

ties of nutrition, absorption, elaboration or chemical metamorphosis, assimilation, elimination, growth, development, functional differentiation, organisation, inanition and disease are shown by osmotic growths exactly as by living organisms." Striking examples of a comparatively high degree of organisation are given in the chapter on "morphogeny," such, for instance, as the capsular terminations of the filament-like growths obtained with manganese salts, or the "osmotic fungi" which very closely resemble natural fungi in their appearance and structure. One of the most interesting features of these growths is the selective distribution of colour in the different parts, one portion of which may be, for instance, greenish-white, another light green, another part dark green and other parts golden yellow.

Phototropism, galvanotropism, &c.—Prof. Leduc contends that the majority of such phenomena as phototropism, chemotropism and galvanotropism, which have been regarded as essentially vital phenomena, can be artificially reproduced with purely mineral or unorganised material. If, for example, a bath of a salt solution is placed so that one half is illuminated and the other half

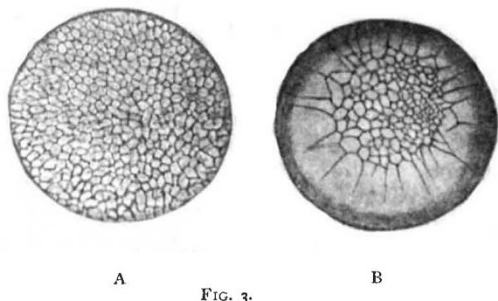


FIG. 3.

is in darkness, and a drop of water tinted with Indian ink is added, "the particles of carbon abandon the illuminated portion and take refuge in the dark part." These and similar results are utilised by Prof. Leduc in a discussion of the nature of the changes occurring in the production of sense impressions. One of the most striking phenomena in this domain, the deformation of the ovule, with the production of a protuberance on the side of the spermatozoid, which Sachs called "the most surprising phenomenon in fecundation," Prof. Leduc claims to have reproduced artificially in a very simple way: If near an artificial cell (hypotonic), produced in a non-saturated solution of potassium nitrate, a small crystal of potassium nitrate be placed, not only is the artificial cell deformed with a protuberance on the side of the crystal, but the lines of circulation within the cell are evidently also influenced.

In this small treatise 118 photographs are reproduced, each of which is said "to be expressive of a fact and to represent the result of a series of experiments." It has here been possible only to outline in the most general manner the character and scope of the work.

W. A. D.

SEMI-CENTENNIAL CELEBRATION OF THE NATIONAL ACADEMY OF SCIENCES IN WASHINGTON.

THE National Academy of Sciences of the United States celebrated the fiftieth anniversary of its foundation on April 22–24 at Washington. A special programme was arranged, and many distinguished guests were invited to participate in the celebration. In recognition of the function of the academy as the scientific adviser of the Government, President Wilson, Vice-President Marshall, and Chief Justice White took part in the exercises.

The celebration was held at the Smithsonian Institution, and began on the morning of April 22 with an address by the retiring president of the Academy, Dr. Ira Remsen, who reviewed the history of the organisation and gave an account of the scientific labours of the incorporators, and of the various trust funds of the academy.

Dr. Remsen was followed by President Hadley, of Yale University, whose theme was the relation of science to higher education in America. An address was then delivered by Dr. Arthur Schuster, F.R.S., on international cooperation in research. After a luncheon the academy and guests listened to a brilliant lecture by Dr. G. E. Hale, director of the Mount Wilson Solar Observatory, on the earth and sun as magnets. The lecture was illustrated by lantern-slides and experiments. In the evening a reception was given by the regents and secretary of the Smithsonian Institution, the hosts being Vice-President Marshall and Chief Justice White, Chancellor of the institution.

On the morning of April 23 an address was delivered by Dr. J. C. Kapteyn, director of the astronomical laboratory of the University of Groningen, on the structure of the universe. In the afternoon the academy and guests assembled at the White House, where certain medals and prizes of the academy were presented by President Wilson. Dr. R. S. Woodward, director of the Carnegie Institution of Washington, read the reports of the committee on the awards, after which the President handed the medals and prizes to those who were to receive them, or to their representatives, prefacing his action by brief remarks in which he gracefully referred to the academy as a great society, and as one long associated in an advisory capacity with the Government of the United States. The awards were as follows:—

The Watson medal to Dr. J. C. Kapteyn in recognition of his bold, penetrating researches on the problem of the structure of the stellar universe. Dr. Kapteyn received the medal in person.

The Henry Draper medal to M. Henri Deslandres, of Meudon, France, for his noteworthy researches in astrophysics. M. Deslandres not being present, the medal was delivered to the French Ambassador, M. Jusserand.

The Agassiz medal to Dr. Johan Hjort, of Bergen, Norway, for his meritorious contributions

to the science of oceanography. In the absence of Dr. Hjort, the medal was received by the Norwegian Minister, Mr. Bryn.

The Comstock prize of 1500 dollars to Prof. Robert A. Millikan, of Chicago, for his demonstrations of the existence of electric atoms in elements and of the equality of the electrical charge of positive and negative ions in ionised gases, and his additions to the knowledge of the molecular constitution and kinetic phenomena of gases.

A business meeting was held on the morning of April 24, when the following officers and new members and foreign associates were elected: *President*, William H. Welch; *Vice-President*, Charles D. Walcott; *Foreign Secretary*, George E. Hale; *Home Secretary*, Arthur L. Day; *Treasurer*, Whitman Cross. *New Members*: Henry A. Bumstead, Gilbert N. Lewis, Louis V. Pirsson, Erwin F. Smith, Leonard E. Dickson, Lafayette B. Mendel, Edward B. Rosa, Ross G. Harrison, George H. Parker, Armin O. Leuschner. *New Foreign Associates*: Arthur Schuster, Theodor Boveri, William Crookes, Gaston Darboux, Henri Deslandres, Albert Heim, Albrecht Kossel, Karl Friedrich Küstner, Johannes D. van der Waals, August Weismann, Max F. J. C. Wolf.

On the afternoon of April 24 an excursion was made to Mount Vernon on the U.S.S. *Mayflower*, which had been placed at the disposal of the academy and its guests by the Secretary of the Navy. In the evening a banquet was held in the New Willard Hotel, at which speeches were made by Vice-President Marshall, the Right Hon. James Bryce, President Remsen, Dr. S. Weir Mitchell, Senator T. E. Burton, of Ohio, and Dr. W. W. Keen, President of the American Philosophical Society.

To mark the anniversary, the academy published a history of its first half-century in a handsome volume of some 400 pages. It includes an account of the founding of the academy, its annals, biographical sketches of the incorporators, and a chapter on the work of the academy as the scientific adviser of the Government, together with appendices, among which is a list of publications.

SCALES OF FISH AS TESTS OF AGE.

THE general principle that the age of a fish may be determined by a study of the markings on the scale has now been generally accepted for many fishes, especially for the Gadoids, Clupeoids, and Salmonidæ. It has been maintained, especially by Norwegian naturalists, that the principle may be carried still further, and that from a measurement of the portions of the scale representing the growth of successive years the length of the fish at the end of each year of its life may be calculated. If this proved to be true, the average annual growth rate of fishes could be determined by the examination of comparatively small samples of fish, since each of the older fishes would give values for a number of years.

That the use of the method in this way must

be undertaken only with great caution is clearly shown in a paper by Miss Rosa M. Lee, published by the International Council for the Study of the Sea (*Publications de Circonstance*, No. 63), entitled "An Investigation into the Methods of Growth Determination in Fishes." By an acute and penetrating analysis of the measurements of scales from herring, haddock, and trout, Miss Lee shows that if the lengths of the fish at the end of each year are calculated from the lengths of the annual rings on the scale, measured from the centre of the scale along its major axis, the figures obtained appear to indicate a change in the growth rate of such a nature that the younger fishes attained a greater size at any given age than was attained by older fishes at the same given age. Thus whereas in a sample of herrings the four-year-old class gave an average calculated length of 25.8 cm. at the end of the third year, the ten-year-old class gave an average calculated length of only 21.3 cm. at the end of their third year.

Various hypotheses are put forward to account for this phenomenon, of which the most probable seems to be either that it is due to an actual shrinkage during the later life of the fish of the portion of the scale already laid down, or that in the samples of fish examined there has been a segregation according to size of such a character that only the larger sizes of the earlier age groups are present. The subject is clearly one which must be further investigated before certain conclusions as to age can be arrived at from the study of fish scales.

THE ROYAL SOCIETY CONVERSAZIONE.

THE annual May conversazione of the Royal Society was held in the rooms of the society at Burlington House on Wednesday, May 7. During the evening lantern demonstrations were given by Mr. Leonard Baird illustrating cases of eddying fluid motion of interest in aeronautical research, and by Dr. A. Smith Woodward on the discovery of a palæolithic human skull and mandible at Piltdown, Fletching, Sussex. Many objects and instruments illustrating recent scientific methods and results were exhibited, and most of them are described in the subjoined summaries from the official catalogue. Exhibits referring to related branches of science have, so far as possible, been grouped together.

Prof. J. T. Morris: The electrical measurement of wind velocity, as applied to the distribution round a circular rod in an air current. In the air current is fixed a Wheatstone bridge made with alternate arms of platinum and manganin. At normal temperature this bridge is out of balance. It is supplied with either (a) a constant voltage, when a millivoltmeter in place of the usual galvanometer gives indications depending on the wind velocity; or (b) a current which can be varied so as to bring the bridge into balance for any velocity; the square of the watts used in the bridge wires is then proportional to the wind velocity subject to a small correction. It is unnecessary to know the direction of the wind before a measurement can be made. *Mr. M.*