS

PROPOSIÇÕES

Tres sobre cada cadeira da Faculdade

THESE

APRESENTADA Á

FACULDADE DE MEDICINA DO RIO DE JANEIRO

Em 8 de Novembro de 1892

E perante ella defendida (sendo approvada com distincção) a 24 de Dezembro de 1892

POR

OSWALDO GONÇALVES CRUZ

Doutor em sciencias medico-cirurgicas pela mesma Faculdade, auxiliar do Instituto Nacional de Hygiene (Estudos de Microbiologia), antigo interno do Hospital da Misericordia, ex-ajudante de preparador interino da Cadeira de Hygiene

FILHO LEGITIMO DO

Dr. Bento Gonçalves Cruz e de D. Amalia de Bulhões Cruz

NATURAL DE S. PAULO

RIO DE JANEIRO

Typographia da PAPELARIA E IMPRESSORA (S. A.) Successora de Carlos Gaspar da Silva

111 e 113 Rua da Quitanda 111 e 113

1893

19

Front page of Oswaldo Cruz's thesis

The introduction to the thesis includes a scientific study of the various existing instruments for collecting water for bacteriological examination, and it goes on to describe a new instrument designed by Oswaldo himself for this purpose. The thesis is in three parts: "Water and microbes", an extensive review on the physics and chemistry of water, and on its contamination; "General prevention of water-borne infection", a description of water purification processes, including a critical and comparative analysis of the first water filters; and the third and final part of the thesis, "An exposition of processes and techniques", which deals with collection of water for exami-

nation and with enumeration of microbes, describing all the relevant processes in minute detail and illustrating its points with experiments carried out by Oswaldo himself at the Institute of Hygiene and Public Health, where he was working. Finally, as was common practice at the time, the thesis concludes with three "proposals" for each of the 29 departments whose courses Oswaldo took while studying at the Faculty. It is a quirk of irony that his proposals to the First Department of Clinical Medicine should specifically mention the very disease that was to kill him 24 years later: "the nephrite and its effects on the heart".

Following his father's death, Oswaldo Cruz was obliged to take responsibility for a large family. He began to work as doctor at the Corcovado Textiles Factory, like his father before him, and also took on his father's private medical practice. On 5 January 1893 he married Dona Emilia Fonseca, the daughter of Commander Manoel José da Fonseca and Dona Elisa da Cunha Fonseca. They had six children: Elisa, Bento, Hercília (born in Paris), Oswaldo, Zahra (died at two years of age) and Walther, who went on to become one of Manguinhos's most prominent scientists.

When he was still a student, Oswaldo Cruz met Francisco de Castro, a renowned clinician and professor of Medicine, "the divine Master", who was his father's doctor. On observing Oswaldo's learnings towards research and public health, de Castro advised him to go and study at the Pasteur Institute in Paris. Later, in a dramatic twist of irony, de Castro died of pulmonary plague, which he caught off a patient whom he examined in October 1901 during the great turn-of-the-century epidemic which Oswaldo was combatting at the time.

Another extremely important meeting, both for Oswaldo and for the future of public health in Brazil, was with Dr Egídio de Sales Guerra, the famous Rio de Janeiro clinician. Oswaldo summoned him in August 1894 to give an opinion on a patient and also to treat his own daughter, Elisa. After the consultation in Oswaldo's home, Dr Sales Guerra was going down to the study to write a prescription when, much to his surprise, he stumbled upon a modern analytical and research laboratory. Oswaldo explained: "It was a present from my father-in-law, a wedding present" (the most treasured of all his presents, no doubt). From that moment on, the two men became firm friends, and Oswaldo was invited to set up and run the laboratory in Rio de Janeiro's General Polyclinic, where Sales Guerra was the head of the internal medical service and Silva Araujo the head of dermatosyphilography.

At the beginning of 1896 Oswaldo Cruz decided to take Professor Francisco de Castro's advice; he went to study in Paris, with the financial support of his father-in-law, an intelligent and wealthy man. Together with his family, he moved into 26 Rue Marbeuf, off the Champs Elysées, not far from the Faculty of Medicine.

He stayed in Paris until the second term of 1889, studying both at the Pasteur Institute, under the supervision of Professor Emille Roux, and in Vilbert and Ogier's toxicology laboratory. At the same time he took a course in urinary tract diseases with the famous Professor Guyon. As the first Brazilian ever to study at the Pasteur Institute, he was exempted from the customary obligation to pay for experimental materials and animals. This privilege may have been granted in deference to Emperor Pedro II, a financial benefactor and emeritus, whom the Institute honoured with the unveiling of a sculpted bust. While studying at the Institute, Oswaldo Cruz struck up a friendship with the Russian scholar, Metchnikoff, who spoke Portuguese, having learned it on the island of Madeira, where his first wife had died.

When he returned to Rio de Janeiro in the third term of 1889, Oswaldo Cruz once again took up his position as head of the laboratory at the General Polyclinic, and also set up his own analytical laboratory on the first floor of No. 10, Travessa de São Francisco (known today as Rua Ramalho Ortigão), next-door to the consulting rooms of Drs Cândido de Andrade and Luiz Barbosa. He was also invited by Francisco de Castro to be the latter's assitant at the Faculty of Medicine, but he turned the ofter down because his mornings were taken up with working as the doctor at the Corcovado Textiles Factory, in place of his father, to whose memory he remained devoted for the rest of his life, even signing his name as Gonçalves Cruz.

At the end of 1899 several suspected cases of bubonic plague came to light in the port of Santos, in the State of São Paulo, and Oswaldo Cruz was sent by the Directorate of Hygiene to investigate the situation. He confirmed the suspicions, thereby preventing the spread of the disease (which was new to Brazil) to Rio de Janeiro. In the wake of this outbreak of bubonic plague, Baron de Pedro Afonso, director of Rio's Municipal Vaccine Institute, was given permission by the city mayor, Cesário Alvim, to use the farm of Manguinhos as the site for a new "Federal Serotherapeutic Institute" – a somewhat grandiose name for an institution that didn't yet possess a single technician capable of preparing vaccines. When the Baron requested the Pasteur Institute to recommend a suitable techni-

cian, he was informed by Professor Roux that the man for the job – a recent trainee of the Pasteur Institute itself – was already in Brazil: Dr Oswaldo Gonçalves Cruz. The Baron happened to have been an old school friend of Oswaldo's father, and immediately invited him to be Technical Director at the new Institute, which in reality was nothing more than a laboratory for preparing anti-plague sera. However, when Oswaldo Cruz drew up a list of the materials that he would require, the Baron – a famous Rio de Janeiro surgeon with a strong authoritarian streak – ordered the deletion of various items. Without further ado, Oswaldo simply resigned his position before he had even taken it up. Only when the Baron had authorized the purchases in their entirety and personally sent for him, did Oswaldo Cruz take up the post, on 23 July 1900. By the end of the same year, the anti-plague serum and vaccine were already being used to treat and prevent the disease. Independent tests carried out subsequently by Professor Roux in Paris and Professors Kolle and Otto in Berlin confirmed that the serum and vaccine were of a very high quality.

At the end of 1902 a crisis was precipitated by the fundamental incompatibility between the Baron and Oswaldo Cruz, leading both men to resign. A few days later Oswaldo returned as sole director, at the age of 30. The way was now open for institutional development.

News of the "new school" was soon being passed around in medical circles, and medical students interested in carrying out research for their theses began to flock to the Institute, initially at the invitation of Oswaldo Cruz himself – as in the case of Ezequiel Dias, Figueiredo de Vasconcellos and Cardoso Fontes, his first three young acolytes – and subsequently in a spontaneous fashion. This second wave included names such as Carlos Chagas, Henrique Aragão, Alcides Godoy, Arthur Neiva, Gaspar Vianna, Henrique da Rocha Lima, Gomes de Faria, Aristides Marques da Cunha, Olympio da Fonseca Filho, Lauro Travassos, and many, many more of Brazil's most prominent scientists. Adolpho Lutz came later, having already acquired a scientific reputation in São Paulo. Oswaldo Cruz was a born psychologist and had a magical gift for awakening in young people a desire to learn and a passion for research; he himself often worked over 14 hours a day. On Wednesdays he held journal club meetings, at which each participant would present summaries of a few articles for subsequent discussion; the meetings, which began at eight in the evening, would often go on into the small hours of the morning. Convinced that the institute needed a hard core of more experienced researchers with broader expertise, he brought Adolpho Lutz from São Paulo to lay the foundations for medical zoology, entomology and parasitology, and also contracted several famous German scientists: S. Von Prowazek and Max Hartmann for protozoology, G. Giemsa for biochemistry, and Hermann Duerck for anatomical pathology.

In January 1903, Dr J. J. Seabra, the Minister of Justice and the Interior – a portfolio that included the Department of Health – invited Sales Guerra, who was his private doctor, to head the Department. Sales Guerra politely turned down the offer on the grounds that he was not a specialist in public health; and, after a lengthy discussion about the eradication of yellow fever in Cuba, news of which he had heard from Oswaldo Cruz, he suggested the latter for the job. "Who is Oswaldo Cruz?" the minister asked; to which Sales Guerra replied: "He is the director of the Manguinhos Institute, an outstanding bacteriologist and a distinguished former student of the Pasteur Institute in Paris". Oswaldo was introduced forthwith to the minister, and took the opportunity to explain his plan for the eradication of yellow fever. The minister, much impressed, put forward Oswaldo Cruz's name for the position of Director of Public Health in his next despatch to the President of the Republic, Rodrigues Alves. The President, startled by the nomination of someone he had never heard of, asked: "Dr Seabra, who is this Oswaldo Cruz?" to which the minister replied, "Mr President, I don't know him either; but a friend of mine, whose judgement I trust, introduced the man to me as an outstanding hygiene specialist who would be capable of eradicating yellow fever, using an American method". Still not satisfied, the President made enquiries through his son Oscar Rodrigues Alves, who was coming to the end of a course in medicine, and it transpired that Oswaldo Cruz's ideas were very highly regarded in medical circles. Soon after, on 23 March 1903, a decree was issued, nominating Oswaldo Cruz as Director-General of Public Health. Within ten days Oswaldo Cruz had not only taken office (26 March), but had also presented his plan for public health reform to the government (1 April). In his brief inaugural address, Oswaldo Cruz ended by declaring that his motto was "Work and Justice"; and when presenting his health plan, he pledged that he would have controlled yellow fever within three years as long as he was given the necessary "power and resources".

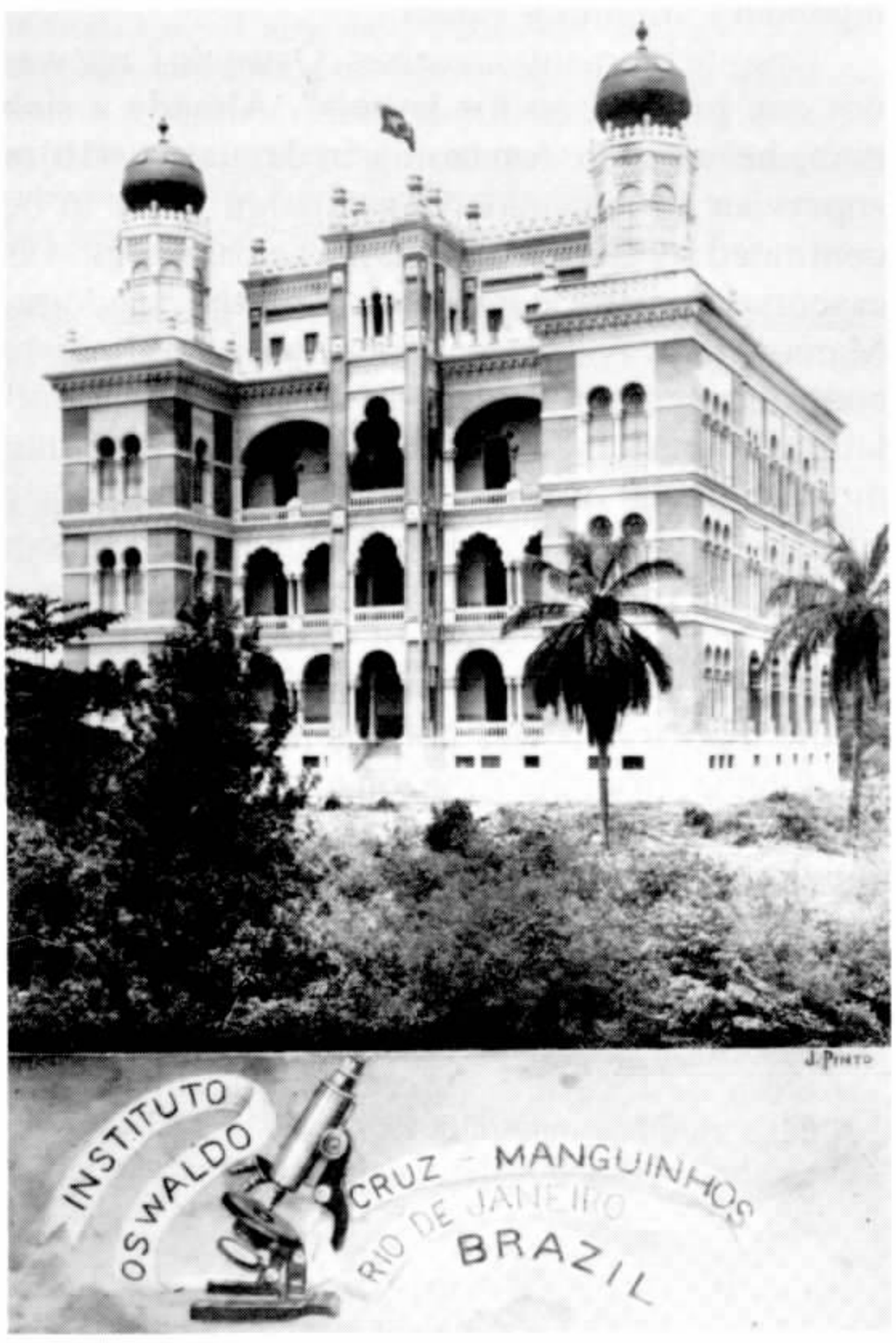
The press and the public reacted to the nomination of Oswaldo Cruz with "suprise and disappointment". Hardly anybody had heard of him.

The medical and academic establishment, as well as being surprised and disappointed, asked themselves how it was that Oswaldo Cruz had been chosen for such an important job. In the resulting climate of scepticism and envy, scorn was pured on Finlay's theory about the transmission of yellow fever via mosquitoes. The theory, which had been proved correct by Walter Reed in Cuba, was applied with great vigour by Oswaldo Cruz in Rio de Janeiro. Immediately after taking office, Oswaldo Cruz – with the assistance of Dr Carneiro Mendonça – implemented a program of preventative measures against yellow fever and bubonic plague, involving house-to-house fumigation with sulphur vapour, treatment of rooves with kerosene, and eradication of mosquito breeding sites and rats throughout the city. At the same time he set about winning approval for his public health reform program, which the government presented to the National Congress on 15 June 1903. After a series of tough debates in Congress, the plan was approved by the Lower House on 15 December, and soon after by the Senate, with official publication of the new law in March 1904.

This period saw an explosion of opposition to Oswaldo Cruz's program in the press, with caricatures, satirical ditties and verses, editorials, scientific critiques, judicial findings and pronouncements, slanders, threats and insults. Undaunted, Oswaldo Cruz not only expanded the program, but even collected the caricatures and criticisms published in the press, such was his conviction that the plan would yield results. The fever of opposition reached its zenith on 14 November 1904 when, in defiance of mandatory vaccination against smallpox, the cadets at the Military School staged an armed rebellion against President Rodrigues Alves. The rebellion was put down within three days, but the government continued to be attacked from all sides – in the press, in Congress and in the streets. Despite all this, the government held to its course, such was its faith in Oswaldo Cruz.

The measures began to yield results. Deaths from yellow fever fell from 984 in 1902, to 584 in 1903, 48 in 1906, 4 in 1908 and 0 in 1909. Rio de Janeiro was now free of the disease. Meanwhile, there had been no sign of bubonic plague since 1906. The only blot on the landscape was smallpox, which not only failed to decline to the same extent, but even escalated in 1908 following inadequate implementation of the law on mandatory vaccination. As a result of this failure Oswaldo Cruz submitted his resignation, but the President refused to accept it.

After the initial success of his eradication campaign, Oswaldo Cruz decided to expand the Manguinhos project, with a view to establishing an institution that would be a landmark in Brazilian public health. Construction work on the Manguinhos Castle began in 1904, on the basis of a majestic design that had been conceived by Oswaldo himself. On one occasion, an admirer of the castle abruptly asked why Oswaldo had chosen that particular style, to which he replied: "Because it looks nicer". Various theories have been put forward as to why he chose the style, but none of them is totally satisfactory. No documents survive that might give a clue, and Oswaldo himself was entirely discreet and silent on the subject. In all probabilities the design was inspired by the Alhambra Palace in Granada, Spain, the "red citadel" or seat of government, constructed at the order of Muhammad al-Ahmar on the hill of Sabika, far removed from the city's commercial centre. The Alhambra and the Manguinhos Castle alike are built in an islamic moorish style, in the Spanish-Arab manner prevalent from the ninth to the thirteenth century. Both are similar in their use of mosaics, ceramics, sculpted stucco and painted wood-carvings, and in their spatial organization, with an internal courtyard surrounded by buildings. Even the hill on which our castle stands is reminiscent of Sabika.



Castle of Manguinhos

Without a doubt Oswaldo Cruz intended the monument to demonstrate to the world that Brazil had established a New Public Health Order.

In 1909, to mark the completion of the new, expanded Manguinhos project, Oswaldo Cruz inaugurated the *Applied Manguinhos Course.* It was nation's first biomedical post-graduate program, and nurtured a new and unprecendented generation of Brazilian researchers and health experts. In the same year he founded the *Memórias do Instituto Oswaldo Cruz,* today one of the world's most pretigious biomedical journals, with a publication history of over 80 years.

In 1907, Brazil was placed first out of 123 competing nations in the International Hygiene Exhibition in Berlin. This success reflected the high level of scientific achievement at the Manguinhos institute, which, in honour of its first director, came to be called the Oswaldo Cruz Institute. It was a period of groundbreaking research, exemplified by the discoveries of the exoerythrocytic cycle of *Haemoproteus columbae* in pigeons by Henrique Aragão in 1906, of the vaccine against anthrax by Rocha-Lima, Alcides Godoy and Gomes de Faria in 1906/1908, and of Chagas' disease by Carlos Chagas in 1909. By any standard, these were glorious achievements, and they brought international recognition and renown to the Institute and its almost legendary founding father.

Despite his many successes, Oswaldo Cruz was not one to "rest on his laurels". Already a sick man, he went to Amazonia in January 1910 to supervise an anti-malaria campaign (later to be continued by Carlos Chagas). The campaign was essential for the construction of the Madeira-Mamoré railway. He also supervised a yellow fever control program in Belém do Pará, and the installation of basic sanitation in Manaus, enduring months on end of travelling in an old and poorly equipped boat between Rio de Janeiro and Belém despite his propensity to sea-sickness. He was a patriot who, in the words of Arthur Neiva, "had a place in his heart for the whole of Brazil – a whole that to him was homogeneous, dense and irreducible, from the Amazon to the Rio Grande".

Despite his protestations, Oswaldo Cruz was elected to the Brazilian Academy of Letters on 11 May 1912. In his induction ceremony, which took place on 26 June 1913, he was officially welcomed by Afrânio Peixoto, who greeted him with the words: "You rank with the great poets who do not create verses. Verses are not necessarily poetical; and yet in your life and work there is poetry in abundance".

Plagued by declining health, Oswaldo Cruz finally took the advice of family and friends, and stepped down from the directorship of the Institute. (The job, as well as being demanding in itself, had recently become even tougher due to a series of personality clashes among Oswaldo's colleagues). He was nominated by the President of the State of Rio de Janeiro to the recently created mayorship of Petrópolis, and took office on 17 August 1916, "in an entirely intimate ceremony devoid of any solemnity whatsoever", as was his wish. The next day, 18 August 1916, he presented an ambitious administrative program, covering everything from basic sanitation, education and public health, to parks, gardens and tourism, and even an electric tram link to Rio de Janeiro. The program, however, was never implemented owing to his state of health, which worsened steadily until he went into a coma on the morning of 11 February 1917. He died later that same day, at ten past nine in the evening, in the company of his son and young doctor, Bento Cruz, and a few intimate friends. Thus was the passing of a man who, in the words of Clementino Fraga, "represented a singular moment in the scientific life of Brazil"; a man who, as Carlo Chagas said when paying his final respects, "to the honour of our time, is borne away on the echoes of a professional redemption and on the blessings of a grateful nation".

Oswaldo Cruz was great in life, and even greater in death, witness his "last wishes", which cannot be reproduced here for lack of space. According to Sales Guerra, they represented "a breviary of culture, moral health and sincerity".

But perhaps Oswaldo was best summed up in a sentence that we can find in the preface to OPERA OMNIA, written by his own son, Oswaldo Cruz Filho: "What people say of him, and what I know of him, shows that he was worthy of that most pure and complete of all possible judgements: He was a Man".

Photographies: Acervo do Arquivo Iconográfico da Casa de Oswaldo Cruz – Fundação Oswaldo Cruz.