GENERAL NOTES

Hatching of Wood Duck Ducklings.—The cavity nesting habit of Wood Ducks (*Aix sponsa*) provides excellent opportunities for observations on home life of the birds, and much has been written on this subject (see especially: J. Dixon. *Condor,* **25:** 41-66, 1924; F. Leopold. *Condor,* **53:** 209-220, 1951; F. C. Bellrose. *Housing for Wood Ducks,* Ill. Nat. Hist. Surv., Circ. 45, 1955; D. Grice and J. P. Rogers. *The Wood Duck in Massachusetts,* Mass. Div. Fish. and Game, 1965). Strangely though, authors commonly take little note of the hatching process and dismiss the complex process with an overly simple statement such as that by Grice and Rogers (*op. cit.*): "About 40 hours after pipping began, a star-shaped protuberance one-quarter inch in diameter became visible just below the air cell in the large end of the egg. Another 30 hours were required for the duckling to cut around the shell, push the cap off and struggle out." The inadequacy of the descriptions of the hatching process presumably derives chiefly from the following two sources: the difficulty of observing what goes on beneath the opaque egg shell, and the relative scarcity and inaccessibility of published information on the hatching process in birds.

Recent authors writing about hatching of the Wood Duck have not ventured to note that, in cutting a ring around the egg, the duckling makes almost one full rotation of its body within the egg shell. However, the rotation of a hatching bird was noted by Z. Y. Kuo (*J. Exp. Zool.,* **62:** 453-488, 1932), who made the following statement after having observed hatching of chicks of the domestic fowl: "the body is gradually rotated around the egg, the direction of the rotation being counter-clockwise." But even Kuo left important unanswered questions about how the hatching bird is able to attain the rotating motion. Kuo noted only that "the body wriggles vigorously and the folded legs are thrust upward against the shell." It may be this thrust of the legs, with the sharp claws against the egg membrane, that causes the duckling to rotate in the shell.

In discussing the escape of Wood Duck ducklings from the nesting cavity, Forbush (*"Birds of Massachusetts and other New England States,"* p. 229, 1925) observed that, "Young Wood Ducks when hatched are well equipped for climbing as they are provided with exceedingly sharp, pin pointed, hooked claws." But sharp claws among ducklings do not appear to be confined to Wood Ducks. To test the idea that sharp claws might be an adaptation of the Wood Duck enabling the ducklings to escape from the nesting cavity, I attempted to separate Wood Duck and Shoveller (*Spatula clypeata*) ducklings by feeling the sharpness of their claws but was unable consistently to make the correct separation. Sharp claws of ducklings may be an adaptation enabling the ducklings to escape from within the egg shell.

I am now unable to state how general among bird species is the practice of rotating within the egg shell when hatching. Likewise, I have not checked a variety of species in regard to sharpness of toe nails of newly hatched young. I can present only the Wood Duck and domestic fowl as rotating in the egg shell and only the Wood Duck and Shoveller as having sharp toe nails at hatching. A recent description (Forsythe, *Wils. Bull.* **79:** 340-341, 1967) of the hatching process in the Long-billed Curlew (*Numenius americanus*) indicates that this species is one that does not rotate its body to cut a cap from the egg but rather pushes out the shell of the large end of the egg into three approximately triangular pieces.

It should be parenthetically noted that in the above cited statement by Grice and Rogers: "about 40 hours after pipping began, a star-shaped protuberance one-quarter inch in diameter became visible," the term "pipping" apparently refers to the vocal calls of the ducklings, rather than the alternative meaning of breaking the shell. In the statement, "Another 30 hours were required for the ducklings to cut around the shell, push the cap off and struggle out," the 30 hours appear to cover the hatching process from the first bulging of the egg shell until emergence of the duckling, rather than the period of cutting around and getting out of the shell as might be understood from the statement. Of two Wood Ducks hatching in my hands on May 7, 1967, one used 8 and the other used 9.5 minutes in cutting around and getting out of the shell.—Paul A. Stewart, U. S. Department of Agriculture, Agricultural Research Service, Entomology Research Division, Oxford, N. C. 27565.