

First documented observation of Island Scrub-Jay (*Aphelocoma insularis*) precopulatory display

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ABSTRACT.—We report what we believe is the first documented observation of Island Scrub-Jay (*Aphelocoma insularis*) copulation behavior. We compare our observations to the behaviors of other *Aphelocoma* jays with the aim of identifying potential species-specific elements. There are observable differences between the precopulatory display of the Island Scrub-Jay and that of more distantly related *Aphelocoma* jays. The display of Island Scrub-Jay and that of the closely related California Scrub-Jay (*Aphelocoma californica*) are very similar despite the species being isolated from each other for approximately 1 million years.

RESUMEN.—Reportamos sobre lo que creemos que es la primera observación documentada acerca de las conductas de copulación de la Chara de Santa Cruz (*Aphelocoma insularis*). Comparamos nuestras observaciones con los comportamientos de otros tipos de charas (*Aphelocoma* jay) con el objetivo de identificar posibles elementos característicos de la especie. Hay diferencias observables entre los despliegues precopulatorios de las Charas de Santa Cruz y las de sus parientes lejanos, *Aphelocoma* jay. Los despliegues de las Charas de Santa Cruz y los de su especie hermana, la Chara Californiana (*Aphelocoma californica*), son muy similares, a pesar de que las especies han permanecido aisladas entre ellas durante aproximadamente 1 millón de años.

Aphelocoma jays represent a group of highly social and diverse species in terms of geographical range and behavior, and the genus includes 3 distinct lineages based on morphology, plumage, and genetic data: scrub jays, Mexican jays, and unicolored jays (AOU 1998, McCormack et al. 2011). The Island Scrub-Jay (*Aphelocoma insularis*), a species restricted to Santa Cruz Island of the California Channel Islands archipelago, has long been recognized as a distinct species based on morphology and plumage (Pitelka 1951, AOU 1998) and more recently through molecular analyses (Delaney and Wayne 2005, Delaney et al. 2008). The life histories of many *Aphelocoma* species, including precopulatory displays and reproductive behavior, are well known (see Brown 1963, 1964, Webber 1984, Woolfenden and Fitzpatrick 1996). However, despite naturalists visiting Santa Cruz Island for over a century (Henshaw 1886), we found no information regarding the precopulatory behavior of the Island Scrub-Jay.

One potential reason for this gap in understanding of fundamental Island Scrub-Jay life history is that this species has been described as shy compared to mainland species (Bent 1964). Also, Santa Cruz Island is isolated and characterized by thick vegetation and rugged topography (Schoenherr et al. 1999). The island is largely inaccessible to the general public, thereby restricting the number of potential observers and making opportunistic observations of behaviors such as copulation unlikely.

Alternatively, the lack of observations of Island Scrub-Jay precopulatory behavior could be due to the relative lengths of pair bonds in our study plots. Color banding and behavioral observations during the breeding season began in 1975 (Atwood et al. 1990), and systematic Island Scrub-Jay nest monitoring has been taking place since 2008 (Caldwell et al. 2013). Island Scrub-Jay breeding peaks from mid-March through April (Atwood 1978), and monitoring typically begins in mid-February to

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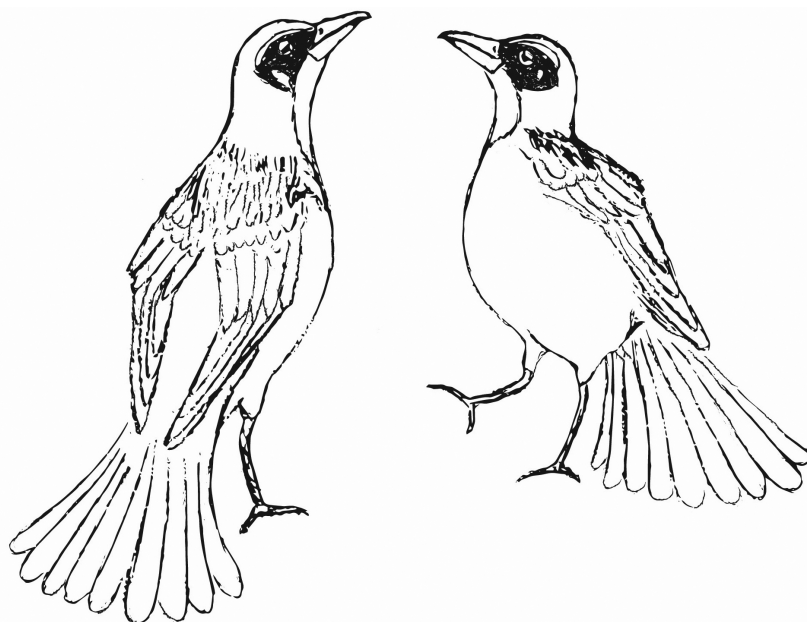


Fig. 1. Posture of the Island Scrub-Jay during the precopulatory display (female on the left, male on the right). Drawing by Michelle Harris.

allow for the observation of courtship behaviors before breeding begins. Most pairs in the long-term study plot (8 out of 14) have been together for at least 3 years (mean 3.67, SD 1.91 years). Writtenberg (1968) and Verbeek (1972) both noted a lack of precopulatory displays between older pairs in other corvid species. If precopulatory displays are rarer in older pairs, this would further reduce the likelihood of observing such behavior in Island Scrub-Jay focal pairs.

Here, we describe what we believe is the first documented observation of copulatory behaviors in the Island Scrub-Jay. Our primary goals are (1) to provide the first description of the Island Scrub-Jay precopulatory display and (2) to compare our observation to those of other *Aphelocoma* species in order to identify potential differences in precopulatory display behavior.

At 07:50 on 11 April 2018, a known pair of color-banded Island Scrub-Jays was spotted approximately 3 m away from our position. Both the male and female were banded within 2 km of the territory they have maintained for approximately 3 years. When first observed, the birds were within 0.5 m of each other and were facing each other. They then hopped

approximately 15 m up a slight hill to the center of a 1-m-wide dirt path. The path was sheltered on both sides by 2-m-tall *Ceanothus arboreus*. The male then rounded in front of the female and walked back and forth in a semicircle several times. He maintained an upright posture, facing the female with his bill raised and the tail slightly fanned, with the tips of the rectrices dragging on the ground. The wings were pulled away from his sides and slightly flared. The female held a similar posture as the male, pivoting her body to face him as he moved around her but otherwise remaining stationary (Fig. 1). The male then approached from her right side. Immediately the female crouched low so that her body was close to the ground with her tail slightly raised. The male then mounted her briefly. Copulation lasted between 1 and 3 s. Following copulation, the pair remained close for a few seconds before flying away together. This whole interaction lasted less than a minute. We heard no vocalizations, despite a lack of wind and our proximity to the pair.

Despite this species evolving in isolation for approximately 1 million years (McCormack et al. 2011), many elements of the copulation behavior of *Aphelocoma* jays are seen in the

TABLE 1. Comparison of recorded precopulatory behaviors among 5 members of the genus *Aphelocoma* and the Steller's Jay (*Cyanocitta stelleri*; outgroup). Y = observed, N = not observed, U = unclear, O = occasionally.

Behavior	<i>A. coerulescens</i> ^a	<i>A. californica</i> ^b	<i>A. insularis</i> ^c	<i>A. wollweberi</i> ^d	<i>A. unicolor</i> ^e	<i>C. stelleri</i> ^f
♂ tail fanned and not raised	Y	Y	Y	Y	N	Y
♂ vocalizations	Y	Y	U	N	N	Y
♀ vocalizations	U	Y	U	N	N	U
Head bowed in ♂	O	N	N	Y	N	N
♂ tilted forward ♀	Y	Y	U	Y	N	Y
Spread wings	Y	Y (Adams 2016)	Y	Y	N	Y
180° arc around ♀	Y, hop (sometimes walk)	Y, walk (Adams 2016)	Y, walk	Y	N	Y
Flared head and breast feathers	Y, head	U	U	Y, head and breast	N	U
Bill probing	Y	N	N	N	N	Y
Food carrying	N	N	N	Y	N	N
♀ response	Begging posture (Ferguson et al. 2016)	Initiate or return display	Courtship and/or begging posture	Wings open	N	Return display
Extra pair paternity (% of offspring)	0 (Townsend et al. 2011)	21.4 (Delaney 2003)	7.8 (Desrosiers 2014)	40 (Li and Brown 2000); 16 (Eimes et al. 2005)	Frequent, no molecular work	Rare, no molecular work
Mating system	Cooperative	Noncooperative (Carmen 1988)	Noncooperative (Caldwell 2013)	Cooperative	Cooperative	Noncooperative

^aWoolfenden and Fitzpatrick, 1996

^bWebber, 1984

^cNew observations reported in this paper

^dBrown, 1963

^eWebber and Brown, 1984

^fBrown, 1963, 1964

Island Scrub-Jay (Table 1). Nearly all recorded observations of *Aphelocoma* copulations note a fanned, unraised tail during precopulatory display, with the male's body tilted towards the female as he moves in a 180° arc around the female with his wings slightly flared (Brown 1963, Webber 1984, Woolfenden and Fitzpatrick 1996). We did not observe a similar body tilt in the male Island Scrub-Jay, but that could be due to the slight angle at which we observed the pair. One potential difference in the Island Scrub-Jay display was the lack of observed male vocalizations, as described for *A. coerulescens* and *A. californica* (Webber 1984, Woolfenden and Fitzpatrick 1996). Nor did we note a flaring of head or breast feathers as seen in *A. wollweberi* and *A. coerulescens* (Brown 1963, Woolfenden and Fitzpatrick 1996). Given that the observed jays had maintained a territory for at least 3 years, the previously mentioned lack of precopulatory displays recorded in older pairs of other corvids (Writtenberg 1968, Verbeek 1972) did not hold true for the Island Scrub-Jay in this instance. *Aphelocoma unicolor* is thought to copulate at the nest with no precopulatory display (Webber and Brown 1994). Most of the elements of the copulatory behavior of *Aphelocoma* jays appear to be conserved, with a few observable differences in Island Scrub-Jay behaviors. Given that our conclusions are based on a single observation, perhaps these should only be considered potential differences to be confirmed or refuted with more extensive observations of precopulatory displays within *Aphelocoma*. Documentation with audio and video recording would be ideal.

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