

chemical characterisation; it is present in such minute quantities in the jelly and probably contaminated by other substances diffusing from the injured cells. It has been impossible to produce similar activity by the use of any pure substance in its place.

A new chapter thus seems to be opened in the study of the correlating influences controlling the

process of cell extension in the tissues of the plant. It is safe to predict that the subject will not be left long in this interesting state, but that further work will elucidate the connexion of the apex of the coleoptile with the extension of its base, and at the same time determine the significance of this mysterious *Wuchsstoff* that diffuses from the cut tip when placed on agar. J. H. P.

The Wright Brothers' and Langley's Aeroplanes.

IN the new wing of the Science Museum, South Kensington, in perhaps the most prominent position, will be found the original Wright aeroplane with a long descriptive notice. This states that it was the first power-driven man-carrying aeroplane to make a free, controlled, and sustained flight. The machine, which was built by Wilbur and Orville Wright, was flown by them on Dec. 17, 1903, at Kittyhawk, North Carolina, and its production was the result of their prolonged experimentation and research, which had been stimulated by the gliding experiments of Otto Lilienthal.

Since the first flights were made the aeroplane has been preserved in the Wright laboratory, but certain parts which had been damaged during their last flight, one extending over 59 seconds and covering a distance of 852 feet, have been replaced, and the machine restored to its original condition.

The fact that this machine, essentially American in ownership and manufacture, should be in the possession of a British museum is rather significant, and is the key to a publication which has just been issued by the Smithsonian Institution, dealing with their relations with the Wright Brothers. The publication, which was issued over the name of C. G. Abbot, Secretary of the Institution, is an attempt to clarify an unfortunate controversy, to correct misunderstandings, and to do justice alike to three great pioneers of human flight—Wilbur and Orville Wright, and Samuel Pierpoint Langley, who, as they themselves said, gave them "a helping hand at a critical time." The details of the controversy, which in parts is rather painful, need not concern us at present, but the difficulty was associated with the exhibition in the United States National Museum in 1918 of a reconstructed variation of a machine which Langley endeavoured to fly in 1903. The label attached to it originally described it as "The original full-sized Langley Flying Machine"; this was later amplified to include a claim that it was the first man-carrying aeroplane in the history of the world capable of sustained free flight; that it was tested over the

Potomac River by Langley in 1903, and successfully flown in June 1914.

As a result of the controversy and further investigation into the actual flights carried through by this machine, the label was altered to indicate that in the opinion of "many competent to judge," the machine was the first "heavier than air craft" in the history of the world capable of free flight under its own power, since it had become clear that in the original test no proper flight had emerged. Smarting under a sense of injustice, Mr. Orville Wright presented their machine for exhibition for five years to the South Kensington Museum.

Committees connected with the Smithsonian Institution have investigated the historical accuracy of the statements which have appeared on the labels, and now in this pamphlet the invitation of the Smithsonian Institution to Mr. Wright is renewed, to deposit for perpetual preservation in the United States National Museum the Kittyhawk plane with which he and his brother, it is agreed, were the first in history to make successful sustained human flight in a power-propelled heavier-than-air machine.

As a further display of goodwill, the Institution is willing to let Langley's aeroplane rest on its merits, and has directed that the label on the Langley Aerodrome shall be so modified as to tell nothing but facts, without additions of opinion as to the accomplishments of Langley. The label now reads: "Langley Aerodrome. The original Samuel Pierpoint Langley Flying Machine of 1903. Restored."

No doubt it was because the Wright brothers have always been appreciated in Great Britain for their wonderful pioneer work in this new field of human endeavour that the machine was deposited in one of our Museums. Whether or no it should now be returned to the United States is clearly a matter for Mr. Orville Wright himself to decide. We, at any rate, in Great Britain shall be extremely sorry if it is to leave our shores; but in any case it is to be hoped that the Science Museum authorities will take steps to procure the production of as close a replica as possible.

Obituary.

PROF. T. C. CHAMBERLIN.

MASTER of research has passed in Thomas Crowder Chamberlin, emeritus professor of geology in the University of Chicago, whose death occurred on Nov. 15, shortly after celebrating his eighty-fifth birthday on Sept. 25. His place is with the greatest thinkers of the past. He leaves few if

any equals among his contemporaries. His far-flung research into the processes of the universe is a challenge to younger students to spread wings of imagination toward the unknown, but only with thorough understanding of the course to be flown and constant checking of the navigation.

Chamberlin, the glacialist, geophysicist, and cos-

mogonist, was a geologist in that large meaning which he expressed at the Cleveland meeting of the Geological Society of America a year ago, in calling upon his colleagues to overleap the bounds of a petrified, terrestrial science. Rocks are not dead. They are to be studied as living assemblages of energy, organised according to the laws of physics and chemistry. He bade geologists explore these domains intensively, as their own. He invited them to penetrate the marvellous cosmogonies of the atoms, where in those intimacies of Nature lies hidden the secret of evolution. He unrolled the history of the planet and traced our dynamic descent from our parent, the sun. His concept of geology embraced the solar system and touched the stars. Fully aware that he could not long sustain the effort, he appealed earnestly to his fellows to carry on in all the fields of science of which "astronomy is the foreign department."

Chamberlin will always be known as the author of the planetesimal hypothesis of the birth and growth of the earth. Its fundamental concepts are wholly his. The mutual reactions of the sun and a passing star in giving birth to the planetary system he reasoned from the orderly movements of the planets, as he has more recently argued the erratic origin of comets in the sun's ungoverned, eruptive activity. These concepts are the survivors of a large number of possible hypotheses which he investigated, rigorously applying the method of multiple hypotheses. His endeavour was to find a process that would give rise to swarms of matter endowed with energy in such wise that the dynamic peculiarities of the planetary system might evolve from them. The initial idea of the growth of the planets by a gathering in of planetesimals was forced upon him by the failure of the gaseous and meteoritic assemblages of matter to meet the tests to which he and his collaborator Moulton patiently subjected them. Some thirty odd years ago he compared the work in which he was engaged to that of a miner exploring an old mine to ascertain what of value might have been left in the leads. It was not until he had proved the old leads valueless that he turned to new prospects, which he exploited patiently, persistently, and critically in discriminating search for the true vein of reality.

In collaboration with the colleagues whom he drew about him, Chamberlin was dominant because of the tremendous mental power behind his thinking, but never by assumption of authority. He put forward every idea that his fertile mind conceived. Then he tried each one by natural logic, as his phrase was, and he expected his associates to test his suggestions by every pertinent, crucial fact or by mathematical analysis. He welcomed a justified destructive critique as clearing away an obstruction to advance. He constantly guarded himself and his fellow students against over-confidence in the verity of his assumptions.

Shortly before the appearance of his last work, "The Two Solar Families," which reviews his

previous work critically and presents supplementary facts that strongly support the original deductions, Chamberlin wrote: "The most friendly thing that I can urge is that you look critically into my logic and my conclusions. I have, of course, great confidence that in all essentials I am in the line of reality, but it behoves others to discount any self-partiality that may creep into my work." Unfortunately, few are qualified by understanding of geology, geophysics, and celestial dynamics to analyse, much less to criticise, Chamberlin's contributions to the science of the earth and the solar system. His philosophy of geology will not bear its full fruitage until a generation shall have grown up free from the inherited theories that he discarded and open-minded toward the new ideas he inspired.

Chamberlin's intellectual detachment from his own ideas was the more remarkable because he was a man of very strong convictions. He was most conscientiously convinced, however, of the inviolate integrity of truth, and he defended the truth, as facts presented it, from misrepresentation by himself as sternly as from attacks by others. The vigour of his argument, backed by his powerful personality, sometimes conveyed the idea that he was opinionated, but his force of expression simply represented the intensity of his pursuit of actualities. He was infinitely patient with new suggestions, whereas he could be biting severe in rejecting the false or meretricious.

In geology, Chamberlin has contributed largely to an understanding of glaciation and Pleistocene climates. He himself would speak with amusement of the apparent inconsequence of his intellectual evolution from a student of glacial cold to an investigator of solar heat. It was a natural evolution, however, for his philosophic mind, which traversed all terrestrial and related phenomena understandingly. His "Manual of Geology," prepared in co-operation with his devoted associate, R. D. Salisbury, is distinguished by its penetrating analysis and correlation of facts, as well as by the consideration of alternative views of unsolved problems.

This is not the place to enumerate his many contributions to geology, to describe his official activities in the U.S. Geological Survey, or his service to the University of Chicago. Neither may we dwell upon his more intimate relations with his fellows. He was a most inspiring teacher provided the student was in earnest. He would discuss his own ideas without reserve with his associates, and he welcomed theirs. He was most conscientious in giving credit to others, and his scorn was unsparing for those who would take credit for borrowed ideas. As mass is energy, so Chamberlin was sincerity; and his sincerity was housed in a great and noble mind.

BAILEY WILLIS.

WE much regret to record the death on Dec. 7 of Dr. J. W. L. Glaisher, F.R.S., senior fellow of Trinity College, Cambridge, at the age of eighty years.