

arches being derived from the ventral mesoderm and the remaining cranial musculature from the dorsal mesoderm. It is noteworthy that the branchial musculature is supplied by lateral motor nerves and by these alone, while the dorsal musculature is supplied by median motor roots. Consequently the nerves supplied to the myotomic muscles of the trunk are to be regarded as the homologues of the cranial median motor nerves, while the white rami fibers, which control through sympathetic neurons the visceral musculature of the trunk derived from the ventral mesoderm, are the equivalents of the cranial lateral motor components.

The other ideas referred to in the paper may, for lack of space, be stated summarily. (1) The distinction between voluntary and involuntary muscles is a physiological and histological one, and not morphological, and the branchial musculature is morphologically equivalent to the visceral musculature of the trunk. (2) The branchiomerid segmentation is not identical with the myotomic, but in the cranial region there exist together two distinct segmentations. (3) Of these the branchiomerid segmentation is probably the older phylogenetically.

*Geographical Distribution of Fresh Water Fishes of Mexico:* S. E. MEEK. (Read by title only.)

*Feeding Habits of a Spatangoid, Mæratropus; a Brittle-Star Fish, Ophiophragma Wurdmannii, and a Holothurian, Thyone briareus:* CASWELL GRAVE.

The observations here given were made on animals kept in the Beaufort U. S. F. C. Laboratory in aquaria in which a balance had been established between animal and plant life by means of diatoms. The spatangoids were reared from plutei.

The function of the so-called ambulacral brushes of spatangoids, which are so con-

spicuously waved about in the water above the animals when dug up and placed in aquaria, has been thought to be principally a respiratory one, but I have found that the animals use these brushes as hands for grasping bunches of sand and diatoms and carrying them to the mouth, the bristles of the brush being used as fingers.

*Ophiophragma* lives below the surface of the sand, with the oral surface of its disc and arms applied to some large object and with the tips of its arms extending into the water above. The foot-tentacles, distributed in pairs along each arm, are seen to be in constant waving motion, and by close observation it may be seen that they are busily engaged in passing little pellets of sand and diatoms toward and into the mouth. Down the oral surface of each arm is travelling a procession of pellets which have been gathered up by the more terminal tentacles and which are being successively handed on by the more proximal pairs.

*Thyone*, in feeding, fully extends the long branching tentacles which surround its mouth, and mops them about in the sand until they are well covered with sand grains and diatoms; then they are, one by one, turned back and poked down the throat; the mouth closes around the base of the tentacle and, when withdrawn, it is free from all débris.

*A Method of Rearing Marine Larvæ:* CASWELL GRAVE.

A method of rearing echinoderm larvæ which I have used for two seasons with much success consists in supplying the aquaria containing them with a generous amount of sand containing diatoms.

From twelve to twenty-four hours after fertilization, the eggs reach a stage in which they swarm at the surface of the water. At this time it is easy to get a pure culture of larvæ by skimming the

surface of the dish in which the eggs were fertilized. The larvæ thus collected are placed in an aquarium of fresh sea water. At the same time there are also added a dozen or more pipettefuls of the *surface* sand from an aquarium containing a culture of diatoms. (Prepared by putting a liter or more of sand, dredged from the ocean bottom, in an aquarium of sea water and allowing to stand several days.) The jar thus stocked is now covered and set before a window, where it is well, but indirectly, lighted.

The diatoms keep the water *pure* and furnish an abundant supply of the *natural food* of the larvæ, and, because of the balance established in the aquarium between animal and vegetable life, the supply of *oxygen* is kept constant and there is no need for frequent changes of water. The larvæ are thus protected from the destructive effects of *rapid changes in temperature* produced when fresh ocean water is added to that which has stood in the house.

A number of spatangoids and sand-dollars, which had just completed their metamorphosis on September 22, have been kept in a healthy and growing condition to the present time (January 1) in such a diatom-stocked aquarium holding one liter. The water has been changed twice during the three months in order to replace the salts used by the diatoms and echinoderms.

*Abnormalities in Development of Hybrid Fishes:* W. J. MONKHAUS. (Read by title only.)

*On the Genera of the Hydracarina:* ROBT. H. WOLCOTT.

However much we may pride ourselves on the naturalness of our present classification, it nevertheless must be admitted that it is a purely artificial device. Thus it seems legitimate to make use of every modification, however artificial it may be,

which increases its serviceability without at the same time doing violence to any of our accepted ideas concerning phylogenetic relationships. In the characterization of various groups, of higher or lower rank, authors have made use frequently of characters so dissimilar as to make it difficult to compare the descriptions or to reduce them to such form as to make them serviceable in a general treatment of the subject. If, in any group, characters can be found which are of family value, others which are generic, and still others clearly specific, while all other variations can be recognized as within the limits of specific variation, systematic work in the group will be greatly facilitated by the recognition of the fact and a clear definition of the value of each factor. It is evident that for each collection of forms that may be treated together in this manner, however many may be thus included, characters will be found which are peculiar to those forms and other characters must be found for any other similar collection. It is also evident that any character which would otherwise be of a given value may, if greatly developed, have its value so increased as to become a character of the rank next above, especially if accompanied by other characters of the higher rank. If this development stand alone it is better to consider it in the line of aberrancy within the lower group. It is further desirable, as soon as these characters may be determined upon for any group, that for the subdivisions of that group diagnoses be formulated which shall bring these characters sharply into contrast; and in the interest of accuracy it is desirable that each of these diagnoses should contain in the briefest possible form a statement concerning all the characters belonging to a subdivision of that rank. Furthermore, for each group a type should be selected in accordance with