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Alexander J. Orenstein

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MEMORIAL ADDRESS —
CARLOS JUAN FINLAY, CLASS OF 1855

DR. ALEXANDER J. ORENSTEIN

Honorary Fellow Royal Society of Medicine, Fellow Royal Society Tropical Medicine and Hygiene (Hon.); LL.D. (Hon.); C.B.; C.M.G.; C.B.E.; Chief Medical Officer, Rand Mines Central Mining Corporation (Johannesburg); formerly Director General Medical Services, Union of South Africa Defense Forces (World War II); formerly Director of Medical Services (East Africa); formerly Acting Director, South African Medical Corps (World War I); formerly Panama Canal Medical Services (1905-1912). Pre-eminent in the field of industrial medicine. He has applied the theories of Gorgas to secure the welfare of vast numbers of men employed in mining operations.

First of all, I must express my sincere gratitude to the authorities of my Alma Mater for the honour and privilege of participating in this notable occasion. I pray your indulgence if I fall below your expectations. In the words of Daniel Everett, I beg you —

“Don't view me with a critic's eye,
But pass my imperfections by.”

There is one thing I can promise you: I shall not forget the injunction of Ecclesiasticus: “Let thy speech be short, comprehending much in few words.”

The purpose of this meeting is to honour the memory of a distinguished son of Jefferson, Carlos Juan Finlay, or as he signed official correspondence in his capacity as Chairman of the Havana Yellow Fever Commission — Charles Finlay.

We honour the memory of Finlay because by his prophetic vision and by his persistence he inaugurated a new and tremendously important phase in the never-ending struggle of man against the ravages of disease.

I must justify the use of the strong expression “tremendously important.” It may be hard for most of my hearers to realize how very important urban yellow fever was in Finlay's time, and before his time. Here are just a few instances of what it has done in this country alone; and it must be remembered that the disease also broke out in epidemic form many times in South American cities, in Cuba, and elsewhere. In the 18th century the then three principal ports in this country were attacked with tragic consequences. There are records of some 41,000 deaths in New Orleans, 10,000 in Philadelphia and 3,400 in New York. In the 19th century it is estimated that there were 100,000

deaths from the disease in the United States. The financial losses due to quarantine measures are estimated at about a hundred million dollars in the one year, 1878. At present purchasing power of money that would be about five hundred millions.

The psychological effect of an outbreak of urban yellow fever was overwhelming. The life of the affected community was profoundly disorganized and fear stalked the streets. It is within my own experience that workmen from the States left Panama on the same ship on which they arrived when they saw funerals and were told it was "yellow jack." There was an amusing incident concerning a member of a Congressional Committee, originally of seven members, on a visit to Panama. Six only arrived and were met by the then Quarantine Officer, the late Major La Garde. A load of coffins were being unloaded from the ship, among these six grand metal caskets. One of the Commissioners asked La Garde for whom these special coffins were intended. La Garde's answer—"Mr. Burr didn't come down, you know"—sent the enquirer post-haste back on board.

Indeed, at one stage, when yellow fever broke out in Panama City, Colon and few other places, twenty-two of these in the Headquarters building, there was a rush to get away which seriously threatened the work on the Canal.

It is merely a statement of fact to say that the Panama Canal could not have been built if yellow fever had not been eradicated.

It is against this background that the importance of Finlay's advocacy of the mosquito transmission of yellow fever must be judged.

Finlay was born on December 3rd, 1833, in Camaguey, Cuba. A loyal and devoted Cuban, he was not of Spanish blood but the son of a Scotch father and French mother. His father was a doctor, educated in Edinburgh and France. Carlos Finlay was educated partly in Cuba and partly in France, where he was sent at the age of eleven in 1844 to live with a relative. There he developed chorea, which left him with a lasting slight impediment in enunciation. He returned to Cuba in 1846. In 1848 he went to France again with his family, but the revolution was on and they went to Germany, where Finlay was at school for a year. Later he returned to France, where he entered the Lycee at Rouen. He thus acquired a good knowledge of three languages, French, English and German, in addition to Spanish. It is recorded by his son that he also read easily Latin and Greek, and was a good mathematician and physicist. His intention was to study medicine in France, but an attack of typhoid caused him to return to Cuba. After recuperating, he went with his uncle to study medicine at Jefferson, where his preceptor was John Kearsley Mitchell, father of S. Weir Mitchell.

It is fascinating to recall, however briefly, what Jefferson was like when Finlay was a student. Professor Goodner, to whom and whose secretary I am indebted for much factual material in this discourse, tells me that the faculty

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consisted of seven: Dungleon, Huston, Bache, Pancost, Mitchell, Mutter and Meigs. The last three were well remembered in my time—I wonder, are they now? The course of study was supposed to be three years, but only two of these had to be spent at Jefferson, at a total cost of \$35! At the end of the course a thesis had to be presented.

In Finlay's time here there were 31 States in the Union. The population was about 30 millions, of whom some 3 millions were slaves. The army had the imposing strength of some 11 thousand, all ranks.

In 1855 bacteriology was undreamed of: Pasteur was still working on crystals. Robert Koch was a boy of 12. Lister was a dresser in University College Hospital, London. Walter Reed a child of 4, William Crawford Gorgas an infant.

In our profession, opening of the abdomen was a deadly hazard. Surgeons prided themselves on their dexterity and speed, and could and did do amputations and cataract operations in the same morning session, working in their old frock coats, often well decorated with pus and blood. Anaesthesia with ether and chloroform was less than a decade old, and not yet whole-heartedly accepted. There were no X-ray machines, no cardiographs, no sphygmomanometers, none of the many gadgets some now have to cart about when they go on their rounds. There were no laboratories and clinical pathologists to bless or damn, according to whether their reports helped or bedevilled.

Specialism, the modern development which threatens to divide our profession into isolated horizontal layers, was unknown. It was still possible for the average doctor to compass all the knowledge and skill he required to serve the community reasonably well and with an untroubled conscience.

Such was Finlay's world when one of a class of 257 he received his diploma of Doctor of Medicine from Jefferson on March 10, 1855.

Although he was advised by Mitchell and others to practice in New York, he decided to return to his native land. In 1857 he passed the examination of the Havana University, a necessary step to enable one to practice medicine in Cuba, and started in general practice and ophthalmology. In 1860-1861 he went to Paris and attended clinics in general medicine and also eye disease.

He married in 1865 Miss Adele Shine, born in Trinidad, both of whose parents were Irish, and who was a most accomplished lady.

Finlay led a busy professional life, playing a full part in the cholera epidemic in 1867-1868. He however found time for research, no easy matter in days when there were no laboratories to which he could turn for help. He also wrote on many subjects, such as leprosy, beriberi, cholera and relapsing fever. His great asset was determination—once he started on a subject, he pursued it despite all obstacles put in his way.

His first connection with yellow fever was in 1879, when he was appointed by the Cuban Governor-General to cooperate with a United States Commission sent to Cuba to study yellow fever. His work with this Commission appears to have influenced him to the belief that there is an intermediary factor in the transmission of the disease and that this factor is a mosquito.

He is described by those who knew him as a man of exceptional charm. Mrs. Gorgas writes that he was the "perfect type of the beloved physician . . . who combined in his own person a keen mentality, a tireless persistence and the utmost geniality and graciousness of manner." Gorgas writes —

"A most lovable man in character and personality; no one could be thrown with Dr. Finlay daily as I was for several years without becoming warmly attached to him and forming the highest estimate of his scientific honesty and straightforwardness. Being familiar with yellow fever both historically and clinically, I was constantly bringing to his notice instances in the past which could not be accounted for on the mosquito theory. Dr. Finlay, with the greatest ingenuity, was able to explain how the mosquito theory could be turned so as to meet just such contentions. I remained unconvinced."

A contemporary portrait supports this appraisal. At the time of the Spanish-American War he was about 65 years old, yet he went to Washington, offered his services to the American Army and served in the Santiago campaign.

Here is another bit from Mrs. Gorgas' recollection of Finlay —

"Dr. Finlay was a well-rounded citizen and physician; he was a scholar, too, in other fields, with a fine taste in old Latin manuscripts, and something of an authority in heraldic and historic studies. But it was his amiability of character that had for so long endeared him to the people of Havana. His kindly face, adorned with side whiskers, and surmounted by a large crop of gray hair, his genial eyes gleaming through his gold-rimmed spectacles, his mild and rather hesitating speech—for he suffered from an impediment which had resulted from an early attack of chorea—were the appropriate outward signs of a nature whose leading traits were affection, devotion to the poor, and a steady, never-sleeping enthusiasm for his profession."

Finlay first published his belief in the mosquito transmission of yellow fever in a paper read before the Royal Academy in Havana on August 14th, 1881. His paper dealt with experiments started in June, 1881, with the mosquito now known as *Aedes aegypti*. He went on with his experiments up to the time Reed started his work. He based his belief on a number of observations, such as the uncommon prevalence of this mosquito in yellow fever outbreaks. He pointed to the ecology of *A. aegypti*; that its habitat was at low altitudes, that it bred during warm weather, and that it was commonly

found in dwellings. All these were acute and pertinent observations. His experiments were based mainly on the hope that by mosquito inoculation a mild type of the disease would be produced, which would thus confer immunity. There is a record of 103 such experiments, according to Walter Reed. The tragedy is that although Finlay's faith in the mosquito theory was never shaken, the negative results of his own experiments were the strongest argument against his theory. "He hit upon the greatest discovery of the age but has never succeeded in demonstrating its truth," writes Mrs. Gorgas. In twenty years of repeated effort, he never once succeeded in producing a single case of yellow fever demonstrably produced by mosquito transmission. And so no one believed him, and the unbelievers included Gorgas and Walter Reed himself.

But there was about this time other support for the probability of an intermediate host in the propagation of yellow fever. Henry R. Carter, an officer in what is now the United States Public Health Service, then the United States Marine Hospital Service, working in Orwood and Taylor, Mississippi, in 1898 noted, as the result of many painstaking observations, that there was a difference in the periods which elapsed before an attack of the disease in the first case and in secondary cases. These periods are respectively about twelve and six days. He published his findings in the *New Orleans Medical Journal*, May, 1900. Mrs. Gorgas records that, when sent for publication, this paper was first rejected as being too long. The significance of Carter's observation was not recognized at the time. Yet it gave unmistakable pointers to two facts: That there must be an intermediate host, and that the intermediate host does not become infective until a period of about twelve days. This is what we call the extrinsic incubation period.

A characteristic of the epidemiology of yellow fever is that outbreaks are a direct function of the ingress of non-immunes. This was very clearly demonstrated in both Cuba and Panama.

The Cuban campaign started in June, 1900. A number of American troops and officials came to Havana—all non-immunes. Yellow fever broke out: 1,600 cases and 231 deaths in a few months. Consequently the Surgeon General, George M. Sternberg, himself a bacteriologist, appointed a board consisting of Walter Reed, James Carroll and Jesse W. Lazear, American officers, and Aristides Agramonte, a Cuban doctor, to study the causation and transmission of the disease. At the time Sanarelli's *Bacillus icteroides* was widely accepted as the causative organism of yellow fever.

By the way, that yellow fever was caused by an organism he named *Paraplasma flavigenium* was brought forward by Harold Seidelin of Liverpool at the 1912 Congress on Hygiene and Demography in Washington. The late Charles F. Craig, an eminent authority, said he thought the alleged *Paraplasma* were artifacts. So did I, when I saw the preparations at this meeting.

Later, in 1918, Noguchi claimed to have isolated an organism he called *Leptospira icteroides*, from the blood of yellow fever cases. This was another fallacy.

The work of the Board was therefore concentrated on isolating the organism from autopsy material and blood. All attempts were negative. Meanwhile, Finlay lost no time in speaking his theory to Reed. Walter Reed writes:

"We here desire to express our sincere thanks to Dr. Finlay, who accorded us a most courteous interview and placed at our disposal his several publications relating to yellow fever during the past nineteen years."

However, I have it on unimpeachable authority that Reed did not believe Finlay's theory, and that he only undertook the experiments, which led to the complete vindication of Finlay, because he saw no other path open. Neither did Gorgas believe in the mosquito theory. Even after the conclusion of Reed's experiment, he wrote in his report, July 12th, 1902, to the Governor-General Wood, himself a physician:

"This idea was so new and so entirely contrary to all former theories on the subject, and apparently to all former experiences, that the paper was received with scant belief. I myself had seen the work and was convinced that the mosquito could convey yellow fever, but I was hardly prepared to believe that it was the only way, or even the ordinary way of conveying the disease."

To us it may seem incredible that Finlay's theory, asserted with almost religious fervour, should have met with almost derision. To understand this, we must remind ourselves that when he first propounded his theory there was only one demonstration of the role of an intermediary host in disease transmission. That was Patrick Manson's discovery that filariasis was transmitted by a mosquito. This discovery was not at all well known outside a small circle of people. It was probably quite unknown to, or not believed by, those who disbelieved Finlay. This was the age of the new science of bacteriology with the strong partisanship that is a feature of a new discovery: People believed that there must be an organism which they could see, isolate in pure culture, cultivate, and reproduce the particular disease with this organism. Unsupported by the finding of any specific organism which corresponded to these criteria; on the basis only of observations of the presence of mosquitoes during yellow fever outbreaks, and that these outbreaks generally occurred during mosquito-breeding seasons, acknowledging that although he attempted to transmit yellow fever by mosquito bites in over a hundred experiments, he had no proof that he succeeded, Finlay inevitably at the best caused people to shrug their shoulders in disbelief, at the worst aroused lively antagonism and even derision.

In 1905, at the Pan American Medical Congress in Panama, Gorgas said—

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"In time Reed's Army Board came along and made the astounding discovery that the mosquito alone conveyed yellow fever, and that dirt and filth had very little, if anything, to do with the question. My good friend, Dr. Finlay, some twenty years before had advanced this same theory, and, during the twenty years preceding our occupation of the island, had written and advocated the theory continuously. I had often heard him expound his views on the subject, but, like the Cuban woman, I smiled in a superior way at the 'crazy Cuban doctor.'"

But the "crazy Cuban doctor" kept at it for twenty long years and had the happiness of seeing not only his belief fully vindicated, but the application of his theory banish the dreaded disease from his own beloved Cuba and from all other urban areas where it lurked ready to strike chaos, dread and death.

Many honours came to Finlay. His Alma Mater conferred on him the honorary degree of LL.D. He was made an Honorary Fellow of the Philadelphia College of Physicians. He was the recipient of the Mary Kingsley Medal and was made an Honorary Member of the Liverpool School of Tropical Medicine. He was created an Officer of the French Legion of Honour, and also received the Breant Prize of the French Academy.

After his death on August 20th, 1915, a bust was unveiled in the Central Court of the Building of the Department of Public Health in Havana. Streets were named after him in Havana and Camaguey. A statue of him was erected in a square opposite the Public Health Department in Havana, in which there are also busts of Drs. Guiteras, Delgado, Gorgas and Lazear. The laboratory at St. Tomas' Hospital in Panama was named after him, and in 1927 The Finlay Institute for Research in Tropical and Preventive Medicine was established in Cuba. In the same year the Finlay Order of Merit was created in Cuba.

Various other honours came to him, and resolutions were passed at many scientific meetings paying homage to his achievements.

Perhaps it was at Jefferson, where Mitchell insistently taught, as did so many of his successors, that one must develop the power of observation, and not rest content with accepting Magister dixit, that the foundation was laid for Finlay's work and success, as the foundations were laid for the good work of many others in the long history of our College.

Of Finlay's life and work one can truly say in Kipling's words—

"For their work continueth,
And their work continueth,
Broad and deep continueth,
Greater than their knowing."

