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Sex-related Differences in Territorial Aggression by Ring-billed Gulls

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Although both male and female *Larus* gulls generally share the duties associated with rearing offspring, the precise nature of their roles in defense of territory and brood has been examined in detail for only a few species. In Laughing Gulls (*L. atricilla*), Burger and Beer (1975) found that although both sexes defended the territory, they did so in different ways. Males, for example, were more likely to give long-calls and to chase intruders. Territorial defense in Herring Gulls (*L. argentatus*) and Black-headed Gulls (*L. ridibundus*) has been attributed, for the most part, to the male (Tinbergen 1956).

From 16 May to 4 July 1976, I observed 17 marked pairs of Ring-billed Gulls (*L. delawarensis*) to determine if sex-related differences in territorial aggression existed. The 17 nests were distributed in three separate groups at non-edge, arbitrarily chosen study locations within the Calcite Colony in northern Michigan (Presque Isle County, 45°N, 83°W). Adult birds were marked with paint during early to mid-incubation and were observed for a total of 87.7 h (mean time/bird = 12.8 h) from a car that served as a blind.

Aggressive encounters between marked birds and intruders were recorded using Moynihan's (1962) terminology, with one exception. Gape-jabbing was defined as a forward thrusting head movement accompanied by an open bill (W. E. Southern in prep.; "gaping" of Moynihan). When birds became involved in long sequences of aggressive interactions, I considered only the initial act for final analysis, though supplemental notes were kept on such behavioral sequences.

In order to determine the sex of the birds studied, I initially captured and measured each bird (Shugart 1977, Ryder 1978). The capture technique, however, disturbed the birds too much to justify its continuation. New study areas and birds were chosen, and thereafter careful notes were kept of size differences within pairs and of copulation behavior. Marking was accomplished by placing paint-soaked materials at the nest rims during incubation, a technique not requiring capture. Toward the end of the breeding season, it was necessary to collect several birds for another study, and 14 (1 member each from 14 pairs) were collected and sexed. On the basis of observed intrapair size differences, I had predicted correctly the sex of all 14 birds. I have included data for the remaining three pairs in this analysis, relying on the same visual determination of sex that proved 100% accurate for all others.

Overall, male Ring-billed Gulls spent slightly more time on territory than did females (Fig. 1; 238.7

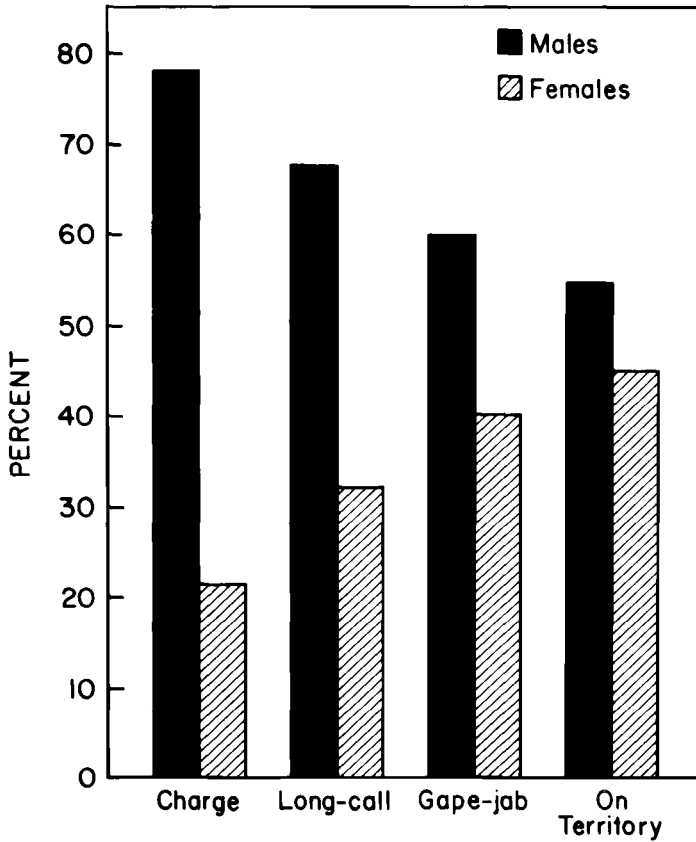


Fig. 1. Sex-related differences in territorial defense behavior and time spent on territory. Sample sizes are: Charge, 224; Long-call, 422; Gape-jab, 172; On territory, 434.8 h (total for all birds).

h vs. 196.1 h; $\chi^2_c = 3.97$, $\nu = 1$, $0.025 < P < 0.05$). This difference was evident throughout the observation period.

Charging, long-calling and gape-jabbing all were performed more often by male ring-bills (Fig. 1). The difference in performance of gape-jabbing, however, was not statistically significant when the time spent on territory was taken into consideration ($\chi^2_c = 1.53$, $\nu = 1$, $P > 0.10$). On the other hand, males long-

TABLE 1. Initial reactions of known birds to selected actions of intruding birds. Based on time spent on territory, expected frequencies were calculated according to the following ratio: ♂♂ 54.9:♀♀ 45.1.

Action of intruding bird	Initial reaction of known bird	Frequency of reaction		χ^2_c
		♂♂	♀♀	
Landing	Long-call	124	56	13.66***
	Charge	73	20	19.97**
Walking toward	Long-call	35	16	3.35
	Charge	58	20	11.15**
	Gape-jab	37	32	0.01
Flying over	Long-call	90	44	7.65*
Gape-jabbing	Gape-jab	17	14	0.03

* = significant at the 0.01 level; ** = significant at the 0.001 level.

called and charged to a significantly greater degree than females (LC— $\chi^2_c = 27.72$, $\nu = 1$, $P < 0.001$; Ch— $\chi^2_c = 49.70$, $\nu = 1$, $P < 0.001$), with time spent on territory taken into account.

Table 1 presents a breakdown of the major aggressive interactions between known birds and intruders. Charges were performed much more often by male ring-bills than by females when an intruder landed or walked toward the nest site. Males were more likely than females to respond with long-calls to an intruder landing nearby or flying over. When an intruder actually approached the nest site, however, males and females responded with long-calls in similar proportions. It is difficult to determine the significance, if any, of this latter finding. Possibly the approach of an intruding bird is a more threatening situation and one that elicits long-calls, but not charges, from even the typically less vociferous females. A larger sample is needed, however, to confirm this conclusion.

In summary, male Ring-billed Gulls played a generally more aggressive role in defense of territory and brood than did females. Although the time males and females spent on territory was somewhat similar, males engaged in long-calls and charges to a substantially greater extent. Gape-jabbing, a relatively lower intensity agonistic action, was performed by both sexes with about equal frequency.

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Fertility of Albinistic Eggs of Mountain Bluebirds

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The usual egg color for Mountain Bluebirds (*Sialia currucoides*) is light blue. Although white eggs have been reported for both Eastern (*Sialia sialis*) and Mountain Bluebirds, they are considered unusual for Mountain Bluebirds (Bent 1949, U.S. Natl. Mus. Bull. 196). Laskey (1939, Bird-Banding 10: 24) reported that white eggs were not only common (9.1% of all eggs) but also fertile (25/26 hatched) for Eastern Bluebirds. Power (1966, Condor 68: 359) found that white eggs comprised 8.3% of all eggs laid by Mountain Bluebirds in Montana, but that only 1 of 9 of these hatched, while complete fertility occurred in normally pigmented eggs in the same nests. He found "the frequency of white eggs to be about equal in these two species of *Sialia*, but with a strong indication that they are less viable in *S. currucoides* than are normally pigmented eggs."

During spring 1980 we monitored five Mountain Bluebird nest box lines in southern Manitoba that contained nests with abnormally colored eggs. Mountain Bluebirds occupied 139 of the 252 available boxes by 15 May. Pair formation, egg laying, incubation, and hatching were monitored regularly to assure accurate documentation of all nests.

Of the 139 nests containing Mountain Bluebirds, 130 had complete clutches of normally pigmented eggs. The mean clutch size of 5.7 eggs was derived from the following observations: 87 nests with 6 eggs, 35 nests with 5 eggs, 4 nests with 7 eggs, and 4 nests with 4 eggs. The total of 789 normal eggs accounted for 93.9% of all eggs laid. Four clutches contained only pale blue eggs (5, 5, 6, 6), which were noticeably lighter in color than normal eggs. The mean clutch size was 5.5 eggs, and the 22 pale blue