SCIENCE

FRIDAY, MAY 22, 1896.

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MSS. intended for publication and books etc., intended for review should be sent to the responsible editor, Prof. J. McKeen Cattell, Garrison-on-Hudson, N. Y.

A SUCCESSFUL TRIAL OF THE AERODROME.

THE editor of SCIENCE has received the following letters containing an announcement of great scientific and practical importance:

THE EDITOR OF SCIENCE—*Dear Sir:* After having published some investigations in aerodynamics ('Experiments in Aerodynamics' and 'The Internal Work of the Wind'), I have made further experiments on the practical application of these conclusions, in the construction of an actual aerodrome or flying machine, upon a scale sufficient to admit of the employment of a steam engine of between one and two-horse power. I have never given any account of these experiments, as I have wished first to attain such a complete control of the flight as would insure its being automatically directed in a horizontal course, in any desired azimuth; but in view of the demands upon my time, which render it uncertain how far I can continue my personal attention to the completion of this object, I have yielded to the request of my

valued friend, Mr. Graham Bell, to authorize the publication of a general statement of the results thus far obtained.

Let me add, in explanation, that the scale of the construction did not admit of any apparatus for condensing the steam or economizing the water, which, therefore, could only be carried in sufficient quantity for a very short flight. This difficulty is peculiar to the scale on which the experiment is conducted, and does not present itself in a larger construction.

Professor Bell has shown me his letter, which follows.

Very respectfully yours,

S. P. Langley.

Washington, D. C., May 12, 1896.

The Editor of Science—*Dear Sir:* Last Wednesday, May 6th, I witnessed a very remarkable experiment with Prof. Langley's aerodrome on the Potomac River; indeed, it seemed to me that the experiment was of such historical importance that it should be made public.

I am not at liberty to give an account of all the details, but the main facts I have Professor Langley's consent for giving you, and they are as follows:

The aerodrome or 'flying machine' in question, was of steel, driven by a steam engine. It resembled an enormous bird, soaring in the air with extreme regularity in large curves, sweeping steadily upward in a spiral path, the spirals with a diameter of perhaps 100 yards, until it reached a height of about 100 feet in the air at the end of a course of about half a mile, when the steam gave out, the propellors which had moved it stopped, and then, to my further surprise, the whole, instead of tumbling down, settled as slowly and gracefully as it is possible for any bird to do, touched the water without any damage, and was immediately picked out and ready to be tried again.

A second trial was like the first, except that the machine went in a different direction, moving in one continuous gentle ascent as it swung around in circles, like a great soaring bird. At one time it seemed to be in danger as its course carried it over a neighboring wooded promontory, but apprehension was immediately allayed as it passed 25 or 30 feet above the tops of the highest trees there, and ascending still further its steam finally gave out again, and it settled into the waters of the river, not quite a quarter of a mile from the point at which it arose.

No one could have witnessed these experiments without being convinced that the practicability of mechanical flight had been demonstrated.

Yours very truly,

Alexander Graham Bell.

1331 Connecticut Avenue,
Washington, D. C., May 12, 1896.

THE DEVELOPMENT OF EXOGENOUS STRUCTURE IN THE PALEOZOIC LYCOPODS—A SUMMARY OF THE RESEARCHES OF WILLIAMSON AND RENAULT.

The fact of the occurrence of exogenous structure in the Lycopodineæ, Equisetineæ and some of the ferns of the Carboniferous age is in itself hardly less remarkable and interesting than is the variety of phases under which this structure makes its appearance. It would seem that during the rapid differentiation and modification of vascular plants at the time of the great coal formation, plants of these lower classes played fast and loose with exogeny, shaping in fantastic and capricious designs a structure that is now the garb of the most exalted classes. Even within the boundaries of the *Lepidodendra* and the *Sigillariæ* the diversity is so great that while some species show no secondary growth at all, others, especially among the *Sigillariæ*, are so highly organized that the followers of the Brongniartian