DOCUMENTATION AND IDENTIFICATION OF NORTHERN ARIZONA'S FIRST RECORD OF CHIMNEY SWIFT

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On 19 May 2018 Chuck LaRue and I were exploring a cottonwood (*Populus fremontii*) bosque along the Little Colorado River near Cameron, Arizona when we spotted a small dark swift flying overhead. White-throated Swifts (*Aeronautes saxatalis*) are a common sight in northern Arizona, but dark swifts are much rarer and are always exciting in this part of the state. The swift was part of a flock of swallows that were in plain view for over 20 minutes while feeding on insects above the cottonwoods. As we watched, I clicked away with my camera and captured the bird from all sides and with lighting from many angles.

While we observed the bird, Chuck and I discussed the identification possibilities: Black Swift would be larger than any of the swallows present and would show a distinctive wing profile. Our bird was small, similar in size to a Violet-green Swallow (*Tachycineta thalassina*), and with a body shaped like a "flying cigar" making it one of the *Chaetura* swifts, either Vaux's or Chimney Swift (*C. vauxii* or *C. pelagica*).

Separating Chimney from Vaux's Swift is among the more challenging of North American bird identification problems. While their vocalizations are distinct from each other, hearing these sounds is not always possible. Visually the birds differ subtly in the shape of their wings, the color of the rump, and the pattern of the throat and breast. Distinguishing them by sight requires good looks and is best supported by photographs or other documentation.

We were fortunate with the single *Chaetura* observed along the Little Colorado River to have ample time to study and photograph it. With over 35 reasonably high-quality photos (Flicker 2018) at all angles and lightings, it was possible to identify the bird as a Chimney Swift – a record accepted by the Arizona Bird Committee (ABC) January 2019 (G. H. Rosenberg pers. comm.).

This marks the first observation of this species in northern Arizona, and one of only 2 ever documented by photograph in Arizona, the other coming from Willcox 10 May 2011. There are only a handful of records outside of Arizona from the intermountain west. Chimney Swift has only been recorded twice in Utah – a specimen from May 1912 and a photographed bird in May 2019 (UBC 2019) – and Chimney Swift is not on the list of recorded birds in the state of Nevada (GBBO 2019). In California, Chimney Swift is a rare summer resident and has nested (Steeves et al. 2020), with the vast majority of records coming from coastal areas. To the east, Chimney Swift regularly occurs in Colorado and New Mexico east of the Rocky Mountains but is exceptionally rare in the western part of those states.

Below I describe the field marks portrayed in the literature that distinguish Vaux's from Chimney Swifts, and how these were applied to the *Chaetura* observed along the Little Colorado River. These traits are reviewed in more detail in Johnson (2013) and Sibley Guides (2010). Careful examination and documentation of *Chaetura* swifts in Arizona is not easy, but by paying attention to the field marks below, perhaps additional records of Chimney Swift will be documented in the state.

FIELD MARKS THAT DISTINGUISH CHIMNEY FROM VAUX'S SWIFTS

Size

Chimney Swift is a slightly larger bird, with wingspan and length measurements like Bank (*Riparia riparia*), Violet-green, and Cliff (*Petrochelida pyrrhonota*) Swallows. In contrast, Vaux's Swift is smaller than Chimney Swift and all common swallow species in Arizona (Table 1). While this difference in size is slight, it is worth bearing in mind if a *Chaetura* swift is seen side-by-side in a mixed flock with swallows or other swifts.

The swift we observed was associating with a mixed flock that contained Bank, Violet-green, and Cliff Swallows. We concluded in the field that the bird was about the same size as the swallows in length and wingspan and not obviously smaller. This impression favors Chimney Swift for identification, though perhaps is of limited value because all birds were observed in flight while foraging at different altitudes over a large area.

Table 1. Sizes of Chaetura swifts and common swallow species in Arizona (Sibley 2014)

Species	Length (in.)	Wingspan (in.)
Vaux's Swift	4.75	12
Chimney Swift	5.25	14
Bank Swallow	5.25	13
Violet-Green Swallow	5.25	13.5
Cliff Swallow	5.5	13.5
Tree Swallow	5.75	14.5
Barn Swallow	6.75	15

Wing Shape

Johnson (2013) and Sibley Guides (2010) describe a bulge in the inner primaries that is distinct in Chimney Swift, but absent in Vaux's Swift. This causes Vaux's Swift to have a "straight-edged and evenly-tapered" appearance (Sibley 2014), whereas the trailing edge of the proximal portion of the wing shows a bulge in Chimney Swift. Sibley cautions that "individual photos of one species can often look like the other [with respect to wing shape], but in a series of photos or an extended observation the overall impression should be different."

Our photos clearly show the Little Colorado *Chaetura* with bulging inner primaries so that the trailing edge of the wing typically did not form a straight edge (Figures 1A-C). The apparent shape of the wing varied significantly among photos, depending on the flight activity of the bird at the moment, but on balance the bulging appearance of the inner primaries was evident in many photos and suggestive of Chimney Swift.

Figure 1. A-C show the bulge in the inner primaries from the Little Colorado *Chaetura* from different angles and during differing flight styles. Photos by Jason Wilder

Rump Color

Vaux's Swift typically has a pale rump that noticeably contrasts with a darker back, whereas Chimney Swift generally shows very little contrast between the rump and back. This trait is reported to be somewhat variable and overlapping but differs on average between the 2 species. Observing the upperparts of *Chaetura* swifts can be challenging, but this trait can be apparent as birds bank in flight.

In the field we were aware of the importance of rump color to distinguish Vaux's from Chimney Swift and noted no marked contrast between the rump and back of the swift we were observing, and that this was consistent when observed in varying light and at different angles. The dorsal side of the bird in flight and the rump is roughly concolorous with the back, a pattern more consistent with Chimney Swift (Figures 2A-C).

B. Figure 2. A-B show uniform coloration across the dorsal surface of the Little Colorado *Chaetura*, including between the back and rump. This is consistent with Chimney Swift, while Vaux's Swift typically has a paler rump that contrasts with a darker back (see C). Photos A-B by Jason Wilder; photo C by Ryan O'Donnell, Macaulay Library at Cornell Lab (ML 98122951)

Wing Aspect Ratio

Chimney Swift has longer wings for its width, while Vaux's Swift's wings are comparatively shorter and wider. In the field, this causes Chimney Swift to appear longer winged. Johnson (2013) used field photographic records to show that the aspect ratio, total wing length to width, does not overlap between Vaux's (mean length:width ratio = 2.89; range: 2.44-3.17) and Chimney Swift (mean length:width ratio = 3.56; range: 3.20-3.92).

To assess Johnson's (2013) methodology and results with respect to wing aspect ratio, I measured wing width and total length in photographs from the Macauley Library (2020) of Chimney and Vaux's Swifts (10 from each species). I selected only photos from the core of the breeding range (to minimize identification problems), with no obvious sign of primary molt (to ensure similarity to the Little Colorado *Chaetura*), and as "straight on" as possible (i.e., with no apparent tilt in any direction). Measurements followed the same procedure as described in Johnson (2013) and were performed using a digital ruler in Adobe® Illustrator® CS. For Vaux's Swift, the mean aspect ratio for 10 individuals was 2.86 (range 2.68-3.06) and for Chimney the mean was 3.22 (range 3.03 – 3.69). These values are comparable to those published by Johnson (2013).

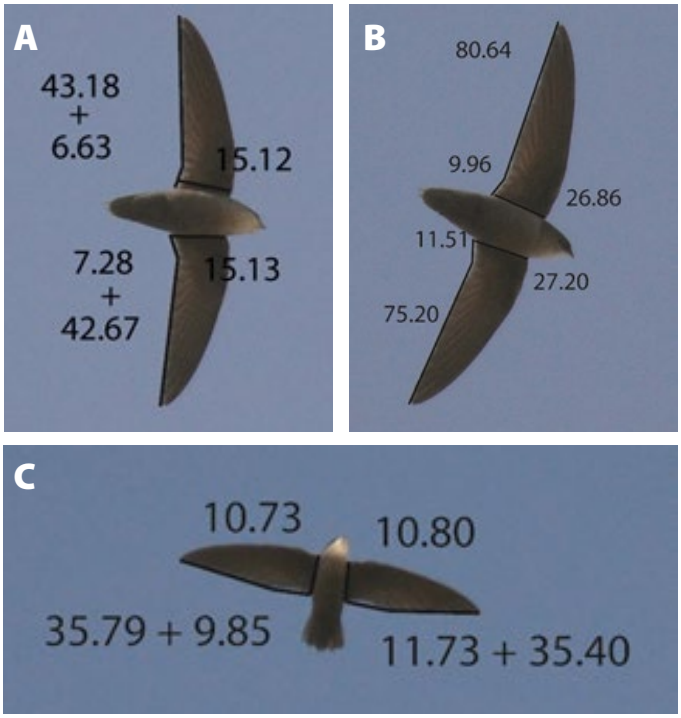

Figure 3. A-C show the application of Johnson's wing aspect ratio measurements to the Little Colorado *Chaetura*. In each case the length of the wing is measured in two linear segments (divided approximately at the junction between primaries and secondaries) along the wing's trailing edge; width of the wing is measured at the base. Measurement units in the photos are arbitrary. Photos by Jason Wilder

To apply this method to the Little Colorado *Chaetura*, I selected 3 photos in which the bird was viewed "straight on", as above. In these three photos (Figures 3A-C) the 6 wing aspect ratios were measured to be 3.29, 3.30, 3.37, 3.19, 3.34, and 3.28. These values exceed the maximum value observed for Vaux's Swift and fall within Johnson's (2013) observed range for Chimney based on both his data and my own measurements of photographs of the 2 species.

Color of underparts

The underparts of Chimney Swift tend to be darker than Vaux's Swift and contrast more sharply with the pale throat. Thus, a Chimney Swift can often show a relatively sharp difference in color between the throat and breast, whereas the underparts are more uniformly pale in Vaux's Swift.

Lighting can affect the appearance of this trait dramatically, and so it is important to observe from multiple angles relative to the sun.

On the Little Colorado *Chaetura* we observed a sharp delineation between a light gray throat and much darker gray upper breast and remaining underparts (compared to the throat). This was observed in many varying lights and is evident in numerous photos (Figures 1-4). This pattern of the underparts is more consistent with Chimney than Vaux's Swift.

Terminal bar

According to Pyle (1997) the longest uppertail covert of Vaux's Swift falls 2-4 mm short of the base of the spiny barb of the tail feathers but reaches the base of the spines in Chimney. This leaves a narrow "terminal bar" that is evident in Vaux's Swift where the coverts fall short of the tail feather tips but is not present in Chimney Swift. Clearly, it is challenging to apply this trait to free-flying *Chaetura* swifts in the field.

Several photos were obtained of the Little Colorado *Chaetura* under intense backlighting as it was overhead. In these photos taken from directly below, the uppertail coverts are evident as a dark wedge that extends all the way to the base of the barb on the central tail feathers (Figures 4A and 4B). In contrast, photos of similarly backlit Vaux's Swifts can show a short gap between the dark uppertail coverts and the tip of the central tail feathers, which is Pyle's (1997) "terminal bar" (see Hacker 2018, for example). The apparent lack of a terminal bar in photos of the Little Colorado bird are more consistent with Chimney than Vaux's Swift.

Figure 4. A-B show that the uppertail coverts of the Little Colorado Chaetura extend fully to the base of the barbs at the end of the tail feathers, consistent with Chimney Swift. On Vaux's Swift, the uppertail feathers fall just short of the base of the barbs. Photos by Jason Wilder

Flight style

Vaux's Swift is described as tending to have relatively short duration glides interspersed with rapid bursts of its wingbeats. In contrast, Chimney Swift has longer glides and slower wingbeats. To the experienced observer, this may be a useful trait that can contribute to identification, and it is one that can be documented via video. I did not take video of the Little Colorado bird and was unfamiliar with this trait at the time of observation.

Voice

While both species make a rapid twittering call, Chimney Swift's are lower pitched while Vaux's are higher with a buzzier more insect-like quality. These calls are distinctive and with experience can greatly aid in identification. Unfortunately, migrant birds are often silent. Observers of a calling *Chaetura* swift would be well served to make a recording to aid in identification. The Little Colorado *Chaetura* was silent, so this trait could not be used to aid identification.

SUMMARY AND DISCUSSION

Observable differences between Chimney and Vaux's Swifts are slight and subtle, making field identification a genuine challenge. However, well-documented birds can be evaluated based on traits that differ on average and, taken together, can aid in determining species identity. In the case of the *Chaetura* observed along the Little Colorado River, photographic evaluation of visible traits all favored Chimney Swift, and this record has been accepted by the ABC. This observation adds to the somewhat perplexing pattern of occurrence of Chimney Swifts in Arizona. A pair was collected on the campus of the University of Arizona in Tucson in June 1952, and then 6-8 birds were reported on the campus in the summers of 1973-80 (Monson and Phillips 1981), with as many as 10 birds seen in the general UA campus area most summers through the mid-1980's (e.g., Witzeman and Stejskal 1984), and then after several years without reports there was one of 2 Chimney Swifts 11 July 1993 (Stejskal and Rosenberg 1993). None of the birds from the 1970's or later were photographed or sound-recorded, but it seems plausible that this species is a rare and sporadic summering bird in the Tucson region some years, given the number of observations by experienced observers cited in the literature. The fact that the 2 records from Utah both occurred in May, as have Arizona's 2 records of presumptive migrants, suggests a possible tendency of western vagrancy for Chimney Swift during late spring migration – usually after Vaux's Swift has passed through.

One of the main lessons learned from the Chimney Swift observed along the Little Colorado River is that all *Chaetura* swifts in Northern Arizona should be examined and documented carefully whenever possible. While Vaux's Swift is a common and expected migrant in the southern and western portions of Arizona (Monson and Phillips 1981), *Chaetura* swifts, including Vaux's Swift, are observed much less often in northern and eastern parts of the state and are rarely rigorously examined to determine species identification. It would be a valuable addition to our understanding of Arizona's birds to document *Chaetura* seen away from the areas where Vaux's Swifts are common migrants, and especially in far northern and eastern parts of the state.

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