PARTHENOGENESIS AND AUTOGENY IN *CULICOIDES BERMUDENSIS WILLIAMS* 1

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Parthenogenesis is a relatively rare phenomenon amongbiting Diptera. At least two species of blackflies (Simuliidae) (Barrow and Rothel, 1959; Davies, 1954), three species of mosquitoes (Culicidae) (Kitzmiller, 1959) and several unidentified species of the genera *Dasyhelea* and *Favantomyia* (Ceratopogonidae) (Downes, 1955) have at times displayed spontaneous ovarian development and it has been noted that possibly at least one batch of eggs of *Culicoides circumscriptus* may have developed parthenogenetically (Becker, 1961). Auto genesis (vi able egg production without a blood meal) has been reported in at least 23 species of mosquitoes (Chao, 1958; Lea and Lum, 1958), three species of blackflies (Davies, 1954), two species of *Phlebotomus* (Johnson, 1961), 5 species of *Culicoides*. (Downes, 1958a and Amosova, 1959). Rarely have the two phenomena been reported to occur in the same individuals of a given species. The blackfly, *Prosimulium urinaria*, exhibits both phenomena in Norway but in Alaska and in other areas of its distribution it is bisexual (Davies, 1954). The genus *Dasyhelea* may contain forms which have spontaneous ovarian development and are nonbiting but conclusive evidence of this is lacking at this time (Downes, 1958b).

*Culicoides bermudensis* was described from Bermuda only from females (Williams, 1956). No males have ever been recovered there either in emergence traps or light traps during three summers of study. In the same year that *C. bermu-

1 Contribution No. 289 of the Bermuda Biological Station. Paper III in a series on "The Biting Midges of the Genus *Culicoides* in the Bermuda Islands (Diptera, Ceratopogonidae)." The 1960 investigations were sponsored by research grant E-2566 from the Public Health Service, National Institutes of Health and funds from the Bermuda Biological Station given by the National Science Foundation.
According to Imms (1957), the significance of the obligate thelytoky type of reproduction ",... is that it permits more rapid reproduction by allowing all the activity of the female to be concentrated on feeding and the production of young and by eliminating any competition for food which might otherwise have resulted from the presence of males." Since C. bermudensis is also autogenous, some other significance must be given to this type of reproduction in this species and in Prosimulium ursinum. In the case of C. bermudensis, it may be merely a result of the importation of females only, into the Bermuda Islands from North America. As may have happened also with C. circumscriptus, a few batches of eggs may have been deposited parthenogenetically, resulting only in females. Some of these, in turn might reproduce in the same manner. Thus the population may have gradually built up to the modest numbers one now finds in the Bermuda Islands.

It would appear that autogeny may have developed after arrival in the Bermudas, for it has been noted that in the Bermuda form of C. bermudensis, the number of mandibular teeth vary from four to eight, a reduction from the maximum of 12 which is frequently found in the U.S. form. Perhaps, as has been suggested for certain other autogenous species of Culicoides, the normal and related hosts of the adults may be wanting in the Bermudas and the larval habitats offer sufficient protein so that the adult does not require further protein for egg development.

Although Dr. Richard Davenport, to whom the author expresses his thanks, made unsuccessful attempts to determine the basic chromosome number in C. bermudensis, it may well be triploid, as found in the unsexual form of the blackfly, Cnephia mutata, which lives with but never crosses with the diploid forms which are bisexual (Basrur and Rothfels, 1959). C. bermudensis is apparently the first known representative of the family Ceratopogonidae to demonstrate complete obligate thelytoky in conjunction with autogeny in nature for many generations and the second such strain or species from an otherwise biting group of Diptera. Of the now known autogenous species of Culicoides, C. bermudensis is the only one reported from a subtropical area, the rest being found in northern regions.

References