TABLE 1. Division of incubation time by sexes on seven Osprey nests at Eagle Lake, California.

Nest no.[a]	Date of observation 1970	No. exchanges	Hours incubation ♂	Hours incubation ♀
5	20 May	9	6.97	6.03
6	20 May	7	8.33	4.67
7	20 May	5	10.85	2.15
9	18 May	7	8.33	4.67
10	18 May	10	7.38	5.62
11	18 May	2	11.33	1.67
12	18 May	5	10.87	2.13
		Average 6.4	9.15	3.85
		% of total	70	30

[a] These are seven of 60 Osprey nests discovered in Lassen and Plumas Counties; their location, history of use, and productivity will be presented later (Garber, Koplin, and Kahl, in prep.).

of each pair exchanged position on the eggs an average of 6.4 times during each 13-hr period of daylight and that males incubated the eggs an average of 30% of the time during the observations (table 1). Ospreys also were observed to exchange position on two nests at Lake Almanor, but the relative length of time each parent remained on the nests at Lake Almanor was not measured. Observations at both Eagle Lake and at Lake Almanor in early June when eggs began to hatch indicated that only one parent, presumably the female, incubated eggs or brooded young at that time.

To the best of our knowledge this is the first report of both sexes of North American Ospreys incubating, although it is apparently well known that both sexes of Eurasian Ospreys incubate (Dementiev and Gladkov 1951:340; Bannerman 1956:347; England 1956:49; Brown and Waterston 1962:135; Brown and Amadon 1968:199). It is interesting that Eurasian male Ospreys incubate eggs during 30% of the daylight hours also (Brown and Amadon 1968:199).

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SHORTNESS OF TAIL IN RED-CROWNED WOODPECKERS AND THEIR HABIT OF ENTERING ROOST HOLES BACKWARD

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An extraordinary habit of Red-crowned Woodpeckers (*Melanerpes rubricapillus*), possibly unique among woodpeckers, is their way of backing into roost holes, a habit described but not explained by Skutch (Pacific Coast Avifauna 35:465, 1969). These birds also have remarkably short tails, as described by Selander and Giller (Bull. Amer. Mus. Nat. Hist. 124:219, 1963). It recently occurred to me, while observing these woodpeckers near Cardenas Village in the Panamá Canal Zone between November 1970 and February 1971, that these two peculiarities, one behavioral and one anatomical, might have survival advantages and be related as adaptations to roosting in a particular type of hole.

An initial observation was at 17:40 on 1 January when a male Red-crowned Woodpecker flew to its roost hole in a broken branch stub 7–8 cm in diameter, peered in several times, then hitched up beyond it and backed down in, turning as it did so that, once inside, it was ready to fly out, which it did at 6:20 on the following morning. The tree involved was a large, spreading one at the edge of woods, and I noted five other broken stubs containing either one or two roost holes. Some of these were of recent origin, while others were in varying stages of decay.

Features of such holes, in addition to the narrowness of the stubs they were in, were their large oval entrances, at least half again as large as ones seen elsewhere in cavities excavated by both sexes at nest sites. In Figures 1 and 2 are reconstructions of events in the two kinds of holes. The woodpecker in figure 1 has to back into its narrow roost hole, for there is no room for it to turn once inside. This feat is aided not only by the large entrance and its thin walls, which permit the woodpecker to slip in at a steep diagonal, but also by the woodpecker having a short, maneuverable tail. The situation is different with a nest stub. Here, as shown in figure 2, the entrance is thick-walled and just fits the body size of the woodpecker, both of these features serving to make the cavity to some extent secure and defensible. The woodpecker can enter such a hole only head first. Once inside, however, there is ample room to turn around.

The question is why should Red-crowned Woodpeckers have evolved the use of a fragile type of roost hole that demands special behavioral and anatomical adaptations to be entered effectively? Two reasons are conceivable. The first involves the common observation that suitable nest stubs, that is, ones of the right diameter at a sufficient height above the ground and decayed sufficiently to excavate, but not so decayed that they break off, are in short supply for many, if not most, species of woodpeckers. If a woodpecker uses one of these stubs by carving a hole in it for roosting in the non-nesting season, it may rot out or even be taken over by some nest-hole competitor before the nesting season begins. Here, any stratagem which will conserve the limited supply of nest stubs will have survival advantages, and one of

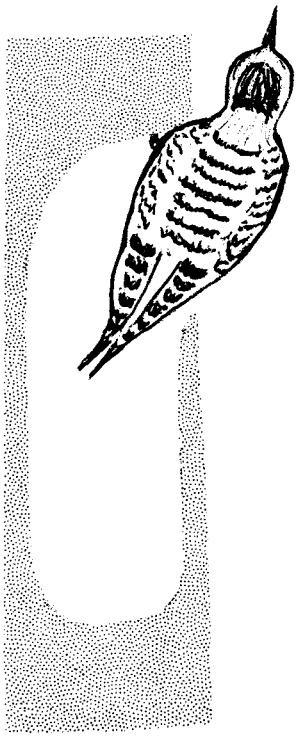

FIGURE 1. Red-crowned Woodpecker entering roost hole carved in branch stub of small diameter by backing in tail foremost and turning as it does so.

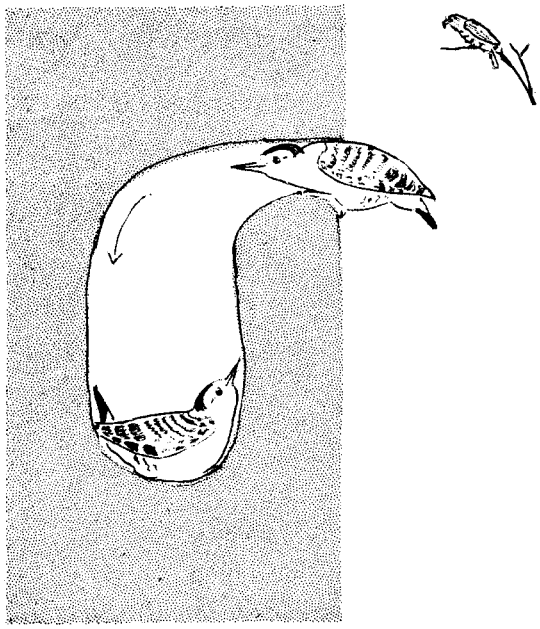

FIGURE 2. Red-crowned Woodpecker entering narrower and deeper entrance of nest cavity has to do so head first. This exposes it to the hazard of being temporarily unable to see outward at a time when a predator might attack it from behind. Once inside, it has room to turn around.

these used by Red-crowned Woodpeckers is the use of narrow stubs, too narrow to contain a nest cavity, for roosting. These branch stubs, in contrast to the larger ones, appeared to be generally available in woods by Cardenas Village.

A second reason for the unusual roosting habits suggested itself on 29 January when a pair of Red-crowned Woodpeckers was trying to feed on the large flowers of the balsa (*Ochroma limonensis*) in competition with three marmosets (*Oedipomidas geoffroyi*). The woodpeckers were obviously nervous, as indicated by their repeated head swings and deep bowing. The roost tree of the male woodpecker was only 30 m away and, when he came to it relatively late at 18:10, he continued his bowing as if still disturbed. His hole on this evening, unlike the one used on 1 January, was on the underside of a nearly horizontal stub. He was thus clinging upside down when he started to back into it at 18:20. Once inside, he kept putting his head out as if still apprehensive. It is difficult to know what a woodpecker may regard as dangerous. The male still may have been concerned about the marmosets or possibly by a Hook-billed Kite (*Chondrohierax unanatus*), which I believe roosted in or near the same tree, for I saw it fly from it repeatedly on early mornings. Woodpeckers are often apprehensive about entering holes. They may bow in and out repeatedly, looking to one side then the other, a likely reason being, as shown in figure 2, that once they start entering a hole directly, they are temporarily defenseless against an attack from behind. Red-crowned Woodpeckers have apparently found one solution to this dilemma. By backing into roost holes, they are able to enter while still keeping a watch out for any predator that might be lurking nearby.

Skutch's account (Pacific Coast Avifauna 35:462, 1969) of Red-crowned Woodpeckers contains much information on their roosting habits. He noted, for example, that both males and females may enter their dormitories backward and that frequent changes are caused, in many instances, "by the falling of the soft trees and limbs" in which the sleeping holes are carved (p. 477). Skutch does not distinguish whether holes backed into were of a different diameter than either old or recent nest cavities which might have been entered directly. His observations, however, were made in a different type of habitat, which he describes as rain forest cleared away for planting maize, with an absence of leafy trees, and charred stubs remaining that attracted a number of species of woodpeckers. The locality where present observations were made, on the other hand, appeared to be a more natural one. While it provided almost no isolated stubs, the woodland border did provide large, leafy trees with broken branches as well as a variety of relatively undisturbed wildlife, including hawks and arboreal mammals. It may thus have simulated conditions closer to ones under which Red-crowned Woodpeckers and their peculiar roosting habits may have evolved.

Other factors also may be involved in shortness of tail in woodpeckers, and a number of these are discussed in a recent publication by Short (Bird-Banding 41:85, 1970). It should be noted here that Selander and Giller (Bull. Amer. Mus. Nat. Hist. 124:219, 1963) mention two other melanerpine woodpeckers as having short tails. Their statement is that, while the tail is supposedly two-thirds as long as the wing in *Centurus* (now *Melanerpes*), it is less than half as long in *C. hoffmanni* as well as in *C. rubricapillus*,

and slightly more than half as long in *Melanerpes* (*Tripsurus*) *pucherani*. It would be interesting to know, in conclusion, whether any of those other species have two types of holes and back into the narrow ones in the manner of *M. rubricapillus*.

(Since the above was written, Dr. Short (pers. comm.) has called attention to other woodpeckers having tails 45–50% of wing lengths, such as *Picoides* (*Dendrocopos*) *maculatus*, *P. absoletus*, and *P. dorae*, various species of *Dendropicos* and *Celeus* (*Micropternus*) *brachyurus* that might be observed for unusual types of roost holes and manner of entering them.)

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CHANGE OF WINTER FEEDING SITES BY INDIVIDUAL BROWN-HEADED COWBIRDS

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It seems logical to expect individual birds to return day after day to winter feeding sites containing abundant supplies of suitable food, and, as every bird-banding station operator knows, this often occurs among birds visiting standard winter feeding stations. However, as shown by the low rate of recapture of birds at a trapping station 2 miles from the roost and the recapture of several 10 miles beyond the first trapping station, it is indicated that Brown-headed Cowbirds (*Molothrus ater*) wander or range widely on their wintering ground even when food is abundant near their roosting site.

During the period 10 November 1960 to 13 January 1961, I operated banding traps 28 different days at the cattle-feeding area on the Kilby State Prison Farm about 2 mi. W from a large roost, chiefly of Brown-headed Cowbirds, near Montgomery, Alabama. I also operated traps on the Smith-McQueen Farm 10 mi. W from the Kilby site, near Prattville, Alabama, for 8 days during the period 15 November 1960 to 21 January 1961. Abundant supplies of food were easily available to the many birds visiting both sites, even without their entering the traps. A total of 7239 Brown-headed Cowbirds were banded at the Kilby site and 1316 at the Prattville site.

Thirty-one recaptures were made during the period of trap operation, and nine of these were of birds recaptured the same day they were banded. Of the remaining 22 recaptures, 16 were made at the banding sites within the first 6 days after banding, and one each was made on the 13th, 16th, and 20th days. The low and declining recapture rate at the banding sites suggested that many birds were feeding elsewhere. That some of these cowbirds changed their feeding sites was also indicated by recapture at Prattville of three birds 13, 14, and 16 days after banding at Kilby. Thus, individual Brown-headed Cowbirds sometimes returned to the same feeding sites, chiefly during successive days. They also used other sites, one of which was more distant from their roost, although food availability was essentially the same and continuously good at both sites.

Among Brown-headed Cowbirds which were foraging in flocks, food-searching was thus somewhat of a daily endeavor, although good feeding sites were involved in recent earlier experiences of the birds. The sites where individual birds fed on successive days may have depended more on movement of flocks than on earlier experiences of individual birds.

Data used in this note were collected when I was an employee of the U.S. Fish and Wildlife Service.

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TESTOSTERONE-INDUCED SINGING IN FEMALE WHITE-CROWNED SPARROWS

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During studies of reproduction in White-crowned Sparrows, *Zonotrichia leucophrys gambelii*, we made ancillary observations of steroid induction of song that are pertinent to an interpretation of the breeding behavior of females of this species under natural conditions. We were not able to study the induced songs systematically because of the conflicting requirements of the main objectives of the experiments; but because it is unlikely that we will be able to augment the data in the near future, we now report them briefly, together with a summary of the pertinent literature. Female *Z. l. gambelii* can be added to the growing list of female passerines for which sonagrams of androgen-induced songs have been published (*Fringilla coelebs*: Thorpe 1958; see also, Hooker 1968:322; *Turdus merula*: Thielcke-Poltz and Thielcke 1960; *Junco oreganus* and *J. phaeonotus*: Konishi 1964; *Turdus migratorius*: Konishi 1965a; *Zonotrichia leucophrys nuttalli*: Konishi 1965b).

MATERIALS AND METHODS

The experimental birds were migrant female *Z. l. gambelii* captured near Pullman, Washington. In each experiment, 30 females with regressed ovaries (November–February; condition of the ovary ascertained by laparotomy) were caged in pairs indoors at 21–25°C and exposed to a daily photoperiod of LD 8:16 (lights on 09:30–17:30 PST). After 1 or 2 weeks, the birds were segregated randomly into five groups of six each. Birds of each group were treated with a single dose level of steroid or with its carrier. In one experiment, the birds received intramuscular (thigh) injections of depo-testosterone cypionate (50, 100, 200, or 400 μg/day); in a second, depo-estradiol cypionate (8.3, 50, 100, or 200 μg/day); and in the third, progesterone (42, 84, 160, or 336 μg/day)

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