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GALÁPAGOS MOCKINGBIRD PECKS AT SEA LION MOUTH

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The mockingbirds of the Galápagos Islands (*Nesomimus* spp.) are well-known for their opportunistic feeding habits. Hood Island Mockingbirds (*N. macdonaldi*), in particular, use a wide variety of sources for food and water. Presumably, the extreme aridity and barrenness of their home island have precipitated such habits as egg-eating, blood-drinking, and predation on *Tropidurus* lizards and nestling sea-birds.

Bowman and Carter (Living Bird 10:243–270, 1971) tabulated feeding habits of Galápagos mockingbirds. While at Punta Suarez on Hood Island, 26 July 1973, I witnessed a behavior not recorded in their paper or elsewhere in the literature. A *N. macdonaldi* foraged along a sandy beach littered with sleeping sea lions (*Zalophus californianus*). This mockingbird spent several minutes hopping from one sea lion to another, pecking at their teeth (fig. 1). The bird appeared to obtain and swallow bits of moist food and/or droplets of saliva. The sea lions continued to sleep, showing no reaction to the mockingbird's pecks. Lack of water, a conspicuous feature of Hood Island, has fostered several unusual methods of feeding in the island's mockingbirds; pecking at sea lions' mouths seems to be an addition to this repertoire.

FIGURE 1. Hood Island Mockingbird pecking at the mouth of a sleeping sea lion.

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DOMINANCE HIERARCHIES IN WINTER SONG SPARROWS

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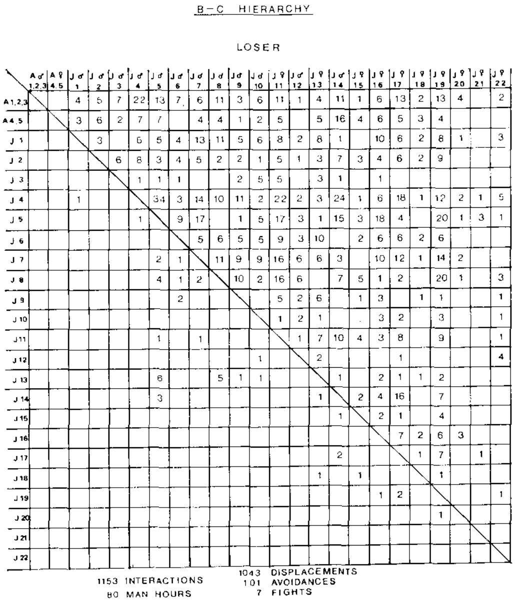
In many species of birds, some individuals are excluded from establishing territories in optimal habitats. Earlier we have shown that first year birds are excluded from spring territories in the Song Sparrow (*Melospiza melodia*) (Knapton and Krebs 1974). Empty territories were rapidly refilled by young birds after experimental removal of adults. In this note we report that the replacement birds were young who had been dominant in winter flocks in the study area. Odum (1942) and Dixon (1963) reported similar cases of dominant birds in winter flocks establishing territories in the spring, but their results were less detailed. Glase (1973) showed that resident pairs were most dominant in winter flocks, and Smith (1976) has reported that higher ranking individuals can obtain better quality breeding territories.



B–C HIERARCHY

LOSER

WINNER

	A♂ 1,2,3	A♀ 4,5	J♂ 1	J♂ 2	J♂ 3	J♂ 4	J♂ 5	J♂ 6	J♂ 7	J♂ 8	J♂ 9	J♂ 10	J♀ 11	J♂ 12	J♀ 13	J♂ 14	J♀ 15	J♀ 16	J♀ 17	J♀ 18	J♀ 19	J♀ 20	J♀ 21	J♀ 22
A1,2,3			4	5	7	22	13	7	6	11	3	6	11	1	4	11	1	6	13	2	13	4		2
A4,5			3	6	2	7	7		4	4	1	2	5		5	16	4	6	5	3	4			
J1				3		6	5	4	13	11	5	6	8	2	8	1		10	6	2	8	1		3
J2					6	8	3	4	5	2	2	1	5	1	3	7	3	4	6	2	9			
J3						1	1	1			2	5	5		3	1		1						
J4			1				34	3	14	10	11	2	22	2	3	24	1	6	18	1	12	2	1	5
J5						1		9	17		1	5	17	3	1	15	3	18	4		20	1	3	1
J6									5	6	5	5	9	3	10		2	6	6	2	6			
J7							2	1		11	9	9	16	6	6	3		10	12	1	14	2		
J8							4	1	2		10	2	16	6		7	5	1	2		20	1		3
J9								2					5	2	6		1	3		1	1			1
J10													1	2	1			3	2		3			1
J11							1		1					1	7	10	4	3	8		9			1
J12												1			2				1					4
J13							6			5	1	1				1		2	1	1	2			
J14							3								1		2	4	16		7			
J15																1		2	1		4			
J16																			7	2	6	3		
J17																2				1	7		1	
J18															1		1				1			
J19																		1	2					1
J20																					1			
J21																								
J22																								

1153 INTERACTIONS
80 MAN HOURS

1043 DISPLACEMENTS
101 AVOIDANCES
7 FIGHTS

FIGURE 1. The hierarchy (number 4) for which most data were recorded. The fact that nearly all the observations fall on one side of the diagonal indicates a high degree of linearity.

Our study area was on Reifel Island, British Columbia, where the Song Sparrow is a year-round resident. Adult Song Sparrows were territorial for most of the year; non-territorial birds (primarily juveniles) formed loose associations in the fall, but did not form tightly integrated flocks, and they tended to congregate at certain favored localities in the study area. Removal experiments in the spring (Knapton and Krebs 1974) presented an opportunity for some of the non-territorial birds to obtain a territory.

Over 95% of all the Song Sparrows on the study area were color-banded for individual recognition. The birds were caught with mist nets and funnel traps, and were sexed by wing length measurements and, during the breeding season, by behavioral differences and by the presence or absence of a brood patch (Nice 1937, Knapton 1973). Of the 71 juveniles that took part in the hierarchies, 89% were caught and banded before the post-juvenile molt. The remaining 8 were aged by a combination of pointed rectrices in the males (Nice 1937), slight plumage differences (Bent 1968), and the yellow color of the oral flanges (Knapton 1973).

Feeding stations were set up along the hedgerows, and observations were documented from blinds. Over 152 hours were spent recording interactions from the blinds, from December 1972 through March 1973. Song Sparrows were readily attracted to the feeding stations, as were a number of other seed-eating passerines, principally Dark-eyed Juncos (*Junco hyemalis*), Rufous-sided Towhees (*Pipilo erythrophthalmus*), and Fox Sparrows (*Passerella iliaca*).

All encounters involving Song Sparrows invariably took place between only two birds at a time, and in all encounters a winner and a loser could be clearly determined. This is in contrast to the interactions in some other fringillids (e.g., juncos; Sabine 1959). Encounters were divided into three categories: displacements, avoidances and fights.

TABLE 1. Position in hierarchy, and number of juveniles in hierarchies, of the seven new territorial males.

Territorial Male	Position in hierarchy (excluding territorial adults)	Number of juveniles in hierarchy	Hierarchy number
1	1st	14	1
2	1st	7	2
3	1st	7	3
4	1st	22	4
5	2nd	22	4
6	2nd	8	5
7	5th	22	4

Displacement: Bird A is feeding at the bird table. Bird B appears, and either makes a rapid determined flight at Bird A, or quickly hops in threat posture (Nice 1943:156) directly at Bird A. Bird B has wings out-of-pocket, body feathers fluffed out, head lowered, and beak pointing directly at Bird A, who invariably flies off before contact is made. Distances between the birds ranged from one-half to one meter.

Avoidance: Bird A is feeding at the bird table or on the ground below. Bird B appears and hops towards the feeding area while adopting a mild threat posture with wings out-of-pocket. Bird A assumes an alarm posture (Nice 1943:225) with raised crest feathers, body feathers sleeked down, and neck stretched out and up. As Bird B approaches, Bird A hops away from the feeding area. Distances between birds varied, but were roughly one meter.

Fight: Two birds 'square off', directly facing each other. Both have tail feathers fanned and generally depressed, wings out-of-pocket, body close to the ground, body feathers puffed out, and bill frequently open. The two birds are usually quite close to each other, about 20 to 30 cm apart, and often remain motionless in these postures for several seconds. Two outcomes can be distinguished: (1) one bird closes its bill, slowly turns its head, and then flies off with the other in close pursuit. There then follows a prolonged chase through the shrubbery, (2) the birds physically fight; they spring into the air together, pecking and attempting to clench claws, each trying to surmount the other. The two birds can rise as much as four meters above the ground, before one gives way and flies off, with the accompanying close pursuit by the victor and a prolonged chase through the underbrush.

Each type of encounter (displacement, avoidance and fight) was given equal weight in the analyses, and all three types of encounters were combined. This seemed justifiable on the grounds that interactions did not involve more than two Song Sparrows at a time, and that the decision as to who was the victor in an encounter was not in doubt.

Seven hierarchies were determined on the study area, and matrices constructed for each hierarchical group. Nearly 1800 interactions were documented. The B-C Hierarchy (fig. 1) is that with the most data. The number of Song Sparrows in each hierarchy ranged from 27 to 5 (av. 13). Of all interactions, 90% were displacements, 9% avoidances, and only 1% fights. All seven hierarchies were strikingly linear. In all hierarchies, the adult male and his female were the dominant birds at the feeding stations located in their territories, and the juveniles were arranged in a linear fashion below them. Males were dominant over females; in the B-C Hierarchy, as an example, out of 22 juveniles, 12 were males and all 12 occurred in the top 14 birds.

On March 7, 1973, seven territorial males and five females were removed from an experimental part of the study area (Knapton and Krebs 1974). Ten males subsequently established territories in this experimental area. Five hierarchies had been determined during the winter in this area, and of these 10 new territorial males, 7 had figured in the hierarchies. Table 1 gives the position in the hierarchies of these 7 males, and the number of juveniles in each hierarchy. The top juvenile males from 4 of the 5 hierarchies established territories, as did 2 males who held second position in 2 of the hierarchies, and finally one male who was fifth in the largest hierarchy (the B-C Hierarchy). The third bird in the B-C Hierarchy obtained a territory in early May on the control (undisturbed) area, shortly after a control male disappeared from his territory. Thus, if we analyze the B-C Hierarchy, out of 12 juvenile males, 4 from the top 5 obtained territories, which is highly unlikely to have occurred by chance ($P = 0.01$, Wilcoxon two-sample rank test). Interestingly, of the 7 females who paired with the new territorial males after the removals, only one had been a prominent member in the hierarchies.

Our results strongly support the hypothesis that, given the opportunity, the juveniles who obtain territories are the dominant individuals in dominance hierarchies established during the pre-breeding season.

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THE OXYGEN CONSUMPTION OF THE MOUNTAIN WHITE-CROWNED SPARROW (*ZONOTRICHIA LEUCOPHRYS ORIANTHA*) IN RELATION TO AIR TEMPERATURE

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The Mountain White-crowned Sparrow (*Zonotrichia leucophrys oriantha*) is the least well-known member of its species, although its reproductive biology has recently begun to receive substantial attention (e.g., Morton, Horstman, and Osborn, Condor 74:152–163, 1972). It is a migrant that winters from the extreme southwestern United States into central Mexico and breeds in the Rocky Mountains, Sierra Nevada, and isolated ranges of the Great Basin (Banks, Univ. Calif. Publ. Zool. 70:1–123, 1964) above an altitude of about 2000 m. Although predominantly a nesting bird of alpine and subalpine meadows, it also inhabits shrubsteppe vegetation dominated by sagebrush (*Artemisia* sp.) at lower altitudes, and the krummholz of the tundra zone at the highest altitudes. As an adjunct of investigations of the ecological energetics of this species we measured its oxygen consumption in relation to air temperature. Inasmuch as these results will not reappear in an explicit form in subsequent publications, we report them here briefly as a contribution to the data archives of crowned sparrows in particular and comparative avian energetics in general.

Six adult *Z. l. oriantha* captured at the end of the breeding season near Niwot Ridge, Boulder Co., Colorado (40.1°N, 105.3°W, ca. 3500 m in altitude) were brought to the laboratory at Pullman, Washington, and initially housed in an outdoor aviary. Together with six adult *Z. l. gambelii* that had been captured during the autumn migration in southeastern Washington, the Colorado birds were placed in individual cages in a constant-condition room (air temperature 8 ± 1°C, photoperiod LD 10:14, lights off at 0700) on 5 February 1975. Oxygen consumption was measured between 1 March and 15 April. The conditions of husbandry and methods of measuring oxygen consumption were as previously described (King, Comp. Biochem. Physiol. 12:13–24, 1964). Measurements were made during the period from 1100 to 1800 within the birds' subjective night, at least three hours after their last meal. Each series of measurements included two *oriantha* and one *gambelii*, the latter included for purposes of interracial comparison. Air-temperature adjustments during the measurement of oxygen consumption were in upward steps, as in