Sibling Aggression among Nestling Ospreys in Florida Bay

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Although sibling aggression between nestlings is common in many species of raptors (Ingram 1959, Amadon 1964, Meyburg 1974, Newton 1977), there has been little evidence offered to suggest that Osprey (*Pandion haliaetus*) nestlings are anything but peaceable. Knight (1932) mentions a single instance of Osprey young attacking each other at a nest he was photographing on Gardiners Island, New York, but Ames (1964) observed unfledged Ospreys at two nests in the Connecticut River estuary for a total of 259 h without noting any attacks on a chick by a sibling. Stinson (1977) spent 230 h watching 11 Osprey nests in southeastern Virginia and never saw any interactions that suggested that a chick was being harmed or threatened by a nestmate. Similarly, Green (1976) reported docile young at an Osprey nest observed continuously for five separate nesting seasons (1969–1973) at Loch Garten, Scotland. During the summer of 1977, my own observations (50 h at 2 nests) of nestling Ospreys in Long Island Sound, New York, combined with 12 days of time-lapse photographic records from other nests in this region, revealed no aggressive behavior by any of these young, which were 6 days to 4 weeks in age. However, while monitoring nestling activity during February and March 1978 at two Florida Bay Osprey nests as part of a study of Osprey feeding ecology in that region, I found one nestling consistently aggressive toward its only nestmate. This aggression produced no obvious physical damage, but was sufficient to reduce the food intake ot the intimidated sibling significantly.

The nest was located on Frank Key, a mangrove-fringed islet 2 km south of Flamingo, Florida in Everglades National Park. This key contains a variety of Osprey nesting sites, as described by Ogden (1977). The nest under study was low to the ground (1.5 m) in an open area toward the interior of the key, facilitating observations which were made from 50 m with a 40–80× telescope. The observations, carried out on 27 February and on 1, 8, 11, 12, 14, and 15 March, totaled 20 h and involved 12 separate feeding episodes. In addition, I spent 10 h on nearby Palm Key, 1 km east of Frank, during this same time period and saw 5 feedings there. At Frank Key, I first checked the nest on 25 February and found 3 young that I estimated to be 4, 3, and 2 days (±1 day) old. One of these young disappeared between 25 and 27 February, but the other two young remained in the nest at least through 15 March, when the study ended. One of these two young was marked on a claw with fingernail polish at 7 days of age, allowing it to be distinguished during the four weighings and measurings that were a part of this study and during the crop checks that followed each observed feeding. Using a triple-beam balance, I recorded the weights of these nestlings on 28 February and on 7, 11, and 14 March, and measured wing and culmen length at the same time. Similarly marked young at the Palm Key nest were weighed and measured on 28 February and 7 March, at ages 4 and 5 weeks, respectively.

Although while handling the young at the Palm Key nest on 28 February I did note one instance of a young Osprey pecking a nestmate, the only instance of aggression seen at this nest, I first saw aggression between undisturbed nestlings while watching the Frank Key nest on 8 March. At 1700 EST that day, the adult male Osprey delivered a 35-cm needlefish to the female at this nest. She immediately seized the fish from the male and, tearing off bits of flesh, began to feed the closer and more actively begging of her two young (young A). After five bits of fish were fed to A, the other young (B) rose from its crouched position near the nest edge and, slowly approaching the female, begged with open beak and was fed two pieces of fish in quick succession. At this point A gaped and advanced on B, pecking B twice on its back and appearing to grab and twist its skin while doing so. B quickly retreated from its position near the feeding female and crouched along the nest edge while A was fed exclusively for the next 7 min (35 pieces of fish). At the end of this time, with A less active in its demands for food, B stood up again and moved forward, slightly crouched, toward the female who fed it four bits of fish. Again A gaped and advanced on B with an upright stance, pecking it twice on the back of the head and driving it to the nest edge, where it crouched submissively. B made no effort during this time to return the aggression, nor did it later in the feeding. For the next 10 min, A continued to be fed by the female, who also ate bits of the fish herself. A received 15 more bits of fish for a total of roughly one-half the prey item, over nine times the amount fed to B. The female finished the fish at 1720. B did no more begging, was not fed, and remained crouched during these last 10 min of the feeding.

Immediately after this feeding, typical of nine out of the 12 total observations of feeding episodes, I approached the nest and inspected the young. Nestling A (known from its position in the nest) was unmarked and had a full, bulging crop. B (marked) had a crop less than one-third full. B showed no

physical injury at this point, nor at later nest checks. At each of the nest checks following feedings, A's crop was at least twice as full as B's, except for one of two feedings on 11 March when no difference was apparent. The only times I saw B fed a substantial amount of fish (more than 25 bits) was when A was totally satiated and no longer actively begging, and, in one other instance, when the adult female stood separating the two young. In this latter case, however, A eventually moved around behind the female to drive B toward the nest edge. Only once was B seen attempting to protect itself, pecking back at the dominant nestling A, but the attempt was brief and ineffective. A few times A attacked B when no food was present, driving it in one instance out from under the female, who stood shading the young from a hot noonday sun. Such cases were rare, however; feeding, coupled with any movement on the part of B, seemed to be the stimulus triggering A's aggressive dominant behavior. Most of the remaining time the young were compatible and moved about the nest taking little notice of each other.

I never saw the female attempt to interfere with this aggression. She usually fed whichever young was closer and more actively begging, often soliciting a nearby young with a bit of fish after its interest in food began to wane. She occasionally moved across the nest to offer food to a nestling farther away, but only if no begging young was near. Most often when begging ceased she fed herself and during three of the 12 feeding episodes was seen to finish the last portions of a fish when B had received nothing during that feeding.

Although the observations of feeding at the Frank Key nest were neither daily nor continuous, the ability of nestling A to dominate much of the food coming into this nest can be seen indirectly in the progression of growth measurements taken between 28 February and 14 March. On 28 February and 7 March, weights (90 g and 300 g, respectively, for the two dates) and wing lengths (24 mm and 45 mm, respectively) were nearly identical for the two young. Telescope observations of two feedings during this time period (1 March) and one just before (27 February) revealed no dominance or aggressive behavior. On 11 March, however, 3 days after the first sibling bullying was seen, nestling A was 16% heavier than B (400 g vs. 325 g) and had a larger wing (65 mm vs. 57 mm). This difference was even more pronounced on 14 March, when there was a 38% gap in the weights of A and B (670 g vs. 420 g) and a 10 mm wing-length difference (94 mm vs. 84 mm). Such a differential growth increase among two young broods was not seen at any of the Osprey nests observed in Long Island Sound during 1977 nor at the Palm Key nest being watched during this study, all nests in which it appeared that aggression was not a factor. The more rapid increase in A's wing length during this time period is due to the slightly earlier eruption of its primaries, presumably a result of the feeding advantage it had seized over its sibling. While it is known that adult Ospreys show a significant sexual size dimorphism (McNamara 1977), nestlings can shift rank (weight) often in relation to their nestmates during development (Stinson 1977). It thus seems unlikely that the weight difference between nestlings A and B is an early expression of sexual dimorphism. The factors that were responsible for A assuming dominance remain, therefore, unclear, given the lack of initial size advantage between these young.

This study ended before it was known if both young in the Frank Key nest survived to fledging. As weight advantage tends to work in its own favor, however, it appears that sibling dominance coupled with aggression could be an important factor leading to Osprey brood size reduction and thus the longer-term evolutionary setting of clutch size in this species. As in many other raptors (Newton 1977), sibling aggression in Ospreys seems to be an adaptation to ensure the successful fledging of an appropriate number of young during a season of food scarcity. In times of plenty, with sibling aggression no longer triggered, full broods could be fledged. Productive Osprey nests on Frank Key and on nearby Palm and Murray keys lost 61% of the young hatched during January, February, and March 1978, presumably the result of a winter with prolonged periods of abnormally cold weather that made fish scarce for the foraging adults (Poole MS). The fact that Osprey sibling aggression has first been seen in such a population under stress conditions, after failing to be observed in others, seems hardly to be fortuitous and supports the prediction of Lack (1966) and others that such aggression is expected to coincide with low food availability. Further observations of other Osprey populations faced with reduced or less available prey populations may reveal that sibling dominance in Ospreys is a more widespread phenomenon than is currently realized.

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Reverse Mounting in the Painted Bunting

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Reverse mounting, in which a female stands upon the back of a male, has been reported in several passerines (Morris 1954, Ficken 1963, Nolan 1978: 109), but because of its rarity, little is known about its causes or the circumstances under which it occurs. We report here three instances of reverse mounting by a pair of color-banded Painted Buntings (*Passerina ciris*) on St. Catherine's Island, Liberty County, Georgia.

The male, designated M49, was in the greenish-yellow yearling plumage (see Sprunt 1968) when banded on 24 April 1978, probably the day he arrived on our study area. The female, F62, was banded on 10 May 1978, the day after she was discovered constructing her first nest on M49's territory; this nest subsequently failed. Her second nest failed between 7–9 June, when three nestlings disappeared. Typically buntings renest rapidly after nest failure, but despite regular observation, we saw no nest building until 28 June, the day after the reverse mountings occurred.

On three occasions within 20 min on 27 June, F62 stood upon the back of M49. In the first episode, M49 flew to a crotch in a 2-m pine; in this cramped position his tail was raised well above the horizontal axis of his body. F62 stepped upon his back, crouched, and treaded rapidly for 3–4 min before hopping off. The second episode took place approximately 5 min later. F62 gave several soft calls from a perch in a 6-m pine; M49 immediately flew to her and crouched in a mass of adjacent needles. F62 moved closer, pecking M49's back lightly before mounting him. She remained there for 30 s before both flew to nearby trees. When relocated,F62 was again perched upon M49's back as he crouched in pine needles. Upon dismounting, she perched motionlessly nearby for several minutes. About 5 min later, F62, accompanied by M49, returned to the pine in which the first episode occurred and settled into the crotch that subsequently became the site of her third nest.

Behavior appropriate to the opposite sex was termed pseudomale and pseudofemale behavior by Morris (1955). Two of four circumstances he associated with such behavior were "the arousal and subsequent thwarting of the sex drive" and "the presence of the releasing stimuli for the sexual behavior of the opposite sex"; both of these seem applicable to our observations. The episodes we report occurred at the end of an unusually long interval (about 20 days) between the failure of one nest and the start of its replacement. One of the cases of reverse mounting observed by Nolan (1978: 109) in Prairie Warblers (*Dendroica discolor*) fell late in an unusually long interval between nest failure and rebuilding. Although

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