AT the last meeting of the College of Medicine of the University of Illinois Chapter of Sigma Xi, seven candidates for active membership and six candidates for associate membership were initiated. Dr. Lloyd Arnold presented his results on "An Experimental Study of Host Susceptibility to Vibrio Cholera Infections." For the ensuing year the following officers were elected: Dr. William F. Petersen, *president;* Dr. W. J. R. Camp, *vice-president;* Dr. William H. Welker, *secretary;* Dr. I. Pilot, *treasurer,* and Dr. Hugh A. McGuigan, *elective member of executive committee.*

AN appropriation of $50,000 to enable the Secretary of Agriculture to purchase a collection of moths and butterflies owned by the late Dr. William Barnes, of Decatur, Illinois, has been recommended by President Hoover. The collection, which consists of 473,000 specimens, would be housed in the National Museum.

THE American Engineering Council announces the appointment of a committee to cooperate in the publication of a new edition of "Who's Who in Engineering." The function of the committee, according to Mr. Lawrence W. Wallace, executive secretary of the council, is "to provide such advice on the qualifications of engineers as will enable the publishers to issue a work which shall be authoritative." The members of the committee are: R. F. Schuchardt, chief electrical engineer, Commonwealth Edison Company, Chicago; John S. Conway, Washington; Dr. Harry A. Curtis, Department of Chemical Engineering, Yale University; C. R. Dooley, Standard Oil Company, New York City; Colonel Frank M. Gunby, associate, Charles T. Main, Inc., Boston; Arthur Huntington, Iowa Railway and Light Corporation, Cedar Rapids, Iowa; B. A. Parks, Byron E. Parks and Son, Grand Rapids, Michigan; Dr. H. S. Person, managing director, Taylor Society, New York City; Dean A. A. Potter, School of Engineering, Purdue University, Lafayette, Indiana; George S. Rice, chief mining engineer, U. S. Bureau of Mines; F. F. Sharpless, consulting engineer, New York City; Robert Sibley, executive manager, California Alumni Association, University of California; Major Brehon B. Somervell, district engineer, U. S. Engineer Corps, Washington. The committee represents membership in the following societies: American Institute of Chemical Engineers, the American Institute of Electrical Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Agricultural Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, the Grand Rapids Engineers Club, the Society of American Military Engineers, the Society of Industrial Engineers and the Taylor Society.

DISCUSSION

THE QUESTION OF THE CENTRAL BODIES

IT has been suggested of late that the so-called central bodies (centrosomes, centrioles) long ago made known by Flemming, Van Beneden and Boveri, and later studied by many other expert cytologists, have no objective existence in the living cell—that they are, in fact, either coagulation-artifacts or the offspring of an unholy union between random granules in the cell and an over-developed will to believe on the part of the observer. Could this be substantiated, it would constitute an important discovery—psychological as well as cytological—and assuredly the questions thus raised should have every opportunity for critical test. In the meantime, I will briefly indicate some of the grounds for thinking that the central bodies may for the present maintain a modest footing in respectable biological society.

Two of the classical objects that have played a leading part in the development of our knowledge in this field are the germ-cells of the nematode *Ascaris megalocephala* and of the annelid *Chaetopterus,* the former having long ago provided the material for the pioneer researches of Van Beneden, Boveri and Brauer, the latter for the important later work of Mead. Both these cases are now in course of reexamination in the Columbia Laboratory. The work of H. P. Sturdivant, dealing especially with the sperm-forming divisions in *Ascaris,* and later to be reported by him in detail, has produced decisive confirmation of the most essential results concerning the central bodies made known by Boveri, O. Hertwig and Brauer. The case of *Chaetopterus,* including the history of the central bodies in maturation, fertilization and cleavage, is being reviewed by the writer in a study of Mead's original preparations and drawings, a large number of which have generously been placed in my hands for the purpose. Many of these preparations, as might be expected after thirty-four years, are now badly faded, though they show good promise of successful restaining. Fortunately, however, a sufficient number have retained their original brilliancy to make possible a close study, with the best modern optical apparatus, of all the essential phenomena recorded by Mead in 1898; and in a number of cases a thorough examination could be

made of the same individual sections, some of them still of great beauty, from which the original figures were drawn.

It is a pleasure to bear witness to the fine quality of these admirable preparations, to the exceptional precision with which they were described and figured and to the faithfulness of Werner and Winter's lithographic reproductions of the original drawings. The figures do not exaggerate the clearness of the preparations; they are not schematized; they represent accurately the facts as they were seen and in large measure may still be seen. No critical observer, I think, who closely studies these preparations could take seriously the naïve notion that the centrioles are merely random granules that happen to lie at or near the astral centers. The assumption that they are merely the coagulated central portions of the astral rays deserves more respectful consideration, but this too seems to me inadmissible in view of the fact that both in maturation and cleavage the centriole is double from the metaphase onwards, and that during the anaphases its halves are more or less widely separated at a time when the asters show no sign of duality, before they have begun to elongate at right angles to the spindle-axis and before the small daughter-asters of the telophase have appeared. Similar conditions are seen with equal clearness in the *Ascaris* spermatocytes, and in great numbers of cells.

In respect to the genetic relations of the central bodies, it must be plain to every observer that in these objects some kind of genetic continuity is maintained between the astral systems of successive divisions. From the first appearance of the polar asters in *Chaetopterus* down to their disappearance after the second polar division, and then again from the first appearance of the sperm-aster through all the operations of fertilization and the earlier cleavages, the new asters arise at each step within, or in close proximity to, the preceding ones. All points to the conclusion that, in these divisions at least, this relation is determined by the centrioles, which are handed on bodily from cell to cell and act as centers for the formation of new asters in each succeeding generation. In respect to all this, and much more, the *Chaetopterus* preparations show a remarkably close and detailed resemblance to the conditions figured and described by Coe in *Cerebratulus* and by Griffin in *Thalassema,* and they are in substantial agreement with the results of many other accurate observers of the same period, including Boveri, Meves, Heidenhain, Ballowitz, Kostanecki, MacFarland, Vejdovsky and others who contributed to the development of the classical view.

For the foregoing reasons I am convinced of the objective existence of the central bodies as normal components of the cell (I do not say of all cells) and of the correctness in principle of the conclusions concerning them drawn by Mead and his fellow workers in this field. Doubts concerning the centrioles have sometimes been caused by considerations relating to the technique of staining. It was long ago demonstrated by Boveri (1901) that so long as the centriole remains single its existence within the centrosome or aster is not susceptible of rigorous demonstration by the regressive methods of staining in iron-hematoxylin, for the apparent size of the centriole may be varied at will, down to seeming disappearance, by extracting the dye in successive degrees. But at certain stages, as above indicated, two centrioles are regularly found at a time when the centrosome or aster is still single—a condition explicable neither as a product of centripetal or concentric extraction (as Boveri also pointed out) nor of mere coagulation of the rays. As a third possibility, the centriole might be thought of as no more than a focus of centripetal condensation within the aster, having no sharply marked boundaries, yet capable of division as if it were an individualized body, and offering the aspect of such a body after centripetal extraction. Such a notion is hardly different in principle from the classical conception, but it introduces new and perhaps insurmountable difficulties, particularly in view of the fact (apparently well established) that in some cases the centriole may persist, as a double structure, in the absence of asters, during the whole interkinetic phase of the cell.

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CREDIT OR RESPONSIBILITY IN SCIENTIFIC PUBLICATION

MAY I venture a comment bearing on the question of credit for illustrations in connection with recent letters by Dr. Stiles and Dr. Mueller? Every one must acknowledge the justice of the criticisms made by both writers, but in neither case is there any practical method of securing real justice. Most illustrations of value enough to be frequently copied are the result of the combined effort of quite a number of individuals. A restoration of an extinct animal owes much of its value to the artist who drew it and likewise to the scientist who deduced from its skeleton the resemblances to and differences from existing animals that must serve the artist as his guide, who in many cases provided the artist with sketches or rough drawings to finish for publication. But no less it is the work of the skilled preparator who, guided by expert practical knowledge of osteology,