ment on some salient features and on the results obtained.

All basic physical concepts and laws are derived from certain general observations, which are the axioms of physics. To express these observations, certain fundamental quantities (the mathematicians' undefined elements) are constructed, namely, distance, time, energy and electric quantity. And to formulate the consequences of these observations, many derived quantities are introduced, such as velocity, force, voltage, magnetic flux. In their quantitative aspect, these derived quantities usually enter as proportionality factors in special cases, and receive their general definitions as derivatives: velocity as the time derivative of distance, force as the distance derivative of energy, voltage as the derivative of energy with respect to electric quantity. A few derived quantities appear as integrals: momentum as the time integral of force and magnetic flux as the time integral of induced voltage. The student is taught to think first of a derivative as the slope of a graph and of an integral as the area under a graph; only in special cases are they directions to perform analytical operations.

The unconventional arrangement of giving electricity immediately after mechanics in the same course was chosen on account of the very close analogies: electrostatics is electrical elasticity and electromagnetism is electrical kinetics. This analogy is emphasized to increase the comprehension of both subjects.

The mechanics, especially elasticity and kinetics, forms the basis of the sophomore work in mechanical waves and sound; and the electricity forms the basis of the sophomore work in electrical fields and electric waves. Light then is introduced as an electric wave; and the laws of reflection and refraction are derived from those of dielectric and magnetic fluxes. (The sophomore work also includes heat, based on the Carnot cycle, and kinetic theory, electronics and an introduction to some of the more recent physical concepts.)

Our present physics course is more difficult for the student, is longer and results in lower average grades, than the course of a few years ago. Nevertheless, the response of the students is gratifying. Physics here is not an unpopular subject. There seems to be a trend in some places toward more superficial physics teaching, with the hope of making the physics course easier and hence more popular. As Professor Williams indicated, this is in the wrong direction: physics should be made more popular by being made more worth while. The late President Humphreys of Stevens often used to say: "Superficiality is the curse of American education."

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COLLECTION AND FILING OF ABSORPTION SPECTRA DATA

THE literature of absorption spectra is so widely scattered that frequently when a long search reveals that measurements have been made for a compound, the data are inconvenient to obtain. Too often no data at all can be located for compounds which have been known for a long time and which most certainly have been studied. The preparation of a new and complete but traditional atlas would offer no solution because it would be expensive to produce and, hence, limited in distribution, and because it would be rendered obsolete quickly by the publication of new data.

It is the purpose of this communication to suggest that a master card file of existing data be established at some central depository. Here the data and references for each substance or group of substances would be assembled in standard form, each upon a separate card. Once established such an index would be perpetually up to date if authors could be induced to supply their new data automatically and promptly. Photoprints or microfilm of the available data for any compound could then be furnished quickly at a small fee, and at moderate expense, institutions would be able to obtain more or less complete duplicate files. In this way it would be possible to avoid the expense of duplicating uninteresting and unnecessary information, thereby reducing the cost of the data actually wanted.

Compilation of the Absorption Spectra Card Atlas proposed above would facilitate and stimulate research and should deserve the support of some fund for scientific advancement. Once prepared the fees for supplying information should support the atlas.

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THE OCCURRENCE OF FRESHWATER SPONGES IN THE HAWAIIAN ISLANDS

THE occurrence and distribution of freshwater sponges in Polynesia is still little known, due, perhaps, either to the lack of interest in or recognition of these interesting animals on the part of most collectors who are out for "bigger game."

Up to the present time the Fijian Islands seem to be the easternmost locality from which freshwater sponges have been recorded in Polynesia; for *Spongilla gilsoni* Topsent[1] has been collected and described from these islands.

Mumford[2] and Adamson,[3] in very interesting articles dealing with the distribution of the terrestrial

[1] Emile Topsent, 5: 187–191, 1912.
[2] E. P. Mumford, *Ecology*, 17: 1, 143–157, 1936.
[3] A. M. Adamson, *B. P. Bishop Museum Bulletin* No. 159, pp. 1–93.

and freshwater faunas of the Marquesas Islands, do not mention freshwater sponges from this island group. Mumford cites Gee, who believes that they may occur here and will turn up eventually as a result of further collecting.

From my own experience in collecting in the Hawaiian Islands during the summer of 1935, I am convinced that freshwater sponges may occur in many of these Pacific Islands. Although Perkins's[4] excellent work on the fauna of the Hawaiian Islands does not mention the presence of these animals, yet during the latter part of July, 1935, I found freshwater sponges in a pool at the bottom of a waterfall at Haepuaena on the Island of Maui. These sponges, vividly green in color and very apparent in the clear water of the pool, were found in large masses encrusting the undersides of rocks and submerged pieces of wood. A request for information concerning the distribution and occurrence of freshwater sponges in Hawaii was made to Dr. E. H. Bryan, Jr., curator of collections of the B. P. Bishop Museum in Honolulu, with the resulting information that Dr. Otto Degener of Honolulu had upon several occasions collected these animals in various parts of the Hawaiian Islands. A request to examine these specimens failed to elicit them, since they apparently had been lost. However, Dr. Degener very kindly sent me specimens which he had collected during the month of February, 1936, on the Island of Oahu. An examination of these two specimens reveal them to be *Heteromyenia baileyi*. Thus as a result of these collections the occurrence of freshwater sponges in the Hawaiian Islands is established for the first time, and the known distribution of these sponges in Polynesia is greatly extended both to the north and east.

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EARLIEST LAND VERTEBRATES OF THIS CONTINENT

ALTHOUGH discovery of amphibian remains in Greenland in deposits close to the Devonian-Carboniferous boundary[1] makes it certain that the origin of land vertebrates occurred in the Devonian Period, we know little of their history until a much later date. In American terminology the Carboniferous is customarily divided into two periods, the Mississippian (lower) and Pennsylvanian (upper). In the Coal Measures of the latter part of the Pennsylvanian, amphibians already well advanced and specialized are numerous and fairly adequately known. But for the entire stretch of time between the beginning of the Carboniferous and the Coal Measures, a period of perhaps 50 to 75 millions of years, land vertebrates, save for footprints, are almost unknown. In Scotland a dozen or so specimens have been found in late Mississippian deposits.[2] Not a single bone has been reported from Carboniferous rocks below the Coal Measures in any other area of the globe.

Last winter the presence of vertebrate remains in the Carboniferous shales of the Hinton District of West Virginia was reported to us by Mr. Harry Damron, graduate student at Harvard University; this locality has been investigated, under his guidance, by R. V. Witter and the writer. In addition to fishes the deposit contained numerous remains of amphibians. Unfortunately the bones are disarticulated and often fragmentary, so that their morphological value is limited. Stratigraphically, however, they are of great interest. Amphibians had been found in various instances in relatively late deposits in the Appalachian coal field area, and we had assumed that the present locality would also prove to be Pennsylvanian in age. To our surprise and delight it proved to be much earlier. The horizon is that of the Hinton shales of the Mauch Chunk Group. These amphibians are thus Mississippian in age. They are exceeded in antiquity only by the Greenland skulls mentioned above, and equalled only by the Scottish materials; they are by far the oldest skeletal remains of tetrapods in continental North America. Despite their incomplete nature these bones are thus important documents in the deciphering of the early history of land life.

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QUOTATIONS

SOIL FERTILITY

A SPIRITED correspondence has followed Lord Cranworth's warning that soil fertility may become exhausted by the pace of the war-time food production campaign, and has brought out several points which have vital significance for the nation as well as for farmers. Larger quantities than ever before of fertilizers, such as superphosphate and sulphate of ammonia, have been applied to the land in the past year, and as a result heavier crops have been grown. It has been the deliberate policy of the government to secure increased supplies of fertilizers and to see that

[4] R. C. L. Perkins, "Fauna Hawaiiensis," Introduction, 1913.

[1] Säve-Söderberg, G. Meddelelser om Grønland, Bd. 94, Nr. 7, 105 pp., 1932.

[2] These have been reviewed by D. M. S. Watson, Palaeont. Hungarica, *I*, 221–252, 1926.