'LIFE AND CHEMISTRY.'

TO THE EDITOR OF SCIENCE: The interesting address of Professor Charles Baskerville, entitled 'Life and Chemistry,' published in SCIENCE, Vol. XXI., No. 539, contains a statement which calls for review. He says that "Seed, one of the means of nature's reproduction, may remain years, centuries, in vaults, as within the Egyptian pyramids. When subjected to the proper conditions, they sprout and reproduce." What are the 'proper conditions' for the germination of these mummy seeds? DeCandolle, and others, experimented with seeds in many ways, and were unable to prove that they possessed such remarkable longevity as that referred to in Professor Baskerville's address. Their germinating experiments indicated that few seeds retained their 'vitality' after ten to fifteen years. They appeared to believe that thirty years was the limit of longevity in the most vigorous seeds.

Seeds collected from mummy cases, and reported to have germinated, are regarded by many botanists as 'salted.' This view regarding the short longevity of seeds is current in botanical literature. If that literature is incorrect it should be revised.

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SPECIAL ARTICLES.

THE IDEAS AND TERMS OF MODERN PHILOSOPHICAL ANATOMY.*

THE ideas of philosophical anatomy have been developed during three periods of human thought: First, the Greek, in which adaptation was clearly perceived as the central phenomenon of life, in its morphological and physiological expression. Second, the pre-Darwinian period, in which ideas of the environmental relations were developed especially by Bacon; and various forms of morphological, physiological and especially psychical adaptation were developed gradually through the studies of Buffon, Lamarck, Geoffroy, St. Hilaire and more especially Goethe; adaptations began to be distinguished broadly into *primary,* or those which had been of use in past time, and *secondary,* or those which were recent in origin and in full use at the present time. Even prior to these writers, however, Vesalius in his studies of human anatomy perceived the importance of this distinction. Philosophical anatomy really owes to Darwin himself the fundamental ideas which are involved in the terms primitive, retrogressive, progressive and dominant, and are now understood with perfect clearness. This is the third period of anatomy as established on evolution. Huxley in his brilliant essay of 1880 on 'The Laws of Evolution as Applied to the Mammalia' was the first to emphasize persistent primitive characters and modernized or adaptive characters, laying great stress on the importance of the former in questions of phylogeny. Among many other anatomical papers E. Ray Lankester's 'Degeneration, a Chapter in Darwinism,' brought out especially the significance of retrogressive changes.

Huxley was a master of logic, but even his keen vision failed to recognize the vast importance of the element of analogy, or similarity of function, in bringing about a similarity of structure in evolution independent of real similarity of kinship. This final phase broad extension of paleontology, and the demonstration over and over again in nature that similar forms have been produced independently either by parallelism from animals related in ancestry, or by convergence in animals unrelated in ancestry. To these processes and results of similar modeling Lankester has applied the fitting terms homoplasy and homoplastic.

In the table an attempt is made, for the first time to my knowledge, to bring together all these processes of change and to indicate their interrelations. There can be little disagreement as to the terms in columns I., II., III., but some surprise may be felt as to the broad inclusiveness of column IV. The justification for this column lies in the fact that in the analysis of any animal form the questions which each anatomist should put to himself as regards each character are: Is this a primi-

* Presented before the New York Academy of Sciences, by Henry Fairfield Osborn, April 10, 1905.