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Ovarian follicles do not reveal laying histories of post-incubation Wood Ducks.—Post-ovulatory follicles (POFs) are ovarian structures from which mature oocytes have ovulated. Although POFs have been used to determine the frequency of ovulation in many avian species (Table 1), little has been published on their use in anatids (Ankney 1974, Ankney and Afton 1988). This note reports the results of a pilot study to see if the POFs of female Wood Ducks (*Aix sponsa*) that were collected just after their young hatched could be used to determine the number of eggs each female ovulated and (presumably) laid in the immediately previous laying sequence.

We examined the ovaries of five captive two-year-old female Wood Ducks in 1989. Females and their mates were maintained from pre-laying until the completion of incubation in individual 1.1 × 3.1 m enclosures at the Max McGraw Wildlife Foundation (MMWF). Each pair was provided commercial laying pellets and water ad lib and a nest box. Clutch sizes ranged from 9 to 12 eggs ($\bar{x}$ = 10.2, SD = 1.1). Females were permitted to incubate full-term (ca 30 days) and were sacrificed one day after young left the nest box. This time of collection was selected to provide an easily implemented criterion for possible future collections of birds that had nested in natural cavities, i.e., females with recently hatched young would certainly have completed laying in the current reproductive bout, regardless of whether it was their first or second clutch.

Intact ovaries were removed immediately from sacrificed females and fixed in 10% neutral buffered formalin. Ovaries were examined under a dissecting microscope using Payne's (1966, 1973) descriptions of post-ovulatory and atretic (regressing unovulated) follicles as a guide. Independent inspections for POFs were made by both authors, an avian reproductive physiologist (A. van Tienhoven, Cornell Univ.), and a wildlife biologist (S. M. Byers, MMWF). The ovaries were coded upon removal, and none of these individuals knew the number of eggs laid by each female when he inspected the ovaries.

Results were disappointing: thorough examinations of fresh and preserved ovaries revealed no evidence of follicles. Pigmentation indicative of the terminal stages of involution also was absent. We did not section the ovaries because the effort and expense were not justifiable, given that no follicular remains were visible (R. B. Payne, A. van Tienhoven, pers. comm.). Sacrificing more birds simply to increase the sample size also did not seem justified.

In areas intensively managed for Wood Ducks in which groups of nest boxes have been erected in the open, the frequency of intraspecific brood parasitism ("dump nesting") is high relative to situations where the birds nest in dispersed, well-hidden boxes (Semel et al. 1988, 1990). As suggested by Semel et al. (1990), this difference in parasitism may result either because (1) individual females lay more eggs when boxes are clustered in the open, perhaps stimulated by frequent opportunities for parasitism, (2) females are attracted to active nest boxes and thus lay a greater proportion of their eggs parasitically, or (3) greater numbers of females congregate in areas with numerous, visible boxes. Accurate determinations of the number of eggs ovulated by individual females during any given reproductive bout are necessary to decide among these alternatives.

Testing hypotheses 1–3 (above) requires comparisons between females nesting in natural cavities and those nesting in clustered, visible boxes. However, natural cavities in which Wood Ducks nest are widely spaced and well hidden in most areas (e.g., Soulliere 1990), making collection of an adequate sample of incubating females from them prohibitively difficult. Therefore, we did not examine whether the POFs of Wood Ducks remain distinguishable during early incubation. Females in association with recently hatched ducklings (i.e., "Class Ia" young: Gollop and Marshall 1954) are more easily collected, and we had hoped to use their POFs to distinguish among our hypotheses. Unfortunately, however, our

TABLE 1

LENGTH OF TIME POST-OVULATORY FOLLICLES PERSIST AS DISTINGUISHABLE STRUCTURES IN VARIOUS BIRDS

Species	Time[a] (days) post-ovulatory follicles remain distinguishable	References
European Starling (*Sturnus vulgaris*)	≥7.5 s[b]	Kennedy et al. 1989
Black-billed Magpie (*Pica pica*)	<12 s	Erpino 1969
Jackdaw (*Corvus monedula*)	≥12 s	Hett 1923 (in Payne 1966)
Rock Dove (*Columba livia*)	<30 s	Davis 1942
Yellow-billed Cuckoo (*Coccyzus americanus*)	≤14 s	Payne 1973
Red-winged Blackbird (*Agelaius phoeniceus*)	≤25 s	Payne 1966
	≤12 m	
Tricolored Blackbird (*A. tricolor*)	≤25 s	Payne 1966
	≤12 m	
Brown-headed Cowbird (*Molothrus ater*)	≤25 s	Payne 1965
	≤12 m	
Fulmar (*Fulmaris glacialis*)	≥365 s	Wynne-Edwards 1939 (in Payne 1966)
Domestic Fowl (*Gallus gallus*)	≥28 s	Davis 1942
California Quail (*Callipepla californica*)	<10 m	Lewin 1963
Blue Grouse (*Dendragapus obscurus*)	≥149 m	Standing 1960
	≤33 m	Hannon 1981
Sage Grouse (*Centrocercus urophasianus*)	unreliable m	Dalke et al. 1963
Ring-necked Pheasant (*Phasianus colchicus*)	≥73 m	Buss et al. 1951
	≥15 m	Meyer et al. 1947
	≤100 m	Kabat et al. 1948
Snow Goose (*Chen caerulescens*)	≥24 m	Ankney 1974
Wood Duck (*Aix sponsa*)	<30 m	This study

[a] There is considerable variability in research design among studies. In this table (≥) means that POFs were still distinct for at least that number of days (and possibly longer), (≤) means that this was the maximum number of days POFs remained distinct, and (<) means that POFs regressed at some prior but unknown time.
[b] Laboratory techniques involving (m) macroscopic examination or (s) serial sectioning.

results indicate that Wood Duck ovarian follicles regress beyond recognition by the end of incubation. A different research approach (such as DNA "fingerprinting," Burke 1989) will be required to determine the mechanisms underlying super-normal brood parasitism in intensively managed Wood Duck populations.

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