

## THE NUMBER OF EGGS LAID BY COWBIRDS

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The number of eggs laid by an individual cowbird is difficult to ascertain in those species which deposit their eggs parasitically in the nests of other birds. It is practically impossible to follow an individual cowbird closely enough to find every egg laid in a season. Nevertheless, by utilizing several techniques, we have accumulated sufficient information to reach a tentative conclusion concerning the number of eggs laid by one individual.

In order to outline the background of the subject it seems desirable to review the literature in some detail. Friedmann's book (1929), from which the following is compiled, is a storehouse of information derived from extensive field work. The cowbird group contains several species distributed in the western hemisphere, and demonstrates the evolution of parasitism. *Agelaioides badius*, an Argentine species, is the most primitive and incubates its own eggs. However, it does not build its own nest but remakes old nests of other species to raise its young. According to Friedmann individual birds lay five eggs and are single brooded; the height of the breeding season is January or February. The next species in this evolutionary series is *Molothrus rufo-axillaris* which parasitizes only *A. badius*. It probably lays five eggs at daily intervals. A third species, *Molothrus bonariensis*, parasitizes many species of birds and occurs throughout South America. According to Friedmann the birds lay daily and several may use one nest. Hudson (cited by Friedmann) believed that each female laid between 60 and 100 eggs in a season, but Friedmann suggests that 6 to 10 is a more likely number.

Our North American Cowbird, *Molothrus ater*, is the best known species. The birds lay daily and Friedmann (p. 182) reported that two birds laid five eggs each and one bird laid four eggs. He is convinced that these individuals did not lay more eggs in that season. He sectioned the discharged follicles of the ovary of several females and found no more than five empty follicles present in any one ovary. Apparently he did not make serial sections of the entire ovary. Although this evidence suggests that only five eggs are laid in a season, there is, in contrast, a record, quoted by Friedmann, of a captive cowbird which laid 13 eggs in 14 days. It is suggested that the cowbirds are possibly in transition between the determinate and indeterminate types of oviposition. In the former type a definite number of eggs is laid whereas in the latter the number laid depends on various external conditions.

In addition to Friedmann's work, Nice (1937:164), while studying the Song Sparrow, obtained much information about cowbirds. Her data are not conclusive but do suggest her belief that cowbirds lay 3 or 4 sets with intervals of 6 to 12 days between sets. However, if we assume that each female lays only five eggs in each set and lays at daily intervals, Nice's table must be rearranged, leading to the conclusion that the interval between clutches is as short as three days.

Information concerning the number of eggs laid by an individual may be obtained by sectioning the entire ovary. The following data were obtained from the study of serial sections cut at 10 or 20  $\mu$  and stained in Mallory's triple stain. Before discussing the number of eggs it is necessary to mention the condition of the ovary. After ovulation the post-ovulatory follicle regresses through a series of histological changes as described by Davis (1942a). A study of the microscopic structure of the follicle permits a determination of the age of the follicle up to about five days. The histological changes are less distinct in older follicles and therefore the age in days can no longer be determined. However, the relative age can be stated. In studying the ovary one must be



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