TRANSLATION

A MALE HAWK'S POTENTIAL IN NEST BUILDING, INCUBATION AND REARING YOUNG*

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Abstract

In each of three years, a trained male Red-tailed Hawk built a nest and incubated a hen egg day and night. In two of these years he adopted and reared a total of three red-tail chicks aged 1, 6, and 21 days at the time of adoption. There were no failures. He displayed at and attempted copulation with people who, apparently, were a stimulus for nest building. Food was brought to him by the authors and he served it to the chicks until they could feed themselves. His molt seemed not to be correlated with incubation.

Introduction

The male's role in nesting is not well known among the buteos. Of 25 species listed in Brown and Amadon (1968) no information is given for 14, partial information is given for some, and in no instance has the norm been established. More is given for the Red-tailed Hawk (*Buteo jamaicensis*) than for most species: "Both sexes build, frequently squatting to shape the nest cavity with breast and wings . . . Both sexes incubate, although the female, fed by her mate, usually does most or all" (*Ibid.*:608).

Observations of a captive male red-tail gave us a chance to learn something of the male's potential. All we knew of the early history of this tercel was that he had been taken from a nest in southeastern Wisconsin in 1967 and held in captivity. When brought to us he still had down on his head. He was tame. To insure a successful release we trained him, intending to hack him back into the wild. He proved to be such an excellent hunter that we reconsidered and kept him for falconry.

During the summer of 1968 we molted him in a 3x4 m pen. He was confined with another red-tail, presumably a female. They behaved amicably, but we noticed no signs of sexual interest. His molt was normal and on 22 May 1968 the red central rectrices were about 65 mm long. The wing molt had started earlier (Hamerstrom, 1971). At the end of the summer the female went back to her owner and F. H. (Frances Hamerstrom) took the tercel hunting almost every day.

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The first sign of sexual activity was on 21 November 1968 when he displayed to F. H. He faced away from her, spread his wings, bobbed his tail up and down like a courting crow, and then dipped his vent to the ground repeatedly as though bathing. The following day he displayed again. Both days were exceptionally warm.

Nest Building

On 29 March 1969, this tercel started trying to build a nest on top of his block perch with his leash. We promptly put him in a roughly 2x4 m screened porch containing an old table. We gave him a few sticks on the table. This established the nest site. He carried more sticks up to the table from a pine on the floor and arranged them in a circle. We put a thick braided rug on the slippery table top to keep the wind from blowing his nest away. The red-tail used his feet more in nest building than our female Golden Eagle (*Aquila chrysaetos*) and, unlike her, pushed ends of sticks into crannies as though to anchor them (for this and later references to our eagle, see Hamerstrom, 1970). His nest building was punctuated with dropping down onto the nest and rolling sideways as though to form a cup. Whenever F. H. approached he mantled, rotating in semicircles with outspread wings as though in defense of a morsel of food or to invite copulation.

The next day we wired some branches together to form a crotch for him to build in, but he thumped down so hard with his breast that he broke the crotch apart. This rough treatment of a potential nest site would have survival value in the wild, as weak branches would be discovered early in nest building. We removed the crotch. He built his nest anew on the table. After the foundation was well formed we put a pile of hay on the nest and he rearranged the cup with it in a matter of minutes. In each case the nest was selected by the "female" (us) placing two or three sticks on the site. It took him about two days to complete the nest.

In subsequent seasons nest building was sporadic early in spring and took considerably longer in total. Available sticks plus the stimulus offered by people increased nest building activity. Even the sight of people watching him through the window offered stimulus, especially after he had attempted copulation.

Copulation

The onset of nest building and the onset of copulation were essentially simultaneous. The tercel attempted copulation on F. H.'s ankle at first, but later preferred her head (Figure 1). In the early stages he mounted carefully, trod essentially on his tarsi with his feet held sideways and toes almost closed. He often fell off. The process was much like that described by Mueller (1970) with a captive Broad-winged Hawk (*Buteo platypterus*), except that the red-tail's call was an insistent, oft-repeated squeaking. After more practice he flew directly to the head of any person who entered his pen and sat down quietly on a bench. He was ready to copulate at about seven-minute intervals. Gradually his technique changed; he no longer fell off, nor did he close his feet. Instead, he got a fairly good (but not puncturing) grip with his feet open, held his tarsi low but not

Figure 1. A Red-tailed Hawk male attempting copulation with an unsuitable object. Photo by Dr. Charles Kemper.

touching his subject's head, and pummeled and scratched with his feet, while swinging his spread tail downwards and from side to side. Had he been mounting a more appropriate mate, this pummeling and scratching might well have stimulated her.

We are left with the question whether the gentle, balled-foot treading is simply preliminary to a somewhat rougher (but still far from dangerous) action, or whether the rougher treading was an over-reaction following repeated failures. Mueller's (*Ibid.*) point is well taken; the balled foot may be an adaptation to prevent injury. On the other hand, stimulation by massaging the region of the gonads is a basic part of the technique of artificial insemination and of the cloacal sexing of raptors (Hamerstrom and Skinner, 1970). On 26 March 1970 we sexed our tercel by the above method. He gave semen.

Incubation

On 2 May 1969 we put a warm hen egg in his nest. He shoved it under his breast with his beak, rocked from side to side with lower breast feathers outspread, and settled to incubate in less than a minute. Leaving the nest for only short periods to feed and preen, he kept the egg warm day and night for nine days and eight nights. We cut the incubation period short at that time by introducing a red-tail chick for brooding.

In later years incubation was fitful for the first two days. He was not on the nest for the first night in 1970 and not for the first two nights in 1971. Our eagle, too, did not incubate steadily during the first few days after the appear-

ance of an egg. Both species often lay when nights are freezing and it is likely that records of eggs deemed infertile by some observers may in reality have been rendered inviable by cold.

A definite brood patch was present in 1971, the only year in which it was looked for. This may be the source of the breast feathers in the nest, mentioned under *Molt*. The brood patch measured about 50x60 mm on 13 May and showed little or no vascularization.

Adoption

The domestic hen egg that he incubated so diligently in 1969 was infertile. We arranged a "hatch" by giving him a red-tail chick for adoption, at the same time leaving the egg in the nest.

Adoption presented no problem. On 10 May after the tercel had been incubating 8½ days, Charles Sindelar brought us a newly hatched red-tail chick and we put it on the nest at 21:25 hours. The tercel left the nest, but as soon as he heard the chick peep he got back on the nest with far greater caution than when incubating. He moved onto the nest on his tarsi and commenced brooding.

We were feeding thawed chicken and, wishing to give him a chance to feed the chick fresh meat, we killed a white mouse on 13 May and threw it onto the floor of the porch. He picked the mouse up gingerly, flew up to the nest with it, and proceeded to brood his bizarre clutch: one hen egg, one red-tail chick, and one dead white mouse. He had moved the three carefully together with his feet and beak. F. H. pushed him off the nest and skinned the mouse whereupon he fed it piecemeal to the chick.

In 1970 the tercel reared two red-tail chicks. Again the young were readily adopted. On 16 May after an unrecorded number of days of incubating a hen egg, we placed a large (about three week old) red-tail chick on his nest. He preened and paddled, and at first seemed distracted. Next we threw food into the porch and within 12 minutes he fed the chick. On 17 May we added another red-tail chick, this one about six days old. Within minutes the tercel was feeding both.

The change-over from incubation to brooding was dependent upon neither the passage of a certain number of days of incubation, nor the stimulus of a hatching egg; the appearance of a chick was enough. Nor was the exact size or age of the chick important, for red-tail chicks of one day, six days, and three weeks were all promptly adopted. Similarly, our female Golden Eagle was not fussy about the size of the red-tail chicks she adopted.

The drive to adopt anything resembling a young chick appears to be strong. Our female Golden Eagle, who has reared three red-tail chicks, once "adopted" a small, dead domestic chicken. She also tried to feed a new large red-tail chick's thigh, which was white, fluffy and approximately eaglet size.

Not all adoptions are successful. Prestwich (1955:7) reports a female Common Buzzard (*Buteo buteo*) which incubated, hatched and reared several broods of domestic chickens, but killed a brood when she had done no prior incubation.

Feeding

We have no idea whether or not female Red-tailed Hawks normally regurgitate food for their very small young. Unlike our female Golden Eagle, the tercel red-tail did not regurgitate food, but offered tiny bits—about half the size of a pea. Each morsel was well moistened as the tercel's salivary juices ran strongly when feeding.

When the first chick was nine days old, the tercel placed pieces of tender meat within its reach and watched the chick feed itself. He ceased brooding the chick at night when it was 16 days old. On 3 June, at 24 days, the chick tried tearing its own food.

By autumn the chick was flying free about our farm and was ready for migration. It departed soon thereafter.

Molt

Olendorff (1971:34), in his fine review of the periodical literature on falconiform reproduction, points out that the correlation between the onset of the molt and the timing of the breeding cycle is still open for investigation. Any tercel, captive or free, must of course be given an egg before he can incubate. His own endocrine balance has nothing to do with the time of arrival of the egg, but probably does affect his readiness to cover it, as well as the timing and progress of his molt. We do not know the earliest date on which our tercel might have accepted an egg, for he covered it when it was first presented in both 1969 and 1971 (no data for 1970).

The first of our red-tails's flight feathers was dropped on 18 April in 1969 and on 21 April in 1971, a year-to-year difference of only three days. We initiated incubation on 2 May and 16 April, respectively, a difference of 17 days, suggesting that the onset of the molt of the remiges was not triggered by incubation per se. Each year we have noticed breast down in the nest; down feathers were in abundance on the 15th and 16th days of incubation in 1971. It is possible that this molt may be correlated with incubation.

Discussion

There have been several instances of the successful hatching of eggs, and of the adoption of young (including the young of other species) by female red-tails in captivity. These, however, are not germane to our discussion of the behavior of males.

We know of only one report in the literature of a male hawk building a nest alone. Nethersold-Thompson and Nethersole-Thompson (in Olendorff, 1971: 68) mention an instance of an unmated male Hen Harrier (*Circus cyaneus*) selecting a nest site and building a nest. During a study of 109 nests of *C. cyaneus* in central Wisconsin (Hamerstrom, 1969) we noted that males frequently built several plucking platforms resembling nests. We never knew a female to lay on one of these platforms, although the possibility exists. We know only that nest-like plucking platforms are common to the species. It would seem to us that the unmated male was perhaps building a plucking platform in the incident reported by the Nethersole-Thompsons.

Despite the expertise of our tercel, it is extremely doubtful that a wild male red-tail could incubate a clutch and rear a brood single-handed—eggs or young would be chilled while the adult was off hunting. It is evident, however, that the male as well as the female has the behavioral repertoire for serious incubation of eggs and rearing of young. It is quite possible that the male shares such family duties more often and more fully than has generally been recognized.

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