that the low depressed areas and local basins are caused by the leaching out of the soluble materials from the underlying beds. 'The Origin of Nitrates in Cavern Earths,' by William H. Hess. The author finds from a study of cavern earths and from many analyses that the nitrates are derived from the soil layers above the caverns and are carried into the caverns by the percolating waters and are finally left in the cavern earths by the evaporation of the water. 'The Calcareous Concretions of Kettle Point, Lambton County, Ontario,' by Reginald A. Daly. The article is illustrated with six reproductions of photographs of these noted concretions and after a somewhat extended discussion of the subject of concretionary growths, the author concludes that these particular concretions "were formed in place in the shales and antedate the period of joint development and final consolidation of the surrounding rock, that the local deformation of the shale accompanied the crystallization, that the energy of the deformation was derived from the change of volume induced by the breaking up of the bicarbonate into the monocarbonate and the fluid biproducts." 'Ants as Geological Agents in the Tropics,' by John C. Branner. The author concludes that the geological work of ants in the tropics is much more important than that of the earthworms in the temperate regions and he records a number of observations on the point. 'Variations of Glaciers,' by Harry Fielding Reid. A summary of the fourth annual report of the International Committee on Glaciers is given. Under the section of Studies for Students, Dr. E. R. Buckley gives a very comprehensive discussion of 'The Properties of Building Stones and Methods of determining their Value.' The author treats especially the economic phase of the subject.

W. G. T.

SOCIETIES AND ACADEMIES.

ZOOLOGICAL CLUB, UNIVERSITY OF CHICAGO.

MEETINGS OF FEBRUARY AND MARCH, 1900.

At the meeting of February 14th, Mr. W. J. Moenkhaus presented a paper entitled 'Some Stages in Hybrid Development' giving some of the results of his experiments upon the production of hybrids among fishes, and Miss Mary Hefferan reviewed Rand's papers on regeneration and regulation in Hydra. The following is an abstract of Mr. Moenkhaus' paper:

Of some twenty crosses made between some of our commoner marine and fresh water fishes there was not a single failure of impregnation, though many of the crosses were between very distantly related forms—soft-rayed and spiny-rayed species. The per cent. of eggs impregnated was, as a rule, quite large, but this bore no relation to the nearness of relationship. Two combinations gave beautiful instances of what a study of the nuclear conditions has shown to be dispermy, fifty per cent. of the impregnated eggs falling directly into four cells, the remainder into two. In all crosses segmentation was carried through. Four crosses went to completion of gastrulation, forming the neural tube, but no optic vesicles. The remainder hatched. From crosses among the trout it appeared that the formation of the tail is a difficult process. Considering in this connection the common phenomenon of infertility, it seemed that in hybrid fishes there were at least four pretty definite stages in development that are critical: (1) beginning and (2) close of gastrulation; (3) formation of tail bud, (4) formation of the sexual elements.

The nuclear behavior during fertilization and during degeneration in these partially successful crosses is being studied.

The session of February 28th was devoted to two papers; a review and critique by Mr. E. R. Downing of Delage's recent work on the fertilization and development of enucleated egg-fragments, and a review by Miss Anne Moore of Calkin's paper on 'Mitosis in Noctiluca.' A few of the more important points touched upon by Mr. Downing were as follows:

Delage finds in embryos produced by the fertilization of enucleated egg-fragments the normal number of chromosomes. He claims to demonstrate (1) a maturation of the cytoplasm corresponding to, but independent of, that of the nucleus; (2) that enucleated eggs resist hybridization as well as entire eggs and that, therefore, the nucleus has nothing to do with such resistance; (3) that the female nucleus is inert and the male excitable. The latter con-

clusion is drawn from the fact that the whole eggs did not fertilize in a drop of water as well as the enucleated fragments. His conclusions were criticised, for the whole eggs in abundant water all fertilized as usual. The only justifiable conclusion would be that confinement in a drop of water prevents fertilization of normal eggs, while it is not an unfavorable condition for enucleated fragments. The small available supply of oxygen may account for this. The second conclusion above given is drawn from contradictory results. The proper inference to draw is that the possibility of entrance of the sperm is determined in hybridization by other things than the presence or absence of the nucleus.

At the session of March 14th, a paper entitled 'The Derivation of Annelid Nephridia' was read by Mr. R. S. Lillie, consisting of a resumé and discussion of the various theories regarding the morphological significance of annelid nephridia.

C. M. CHILD.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

AT the 517th meeting of the Society, held April 14th at the Cosmos Club, Professor Geo. L. Raymond, of Princeton University read a paper on 'Some Æsthetic Aspects of Music.' He showed that the one distinction between talking and singing lay in the sustained character of the tones of the latter. Birds, dogs or men chirp, bark or talk in unsustained tones at those who have interrupted them. They sing, howl or hum in sustained tones, subjectively and spontaneously. This explains why music need not convey definite intelligence, nor imitate external conditions. But natural music, as when a man hums, does represent moods, and may repeat what has been heard. Artistic music develops, according to the laws of form, phrases of natural music; and what these mean may be determined by the meanings of time, pitch, force and quality as manifested in intonations of speech as distinguished from the articulations of words.

Mr. R. H. Strother spoke on the 'Physics of the Phonograph,' and C. K. Wead discussed 'Modern Problems in Acoustics.'

The 518th meeting, held April 28th, was devoted to a paper by Mr. Lyman J. Briggs 'On the Absorption of Salts by Organic and Inorganic Substances,' followed by 'An Unscientific Account of a Scientific Expedition to Hawaii,' illustrated by lantern slides, by Mr. E. D. Preston and the exercises closed with a statement by Mr. R. A. Harris of 'A new way of indicating the Acceleration of a point referred to Polar Co-ordinates.' The author showed how the ordinary expression for the acceleration of a point moving in a circle, or how the resolution of the acceleration with reference to tangent and normal for any path (plain or twisted), does by its form indicate the resolution with reference to polar co-ordinates.

E. D. PRESTON,
Secretary.

NOTES ON PHYSICS.

ANALYSIS OF VOWEL SOUNDS.

PROFESSOR LOUIS BEVIER, Jr., describes in the *Physical Review*, for April, some interesting work in vowel analysis. The author magnifies the ordinary phonograph record by a mechanical-optical device, thus obtaining tracings which he subjects to harmonic analysis. He has thus far analyzed only the vowel *a* (as in father). He finds two mouth tones in this vowel. The higher and more characteristic mouth tone has a pitch of about 1150 ± 150 vibrations per second. The lower mouth tone has a pitch of about 675 ± 125 vibrations per second. The resonance corresponding to the higher tone is the more pronounced, and this tone varies less in pitch than the lower tone, with different voices.

DISSOCIATION THEORY OF THE ELECTRIC ARC.

PROFESSOR C. D. CHILD applies the theory of ionic dissociation to the explanation of some of the more prominent of the phenomena of the electric arc in the *Physical Review*, for March, 1900. Professor Child explains the curve obtained by Mrs. Ayrton (representing the fall of potential from carbon to carbon). He explains the peculiar light clouds which N. H. Brown found advancing at different velocities from positive and negative carbons in an alternating current arc, and he verifies the drag of the ions upon the vapors of the arc by the method