offers exceptionally favorable material for the study of rhythmic pulsation; and to the reactions of this species he devotes the greater portion of his paper on rhythmical pulsation. In this species he has discovered a new and very interesting way in which rhythmical pulsations may be maintained. In general, in medusæ, the pulsations are originated in the margin, which contains the sense organs and the greater part of the nervous system. If this margin be cut off the central part of the disc does not, in general, continue to contract in sea water. Romanes, however, found that by passing a weak constant current through such an emarginated disc rhythmical contractions could be kept up in *Aurelia;* and Loeb has found that the central part of both *Gonionemus* and *Polyorchis* can be made to pulsate continuously in appropriate chemical solutions, which are different for the two forms. Mayer has found that if in *Cassiopea* the marginal sense organs are removed, the remainder of the disc does not pulsate in sea water. If from this disc a ring of tissue be cut, or if the disc be cut in other ways, so that a closed circuit of uninjured tissue be left, in which an impulse can pass continuously from one point, around the circuit, to its point of origin, without passing over any portion of its path twice, it still does not pulsate. If, now, a disc which has been cut in this way is strongly stimulated electrically, mechanically or chemically, a wave of contraction starts from the point of stimulation, and passes with constantly diminishing intensity around the circuit. When it reaches its point of origin it is suddenly reinforced, and starts around the circuit again with renewed vigor. In this way a perfectly regular series of contractions is originated which keeps up indefinitely. The rate at which these contractions follow each other depends upon the length of the path from the point of origin around the circuit and back again. If, now, during such a series of pulsations, the ring of muscular tissue be cut across so that there is no longer a closed circuit, the pulsations stop instantly. The point from which the pulsations start does not always remain at the original point of stimulation, but may shift to some other place. In such cases, and when the series of pulsations has been started by an unlocalized stimulus, there is a decided tendency for the point of origin of the pulsations to be located in the geometrical axis of symmetry of the figure into which the disc has been cut.

Although Dr. Mayer does not discuss this point, phenomena of this kind have a special interest for us on account of the analogy which they may furnish for some of the processes going on in the central nervous system; and for these reasons it is to be hoped that the cause for the characteristic location of the point of origin of the pulsations, the nature of the reinforcement given to the wave of contraction, the nature of the reciprocal influence of two points of origin on each other, and similar questions will be still farther studied.

Many other questions, which it will be impossible to discuss here, are also investigated. Among them the rôle of the various salts of the sea water in stimulating and inhibiting the pulsations is considered, but as these chemical questions are not considered from the point of view of the modern general physiology, which is based upon physical chemistry, they are less satisfactory than other portions of the paper. Frank W. Bancroft

---

*SCIENTIFIC JOURNALS AND ARTICLES*

*The Journal of Experimental Zoology,* Vol. IV., No. 1, February, 1907, contains the following papers: 'Abnormal Development of Toad Ova Fertilized by Spermatozoa exposed to the Roentgen Rays,' by Charles R. Bardeen. 'An Ecological and Experimental Study of Sarcophagidæ with Relation to Lake Beach Debris,' by William B. Herms. This is a study of the conditions presented by the flesh-feeding fly-larvæ, and the adaptations which have resulted from a certain amount of isolation and apparently fairly regular periodicity of food (fish) supply in the particular locality studied, and determination of minimum food supply required for the maturity of individuals as well as the optimum and maximum periods of feeding. 'Rejuvenescence as the

Result of Conjugation,' by Sara White Cull. Experiments were made to determine (*a*) whether conjugation always produces rejuvenescence and (*b*) whether the fertilization resulting from conjugation is or is not mutual. Conjugating pairs of *Paramecium caudatum* were isolated and the individuals, after they had been separated, were isolated and counted at intervals for a month. The statistics gathered show that (*a*) conjugation frequently fails to produce rejuvenescence in either conjugant and (*b*) that conjugation, among the infusoria, is not mutual and there are strong indications that it is incipient fertilization as seen among higher forms. 'Artificial Parthenogenesis in Thalassema mellita,' by George Lefevre. An investigation of artificial parthenogenesis in *Thalassema mellita* has shown that the unfertilized eggs of this worm can be induced to develop into actively swimming trochophores by immersion for a few minutes in very dilute solutions of both inorganic and organic acids. Nitric, hydrochloric, sulphuric, carbonic, acetic and oxalic acids were used successfully, and in favorable experiments 50–60 per cent. of the eggs developed into swimming larvæ that were hardly distinguishable from normal trochophores of a corresponding stage. The parthenogenetic development in many cases involves a perfectly normal maturation, a more or less regular cleavage, and the usual processes of differentiation leading up to the formation of the normal larva. The reduced number of chromosomes (twelve) persists when the maturation has been normal, and has been repeatedly counted even in late blastula and gastrula stages. Differentiation of the egg does not occur in the absence of cleavage, and all ciliated bodies, whether normal or abnormal, possess a cellular structure. 'Concerning the Theory of Tropisms,' by Jacques Loeb. 'The Mechanism of the Galvanotropic Orientation in Volvox,' by Frank W. Bancroft. O. P. Terry's result, showing that volvox colonies subjected to a bright light swim to the cathode, while those subjected to a dim light or darkness swim to the anode was confirmed. This difference was found to be due to a reversal of the pole at which the galvanic current acts. In anodic colonies the galvanic current stops the flagella current on the anode side of the organism. In cathodic colonies the orientation is produced by stopping the flagella current on the cathodal side. Pressure on anodal colonies reverses the pole at which the galvanic current produces its effect.

## *SOCIETIES AND ACADEMIES*

### THE PHILOSOPHICAL SOCIETY OF WASHINGTON

THE 633d meeting was held on April 13, President Hayford in the chair.

Professor Newcomb discussed the question of the variability of the sun's radiation, giving the results of a statistical investigation on that subject. The line of investigation was directed upon the point whether there is any tendency to synchronism between spells of high and low temperature in widely separated regions of the earth. The material included annual mean temperatures, as observed from 1820 to 1904, and deviations during terms of ten days, and of one month, from 1872 until 1904. The general conclusion was that there were no well-marked deviations other than those which resulted from local causes, and that when these were duly allowed for, the temperature of the earth at large remained constant within a fraction of a degree. The only appreciable indication of any cosmical cause affecting the whole earth was in the monthly deviations. So far as the investigation had been carried, these indicated that there really was a deviation, which could be accounted for by a change in the sun's radiation from month to month, sufficient to change the temperature of the equatorial regions by an average amount of about one third of a degree centigrade. But even this small change may be due to the trade winds and other great movements of the air, by which a body of air colder or warmer than the normal is carried from one region to another within the monthly limits. The only ascertained law of change was that of the sun-spot period. The result reached by Köppen, that the temperature of the earth generally was somewhat higher the fewer the sun-spots,