

description of what the X-ray reveals, just as Hooke disclosed what the microscope told him, and then the greater and even wider enterprise of connecting the

structure of bodies with the properties which they possess. You will understand the fascination of this new field of research.

A MOMENTOUS HOUR AT PANAMA¹

By Dr. JOHN FRANK STEVENS

FORMER CHIEF ENGINEER, THE PANAMA CANAL

THERE has been published from time to time such a mass of information about the Panama Canal, a project which aroused much controversy a quarter of a century ago, that any reference to it after the lapse of years may seem to be quite superfluous; but as is often the case in human affairs, history does not always record events which have had a profound influence for good or evil upon the solution of the problems involved. The history of the planning and construction of the Panama Canal is no exception to this general rule.

The condition of affairs on the isthmus during a part of the year 1905 can truly be described as desperate; by many well-wishers even it was regarded as hopeless. When the speaker arrived there in July of that year, he found not even the skeleton of a general organization. Supreme authority was vested in no one. The Sanitary Department was the only one having the semblance of a proper organization, and it was doing a limited amount of work under what would probably have proved a fatal handicap had it continued. The usual tropical diseases were prevalent, and that scourge of the white race, yellow fever, was taking its deadly toll daily. While the situation was in some degree psychologic, the danger was great, enough so that unless the disease was promptly checked and thereafter held under control, the success of the great enterprise would be jeopardized.

The tragic story of the French attempt to build a canal there was in many mouths, and predictions were freely made that the history of the Americans on the isthmus would be a repetition of the De Lesseps failure. Under the then existing conditions it would not have been possible to hold the small force of clerical and skilled white labor which had been collected, much less to induce thousands of other whites to enter the service. Especially so in view of the pessimistic attitude which some of the American press had taken, and the exaggerated accounts which they were publishing as to living and health conditions on the isthmus, some influential members openly advocating that the whole undertaking should be abandoned as affording no hope of a successful outcome.

¹ Medal Day address, delivered at the Franklin Institute, Philadelphia, Pa., on May 21.

At that time few of the general public knew anything of the so-called mosquito theory of the transmission of yellow fever, and they mostly regarded it as purely theoretical. Not so with the medical scientists who had successfully demonstrated it in Cuba, and of those scientists was Colonel William C. Gorgas, of the Medical Corps of the Army, who was the head of the Sanitary Department on the isthmus. He was working intelligently with a small but efficient staff, but with an utter lack of cooperation on the part of his immediate superiors. He was one of the first officials that I met there, and from him I gained my real insight into the famous theory.

Of Colonel (later General) Gorgas, his work and supreme service to mankind, it is unnecessary to speak here. His memory is so deeply cherished and his fame is so secure that no words of mine can add to either. Best of all, he was a kindly, sincere man, the highest type of gentleman, and I am proud to have known him, not only officially, but also as a warm friend.

The then chairman of the Isthmian Canal Commission accompanied me on my first visit to the isthmus, remaining there but five days, as the situation did not appeal to him. At that time Colonel Gorgas was reporting to the governor of the Canal Zone. Neither the governor nor the chairman had the least faith in the efficacy of the mosquito theory—at least they so emphatically advised me at once, and their actions confirmed their words.

Quoting from a brochure of General Gorgas's life and activities, written by the president of the American College of Surgeons:

Finally, in June, 1905, the governor and chief engineer [my predecessor], members of the executive committee of the commission, united in a recommendation to the Secretary of War that the Chief Sanitary Officer (Colonel Gorgas) and those who believed with him in the mosquito theory should be relieved, and men with more practical views be appointed in their stead. They stated that the sanitary authorities had visionary ideas with regard to the cause of yellow fever, and no practical methods even of carrying them into effect.

The President declared his faith in the theory and directed that every possible support and assistance be

extended to the sanitary officials. Personally, I have no knowledge except from hearsay of the accuracy of these statements, although I believe them to be true. What I *do* know is that such directions were not carried out either in letter or spirit.

Quoting again from the same authority:

About this time Mr. John F. Stevens was appointed chief engineer of the commission, and he recommended that the Sanitary Department should be made an independent bureau and report directly to himself. This enabled Colonel Gorgas to make known his needs directly to the highest authority, and there he was accorded loyal support. This, remarks Gorgas, was the high-water mark of sanitary efficiency on the isthmus, and more sanitation was done at this time than during any other period of the construction of the canal.

Incidentally, I may here remark that on my recommendation some time afterward the President appointed Gorgas as a member of the Isthmian Canal Commission.

However, these results were not achieved without a sharp controversy, during which the chief engineer clashed sharply with the chairman and the governor. I had been very deeply impressed by my conferences with Colonel Gorgas as to the probable truth of the mosquito theory, as well as by his personality. I also felt well assured that no canal could be built at Panama until the specter of yellow fever had been laid. There was no other promise of relief in sight than that of Gorgas and the mosquito theory, and there seemed to be but one course to follow.

On the occasion of a trip over the Panama Railroad, accompanied by the chairman and the governor, the sanitary work which was in progress, visible from the train, such as drainage of pools of water, applying oil where drainage was not practicable, fumigation of houses, etc., was pointed out to me in great detail by these officials, accompanied by constant ridicule, not only of Colonel Gorgas but also of the mosquito theory, some of these comments reflecting very severely upon the quality of the colonel's mental equipment.

My attention was repeatedly called to the great waste of money and the utter futility of the whole procedure. It became very apparent that a serious situation existed, and I was in a quandary as to how it could be met, as I well knew that it must be or a total collapse was inevitable. The climax came quickly.

The day before the chairman sailed for the States he advised me that he and the governor had decided that Colonel Gorgas must be gotten rid of (in his precise language, that he would "fire" him), and the mosquito theory, also. Some quick thinking and an

important decision were needed on my part, which decision I proclaimed in rather heated language, not to be repeated here. At the close of my harangue, I said that if there seemed to be the least likelihood of approval of his action being given by the President (which I did not believe possible) I should take the matter in person to Washington; and that if Colonel Gorgas were removed I should not come back to the isthmus.

I asked him what he thought the reaction would be from the doubtful ones, and from the already unfriendly press, if it became known that the commission had urged the abandonment of the mosquito theory and the disruption of the Sanitary Department, and stated that, furthermore, if after a hasty visit to the isthmus the new chief engineer had, by his action, indicated his belief that the construction of the canal was impossible, it would mean chaos, whatever attitude the President might take. If it did not kill the project it would certainly delay it, and the end no man could foresee. He left for the States without further comment on the matter. If he urged his views in Washington (which I do not believe he did) I was never advised, and so the matter ended there, as it should.

I was seeking a way to stabilize the situation, for it was no time to be rocking the boat. Opportunity must be given for the Sanitary Department to prove its faith by its works, which I believed it could do.

It was not a question of Colonel Gorgas's business ability, but one of making the isthmus a safe place for white people to live and work in, and that quickly, regardless of whatever cost in mere money might be involved. Beyond doubt those officials were sincere in their opinions, but in my judgment they were wrong.

It was after this occurrence that Colonel Gorgas began to report to me, and from that time forward harmony prevailed. The Sanitary Department was furnished with everything it asked for as fast as it could be provided, and every other activity was made subordinate to its needs. Sanitary success soon became so apparent, coincident with the creation of a general organization, that carping criticism was practically stilled, for the first time since the American occupation of the isthmus. Science had scored a wonderful triumph over a deadly foe to the human race.

Sanitation was fundamental, and the success which the Sanitary Department achieved under Colonel Gorgas made the Panama Canal possible. When the result of its work became manifest, and when the lock type had been adopted, then the successful construction of the canal was as well assured, early in 1906, as it was on that historic opening day in Au-

gust, 1914, when the steamship *Ancon* passed through it from ocean to ocean.

At this distance of time and space the episodes related may seem trivial. Only one who was on the ground, charged with tremendous responsibilities, can comprehend the magnitude of the issues at stake. A rejection of the mosquito theory at that juncture would probably have meant the indefinite postponement of the canal project.

I have said that I did not then deem it possible that President Roosevelt would uphold the elimination of Colonel Gorgas, but an occurrence which took place some years later gave me food for thought. Some time after Mr. Taft had become President, Colonel Roosevelt sent me an invitation to call upon him, which I did at the office of the *Outlook* magazine in New York. After some preliminary talk he told me that friction among officials on the canal had reached such a point that changes would have to be made, and that he thought Colonel Gorgas would have to go. He said that he was well aware that I knew more of Gorgas and his work than any man, and asked if in my opinion he should be kept.

It is needless to repeat what I told him. It was emphatic and to the point, and I closed by saying that if Gorgas were removed it would be a stupid blunder. Colonel Roosevelt pounded the desk in his usual vehement manner and exclaimed, "That settles it; Gorgas stays." Which he did, through what influences one can only conjecture.

I have thought, since that time, that possibly it was just as well that the issue was not raised to a

finality in July, 1905. I had reason to know that the President then had great confidence in the chairman, but the status of the chief engineer in that respect had yet to be demonstrated. I did not have faith enough in the result to wish the matter put to a test.

In the year 1914, when Gorgas was Surgeon-General, I received a letter from him, reading in part as follows:

I have a very clear and grateful recollection of the support and friendship you always gave me on the isthmus. I knew very well that you were the only one of the chief officials who believed in the sanitary work we were doing, and who was not taking active measures to oppose us. The fact is that you are the only one of the higher officials on the isthmus who always supported the Sanitary Department, and I mean this to apply to the whole ten years, both before and after your time, so you can understand that our relations, yours and mine, stand out in my memory of the very trying ten years I spent on the isthmus as a green and pleasant oasis.

Only fragmentary accounts of these episodes have ever been related, and as now that every one of those officials who were directly concerned with them, President, Secretary of War, governor, General Gorgas—every one excepting myself—has passed beyond the sphere of human activities, it seems fitting that while first-hand knowledge of the matters then at issue is yet available, it should become a part of the history of the construction of the canal, for it is not believed that the full significance of these events has ever been appreciated.

SCIENTIFIC EVENTS

TROPICAL DISEASES EXHIBIT AT ANTWERP

ACCORDING to *The British Medical Journal* the Antwerp Exhibition was opened by the King of the Belgians on April 26. The Tropical Diseases Section, in the British Government Building, was organized under the auspices of the Exhibitions Branch of the Board of Trade, and is under the direction of a committee, of which Major-General Sir Wilfred Beveridge is chairman. The exhibit has been designed to impress upon the general public the importance of knowledge of health matters to those who live under tropical conditions. It also depicts certain dangers and the means by which they may be combated. A complete outline of thirteen important tropical diseases is presented by means of serial illuminated pictures, illustrating the causation, manifestations, treatment and prevention of each disease. Above each series are placed enlarged photographs of work which has been carried out in connection with the

disease under consideration. Above these photographs are illuminated statistics showing the beneficial results to the community of such preventive treatment. The organisms responsible for various tropical diseases—protozoa, helminths and bacteria—are demonstrated by color photomicrography in six specially constructed viewing cases. Some of the diseases are dealt with in greater detail in six cases prepared and lent by the Liverpool School of Tropical Medicine, and several excellent wax models of the insect vectors of diseases are shown. Enlarged photographs have been prepared of men who have laid down their lives in the investigation of diseases prevalent in tropical countries; this exhibit indicates the special dangers attaching to research work in yellow fever and typhus. A model of the new London School of Hygiene and Tropical Medicine, taken in conjunction with the Liverpool School exhibit, emphasizes the fact that the importance of education in tropical medicine is recognized. The care