

A Hybrid Cliff x Barn Swallow from Western Nebraska

Charles R. Brown and Catherine E. Page
Department of Biological Sciences
University of Tulsa
Tulsa, OK. 74104

The Cliff Swallow (*Petrochelidon pyrrhonota*) and the Barn Swallow (*Hirundo rustica*) occupy sympatric breeding ranges across much of North America, often nesting at colony sites that contain both species (Brown and Brown 1995, 1999; Kopachena et al. 2007). Mixed-species nesting aggregations typically occur in box-shaped concrete culverts underneath roads or railways. Cliff Swallows' enclosed mud nests can be as close as 1 m to Barn Swallows' open mud nests (C. Brown, pers. obs.), and at such sites Cliff Swallows regularly usurp both inactive and active Barn Swallow nests (Brown and Brown 1999). The close proximity of these two ecologically similar species leads to at least occasional social interaction among them, such as during combined alarm responses at predators. Another consequence may be extra-pair copulation between male Cliff Swallows and female Barn Swallows, leading to intergeneric hybridization (Brown and Brown 1999; Rohwer et al. 2014).

Hybridization between the Barn Swallow and the Cliff Swallow's close relative, the Cave Swallow (*P. fulva*), was reported to be common in south Texas in the 1970s (Martin 1980). This reflected relatively recent contact between Barn Swallows and Cave Swallows, as the latter species began moving out of its ancestral sinkhole-cave nesting sites in the late 1960s and occupying highway culverts where Barn Swallows nested (Martin and Martin 1978). The high frequency of hybridization between Cave and Barn swallows in Texas suggests that similar hybridization might occur between Cliff and Barn swallows, especially given the widespread contact between the two species and the fact that Cliff Swallows are colonizing new areas in eastern North America (Brown and Brown 1995) where they are coming into contact with Barn Swallows for the first time. Despite this prediction, we have located only three documented reports of Cliff x Barn Swallow hybridization from throughout North America. In this report, we present a fourth and the first for Nebraska.

Description of Hybrid

On 12 June 2014, we visited a double-tunnel culvert underneath Interstate 80 about 8 km east-southeast of Roscoe, Keith Co., western Nebraska (41° 06.438' N, 101° 29.634' W). There were no active Cliff Swallow nests at the site on that date, and we estimated about 15 active Barn Swallow nests, all with eggs. Our attention was drawn to a bird's vocalization that resembled a Cliff Swallow's alarm call (Brown 1985). We observed a swallow with plumage characters clearly intermediate between those of Cliff and Barn swallows while the bird flew among Barn Swallows during an alarm response at us as we stood in the culvert.

On 17 June 2014, we returned to the site and caught the hybrid in a mist net strung across one end of the culvert. The bird was a male, determined by the



Fig. 1. A hybrid Cliff x Barn Swallow captured at a highway culvert near Roscoe, Nebraska, on 17 June 2014.

presence of a cloacal protuberance and the absence of a brood patch. The head resembled a Barn Swallow's, while its throat was Cliff Swallow-like (Fig. 1A). The hybrid lacked the blue above the shoulder characteristic of Barn Swallows, and the throat was less clearly demarcated than in Barn Swallows. It showed slight bluish spotting at the base of the throat typical of Cliff Swallows (Fig. 1A). The blue on the throat occurs in both sexes of Cliff Swallows but averages more extensive in males (Brown and Brown 1995). The rest of the dorsum was bluish as in a Barn Swallow with less of the vertical white striping of the Cliff Swallow; the orange rump seemed indistinguishable from that of a Cliff Swallow (Fig. 1B). The tail was intermediate between the two species (Fig. 1C). It had white windows in the outer four rectrices on each side, similar to a Barn Swallow but lacked the Barn Swallow's long outer tail streamers. The breast and belly more resembled a Cliff Swallow's, although with a slightly enhanced orange tone (Fig. 1D). The lower tail coverts were light orangish-buff as in a Barn Swallow.

The unflattened wing chord of the hybrid's outer primary was 110.0 mm, shorter than the average 114.7 mm wing chord measured for nine male Barn Swallows at that site on that date but near the upper end of the Cliff Swallow's wing length (Brown and Brown 2013). The hybrid weighed 19.0 g, slightly more than the average 17.6 g for the nine male Barn Swallows but lower than that of most Cliff Swallows at that time of year (Brown and Brown 1996).

The hybrid's behavior also appeared intermediate. When flying among Barn Swallows, it clearly glided more and flapped less than the Barn Swallows: the

bird could easily be identified from a distance by its more Cliff Swallow-like flight before any plumage features were visible. It gave a Cliff Swallow-like alarm call on one occasion, and when released after handling it gave a vocalization much like the Barn Swallow's *chirp* call (Brown 1985).

We identified the hybrid's nest within the culvert (Fig. 2) by observing it fly to the nest repeatedly. It attended the nest with a presumably-female Barn Swallow. The nest was noticeably more flared out along the upper rim than are typical Barn Swallow nests, but there was no indication of any attempt to dome over the open nest as Cliff Swallows do when they use Barn Swallow nests. The nest appeared to have been an old Barn Swallow nest existing from a previous year, which the pair in 2014 refurbished. The nest had three eggs when first checked on 17 June 2014.

The hybrid was observed at the site on three additional visits by us or colleagues, with it last being seen on 29 June 2014. At that time, the eggs had not hatched. When we next visited the site on 6 July 2014, the hybrid and most of the Barn Swallows were gone. Apparently the nests there had failed *en masse* between 29 June and 6 July, for reasons that were unclear. Only one Barn Swallow nest remained active, but three pairs of Cliff Swallows had arrived and were occupying nests at the opposite end of the culvert and in a different tunnel from the hybrid's nest.



Fig. 2. Nest attended by a hybrid Cliff x Barn Swallow in a highway culvert near Roscoe, Nebraska, during June 2014.

Discussion

The previous Cliff x Barn Swallow hybrids, documented with detailed descriptions or photographs, were reported from Delaware Co., Pennsylvania, on 22 May 1878 (Trotter 1878), El Paso Co., Texas, on 14 June 1893 (Mearns 1902), and Weld Co., Colorado, on 15 July 2012 (Anonymous 2014). Additional reports of

hybrids from California, Louisiana, Colorado, and New York, while possibly valid in some cases, lack descriptive details (Dittmann and Cardiff 2002; Rogers and Jaramillo 2002; Wood et al. 2011) or appear to be southwestern Cliff Swallows with dark foreheads (Anonymous 2014).

Hybridization between *Petrochelidon* and *Hirundo* swallows is thought to be caused largely by extra-pair fertilizations perpetrated by male Cliff/Cave swallows on female Barn Swallows (Brown and Brown 1999; Rohwer et al. 2014). Consequently, hybrids are raised in Barn Swallow nests and likely socially imprint on Barn Swallows. The Nebraska hybrid was consistent with this scenario: it lived at a colony site with only Barn Swallows, paired with a Barn Swallow, used a Barn Swallow-like nest, and departed from the site with other Barn Swallows. Cave x Barn Swallow hybrids typically are raised by Barn Swallow parents (Martin 1980, 1982), and a Cliff x Barn hybrid in Texas was paired with a Barn Swallow and attended a Barn Swallow-like nest (Mearns 1902).

Cliff Swallows commonly engage in extra-pair copulations (Brown and Brown 1996). When large numbers of birds gather mud, forced (and some not-forced) copulation attempts can sometimes be so frequent that successful mud-gathering is disrupted, with the birds believed to flutter their wings during mud collecting to deter extra-pair copulation attempts (Butler 1982; Brown and Brown 1996). Thus, whenever Barn Swallows gather mud near Cliff Swallows, heterospecific copulation attempts can potentially occur, and these may be more likely because Barn Swallows do not flutter their wings while gathering mud.

The relatively few documented cases of Cliff x Barn Swallow hybrids in North America, despite the two species' widely sympatric breeding ranges, suggest that some factors work to limit hybridization. These are at present unknown but may reflect Barn Swallows' increased avoidance of culverts where Cliff Swallows nest, which reduces the opportunity for contact. The number of mixed-species colonies has declined in our western Nebraska study area over the last 33 years (C. Brown, unpubl. data), with Barn Swallows moving more onto buildings or into the small road culverts that Cliff Swallows avoid. A similar situation may have occurred in Texas, where the sites with the extensive Cave x Barn Swallow hybridization from the 1970s have now become almost exclusively Cave Swallow colonies (Ormston 2001). If intergeneric swallow hybrids are less successful at surviving and/or reproducing, hybridization (if common) could select against Barn Swallows that nest near Cliff or Cave swallows and incur greater risk of extra-pair fertilizations. We should continue to monitor situations in Nebraska and elsewhere where both Cliff and Barn swallows nest together and document whether hybridization, if it occurs, could contribute to the developing ecological separation between these two species.

Acknowledgments

We thank the University of Nebraska-Lincoln's Cedar Point Biological Station for use of their facilities and the National Science Foundation (DEB-1019423) for financial support.

Literature Cited

- Anonymous. 2014. Bird hybrids: barn swallow x cliff swallow. Online. <http://birdhybrids.blogspot.com/2014/06/barn-swallow-x-cliff-swallow.html>.
- Brown CR. 1985. Vocalizations of barn and cliff swallows. *Southwestern Naturalist* 30: 325-333.
- Brown CR, Brown MB. 1995. Cliff swallow (*Hirundo pyrrhonota*). In: *Birds of North America* (A Poole, F Gill, eds.), no. 149. Academy of Natural Sciences, Philadelphia (PA) and American Ornithologists' Union, Washington, D.C.
- Brown CR, Brown MB. 1996. Coloniality in the cliff swallow: the effect of group size on social behavior. Chicago (IL): University of Chicago Press.
- Brown CR, Brown MB. 1999. Barn swallow (*Hirundo rustica*). In: *Birds of North America* (A Poole, F Gill, eds.), no. 452. *Birds of North America, Inc.*, Philadelphia (PA).
- Brown CR, Brown MB. 2013. Where has all the road kill gone? *Current Biology* 23: R233-R234.
- Butler RW. 1982. Wing fluttering by mud-gathering cliff swallows: avoidance of "rape" attempts? *Auk* 99: 758-761.
- Dittmann DL, Cardiff SW. 2002. "Let's take a closer look" – Louisiana swallows. *Louisiana Ornithological Society News* 200: 5-12.
- Kopachena JG, Cochran BL, Nichols TB. 2007. The incidence of American swallow bugs (*Oeciacus vicarius*) in barn swallow (*Hirundo rustica*) colonies in northeast Texas. *Journal of Vector Ecology* 32: 280-284.
- Martin RF. 1980. Analysis of hybridization between the hirundinid genera *Hirundo* and *Petrochelidon* in Texas. *Auk* 97: 148-159.
- Martin, RF. 1982. Proximate ecology and mechanics of "intergeneric" swallow hybridization (*Hirundo rustica* x *Petrochelidon fulva*). *Southwestern Naturalist* 27: 218-220.
- Martin RF, Martin SR. 1978. Niche and range expansion of cave swallows in Texas. *American Birds* 32: 941-946.
- Mearns EA. 1902. Description of a hybrid between the barn and cliff swallows. *Auk* 19: 73-74.
- Ormston CG. 2001. Breeding-site characteristics and range changes of culvert-nesting swallows in Texas. M. Sc. thesis, University of Tulsa, Tulsa (OK).
- Rogers MM, Jaramillo A. 2002. Report of the California Bird Records Committee: 1999 records. *Western Birds* 33: 1-33.
- Rohwer S, Harris RB, Walsh HE. 2014. Rape and the prevalence of hybrids in broadly sympatric species: a case study using albatrosses. *PeerJ* 2: e409. doi 10.7717/peerj.409.
- Trotter S. 1878. Description of a hybrid (*Hiurndo horreori-lunifrons*) between two North American swallows. *Bulletin of the Nuttall Ornithological Club* 3: 135-136.
- Wood CL, Guthrie A, Barry JH. 2011. A cliff swallow x barn swallow hybrid in western New York state. *Kingbird* 61: 307.