II, it is evident that the potential developed varies regularly with the composition of the gas from acetylene, which contains least hydrogen, to methane, which contains most.

In all gas electrodes the results are greatly affected by the nature of the first-class conductor in which the gas is absorbed. Table III[6] gives an interesting arrangement of the elemental gases. It represents these in decreasing order of the basicity of the potentials which they produce in three different electrolytes and when absorbed in the various metals listed.

Regarding these experimental data, particularly the potentials developed by helium and argon, which are chemically inert and so far as we know at present do not form chemical compounds at all, one naturally again raises the question, Are the potentials developed by mere contact or are they due to chemical action? It is quite certain that one can not say, at least so far as the noble gases are concerned, that the E.M.F. is due to chemical action, for no chemical change takes place, and we know of no authenticated cases in which these gases have gone into chemical combinations. One might, however, argue that the potentials are, after all, caused by chemical affinity, that is, by special chemical strains, which are insufficient in magnitude to overcome existing cohesions and are consequently unable to produce actual chemical reactions. The data collected in the case of the noble gases might, of course, be construed as indicating that those gases are by no means as inert chemically as is at present supposed, and that special exertions ought once more to be made to form chemical compounds with them and other elements. Such experimentation would doubtless be desirable, especially since recently some biologists have reported that life can not endure in an atmosphere composed of pure oxygen and nitrogen, thus indicating the possibility that the rare gases of our atmosphere might after all play an important rôle, and that it may be chemical in character.

Instead of using the observed potentials of the rare gases as an argument in favor of the contact theory and against the chemical development of potential, I am disposed to use those facts rather as an indication that we are still quite ignorant as to the real fundamental relation between what we term gross matter, on the one hand, and electricity, on the other. To be sure we are now, on the basis of our electronic theory of matter, constructing quasi-astronomical configurations to represent each of the atoms of the known chemical elements; and I have no fault to find with this, for I am still in hopes that this atomic structure speculation may lead us to some new knowledge and not prove to be merely another interesting attempt to account for some of the facts we have observed. It is well to bear in mind that our conception of a chemical element is that of a substance which has thus far defied our efforts to resolve it into something else, and that our atomic theory is founded on the ratios in which the elements combine by weight, that is to say, upon the three stoichiometric laws. Moreover, it is also well to recall here that the molecular conception has for its basis the laws of Gay Lussac of combination of gases by volume and that, for instance, we distinguish between the atom H and the supposed molecule H_2 simply because we want to hold Avogadro's hypothesis, which naturally grows out of the facts of Gay Lussac's law, when it is regarded in the light of the atomic theory. This being the real situation, is it surprising that we are not able to correlate optical, electrical, radiant and kindred phenomena with our atomic conceptions; and that, however valiantly pursued, our so-called atomic structure ideas are not yielding what they at first promised?

This is preeminently a time when careful, entirely new experimentation is necessary—experimentation that is not overawed by the work of the desk warriors, who with long intricate mathematical equations founded upon inadequate factual data overawe the young, ardent experimenter and stifle his efforts by leading him to think that practically everything of a fundamental nature is already ascertained, and that only a few little finishing touches are now required to complete the picture.

To the young investigator I would rather say—and I am sure that in doing so I would voice the spirit in which Edgar Fahs Smith ever worked and taught and inspired his students—Go into the laboratory and by means of careful experimental inquiry and observation seek to unravel the problems of our science, seek to penetrate the mystery of the relation between gross matter and electricity and thus solve the relationship between chemical reactivity and electrical potentials.

OBITUARY

ULYSSES SHERMAN GRANT

DR. ULYSSES SHERMAN GRANT, professor and head of the department of geology and geography at Northwestern University, died at Evanston on September 21. The end came unexpectedly after a brief illness and a major operation, following his return from the

[6] This rather elaborate table, giving the results with twenty-nine different metals, each laden with A, H_2, He, O_2 and N_2, respectively, and investigated in KCl, KOH and HCl, is identical with that on p. 143, Vol. lviii, *Trans. Amer. Electrochem. Soc.*, and so is not reproduced here.

Lake Superior Region, where he had been with a group of graduate students studying Precambrian geology.

Born at Moline, Illinois, Dr. Grant spent his boyhood days near Des Moines, Iowa, where he became an enthusiastic collector of snails and snail shells. In this he already showed himself a close observer and a great lover and student of the out-of-doors. These traits remained with him to the end. He entered the University of Minnesota and was graduated from there at the age of 21. Accepting a fellowship in biology, he continued his studies there the following year. The year after found him at Johns Hopkins as a biology student, with geology as his minor subject, and he received from there his doctorate in 1893, at the age of twenty-six. Due, perhaps, to the new and undiscovered world which his teacher and friend, G. H. Williams, showed him in rocks, he centered his interest on geology and especially on rocks. With this background and interest he developed his life's scientific activities around the study of the Precambrian geology of the Lake Superior region.

In 1899 he came to Northwestern University to fill the chair of geology, which had just been organized. At the time of his entrance on his major life's work at Northwestern, he found in the entire university far fewer students than are now registered in the department of which he was head. He was repeatedly reelected on the most important committees and was known, even to those who differed from him as to policies to be pursued, for his fairness and his honesty of purpose. In two separate occasions, for brief periods, he was called to the deanship. Therefore, to many on the campus he was always known as Dean Grant.

Upon his graduation from Johns Hopkins, Dr. Grant served as assistant state geologist of Minnesota until going to Northwestern. During the latter two years of this period, he was also on the geology staff of the university. Later, he served on other state surveys also, including Wisconsin, Oregon and Illinois. For the United States Geologic Survey he carried on studies in Alaska, Illinois, Oregon, Wisconsin and Wyoming. He was unusually well informed on the geology of the Lake Superior region, to which he made many enduring contributions.

At meetings of the various scientific societies Dr. Grant was a familiar figure, and he prized the friendships that in this way he could renew. He served successively on a number of committees of the Geologic Society of America, the Society of Economic Geologists and the American Institute of Mining Engineers. He was also vice-president of Section E of the American Association for the Advancement of Science in 1915, and was associate editor of the *American Geologist* from 1897 to 1905. Unstintingly did he lend his energies to further scientific projects at every opportunity, and was always active in the dissemination of scientific information in and about Evanston. At the time of his death he was a member of the board of directors of the Chicago Geographical Society.

Very probably his greatest and most enduring contribution was his imprint on the lives of his students and junior associates. Many men now prominent owe much of their success to his kindly stimulus, which continued to manifest itself in his voluminous correspondence. His friendships for and interest in his students and close associates in his work dominated his life completely. To him geology was a living thing, like a friend, not a text-book subject. It was an important part of the "great out-of-doors," where he was always at his best, not only with rocks but with birds and trees and the beauty and freshness of nature.

Dr. Grant is survived by his wife, two daughters and two sons. His friends, now so widely scattered, will sympathize with his family and share in their profound loss.

W. H. Haas

Northwestern University

HAROLD JACOBY

Professor Jacoby, who died on July 20, 1932, was born in New York City on March 4, 1865. He received an A.B. degree from Columbia University in 1885 and a Ph.D. in 1896. Jacoby took part in the United States Eclipse Expedition to West Africa, 1889–1890, and subsequently became a voluntary assistant at the Cape of Good Hope Observatory. There he married Annie Maclear, daughter of George Maclear, chief assistant at the Cape Observatory and granddaughter of Sir Thomas Maclear, who was for many years Astronomer Royal at the Cape of Good Hope.

In 1890, Rutherford gave, along with his instrumental equipment, his valuable series of astronomical photographs and measurements to Columbia University. Jacoby reduced the plates on the Pleiades, and several other regions were reduced under his direction. The method of determining accurate star places by means of photography, which was then in its infancy, is at present regarded as the only satisfactory method to obtain positions of high accuracy for large numbers of faint stars. Jacoby was among the few astronomers of his time who realized the importance of this method.

Jacoby took part in the observations and especially in the reduction of the variation of latitude. He also investigated the effect of optical distortions of the objective on photographic measurements.