

diverse problems in which our author has done pioneer work. The following incident might give us perhaps the key to his starting point. From 1886 to 1888 Loeb was assistant in (animal) physiology in Würzburg. At that time the chair of botany at that university was occupied by Julius von Sachs, one of the foremost plant physiologists, who made a special study of tropism in plants and whose celebrated lectures on plant physiology appeared in 1887 in a second edition. This great investigator apparently exerted a lasting influence upon the direction of Loeb's searching mind. Thus we find that the first larger piece of work of our author consists in a pamphlet entitled: 'The Heliotropism of Animals and its Identity with the Heliotropism of Plants.' That pamphlet forms the first paper of this collection. Through a number of ingenious but simple experiments it is shown for the first time how the dependence of animal movements on light is in every point the same as the dependence of plant movements on the same source of stimulation. In the next paper it is shown that the same holds good also for the movements of sessile animals. In other papers which followed, the influence of gravity upon the movements of animals (geotropism) and the influence of contact irritability (stereotropism) were studied and were also found to be identical with the same influences in plants. The similarity of these phenomena in animals and plants demonstrated to Loeb their independence of a nervous mechanism, and in a paper on 'Instinct and Will' he comes to the conclusion that what has been taken for the effect of 'will' or 'instinct' is really the effect of light, gravity, friction, chemical forces, etc. In a study upon 'Heteromorphosis' he shows that by the above-mentioned physical influences, as in plants, the regeneration in some animals would lead to the production of an organ different in form and function from the original one. In this study the factor of turgescence, of hydrostatic pressure is mentioned for the first time. In a further study on 'Organization and Growth' upon marine animals it was found that besides the above mentioned physical

factors, the concentration of the sea water was an important factor, there was no growth nor regeneration in concentrations above 5.4 per cent. nor below 1.3 per cent. Furthermore, the presence of oxygen as well as of potassium and magnesium was indispensable. From now on we meet with studies in which the importance of oxygen and especially of osmosis as physiological factors were considered in the first place. We meet them in the 'Experiments on Cleavage,' in the studies 'On a Simple Method of Producing from one Egg two or more Embryos which are Grown Together,' in the studies on the 'Sensibility of Fish Embryos to Lack of Oxygen and Loss of Water,' etc. Meanwhile the studies of Van't Hoff, of Arrhenius and of Ostwald upon osmotic pressure and dissociation of electrolytes created a new epoch in the sciences of physics and chemistry, and we find Loeb henceforth profoundly engaged in unraveling the mysteries of life with the aid of the newly established science of physical chemistry. The fruit of these new efforts we find laid down here in numerous papers on 'Artificial Parthenogenesis,' on the physiological effects of ions, on ion-proteids, on the effect of ions on contractility, on the toxic and antitoxic effects of ions, etc. It is, of course, impossible to give here any intelligible account of the multitude of important new facts laid down in these papers. We have here before us the fruit of a most indefatigable and ingenious investigator who has done pioneer work in many fields in biology. These studies will be a source of instruction and stimulation to many an earnest student in general physiology, and we ought to be thankful to the author as well as to the editors of the Decennial Publications of the University of Chicago for presenting to us the collection of these very valuable studies.

S. J. MELTZER.

ROCKEFELLER INSTITUTE.

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SCIENTIFIC JOURNALS AND ARTICLES.

*The American Naturalist* for April contains but three papers: the first 'The Fresh-water Copepoda of Massachusetts,' by A. S. Pearse, adds seventeen species, two new, to

the eight previously recorded. James B. Pollock discusses at some length 'Variations in the Pollen Grains of *Picea excelsa*,' and A. M. Reese describes the 'Anatomy of *Cryptobranchus alleghaniensis*.' Some comparisons are made between the skeleton of this species and that of the great salamander of Japan but no deductions are made as to their generic identity or differences. No reference is made to Cope's description of the anatomy of *Cryptobranchus*, though this is given at some length with one or two good figures in his *Batrachia* of North America.

*The Museums Journal* of Great Britain for March contains a good account of 'The New Zoological Institute at Breslau' by W. E. Hoyle. The idea of preservation of material in the exhibition series is carried to the extreme, for the museum is open to the public but twice a week, and then for only two hours. J. T. Wilson gives a description of the relations existing between the state and 'The Australian Museum, Sydney, New South Wales.' Professor Wilson concludes that in Australia the only practicable form of museum administration is by a board of directors, or trustees; that municipal control is quite out of the question, and that any autocratic form of administration by a director, in the case of an institution supported by public funds, would not be tolerated. In this respect then Australia would seem to differ from other parts of the world where the best form of museum administration seems to be by a responsible director. Mr. Edward Lovett presents in some detail a scheme for a folk museum and there is a brief account of the meeting of the Swedish Museums Association. Among the notes is one stating that in the Hamburg Museum the group illustrating a North Sea oyster bank has been enlarged and reinstalled and cases added showing the growth of precious coral and sponges. Hamburg is certainly to be congratulated on having such a progressive institution.

*The Zoological Society Bulletin* for March is styled the Aquarium Number and devoted entirely to the New York Aquarium or matters thereto pertaining. Among other articles

it contains the following conundrums: 'Are Fishes Killed by Freezing?' 'Do Fishes Sleep?' 'Do Fishes Hear?' 'Have Fishes Memory?' The last three are answered in the affirmative, the first in the negative. And yet we have known every fish in a large but shallow pond to be killed during an unusually severe winter, though the possibility is that they died from lack of air. Fishes of the pike family may eat but little in an aquarium during winter, but in the New England states many more pickerel are taken through the ice than at any other season. There are interesting articles on the 'Remodeling of the Aquarium'; 'The Sounds Made by Fishes'; 'How Fishes Change Color'; 'Four Years' Change in the Axolotl,' besides many notes. The number is profusely and well illustrated. As a parting shot we should like to express our disbelief in green turtles or loggerheads exceeding 1,000 pounds in weight and would be glad to see one of half that size.

#### SOCIETIES AND ACADEMIES.

##### THE TORREY BOTANICAL CLUB.

THE club met in the American Museum of Natural History, March 13, 1906, at 8 p.m. President Rusby was in the chair and thirteen persons were present.

A communication was read from Mr. Ellsworth Bethel, of Denver, Col., stating that he and Dr. Sturgis were at work on the fungi of Colorado, and would soon publish their first number, listing the Myxomycetes of the state.

President Rusby presented the matter of public recognition by the club of the coming tenth anniversary of the establishment of the New York Botanical Garden, and the appointment of Dr. Britton as professor emeritus of botany in Columbia, and of Professor Underwood as Torrey professor.

Motion was made and seconded that a committee be appointed by the chair to make arrangements for such an event. The motion was carried, and the president appointed the following committee: Miss Vail, Miss Marble, Dr. Murrill, Dr. Curtis, Professor Richards, Dr. MacDougal and Dr. Barnhart.

The first paper on the scientific program