

Resting Birds Tuck Bills Toward Outside of Group

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A flock of Black Skimmers (*Rynchops niger*) and a pair of Black-necked Stilts (*Himantopus mexicanus*) were observed in Everglades National Park, Florida. Resting birds tended to tuck their bills on the side away from the center of the group. After being disturbed from one side of the group, there were suggestive (although not statistically significant) shifts to tucking the bill on the side of the disturbance.

The Black Skimmer flock of about 200 birds was observed on an Everglades City pier on 23 March 1980. The flock covered an area of approximately 8 m × 5 m. Most birds were aligned with the long axis of the flock and faced southwest into the wind about 30° east of the sun azimuth. At about 1645 EST, two other observers and I stood approximately 15 m southeast of the flock and independently tallied bill-tucking sides (bills tucked in left or right scapulars). From our positions, only the left portion (a little more than half) of the flock could be seen. It may have been easier for us to determine the bill-tucking side of birds with their bills on the left, toward us; birds whose bill side was unclear were never included in tallies. The vast majority of birds with their bills tucked had them in their left scapulars (Table 1).

To tally birds on both sides of the flock, two of us then moved to about 40 m behind the back edge of the flock, in line with its long axis and slightly above the birds. Through a 30× spotting telescope we recorded the bill-tucking sides of birds whose tails pointed northeast. Bill position was more difficult to determine at this greater distance, so the number of birds tallied was considerably smaller. Bill side may have been easier for us to determine for birds with their bills tucked toward the center of the flock (toward us). Again, however, most birds were found to have tucked their bills toward the nearest edge of the flock (Table 2, part A).

Another observer and I then walked to about 10 m from the flock's right edge. Every bird in the flock raised its head. We returned to the tallying position behind the flock; after about 5 min, many birds had tucked their bills, and we made another tally. Again, most birds had tucked their bills toward the nearest edge of the flock. A higher (although not significantly higher) proportion of birds on both sides of the flock, however, had their bills on the right (Table 2, part B). Further tallying was curtailed when for unknown reasons the skimmers flew up and resettled facing in different directions.

The pair of Black-necked Stilts was observed at Eco Pond, near Flamingo, from 0907 to 0931 on 24 March 1980. The pair stood alone side by side about 0.3 m apart in water 1-2 cm deep. Both faced toward 185° (approximately south). The sun azimuth was east; the

wind, from the southeast, gusted to force 3 (Beaufort scale). Both stilts had their bills tucked during most of the first 11 min of observation. From time to time, one or both together raised their heads, looked around, and then retucked their bills. Each stilt tucked its bill a total of four times, always on the side away from the other stilt [P (left bird = right bird) = 0.014, FET₁]. During the next 5 min both stilts had their heads up as a Great Blue Heron (*Ardea herodias*) stalked, caught, and swallowed a frog several meters to their left. The left stilt looked left, and the right stilt looked left, right, and straight ahead. After this, both stilts tucked their bills for most of the next 8 min. Both now tucked their bills only in their left scapulars, the left bird tucking its bill once and the right bird twice [P (left bird = right bird) = 0.333, FET₁; P (no shift with disturbance, right bird) = 0.066, FET₁]. The onset of foraging at 0931 precluded further data collection.

In September 1982 I observed a flock of wing-clipped Greater and Chilean flamingoes (*Phoenicopterus ruber* and *P. chilensis*) for 1.75 h in an outdoor enclosure at Vilas Park Zoo, Madison, Wisconsin. I also observed mixed-species aggregations of wild Mallards (*Anas platyrhynchos*), American Black Ducks (*A. rubripes*), Ring-billed Gulls (*Larus delawarensis*), and Herring Gulls (*L. argentatus*) for 5 h that month on a narrow sand bar in a Madison harbor. Resting birds in these groups showed no tendency to tuck their bills away from (or toward) the center of the group. These species may not exhibit such tendencies. The mixed-species composition of the groups, however, and the differences from the conditions under which the skimmers and stilts were observed, including much more movement within and to and from the groups during observations and less uniformity in the direction group members were facing, may also account for the difference in their behavior.

Tucking the bill toward the outside of a group may improve a bird's awareness of and readiness to de-

TABLE 1. Lateral bias in bill-tucking: left portion (slightly over half) of Black Skimmer flock.

Ob-server	Bill on		χ^2	P (Left = Right) ^a
	Left	Right		
1	60	(not tallied)	51.57	<0.001
2	(not tallied)	3		
3	71	6	54.87	<0.001

^a All statistical tests from Siegel (1956).

TABLE 2. Lateral bias in bill-tucking: sample from entire Black Skimmer flock.

A. Before disturbance			B. After disturbance from right		
Half of flock	Bill on		Half of flock	Bill on	
	Left	Right		Left	Right
Left	8	3	Left	11	9
Right	5	15	Right	2	12
P (Left half = Right half) = 0.014, One-tailed Fisher Exact Test (FET ₁)			P (Left half = Right half) = 0.018, FET ₁		
P (No shift with disturbance from right): Left half = 0.282, FET ₁ ; Right half = 0.378, FET ₁					

fend its most exposed side. The bill and sensory organs on the head will be directed toward the side of tucking when the bird first raises its head (and in some species, are most exposed to that side even when the bill is tucked). The suggestive, though not statistically significant, tendency for birds to tuck their bills toward the side of recent disturbance also supports this hypothesis. Jack P. Hailman has suggested

another possible explanation for the bill-tucking behavior of undisturbed birds: turning the bill and head away from the majority of conspecifics may be an appeasement signal, as Tinbergen (1960) has described in pairs of interacting gulls.

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Functional Incubation in Male Barn Swallows

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In many bird species a brood patch develops to facilitate heat transfer during incubation (Tucker 1943, Bailey 1952, Jones 1971). In general among species that develop brood patches, there is a correlation between the sex that incubates and the possession of this structure (Eisner 1960, Lehrman 1961, Drent 1975). An exception to this rule occurs among males in the suborder Passeres (oscines), many of whom incubate but do not possess a brood patch (Bailey 1952; Skutch 1957, 1962, 1976). Although from behavioral observations alone, it often seems that these males are incubating (Verner and Willson 1969), there is still some question as to whether or not they functionally incubate (Drent 1975), i.e. apply "the heat necessary for embryonic development" (Beer 1964: 396). In this paper I report data on egg temperature in Barn Swallows (*Hirundo rustica*), an oscine species in which males share in incubation but lack a brood patch (Samuel 1971a, 1971b). I conclude that during

the day under mild breeding-season temperatures (20-25°C) male Barn Swallows can incubate as effectively as females.

I observed three nests in 1980 and four in 1981, each for one watch. I conducted six of the watches in June and one watch in late May. The watches were all conducted from a canvas blind about 3 m from the nest. They varied in length from 1 to 3 h (\bar{x} = 108 min, SD = 37.6 min) and were performed between 1100 and 1730 EDT. All observations were made at a colony of 90 pairs nesting under the decking of the Rutgers Marine Field Station on Little Egg Harbor, about 40 km north of Atlantic City, New Jersey. Adults were caught, sexed, banded, and individually color marked during May. Test eggs were taken from fallen or abandoned nests. A small hole was made in the egg with a 30-gauge needle and the temperature probe was inserted in the egg and attached with a dab of cyanoacrylic cement and a small piece of white adhesive tape. The test egg was initially placed in the center of the natural clutch but it was usually shifted to the edge by the incubating bird. The temperature probe was connected by extension wire to

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