

teratology for the elucidation of phylogenetic morphological problems. This purpose is set forth in the paragraph which concludes a preface to the *Beiträge* in which Braus dwells on the distinctions between the historico-genetic and the dynamic aspects of biological problems. "The close relations," he says, "of this branch of experimental embryology to the program of 'Gegenbaur's *Morphologisches Jahrbuch*' led me, by agreement with the editor and publisher of this journal, to embody my 'Experimentelle Beiträge zur Morphologie' in it and thus to certify their appurtenance to the life work of the founder of modern morphology. On the other hand, in order to emphasize the unity of purpose of the 'Experimentelle Beiträge' and to make them more readily accessible to those who care especially for the broad aspects of experimental embryology and for its relations to the physiology of development, the *Beiträge* following their appearance in the *Jahrbuch* are to be brought out in the form of separate Hefte. It is anticipated that several Hefte can be bound into a volume. Should they grow in general into a collection for experimental-embryological work which has the historic-morphological problem as its aim, yet in which sight is never lost of the relations of the facts discovered to the other aspect of biological investigation, that of the physiology of development, there may be added other volumes to the series and the progress here aimed at may prove lasting."

Thus far two Hefte have appeared. These contain reprints from the *Morphologisches Jahrbuch* of articles on experimental embryology and teratology by Braus and one of his pupils. Bd. I., Heft 1, is given up to the preface above mentioned, and to a paper entitled 'Ist die Bildung des Skeletes von den Muskelanlagen abhängig.' A series of experiments on the developing pectoral fin of sharks leads Braus to conclude that in the selachian fin the skeleton develops independently of the musculature but that parts of the skeleton are dependent upon other parts for stimulus to development.

In Bd. I., Heft 2, there is an article by O. Bender entitled 'Zur Kenntnis der Hypermelie

beim Frosch.' This gives a description of the external form and of the skeletal muscles and nerves of a left supernumerary hind leg of a frog. Deductions are drawn as to the probable cause of the anomaly.

The chief paper in this Heft is one by Braus on the 'Vordere Extremität und Operculum bei Bombinatorlarven' in which Braus shows that although normally the fore limb at a certain stage of development appears to break through the operculum yet, if no fore-leg is developed, there is none the less an aperture formed as if the leg were present. The developing limb has the power to force its way through a covering of skin artificially formed above it. The results of the experiments are considered from the point of view of phylogenetic morphology.

All anatomists acknowledge the great help which the study of normal embryology has been in the development of a science of structural form. That accidental and experimentally produced abnormality of structure may help to clear up obscure fields of anatomy has been abundantly proved of late years. Abnormalities and variation in the structure of man and some other animals have long been used as a basis for phylogenetic speculation. It is not improbable that teratology controlled through experiment may throw interesting light on this aspect of biology. We trust that the 'Beiträge' may serve to stimulate more work in experimental embryology in its morphological aspects. On the other hand, it is to be hoped that vague speculation will not take up an undue amount of the pages devoted to the subject. C. R. B.

Rhythmical Pulsations in Scyphomedusæ. By ALFRED G. MAYER, Director of Department of Marine Biology of the Carnegie Institution of Washington, Tortugas, Florida. Pp. 62, with 2 plates and 36 text figures. Washington, D. C. The Carnegie Institution. 1906.

Among the wealth of new material for investigation which the Carnegie Station at Tortugas has placed at the disposal of the scientific public Dr. Mayer has discovered that a small scyphomedusæ, *Cassiopea xamachana*,

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