

## FROM FIELD AND STUDY

**The Problem of Timing of Development of the Incubation Patch in Male Birds.—**

In a study of the hormonal control of the incubation patch in fringillids, in which only females normally develop a patch and incubate, Bailey (Condor, 54, 1952:121-136) determined that testosterone (administered by subcutaneous implant of pellets) plays no part in the physiological mechanism of incubation patch formation. He suggested, however, that in species of birds in which males develop patches, "androgen . . . may have the same relation to the incubation patch as does estrogen in passeriforms." Bailey believed that incubation patches in passerines are confined to females, but there are in fact some species in which males also have patches; see Mewaldt, Condor, 54, 1952:361; and Parkes, Condor, 55, 1953:218-219.

The suggested action of androgen has recently been confirmed in part by Johns and Pfeiffer (Science, 140, 1963:1225-1226), who, working with phalaropes (*Steganopus tricolor* and *Lobipes lobatus*), in which the male alone incubates and has an incubation patch, found that injections of testosterone propionate and prolactin produced patches in both males and females, whereas injections of estradiol benzoate or a combination of this estrogen and prolactin were ineffective. Incidentally, this finding means that the presence of incubation patches in male birds can no longer be cited as indirect evidence of estrogen secretion in males; see Van Tienhoven, Sex and Internal Secretions, 1961:1106.

While Johns and Pfeiffer (*op. cit.*) have shown that testosterone is necessary for incubation patch formation in phalaropes, it would appear from their work that this androgen does not have quite the same relation to the incubation patch as does estrogen in the female-incubating species of passerines and that the mechanism of control of the patch may be different in male and female birds. It is a significant, although unemphasized, point in the findings of Johns and Pfeiffer that an incubation patch could not be induced in phalaropes by injecting testosterone alone, for in fringillids (Bailey, *op. cit.*; Selander, Condor, 62, 1960:65) and icterids (Selander and Kuich, Condor, 65, 1963:73-90) a patch can be induced by treatment with estrogen alone. According to Bailey's work (*op. cit.*) with hypophysectomized fringillids, estrogen administered alone causes increased vascularity in the integument of the ventral apterium, but both estrogen and prolactin are required for complete formation of the patch; and in nonhypophysectomized birds, as, presumably, in wild birds, it is thought that estrogen stimulation of the adenohypophysis induces prolactin secretion. In phalaropes, however, it would appear that testosterone does not similarly induce prolactin secretion by the pituitary, for, according to Johns and Pfeiffer (*op. cit.*), a patch is produced only when exogenous prolactin is administered with testosterone. It has not been determined whether or not testosterone induces increased vascularity in the integument of phalaropes.

Consideration of the sexual differences in the timing of events in the gonadal cycles in birds suggests a possible explanation, in adaptive terms, for this apparent difference in the mechanism of control of the incubation patch in the two sexes.

In female birds, as indicated by numerous studies of both wild and domesticated birds, the ovarian follicles do not experience rapid or marked enlargement until a short time (4 to 11 days in various species) before eggs are laid (see review by Lehrman, Sex and Internal Secretions, 1961:1272-1273). Although the follicles may be slowly increasing in size during the early part of the breeding season, weeks before ovulation will occur, there is reason to believe that estrogen titers remain relatively low until the period of rapid ovarian enlargement, as indicated by the fact that rapid growth of the oviduct also occurs in this period. It seems probable that estrogen titers do not until this time become high enough to stimulate response in the integument of the ventral apterium or to induce the adenohypophysis to secrete prolactin in quantity. In female passerines, the incubation patch is developing shortly before and at the time of ovulation. Usually defeathering of the ventral apterium is completed before the first egg is laid, and some increase in vascularity and thickening of the integument occurs at this time, but the greatest increase in vascularity and thickening occurs in the egg-laying period; see Selander and Kuich (*op. cit.*). Thus, close timing of appearance of the patch to the beginning of the incubation period can be achieved in the female by having estrogen set the physiological mechanism in motion. But in the male bird of species in which an incubation patch develops in males, comparable stimulation of the integument or of the pituitary by testosterone would result

in premature development of the patch, since the testes recrudescence, and presumably become fully active in secretion of testosterone, weeks before the time of egg laying by the female. In other words, in males the appearance of the incubation patch cannot be closely timed to the production of eggs by the female and the onset of incubation by having testosterone set the mechanism in motion. Appropriate timing could be achieved only by having prolactin secretion triggered by other stimuli just before incubation is to begin.

In phalaropes studied in Montana, Johns and Pfeiffer (*op. cit.*) note that "males have no incubation patch when they first arrive on the breeding grounds in May, although the testes are greatly enlarged and spermatogenesis is in process. The development of incubation patches in these birds occurs during a few days in early June and appears to be concurrent with nest building." Perhaps in male birds copulatory behavior, visual stimuli from the nest, or, where the male builds the nest, participation in nest building leads to the secretion of prolactin by the adenohypophysis. The testosterone titer is already high, and the newly secreted prolactin becomes available to work synergistically with testosterone to induce response of the integument of the ventral aperture. In this way development of the incubation patch in the male could be appropriately timed to the onset of incubation.—ROBERT K. SELANDER, *Department of Zoology, The University of Texas, Austin, Texas, July 18, 1963.*

**Bay-breasted Warbler and Red-eyed Vireo in Klamath County, Oregon.**—While observing birds at Upper Klamath Lake, Klamath County, Oregon, on July 6, 1963, we located a Bay-breasted Warbler (*Dendroica castanea*) and a Red-eyed Vireo (*Vireo olivaceus*).

The Bay-breasted Warbler was found on the west side of Upper Klamath Lake, 12 miles south and 4 miles west of Fort Klamath, 4200 feet elevation. It was alone, foraging silently in mixed aspen and fir along the side of the lake. The bird, a male in nuptial plumage, is now specimen no. 149537 in the Museum of Vertebrate Zoology, Berkeley, California. This appears to be the first record for Oregon and one of the few records from the western United States.

The Red-eyed Vireo was found singing in a grove of mixed aspen and willow on Oregon State Highway 62 opposite Tecumseh Spring, 3.2 miles south and 2.6 miles east of Fort Klamath, 4200 feet elevation. Although the habitat appeared to be suitable, because of failing light we were unable to find any concrete evidence of breeding. The bird, a male in breeding condition (testis 10 mm.), is now specimen no. 149536 in the Museum of Vertebrate Zoology. This species is known to breed along the northern border of Oregon (Gabrielson and Jewett, *Birds of Oregon*, 1940:493-494) and has been found in migration on Malheur National Wildlife Refuge, Harney County, Oregon (Kridler and Marshall, *Condor*, 64, 1962:163, and Kridler, *Aud. Field Notes*, 17:54). The Red-eyed Vireo may be extending its range southward and should be looked for in suitable habitat south of its known breeding range in Oregon and northern California.—R. G. McCASKIE, *Tahoe City, California*, and PAUL DE BENEDICTIS, *Berkeley, California, July 12, 1963.*

**Observations of Golden Eagle Attacks on Coyotes.**—The predatory activities of both the Golden Eagle (*Aquila chrysaetos*) and the coyote (*Canis latrans*) are well known, and it seems to be commonly accepted that each obtains a good share of its food through predation. We know of no written accounts of one preying on the other. However, agents of the Bureau of Sport Fisheries and Wildlife have reported that it is not uncommon for eagles to prey on coyotes in the puppy stage. But observations indicate that at times Golden Eagles will attack mature coyotes. Two instances of this were witnessed by agents in Nevada and the third was in an adjacent section of California.

On May 23, 1961, while aerial hunting for coyotes on the antelope kidding areas of the Charles Sheldon Antelope Range located in northwestern Nevada, Hayden Purdy and T. C. Barber observed an eagle attacking a coyote. An adult coyote had been spotted standing above a rocky outcrop on a hillside. As the plane approached, the coyote began to move off in a trot. At this point a Golden Eagle flew past the plane in a steep dive and struck the coyote over the hips with both feet and continued on in flight. The coyote was partially knocked to the ground. Recovering, it whirled, jumped, biting in the direction of the eagle which by now was gaining altitude. The men in the plane could see a considerable amount of hair torn from the coyote's back. The plane was then within range and the coyote was dispatched, unfortunately ending the observation. The eagle was not sighted again.

On November 16, 1961, near the southeast side of Honey Lake, Lassen County, California, Frank