weights 35 and 37 for chlorine, thus confirming to this extent my theory with respect to the light elements and also for the heavy elements. Also in accord with the theory presented in my papers on atomic weights, he finds that the atomic weights on the oxygen basis are practically whole numbers.

The details of our experimental work on the separation of chlorine will be published as soon as we have collected enough material to enable us to make a more careful purification of our material, and when in addition the accurate atomic weight determinations have been completed. We expect to make the final separations by thermal diffusion. The theory of this method has been worked out by Chapman. Mr. Broeker and I are also beginning preparations for an extensive attempt to separate hydrogen into hydrogen and meta-hydrogen, the latter with an atomic weight of 3.0. While there was sufficient evidence for the existence of a meta-chlorine in ordinary chlorine to be found already in the atomic weights, there is no such evidence that ordinary hydrogen contains meta-hydrogen. However, there is evidence that the meta-hydrogen nucleus of a formula $h_3e_2^+$, where h is the hydrogen nucleus and e is the negative electron, is the most important unit in the building of atomic nuclei, with the exception of the alpha particle ($h_4e_2^{++}$). The nucleus of an isotopic atom of higher atomic weight differs from the nucleus of the normal atom by the presence of a mu group (h_2e_2) which carries no *net* charge, and which, if it were alone, would have an atomic number zero. Isotopes of higher atomic weight are also formed by the addition of alpha groups ($h_4e_2^{++}$), each alpha group being attached by two cementing electrons. This is equivalent to the addition of an h_4e_4 group. The details of this system will be found in a paper now in print in the *Physical Review*.

It should have been noted in the above paper that neon, magnesium, and silicon, the even numbered light elements which contain isotopes, lie *adjacent* in the even numbered series, since their numbers are 10, 12, and 14. It is *possible* that a third isotope of chlorine exists.

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WILHELM PFEFFER

WILHELM PFEFFER, with Sachs the founder of plant-physiology as it has been studied for more than a generation, died in Leipzig on January 31, of this year. A long line of Americans, as well as many other foreigners, resorted to him, in addition to the Germans who studied with him. He probably shared with Strasburger the distinction of having a larger number of foreign students of botany than any other German university professor. By these men, and many others, he will be remembered as a striking personality as well as a great leader in the science to which he devoted his life.

The details of his life are probably known to few Americans, but the general outlines may well be set down. He was born March 9, 1845, in Grebenstein near Cassel, the son of an apothecary. The elements of science, and scientific curiosity, he probably acquired from his father; for the old-time German Apotheker was a very different sort of person from the American drug-store proprietor of to-day. He studied at the universities in Göttingen, Marburg, Berlin and Würzburg, taking his doctor's degree at Göttingen in 1865. He began his teaching career as Privatdocent in Marburg, going thence as Ausserordentlicher to Bonn and as Ordentlicher Professor to Basel, Switzerland. In 1878 he removed to Tübingen where, I believe, the first Americans worked with him, Goodale of Harvard, Wilson of Philadelphia, Campbell of Stanford, and perhaps others. In 1887 he went to Leipzig, where he stayed for the rest of his life, in spite of calls to what, to others, might have seemed more attractive posts. But in the Botanisches Institut in Leipzig he had a laboratory fitted to his ideas and desires, with a garden adjacent in which the material which he and his associates used could be readily grown, a garden of such size, position, and plan that it took the

minimum of time for administration. The university and state administrations were able and willing to give him cordial support, and he made his laboratory the resort of all who were pursuing plant-physiological studies or were interested in them.

His long list of publications, beginning with one on mosses, plant-geographical in character, and one or two embryological papers, not only opened the way for plant-physiological work by many others, but directed and to a great extent molded their studies. He not only influenced botanical study, but his osmotical investigations were and are of fundamental importance in physical-chemistry. As friends and neighbors for years, Pfeffer and Ostwald conversed and thought together, to the corresponding advantage of the sciences to which they were devoted.

Two publications stand out from the many because of their general, rather than special, botanical interest, namely the Handbuch der Pflanzenphysiologie, which passed through two editions and in the second was translated by Ewart into English, and was the great reference book in plant-physiology for two generations; and the Jahrbücher für wissenschaftliche Botanik, founded by Pringsheim, and continued after Pringsheim's death and until Strasburger's, in collaboration with him. The Untersuchungen aus dem botanischen Institut zu Tübingen, which lasted only during Pfeffer's stay at the south German university, gave him experience in the mechanical detail as well as in the editorial work of serial publication.

Pfeffer is survived by his widow, his daughter-in-law, and a grandson. He had one child, a son who was of age to be one of the direct sacrifices of the war, and presumably was. But he himself, a man of deep feeling and clear vision, must also have been a sacrifice.

Just as the war began, a jubilee volume was being prepared to celebrate the fiftieth anniversary of his doctorate and his seventieth birthday. Contributions had been promised by his students all over the world. With the coming of war many found themselves prevented from sending their papers, and in consequence the Jubilee Volume which appeared in 1915, as part of the Pringsheim series of Jahrbücher, contained only a fraction of the contributions to science which his students had planned to make in his honor.

Belonging to an age in Germany in which ideas were more sought than discipline, when scholarship was more honored than military rank, when a professor was more likely than a tradesman to become a Geheimrath, his life lasted through the fall of German imperialism and came to an end before German reconstruction was more than begun. Honors, national and international, were conferred upon him; and we who had the privilege of studying under his direction will continue to honor him as an inspiring teacher and a great example of scholarly devotion and productiveness.

G. J. P.

SCIENTIFIC EVENTS

THE ORGANIZATION OF SCIENTIFIC WORK IN INDIA[1]

The reorganization and development of scientific work in India are now under consideration, and important and far-reaching decisions on these questions will shortly be made by the Secretary of State. It has already been decided, both by the government of India and by the Secretary of State, that large sums of money must be found at the earliest possible moment for the purpose of fostering the development of the Indian empire by means of scientific research. The principle of state aid on a generous scale has been accepted, but the important question of the best method of utilizing this form of assistance in the future development of India remains to be settled. These matters were referred to by the Viceroy on January 30 last in his speech opening the present session of the Imperial Legislative Council at Delhi. It is evident from the report of Lord Chelmsford's remarks which appeared in the London *Times* of February 6 that the government of India is now considering large schemes of expansion in regard to the scientific activities of the state.

Two policies at present hold the field: (*a*) Centralization under a proposed Imperial De-

[1] From *Nature*, February 19, 1920.