duction occurs under conditions of prolonged ingestion of mineral acids.

Our observations show that a small amount of H_2SO_4 may limit the growth of the rat in the second generation even when little or no effect on the growth of the first generation was apparent.

A study of the effect of various acids and acid-forming substances on the reproduction of rats and swine is now being made in this laboratory.

W. D. Salmon

Laboratory of Animal Nutrition,
Alabama Polytechnic Institute

THE HYDROID OF CRASPEDACUSTA RYDERI IN KENTUCKY

Since the finding of the hydroid of Craspedacusta ryderi[1] (1920) in Boss Lake, Elkhart, Indiana, I have been anxious to find it elsewhere, especially so since all the medusae at Elkhart were females and all medusae found elsewhere were males. I have been interested in the sex question involved and wish to transplant hydroids from some other source to Boss Lake.

July 30 I made a trip to Benson Creek, where Garman[2] found the medusae in 1916, 1917 and in 1924, and was rewarded by finding the hydroids on the rocks in the shallow water just above the place where the medusae were most abundant. As the water was muddy and most of the rocks covered with slime only a few hydroids were found. Some of these I took to my laboratory, where they now are and where I hope to be able to rear them. When the water clears I shall try to find more of them.

In comparison with the hydroids in Boss Lake they are much smaller, but otherwise they look the same. The size difference may be merely a question of the food supply. The water in the creek contained very few micro-organisms.

The hydroids were not producing hydroid or medusae buds. This would also indicate unfavorable conditions.[3]

Fernandus Payne

Indiana University

SCIENTIFIC BOOKS

The First One Hundred Years of American Geology. By George P. Merrill, head curator of geology, United States National Museum. XXI + 773 pages, 6½ x 10 inches. Yale University Press. 1924.

In the report of the U. S. National Museum for 1904 Dr. Merrill published "Contributions to the history of American geology," a work of great and timely interest. The present volume is practically a republication of the former work, with the addition of three new chapters on special subjects and an appendix of personal letters. It makes a handsome large octavo volume of 773 pages, with 36 page plates and 130 text illustrations. The illustrations are slightly less in number than in the former volume. Twenty of the plates and 105 of the text figures are portraits. This is the first work published on the Philip Hamilton McMillan Memorial Publication Fund.

The history covers the ten decades from 1785 to 1885, grouped in eight eras. The first two eras are named after the two most active workers in the early days, William Maclure, the "father of American geology," and Amos Eaton, the earliest teacher of the science. The Maclurean Era includes the years 1785–1819, and the Eatonian 1820–1830. Five chapters cover five decades of State Geological Surveys (1830–1888), with chapter eight devoted to the National Surveys. The special problems discussed in the previous work were, "The fossil footprints of the Connecticut Valley," "The Eozöon question," "The Laramie question" and "The Taconic question." The three new special topics are, "The development of the glacial hypothesis"; "The development of micro-petrology," and "How old is it?"

The biographical sketches of the geologists are not the least interesting part of the history, and the author has described the workers and their work with discrimination and fairness. The appended personal correspondence is a welcome addition. It also emphasizes the large psychologic element, especially in the pioneer work. Geology is not an exact science, but relies on observation, diagnosis, comparison and interpretation. The personal element in the early years is shown by the diverse and even contradictory views on phenomena and features which to-day are lucid. A touch of humor is suggested by the placing of the portraits of Cope and Marsh side by side.

The student of geology finds the history a real romance. The young worker especially needs it for breadth of information and as suggestion of caution in his work and modesty in opinion. Dr. Merrill has done a good service not only to the geologic profession but to general science, and to the history of the evolution of real knowledge. It was a rare and fortunate combination for the author to have access to the literature and records, the time, patience and industry for collecting the vast mass of fact and the knowledge and discrimination necessary for its effective presentation.

The only suggested criticism of the work is its

[1] Payne, *Journ. Morph.*, Vol. 38.

[2] Garman, Science, Vols. 44, 56 and 60.

[3] Three weeks later hydroids were found in abundance and transplanted to Elkhart.

omission of the history since 1885. Four decades have passed, and two decades since the first publication of the work. It would appear that the progress in the science up to at least 1900 might have been given with sufficient perspective and with justice to the few surviving men. They would not be injured by a little praise while living. Such later account would be helpful especially to younger workers in the field.

H. L. F.

SPECIAL ARTICLES

THE CHEMICAL EFFECTS IN IONIZED ORGANIC GASES

ABOUT a year ago[1] we gave a preliminary account of the effect of ionizing pure ethane by means of radon (radium emanation) mixed with it. This work has since been extended, and a further preliminary report will now be made. The gases hitherto studied are methane, ethane, propane, butane, ethylene, acetylene, cyanogen, hydrogen cyanide and ammonia; other reactions studied are: oxidation of all the foregoing except ethylene and hydrogen cyanide; the hydrogenation of acetylene, ethlene and cyanogen, and the polymerization (also in the presence of nitrogen) of acetylene, of cyanogen and of hydrogen cyanide.

In methane, propane and butane the same kind of behavior was encountered as for pure ethane. The idea has been abandoned (also for ethane) that free carbon results from these reactions. In fact, it is more exact to use the term condensation (with elimination of hydrogen) instead of decomposition. The yellow or brownish color of the liquid or solid condensates we now attribute to some unsaturation, not to free carbon.

In the case of methane the pressure change at room temperature is not a safe criterion of reaction, for the pressure remains almost constant, even when analysis shows that the greater part of the gaseous product is free hydrogen which is accounted for by reaction without volume change, such as:

$$2CH_4 = H_2 + C_2H_6.$$

The condensation of a liquid from methane is much delayed, perhaps, because it must build up in successive steps from the lowest member, methane. In propane and in butane liquid appears in droplets much sooner even than in ethane, and later may pass partly into the solid state, if a sufficient quantity of radiation be absorbed by the liquid. The phenomena in propane contained in a small volume where the density of radiation at the wall was high were particularly striking; minute gelatin-like masses with sharply defined contours built up to an appreciable depth on the wall and later curled away from it; while in a larger volume with a lower radiation density only liquid appeared. In radiating methane the total pressure at 25° C. remained practically constant during the entire reaction.

In the earlier paper it was suggested that the liquid phase formed from ethane might be octane. We now know that the ratio of hydrogen to carbon in the liquid condensates is about 1.8 to 1, which would indicate some degree of unsaturation or ring compounds, or both. Analysis further shows that methane as well as hydrogen is a product of the condensation of ethane, of propane and of butane; the ratio of hydrogen to methane liberated remained constant throughout the reactions and had the following values: for ethane about 6 hydrogen to 1 methane, for propane about 4 to 1, for butane about 6 to 1. Small proportions of other saturated hydrocarbons are also found, *e.g.*, propane and butane in the ratio of 1 to 2 from ethane; and ethane and butane in the ratio of 4 to 5 from propane. Evidently, if either one hydrogen or one methane molecule can be eliminated from a di-polymer of ethane (as assumed in our former paper) the residues would be butane and propane, respectively, and so forth for other similar possibilities. If two hydrogen molecules be eliminated from the di-polymer of a saturate, unsaturation would result, as illustrated by the ratio found, 1 carbon to 1.8 hydrogen (approximately the same in the liquids from ethane, propane and butane). Probably the two reactions involving the elimination of one or of two hydrogen molecules proceed simultaneously. Evidently, by this means, starting with any saturated hydro-carbon we can get both lower and higher members until soon all the members up to quite high polymers will be represented in the mixture, thus suggesting the mixtures occurring in petroleum.

In these ionic condensations of saturated hydrocarbons the average number of molecules of hydrocarbon condensing per positive hydrocarbon ion, M/N, varies from 1.4 to 2. For the unsaturated hydrocarbons M/N is higher, for ethylene (double bond) about 5, for triple bond compounds yet higher—cyanogen, 7; hydrogen cyanide, 10; acetylene, 20,[2] the highest yet found. This shows that the ionic

[1] SCIENCE, 60, 364, October, 1924.

[2] Professor W. Mund, of the University of Louvain, kindly communicated this value for acetylene (which we have confirmed) in advance of a forthcoming publication (*Bull.* Soc. Chem. Belg., 34, 241, May, 1925), the appearance of which has been delayed by a printers' strike in Belgium. We have also confirmed in general the results reported by Mund and Koch (*ibid.*, 34, 119, February, 1925) on the radiation of ethane, ethylene and acetylene.