



THURSDAY, JANUARY 26, 1922.

*Editorial and Publishing Offices:*

MACMILLAN & CO., LTD.,  
ST. MARTIN'S STREET, LONDON, W.C.2.

Advertisements and business letters should be  
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Telegraphic Address: PHUSIS, LONDON.

Telephone Number: GERRARD 8830.

### The Langley Aeroplane and the Hammondsport Trials.

THE Americans most intimately associated with the work of Prof. S. P. Langley have written to the Royal Aeronautical Society and to *NATURE* protesting vigorously against the conclusions reached by Mr. Griffith Brewer and summarised in a paper<sup>1</sup> read before the society in October last. The conclusions were<sup>2</sup> :—

(a) The Langley machine was not capable of sustained free flight.

(b) The Langley machine was not successfully flown at Hammondsport, New York, on June 2, 1914.

The correspondence is published in full in the *Journal of the Royal Aeronautical Society*, and when discussion is closed it is to be hoped that the society itself will consider the whole matter and express an official opinion. In the meantime it may be assumed that the American presentation of the case is better than that of Mr. Brewer when they claim that in all substantial respects the original Langley aeroplane was capable of sustained flight. It is true that certain modifications were made for the Hammondsport trials which changed the machine in some of its details, but the secretary of the Smithsonian Institution, Dr. Walcott, appears to put the matter very fairly when he says :—

“I was present at Hammondsport on May 31, 1914, and saw the machine with the original engine

<sup>1</sup> *Aeronautical Journal*, December, 1921.

<sup>2</sup> *Ibid.*, p. 629.

giving only two-thirds the original thrust and with wings approximately of the original design, but far rougher executed, get under way from rest and fly gracefully, carrying, besides a man, more than 300 lb. of floats in excess of what the machine was designed to carry. I am still confident that what it did under these relatively adverse circumstances is far inferior to what it was capable of doing in its original condition.”

It is much to be regretted that anything happened to prevent a successful flight of the Langley flying machine on October 7, 1903, for no one with an intimate knowledge of the subject can doubt that, aerodynamically and structurally, the machine was good. Aerodynamically it had been preceded by a long series of experiments on a whirling arm, culminating in the flight of a power-driven model based on the results obtained. Although the practical man is loth to admit the fact, it is nevertheless true that the very great bulk of trustworthy information is derived from tests on models by men of science. For very many years to come aviation will continue to draw its inspiration from results obtained on models. Structurally the Langley aeroplane had been carefully made and tested by loading with sand; it is difficult to give credence to Mr. Brewer's suggestion that the structure was obviously defective. Nor is there lack of evidence in the other direction in the later flights. The account of the original failure, vouched for by Mr. C. M. Manly, the pilot on the occasion, is that :—

“The machinery was working perfectly and giving every reason to anticipate a successful flight, when this accident (due wholly to the launching mechanism) drew the aeroplane abruptly downward at the moment of release and cast it into the water near the houseboat.”

This explanation is supported by clear observations of damage to the clutch which held the aeroplane on the launching ways, but is apparently not accepted by Mr. Brewer.

Despite the failure to crown his efforts with a striking popular flight, Langley's work was a very great achievement and removed many difficulties from the paths of his successors, amongst whom were the Wright brothers.

The claims made for Langley by the Smithsonian Institution are :—

(1) His aerodynamic experiments, some published and some as yet unpublished, were complete enough to form a basis for practical pioneer aviation.

(2) He built and launched, in 1896, the first steam model aeroplane capable of prolonged free flight, and possessing good inherent stability.

(3) He built the first internal-combustion motor suitable for a practical man-carrying aeroplane.

(4) He developed and successfully launched the first gasoline model aeroplane capable of sustained free flight.

(5) He developed and built the first man-carrying aeroplane capable of sustained free flight.

Only the last of these items appears to be in dispute, and, even were adverse criticism justified, the merit of Langley's work would scarcely be affected. It is not disputed on the other side that the Wright brothers made the first sustained flight and so marked a stage of progress which appealed to the world at large instead of to a limited number of men of science. The list of earlier contributors to progress in aviation is long, and all deserve some credit for the ultimate result, but the modern phase took its beginning with the publication of Langley's researches on aerofoils, etc., and the additional spur given by the successful flights of his power-driven models.

It is not too much to say that more original and personal solid work underlay the Langley aeroplane than is the case for any other aeroplane, not excepting those of the present day. The solution of the problems of stability which Langley reached as a pioneer in one instance is still beyond the powers of the majority of his successors in the art of aeroplane design.

### Intestinal Protozoa of Man

*The Intestinal Protozoa of Man.* By Clifford Dobell and F. W. O'Connor. Pp. xii + 211 + 8 plates. (London: Published for the Medical Research Council by J. Bale, Sons, and Danielsson, Ltd., 1921.) 15s. net.

THIS is a treatise which will be very valuable to the medical investigator of the microscopic intestinal parasites of man—other than those belonging to the great group of Bacteria. Its origin is due to the continuous and comprehensive study, made during the great war, of the relation to parasitic Protozoa of dysenteric disease occurring in the British Army. Mr. Clifford Dobell has previously published various reports of his masterly work on this subject, and two years ago (December 11, 1919, vol. 104, p. 369) we noticed in these columns his critical essay entitled "The Amœbæ Living in Man." In the present publication Mr. Dobell has been assisted by Mr. F. W. O'Connor, who had independently carried on investigations on intestinal Protozoa in connection with the Egyptian Expeditionary Force. Mr. O'Connor was to have been specially responsible for the medical parts of this book, and Mr. Dobell for those parts which are

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purely zoological. But, owing to the departure of his medical colleague in 1919 on an expedition to the Gilbert and Ellice Islands, the task of completion of the work and responsibility for the greater part of it have fallen on Mr. Dobell. The treatise is distinguished by that patient inquiry into previous work and critical judgment as to nomenclature and synonymy which have rendered Mr. Dobell's earlier publications of special value. It is absolutely necessary that medical men and protozoologists should agree upon a terminology in order that they may understand each other's writings, and this result Mr. Dobell's careful review and original observations enable them to achieve.

The book is divided into nine chapters, followed by a very complete bibliography and an index and eight plates. Chap. 1 is an introduction to the whole subject, and is followed by chap. 2 on the intestinal Amœbæ of man; chap. 3, Amœbiasis (the name given to infection by Amœbæ, and especially by *A. histolytica*); chap. 4, the intestinal Flagellates of man; chap. 5, the intestinal Coccidia of man; chap. 6, the intestinal Ciliates of man; chap. 7, the diagnosis of intestinal protozoal infections; chap. 8, the treatment of intestinal protozoal infections; and chap. 9, the coprozoic Protozoa of human fæces.

One of the chief sources of error which has to be guarded against by the novice in this study is that of supposing that parasites found in the fæces are necessarily parasites of the intestine. There is a whole series of Amœba-like and flagellate Protozoa which are present in the soil and may obtain access to, and develop in, the fæces after deposition. These are called "coprozoic Protozoa." They may also obtain access to the fæces by means of resistant spores which are swallowed with dust and pass uninjured and undeveloped into the intestinal contents. Apparently the high temperature of the intestine is unfavourable to their development, which occurs only when they have passed to the cooler conditions of the outer world. Many mistaken descriptions of protozoal parasites have been due to this source of error.

The Protozoa which are not merely coprozoic, but actually live in the intestine of man, are only seventeen in number—viz. five Amœbæ, five Flagellata, four Coccidia, and three Ciliata. Some of these are very rare or exceptional; others are abundant, but are not shown to be harmful. Only two which actually sometimes (but not always) destroy the tissue of the intestinal wall or of other organs when present in man are admitted by Mr. Dobell to be pathogenic—viz. *Entamoeba histolytica* and the ciliate *Balantidium coli*. The work of recent years, and much of that of Messrs. Dobell and O'Connor,