

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.