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MALE-DOMINATED INCUBATION IN OSPREYS

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In mated pairs of Ospreys (*Pandion haliaetus*), incubation is primarily done by the female (Bent 1937, Garber and Koplin 1972, Green 1976, Levenson 1979, Jamieson et al. 1982). I report here a case in which it was done mostly by the male.

I studied incubation behavior of Ospreys nesting at two main-stream reservoirs, Canyon Ferry and Holter, approximately 39 km apart on the upper Missouri River in southwestern Montana. I monitored six nests, three at Canyon Ferry and three at Holter, for 131.7 h on 15 days between 16 May and 6 July 1982, to measure the duration of incubation duties by each sex. Of the observations, 48% were made between 05:30 and 13:30, and 52% were made between 13:30 and 21:30. Observation periods ranged from 2.8 to 13.5 h. In each pair I assumed the female to be the bird with the darker breast patch (Macnamara 1977), and was able to verify this at one nest by observing copulations.

Incubation began mostly during the second and third weeks of May and hatching occurred mostly during the last two weeks of June. At Canyon Ferry, the males at the three nests incubated 0 to 58% of the time on the days observed, only once incubating over 42%. At Holter, they incubated 43 to 71%, only once incubating less than 51%. Table 1 summarizes the results. The percent of time that males incubated differed significantly between the two localities ($t = 3.80$, $df = 15$, $P < 0.005$). I cannot explain this difference in incubation sharing. Stinson (pers. comm.) and my own investigation found weather to have little effect on incubation sharing. No significant difference was found in food habits (Grover 1984), productivity ($t = 0.93$, $df = 36$, $P = 0.18$), or number of nests per 1,000 ha of reservoir surface area ($\chi^2 = 1.42$, $df = 1$, $P = 0.24$). My findings suggest, however, that the sharing of incubation duties should be measured in future studies of Osprey breeding habits; perhaps then an environmental variable could be identified that influences incubation behavior.

TABLE 1. Daytime incubation sharing by Ospreys, upper Missouri River, 1982.

	Canyon Ferry	Holter
No. of nests observed	3	3
Total hours observed	90.4	41.3
Overall percent of incubation by		
Female	74.0[1]	41.4
Male	25.5	56.8
Neither[2]	0.5	1.8

[1] Mean and standard deviation of observed percent male incubation at: Canyon Ferry; $\bar{x} = 23.8$, SD = 16.2; Holter; $\bar{x} = 53.9$, SD = 10.3.
[2] Does not include time taken by incubating bird to stand and "stretch" or time required to trade duties with its mate.

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VARIATION IN THE WEIGHT AND COMPOSITION OF MUTE SWAN (*CYGNUS OLOR*) EGGS

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Egg composition varies greatly among species (Romanoff and Romanoff 1949), yet eggs of species with precocial young generally have large yolks compared to those with altricial young (Ricklefs 1977). It has been suggested that the amount of yolk varies with the relative precocity of the young (Romanoff and Romanoff 1949, Ricklefs 1977, Carey et al. 1980). The relationship between composition and egg size has been examined in detail for few anseriform eggs. Basic data are available for the domestic duck (*Anas* sp.), goose (*Anser* sp.) and Mallard (*Anas platyrhynchos*) (Romanoff and Romanoff 1949, Carey et al. 1980, Ricklefs 1977). Examining the proportion of yolk in the eggs of many wildfowl species, Lack (1968) concluded that it did not vary significantly with egg size. He discarded the idea that chicks of species with proportionately large eggs might hatch with proportionately large yolk reserves but gave no intraspecific analyses. I studied the eggs of Mute Swan (*Cygnus olor*) in order to learn their general characteristics and to determine the relationship between egg size and yolk reserves. I wanted to see if larger eggs had disproportionately larger yolk reserves since such eggs may give a survival advantage to newly hatched young.

Ten swan eggs were collected (under license from the Nature Conservancy Council) within 24 h of laying from