

ABSTRACTS OF MEMOIRS

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY

RICERCHE SU *ASTERINA GIBBOSA* (PENN.). I. LA MIGRAZIONE DELLE GONADI. II. L'ERMAFRODITISMO IN UNA POPOLAZIONE DI PLYMOUTH

By Guido Bacci

Arch. Zool. Ital., Vol. xxxiv, 1949, pp. 23-29, 47-74.

The gonads of *Asterina gibbosa*, in individuals with an arm length of 3 mm., the smallest sizes examined, are still found in the aboral region. During subsequent growth, they turn along the internal walls of the interradial zones until they reach the vicinity of the mouth in the oral position. When this definitive position is reached (in individuals with an arm length of 9 mm. in the Plymouth *Asterina*) the genital pores open.

The great difference in the embryological processes by which analogous conditions are reached in ophiuroids is emphasized.

A. gibbosa is represented by an Atlantic race which has only hermaphrodite individuals and a Mediterranean race which has partly hermaphrodite and partly gonochoristic individuals (Cuenot). In the present work the problems of sex-differentiation and of sex-determination in a wholly hermaphrodite population occurring in the waters of Plymouth Sound are examined both by morphological and statistical methods.

Morphological study of the gonad development has given the following results: (i) the gonads appear ambisexual from a very early stage; (ii) the maturation of the male always precedes that of the female elements which continue their growth during the male phase; (iii) individual differences can be observed in this relative rate of maturation of the male and female elements; (iv) ripe sexual elements left in the gonad after spawning are destroyed by amoebocytes; (v) vesicular tissue formations appear in the gonad both of the male and of the female after spawning; (vi) germinal elements of the ripe gonads in the female phase are represented by female germ cells only; (vii) the absence, during the reproductive period, of transition stages between gonads in the male and in female phases shows that the change from the male to the female phase takes place between successive spawning periods.

A statistical analysis of the sexual phases in the population gives the following results: (i) all the individuals of the population are protandric hermaphrodites; (ii) sex reversal takes place in individuals having an arm length between 9 and 16 mm.; (iii) the maximum rate of change is found to occur in individuals having a size which more or less corresponds to that attained when the males and females are in equal numbers.

The necessity of dividing the study of sex in its morphophysiological (differentiation) and genetical (determination) aspects is emphasized; the existence among Metazoa of species with totally phenotypical sex-determination is considered doubtful.

On the ground of preceding statistical research (Bacci, 1947) and of the results on *Asterina* two main categories in the sex determination of hermaphrodites may be defined. In the first one (*Patella* type) the action of sex factors is exercised with an unequal intensity among the different individuals of a population. In the second (Plymouth *Asterina* type), sexual factors are in a condition of approximate balance among the different individuals of the population. While in the first category sex determination is probably due to multiple factors, in the second, sex determination is certainly due to a gene mechanism. As far as sex differentiation is concerned three principal conditions are considered in hermaphrodite animals. In the first (false gonochorists) each sexual phase contains elements of only one type. In the second, heterologous elements coexist in the same phase but never reach maturation at the same time. In the third, the heterologous elements reach maturity in the same period so that even autofecundity is made possible. For the species of the first two categories of differentiation the following principle is considered to be general. In hermaphrodite animals with distinct sexual phases sex change takes place during the period of sexual rest. G.B.

SOME NEW MYXOSPORIDIA FROM PLYMOUTH WITH A
PROPOSED NEW CLASSIFICATION OF THE ORDER

Yogendra R. Tripathi

Parasitology, Vol. 39, 1948, pp. 110-18

Four new species of Myxosporidia are described from fishes at Plymouth, *Sinuolinea rebae* n.sp. from the urinary bladder of *Solea solea*, *Leptotheca vikrami* n.sp. from the gall bladder of *Zeus faber*, *Zschokkella russelli* n.sp. from the gall bladder of *Gaidropsarus tricirratus*, and *Ciliata mustela* and *Zschokkella sturionis* from the gall bladder of *Acipenser sturio*. This is the first record of amyxosporidian from a chondrosteian. An attempt has been made to standardize the terminology used in describing the spores. The terms as used by Kudo (1920) are adopted because they are well defined and used by many other authors. A new classification is proposed, based on the form of the spores, and an emended definition of the genus *Leptotheca* is given. Y.R.T.

THE FUNCTION OF THE GIANT AXON OF *MYXICOLA INFUNDIBULUM*
MONTAGU

By J. A. C. Nicol

Can. Journ. Research, D, Vol. 26, pp. 212-22.

The giant axon of *Myxicola infundibulum* runs throughout the nerve cord and gives off peripheral branches to the longitudinal muscles. Movements of the animal are quick synergic contractions of the whole body and slower meta-chronous locomotory movements. Injury to the giant axon without interrupting the rest of the nerve cord blocks the passage of the quick contraction but not of slower locomotory waves. It is concluded that the quick end-to-end shortening is intermediated by the giant axon and that slow waves of locomotion depend upon transmission through short segmentally linked neurones. Traction of one segment on another is not effective in transmitting either type of movement. The giant fibre response is of an all-or-none nature. Repetitive stimuli lead to summation of muscular contractions. The axon conducts in either direction during the natural life of the animal. The nature of the effective stimuli, the simplicity of the neuronal arrangement involved, and the character of the synergic response are discussed in terms of their survival value to the species. J.A.C.N.

CONDUCTION VELOCITY IN RELATION TO AXON DIAMETER IN
MYXICOLA INFUNDIBULUM

By J. A. C. Nicol, C. N. Smyth and D. Whitteridge

XVII Int. Physiol. Congr. Oxford, 1947, pp. 243-4.

Some characteristics of conduction in the giant axon of *Myxicola infundibulum* are presented. The axon tapers from 0.5-1 mm. at one end to 0.1 mm. at the other. A single electrical stimulus leads to a nerve action potential which is all or none. Sharp mechanical stimuli give rise to single nervous impulses resulting in separate muscular contractions. The axon conducts equally well in both directions, when the stimulation is electrical or mechanical. J.A.C.N.