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Interspecific Cooperative Nesting Between Barn Swallows and Say's Phoebes in South-central New Mexico

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Intraspecific cooperative nesting is not a common event in the avian world, although it is well documented in species like the Acorn Woodpecker (*Melanerpes formicivorus*; Koenig et al. 1984) and Common Moorhen (*Gallinula chloropus*; Gibbons 1986). Intraspecific cooperative nesting occurs when more than two birds of the same species take part in providing parental care to rear the young (Emlen and Vehrencamp 1983). Our purpose is to document an observation of interspecific cooperative nesting between a pair of Barn Swallows (*Hirundo rustica*) and a Say's Phoebe (*Sayornis saya*). We have found no published records that document interspecific cooperative nesting in birds. This event is even more unusual in that Say's Phoebes often usurp Barn Swallow nests (Bent 1942).

In late March 1993, a pair of Say's Phoebes built a nest atop an old Barn Swallow nest at our housing facilities at the Orogrande base camp on the Fort Bliss Military Reservation. The nest was located at the juncture of two steel girders supporting the roof. Orogrande is located in south-central New Mexico, approximately 96 km north of El Paso, Texas. Adjacent habitat is Chihuahuan Desert scrub (Shreve 1942) and desert grassland (Budd et al. 1979).

After fledging one of three young in late April, the phoebes left the general area and were observed occasionally foraging from surrounding poles and utility wires. A short time after the phoebe fledged, Barn Swallows began to occupy and restore other nearby swallow nests with no apparent interest in the phoebe nest.

On 13 June, we observed Barn Swallows lining the phoebe nest with feathers. Barn Swallows commonly line their nests with feathers, but phoebes do not (Terres 1991). On 15 June, we discovered a Barn Swallow egg in the phoebe nest. Because nest reuse occasionally occurs in birds (Butler 1980, Butler and Campbell 1987, Shields et al. 1988), the fact that the Barn Swallows were using the phoebe nest did not appear odd. However, later that same day, a Say's Phoebe was observed on the nest. We checked the nest using a mirror and saw that a Barn Swallow egg

was still present. The following day, the phoebe was again on the nest and one heavily speckled swallow egg was found broken on the concrete below the nest. We inspected the nest and found one swallow egg and one phoebe egg. The phoebe and swallows incubated at different times during the day. Two days later, we found two phoebe and three Barn Swallow eggs, and both species incubating. We observed the phoebe most frequently incubating the eggs. At night, the swallow pair would perch on the steel girder approximately 0.5 m from the nest, while the phoebe apparently incubated throughout the night. We monitored the nest daily for the next three days and, on 22 June, three phoebe and three swallow eggs were present. On 26 June, one swallow egg was gone and both species continued to incubate.

Throughout the entire nesting cycle, we never saw two phoebes at the nest or together. The phoebe present appeared to be the one laying eggs; thus, we believe it was the female and that this was her second clutch. This is corroborated by our observations on other sites where we observed Say's Phoebes reusing their nests from the same season. Hatching began on 2 July and ended on 4 July. Three phoebe and two swallow eggs hatched, and both species began feeding the nestlings. No apparent discrimination towards nestlings was evident, since both species were observed feeding each other's young (Fig. 1). However, we did not collect quantitative data on proportionate incubation times or feeding rates of each species.

Until hatching, very little mobbing behavior was exhibited by the Barn Swallows, even though this is a common behavior exhibited by this species towards potential predators (Shields 1984). In fact, during incubation, the phoebe seemed more aggressive towards the swallows than the swallows were to the phoebe. The swallows appeared to "sneak in" to incubate, where as the phoebe seemed to fly in at will and sometimes chased off an incubating swallow. However, when the eggs hatched, both swallows began to attack the phoebe when it would attempt to feed the growing young. Mobbing intensity increased through the nestling stage. Despite the increase in aggressive behavior, the Say's Phoebe and the Barn Swallows continued to feed the nestlings.

On 23 July, two phoebes and two swallows fledged. One phoebe chick died prior to fledging, apparently as a result of starvation (it was notably smaller than its siblings). After fledging, we observed swallow and

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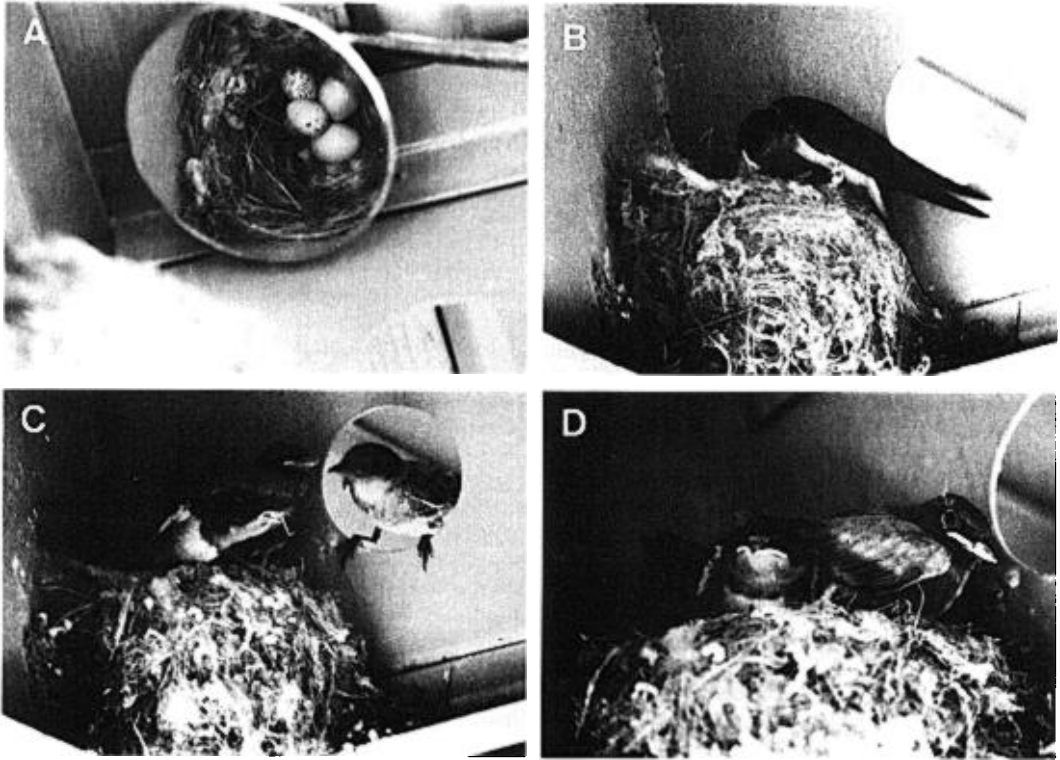


Fig. 1. (A) Three Barn Swallow eggs and two Say's Phoebe eggs in nest. (B) Adult Barn Swallow feeding young. (C) Adult Say's Phoebe perched near nest after feeding Barn Swallow nestling. (D) Young Barn Swallow and young Say's Phoebe in nest. Nest at dormitory complex in Orogrande, New Mexico (June–July 1993).

phoebe young together for one to two days in the immediate vicinity. Following this period, the fledgling swallows associated with the adult swallows, while the phoebe fledglings were no longer seen in the vicinity of the housing complex.

There is no previous documentation of interspecific cooperative nesting in birds. We offer several explanations for the behaviors we observed. First, both species readily nest on artificial structures (Ehrlich et al. 1988, Terres 1991), both Say's Phoebes and Barn Swallows reuse old nests, and both prefer to nest at the juncture of the steel girders supporting the roof. Therefore, since suitable nest sites are limited (girder junctures), these birds chose to use the nest simultaneously. We did not, however, evaluate the suitability of other nest sites. Second, Barn Swallows cannot distinguish their own eggs from other Barn Swallow eggs, or the eggs of other species (Grzybowski 1979). This lack of egg recognition may have allowed the swallows to tolerate the introduction of the phoebe's eggs. Third, the arid desert environment, lack of permanent standing water, and below-average monthly precipitation in April and May (National Climatic Data Center, unpubl. climatological data for El Paso, Texas) could have caused a shortage of nesting material (mud) for the swallows. This may have

resulted in the swallows being less likely to construct a new nest due to the increased costs of finding suitable nesting material (Shields et al. 1988) and, consequently, more tolerant of the phoebe's presence. Finally, the late initiation of this nest suggests that these Barn Swallows may have experienced a previous nest failure, or may have immigrated from another area. Cooperative nesting may have offered the swallows perhaps their only chance to reproduce that year, due to the use of suitable sites by resident swallows and the lack of nesting material.

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Size and Abundance: Breeding Population Density of the Calliope Hummingbird

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Population density is a basic component of life histories, competition, the structure and energy turnover of communities, and conservation. Hence, interspecific patterns in abundance or density are relevant to a wide range of ecological processes. The search for such patterns is fraught with variation due to heterogeneous resource distribution (Whittaker 1970), successional habitat changes (Johnston and Odum 1956), niche specialization (Perrins and Birkhead 1983), vulnerability to extirpation (Terborgh 1989), census methods (Dawson 1981, Calder 1990), biases towards study of abundant species (Brown and Maurer 1986), and consequences of body size (Juanes 1986). Relationships between density and size are attracting considerable attention (e.g. Damuth 1981, Brown and Maurer 1986, 1987, Juanes 1986, Lawton 1989, Cotgreave and Harvey 1992, Cotgreave 1993, Blackburn

et al. 1993a, b, Currie 1993). Two patterns of abundance have appeared: inverse log-linear regressions of population density on body size, and a triangular scatter plot when density/mass data sets include proportionately more rare species. Biological meanings are not yet clear.

Small mammals generally are more abundant than large mammals, and density/mass scaling correlations for common species are strong (e.g. $r^2 = 0.74$; Damuth 1981). Population density/size correlations are weaker for birds than for mammals. Juanes (1986) pooled densities of birds of all feeding types ($n = 564$) and found:

$$\log D = 1.96 - 0.49 \log M, \quad (1)$$

where D is density (birds/km²) and M is body mass (g). Although highly significant ($P = 0.0001$), the re-