SCIENTIFIC BOOKS

CLADOCERA

Studies on the Physiology, Genetics, and Evolution of Some Cladocera. By A. M. BANTA, with the collaboration of THELMA R. WOOD, L. A. BROWN and LESTER INGLE. x + 285 pp., 170 figs., 16 diagrams. Paper No. 39, Department of Genetics, Carnegie Institution of Washington. 1939.

THIS book tells the general story of results obtained in a series of studies of Cladocera which began in 1911 and continued to 1938. The immediate problem in the beginning was concerned with selection in relation to evolution. This group of animals seemed particularly favorable for a study of small heritable variations because many of the forms show considerable variations in different types of habitats. As the investigation progressed, however, the scope of the studies was enlarged to include a number of problems as shown by the headings of the twelve chapters into which the book is divided; the various topics include discussions of selection, sex intergrades, head mutations, control of male and sexual egg production, genetical studies in sexual reproduction, growth, the effect of environment, and finally the adaptation and evolution of the group.

Limited space permits only brief references to some of the more salient points. With regard to sex intergrades, *Simocephalus exspinosus* showed various stages of intergradedness and some clones produced many more individuals of this type than others; the sex reversals were always from male to female. Many of the intergrade individuals were either sterile or had a low reproductive capacity, thus leading to the conclusion that a sex intergrade stock could not survive in nature. With one possible exception, no sex reversals were found in *Daphnia longispina,* but hermaphroditic individuals were noted occasionally; they also had a low reproductive capacity and probably could not survive under natural conditions.

An excavated-head type of *D. longispina* came from a sex intergrade stock, and the character proved to be heritable in both males and females; it was found in the 250th generation following its appearance. Three elements of the environment were found to have some effect on the sex of cladocerans; temperature and quantity of food acted as general or limiting conditions, while crowding also proved effective in inducing liberal male production. Apparently male production was caused by a lowered rate of metabolism of the mother.

In the genetical studies, some culture lines remained vigorous for long periods of time under parthenogenetic reproduction. A culture of *D. longispina* remained vigorous for 14 years (680 generations), but most lines became weak after prolonged parthenogenesis. Clones of *Moina macrocopa* showed no loss of vigor over a period of 23 years (1,572 generations). Some of the declines in clones may have been due to unfavorable culture conditions, but in some cases they may have been due to dominant or semi-dominant mutations that affected vigor.

The growth studies showed that the normal life of *Daphnia longispina* consisted of 3 juvenile, 1 adolescent, and 10 to 19 adult instars, with a life span of 29 days at 25° C. The growth during the adolescent instar was unusually large, even up to a doubling of the body size. These animals increase in size for about 71 per cent. of their lives, remain at the maximum for 17 per cent. and then have a senescent decline for about 12 per cent.

Marked differences in growth rate were found in different clones and even among individuals of the same clone. Such variations were especially noticeable in the slowly developing dwarf clones which produced individuals phenotypically different from one another, though the members of the clone were all genotypically alike. Apparently the dwarf clones were due to some heritable defect in their assimilative mechanism.

The final chapter deals with the adaptation and evolution of the Cladocera. Parthenogenesis is pointed out as one of the most striking characteristics of the group. It enables them to quickly and abundantly populate temporary habitats, such as seasonal pools, as well as permanent bodies of water when conditions are favorable. When crowding or other unfavorable conditions overtake them, they are able to reproduce sexually and form resistant eggs which are able to withstand severe environmental conditions and thus provide for the survival of the various forms.

The book is a fitting climax to the arduous and painstaking studies that have been carried on for such a long period of time.

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REPORTS

THE NATIONAL RESEARCH COUNCIL COMMITTEE ON MATHEMATICAL TABLES AND AIDS TO COMPUTATION

SINCE this committee has been especially active during the past twelve months, it seems desirable that some account of this activity and of the committee's plans should be more generally known. At present its chief aim is to prepare a series of reports on pub-