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SCRUB JAY PREDATION ON STARLINGS AND SWALLOWS: ATTACK AND INTERSPECIFIC DEFENSE[1]

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Key words: Aphelocoma coerulescens; *Cliff Swallow; European Starling; interspecific defense; predation; Scrub Jay.*

Jays are known to be important predators of both the eggs and nestlings of other birds, but attacks on adults or juveniles capable of competent flight are rarely reported. On the campus of Stanford University, Santa Clara County, California, a Scrub Jay (*Aphelocoma coerulescens*) was observed repeatedly attacking a juvenile European Starling (*Sturnus vulgaris*). When first observed, at 09:00 on 4 May 1987, the starling appeared disoriented. It flew at a height of about 1 m into the side of a building, dropped to the ground, but remained active. The pursuing jay immediately cornered the starling and pinned it to the ground with its feet. While leaning away from the starling to avoid jabs of its bill, the jay repeatedly pecked vigorously at the starling's head and shoulders with its bill. The sequence was interrupted by the intervention of an adult starling which chased the jay away from the juvenile, but the jay then returned and pursued the flying juvenile, catching it twice, pinning it as before, and hammering at it until the adult starling intervened each time. Groups of students interrupted the attack and all three birds disappeared. The entire sequence probably took less than 1 min.

In a location about 50 m away on 8 May 1987 a second predatory interaction was observed. The behavior of the jay and the juvenile starling was similar; the starling's flight seemed clumsy, but it was impossible to determine whether this was because of its inexperience or a result of injury. In this case two or three Brown Towhees (*Pipilo fuscus*) intervened and temporarily drove off the jay. It returned to resume the attack, however, until an adult starling flew down from an adjacent live oak tree (*Quercus agrifolia*) and attacked the jay. The juvenile weakly flew several meters and was again pinned by the jay. The adult starling

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had been lost from view, but two towhees and an Acorn Woodpecker (*Melanerpes formicivorus*) mobbed the jay and terminated its attack on the juvenile starling; at this point the juvenile reached cover beneath parked cars and no further attacks were seen.

A third Scrub Jay predation event occurred at 12:00 on 28 May 1987 during observation of a Cliff Swallow (*Hirundo pyrrhonota*) nesting colony under eaves of a building at Stanford University, some 250 m from the site of the attacks on the starlings (Sunia Yang, pers. comm.). Alarm calls from the swallows attracted attention, and a jay and an adult swallow were seen falling together from roof height. After landing on the lawn below, the jay attacked the swallow in a manner similar to that described above: it pinned the swallow with its feet and hammered the swallow's neck with a closed bill. Several swallows from the colony circled above the pair, but the jay persisted in its attack until the observer approached to within 2 m, at which point the jay released the swallow. The swallow immediately flew away with the jay in pursuit, but the faster swallow easily escaped. The jay returned to the colony several times but was greeted by swallow alarm calls on each approach, and it soon departed.

Whether or not the same jay was involved in more than one of the attacks is not certain. There is, however, a very high density of Scrub Jays on the Stanford campus, and the distance of the third attack from the other two makes the involvement of at least two jays probable.

These interactions seemed noteworthy because of the persistent pursuit of flying birds by the jays, the use of their feet to pin the prey (as corvids often do with nuts—see Wilmore 1977, Angell 1978), their leaning away from the starling to avoid the defensive thrusts of its bill, and the intervention of other species. The first three indicate that the predatory activities of Scrub Jays can be highly refined and extend well beyond nest robbing. The same is indicated by a report of a Scrub Jay attacking and capturing an immature female Hermit Thrush (*Catharus guttatus*) in flight (McLandress and McLandress 1981).

Similar behavior has been reported in other species of jays. A Blue Jay (*Cyanocitta cristata*) has been observed on a branch holding a Purple Finch (*Carpodacus purpureus*) in its feet and striking the finch's head with its bill (Downs 1958). Another Blue Jay was reported to attack a dust-bathing House Sparrow (*Passer domesticus*) in Pennsylvania, pecking it violently and eventually killing it, and carrying it in its feet to a tree to feed (Master 1979). A Blue Jay has also killed a Yellow-rumped Warbler (*Dendroica coronata*), but the details of the attack were not observed except that the prey was seen to be carried in the bill (Johnson and Johnson 1976). Another Blue Jay captured a fledgling Mourning Dove (*Zenaida macroura*) in flight by landing on top of it. The jay seized the dove in its feet, forced it to the ground, and pecked it to death (DuBowy 1985). After an unusual snowstorm at the Southwestern Research Station in the Chiricahua Mountains of Arizona, a Gray-breasted Jay (*Aphelocoma ultramarina*) killed an unidentified small bird by pecking it (Roth 1971). Also after heavy snows in Arizona, a Steller's Jay (*Cyanocitta stelleri*) was seen using its feet to capture a Dark-eyed Junco (*Junco hyemalis*) in flight and another caught a Pygmy Nuthatch (*Sitta pygmaea*) in the same way (Carothers et al. 1972). In both cases the jay flew back to a perch to pluck and eat its prey. Gray Jays (*Perisoreus canadensis*) have also been observed carrying nestlings in their feet (Ouellet 1970).

Thus the use of the feet for attacking birds capable of flight, and for transporting prey, seems widespread in jays. It is also reported in shrikes, but shrikes use their hooked bills to bite their prey (Cade 1967); the straight bill of the jay is more suitable for hammering. A Common Myna (*Acridotheres tristis*) nesting in Everglades City, Florida, dragged a female Purple Martin (*Progne subis*) out of a nest hole in a martin box, pinned it with its feet, and pecked many times at its head. The martin writhed free (Susan Allen, pers. comm.). However, when attacking birds, other passerines did not use their feet. Pearly-eyed Thrashers (*Margarops fuscatus*) preying on White-crowned Pigeon (*Columba leucocephala*) nestlings in Puerto Rico use their bills and recoil from the defensive thrusts of the squabs in a manner similar to the jays—but did not employ their feet to pin their victims (Wiley and Wiley 1974). Brown-headed Cowbirds (*Molothrus ater*) attacking a junco in the snows of Arizona simply pecked at it (Roth 1971).

The responses of the adult starlings in the first two jay attacks may have been instances of parents defending their fledglings. The intervention of birds of other species in the jay attack on the second young starling may, like mobbing behavior in general, simply be a "move along" response to an obvious act of predation (Curio et al. 1978), although jays behaving "normally" are not mobbed by Brown Towhees or Acorn Woodpeckers. On the other hand, the starlings' distress calls might have been confused with those produced by juvenile towhees or woodpeckers.

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NEW BIRD RECORDS FROM THE GALÁPAGOS ASSOCIATED WITH THE EL NIÑO-SOUTHERN OSCILLATION[1]

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Key words: Galápagos; colonization; El Niño-Southern Oscillation; Black Tern; Rose-breasted Grosbeak; Eared Dove; Dark-billed Cuckoo; Cedar Waxwing.

Colonization is a critical element of biogeographical processes (MacArthur and Wilson 1967). However, even for the avifauna of the Galápagos Islands, which has been the focus of many studies of evolutionary change, speciation, and community structure (Grant 1984a), the frequency of colonization remains poorly documented. Here we report on records associated with the El Niño-Southern Oscillation (ENSO) event of 1982–1983 for three bird species new to the Galápagos. We suggest that such rare climatic events have an important influence on the archipelago's avifauna by increasing the frequency with which birds reach the archipelago, disperse among the islands, and become successfully established.

Between October 1982 and July 1983, the Galápagos Archipelago experienced unusually heavy rain and strong winds associated with an extraordinarily strong ENSO event (Philander 1983, Grant 1984b). Many of the biological effects of these conditions have been discussed elsewhere (e.g., papers in Robinson and del Pino 1985). We conducted field studies in the Galápagos between 31 December 1982 and 23 June 1983 on Genovesa, a small isolated island in the northeast corner of the archipelago (89°57′W 0°18′N). Storms producing unprecedented rainfall occurred throughout this period (Grant 1984b, Curry 1985). We made additional observations on Genovesa between 13 December 1983 and 5 May 1984, and on several other islands in both 1983 and 1984. Our fieldwork was part of continuing long-term studies of finch and mockingbird breeding biology begun in 1978.

On 29 and 30 January 1983, both of us observed a Black Tern, *Chlidonias niger,* flying over the beach and tidal lagoon below our camp on Genovesa, when it was hawking for insects over low scrub (mostly *Cryptocarpus pyriformus*). In winter plumage, the bird was predominantly white with a dusky nape, a small dark ear covert spot, and a slightly forked tail; these characters are visible in our photographs of the bird (copy on file, Division of Birds, Museum of Zoology, University of Michigan). A Common Tern (*Sterna hirundo*) present on the same days, also in winter plumage, was noticeably larger.

Our sightings coincided with a period of severe weather, with 109 mm of rain falling between 28 and 30 January, strong winds from various directions, and unusually heavy surf. Both terns may therefore have been blown off course toward the Galápagos from their normal wintering range. The Black Tern is a common winter resident on the Pacific coast of Colombia (Hilty and Brown 1986), occurring more rarely south to Ecuador (Butler 1979) and Peru as far south as Lima (Koepcke 1970, Parker et al. 1982). The sole previous record of this species for the Galápagos was a dead immature bird (Harris 1982).

We observed at least two Rose-breasted Grosbeaks, *Pheucticus ludovicianus,* on Genovesa in 1983. On 12 April, Stoleson saw a male, in winter plumage, with

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