ORNITOLOGIA NEOTROPICAL 5: 61–63, 1994

GEOGRAPHIC VARIATION IN THE ANDEAN SISKIN (*CARDUELIS SPINESCENS*), WITH COMMENTS ON ITS STATUS IN ECUADOR

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Key words: Carduelis spinescens, *geographic variation, Ecuador.*

In March 1992, an expedition by the Academy of Natural Sciences, Philadelphia (ANSP), and the Museo Ecuatoriano de Ciencias Naturales (MECN), Quito, found *Carduelis spinescens* to be relatively common in páramo and in clearings at Cerro Mongus, Prov. Carchi, Ecuador (00°27'N, 77°52'W; Robbins et al.1994). In attempting to determine the subspecific affinities of these birds, we found that the recent literature has incorrectly portrayed the distribution of the three described forms (Howell 1968, Hilty & Brown 1986, Fjeldså & Krabbe 1990), and overlooked that the subspecies *C. s. nigricauda* is nearly sexually monomorphic in plumage (Hilty & Brown 1986, Ridgely & Tudor 1989, Fjeldså & Krabbe 1990). The following review is based on having examined 103 *C. spinescens* specimens in United States museums and the MECN.

There are three described forms of *C. spinescens*. The nominate race is found from the coastal mountains of northern Venezuela, the western Venezuelan Andes (Mérida, Trujillo), and the Perijá Mountains on the Venezuela-Colombian border, south along both slopes of the Eastern Colombian Andes to Cundinamarca. *Capitaneus* is restricted to the Colombian Santa Marta Mountains, and *nigricauda* ranges from the northern end of the Western and Central Colombian Andes from Antioquia south to Cauca and western Putumayo. We know of no confirmed records for eastern Nariño, but undoubtedly *nigricauda* does occur there, given that it is now known from just across the border in Ecuador (see below).

The nominate race and *capitaneus* are indistinguishable in plumage morphology, and, as Todd (1926) pointed out, the purported difference in size between these forms is not supported when examined in a series (Table 1). The supposed more dusky or olivaceous cast to the lower underparts of adult male *capitaneus*, in comparison with the clearer yellow of *spinescens*, also does not hold up when a series of these two taxa are compared. Perhaps the only reason for maintaining the name for the Santa Marta birds is that through their isolation they presumably have diverged genetically from nominate *spinescens*. However, the Perijá population is just as isolated as the Santa Marta birds, but is assigned to the nominate race. Thus, for consistency's sake, we recommend that *capitaneus* be synonymized with *spinescens*.

All specimens referable to the nominate form (now includes Venezuelan, Santa Marta and Perijá mountains and Eastern Andean Colombian birds) are strongly sexually dimorphic in plumage (see color plates in Hilty & Brown

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TABLE 1. Selected measurements (in mm; $\bar{x} \pm SD$) of *Carduelis spinescens* subspecies.

Subspecies		bill (exposed)	wing (chord)	tail (longest rectrix)
spinescens	61	9.8 (+0.8)		41.1 (+1.6)
capitaneus	14	10.0 (+0.3)		42.4 (+1.1)
nigricauda				
male	13	10.3 (+0.7)	71.1 (+1.2)	41.9 (+1.2)
female	15	10.6 (+0.5)	69.3 (+1.0)	40.9 (+1.0)

[1] Sexes are pooled for *spinescens* and *capitaneus*, as there are no significant differences between the sexes in the above measurements. Measurements for both sexes of *nigricauda* are given as males have significantly longer wings than females ($P < 0.001$; two-tailed, t-test). *Nigricauda* sample includes all Ecuadorian specimens.

1986, Fjeldså & Krabbe 1990), and have relatively large amounts of yellow at the base of the rectrices. Adult male *spinescens* also have brighter yellow underparts than *nigricauda* adult males. In contrast, the plumage differences between the sexes of *nigricauda* are only minor (Chapman 1912, Todd 1926), with the primary difference being that adult females have a sooty brown cap, whereas the crown is black in adult males. Both sexes of *nigricauda* have only a hint of yellow at the base of the inner rectrices, ranging from virtually none in Colombian birds to small traces in northern Ecuadorian birds. Even in the most marked Cerro Mongus individuals, the yellow is only discernible when the upper tail coverts or crissum feathers are pulled completely out of the way.

Carduelis spinescens was first recorded in Ecuador near the Colombian border in páramo at Volcán El Angel, Prov. Carchi, in January 1982 by P. Greenfield *et al.* (Ridgely & Tudor 1989). The first specimen was obtained by Krabbe (1992) in November 1990 at El Angel, followed by another specimen from there in November 1991 (MECN 5745,6000). Both specimens are adult females and were assigned to the nominate form. Reexamination of those specimens indicates that the birds are undeniably attributable to *nigricauda*. The El Angel birds, especially MECN 5745, have a brownish-black cap like that of adult female Colombian *nigricauda*. Furthermore, one bird completely lacks any yellow in the tail, and the other has only a hint of yellow at the base of the third and fourth rectrix on the left side only. Thus, in this feature the El Angel birds resemble the Colombian birds more than they do the Cerro Mongus series (see below).

Our Cerro Mongus specimens and an adult male taken ca. 25 km to the northeast (Cocha Seca, 00°38'N, 77°40'W; G.R. Graves, M.J. Braun, *pers. comm.*) are closest to *nigricauda*, with both adult sexes having dark caps, olive-yellow underparts, and relatively little yellow at the base of the tail. Nevertheless, the Cerro Mongus birds do differ from the Colombian *nigricauda* and the Ecuadorian El Angel birds in two characters. The cap color of Cerro Mongus adult females is virtually identical to that of Cerro Mongus adult males, i.e., it is black. Both sexes of the Cerro Mongus material have yellow in the tail, although still considerably less than *spinescens*, which is absent or nearly so in Colombian *nigricauda* and the two Ecuadorian El Angel birds. Yellow is not found in the outermost and the central pair of rectrices in the Cerro Mongus and Cocha Seca birds, but all three Cerro Mongus adult males have discernible yellow at the base of the 2nd through 5th pair of rectrices, whereas the Cocha Seca bird has yellow at only the base of the 2nd rectrix. All five adult Cerro Mongus females have yellow in the 3rd through 5th rectrices. The extent of the yellow is variable, with the 3rd rectrix pair averaging the most amount of yellow. It is unclear whether the slightly greater amount of yellow at the rectrix base of the Cerro Mongus/Cocha Seca birds, as compared to Colombian *nigricauda*, is a pleisomorphic character within the *nigricauda* populations, an incipient character arising within the Ecuadorian population, or obtained through hybridization with sympatric *C. magellanica*. No other plumage characters indicated hybridization between these taxa at Cerro Mongus/Cocha Seca.

Although the entire Cerro Mongus series and the Cocha Seca bird are separable from all other known forms of this species, we refrain from naming it for the following reason. *Carduelis* are known for being highly mobile and nomadic, and given that *C. spinescens* regularly occurs in assorted types of second growth vegetation as low as 1800 m (Hilty & Brown 1986), it is conceivable that birds found in extreme eastern Carchi (Cerro Mongus) and western Sucumbios (Cocha Seca) may come into contact with the El Angel population, that is only ca. 40 km away. A larger sample from the latter area may eventually show that there is minimal plumage differences between the northern Ecuadorian birds and/or hybridization between those siskins and *C. magellanica*. Based on plumage morphology and distribution we surmise that the northern Ecuadorian populations and Colombian *nigricauda* are more closely related to each other than either is to nominate *spinescens*.

At Cerro Mongus this siskin was found to be fairly common in the *Espeletia*-dominated páramo (above 3400 m) and in agricultural clearings at 3300 m. In the páramo it was found only in monospecific flocks comprised of both sexes. The largest flock in the páramo numbered 26 individuals. At our 3300 m camp, it was most frequently observed in association with *Carduelis magellanica* while perched in isolated trees in clearings or at the forest edge. At 3300 m, on 22 March, Sornoza collected 6 siskins (2 *C. spinescens*, 4 *C. magellanica*) from a relatively large flock of ca. 20 individuals. Although this appears to be the first documentation of these two species occurring in the same flocks, there are numerous observations of other South American siskins flocking together (Fjeldså & Krabbe 1990).

ACKNOWLEDGEMENTS

Our work in Ecuador was supported by a grant from the MacArthur Foundation. We thank our friends at the Museo Ecuatoriano de Ciencias Naturales, Quito, for logistical assistance. The Ministerio de Agricultura, Quito, especially Sergio Figueroa, provided authorization for our work in Ecuador. Aldo Sornoza Molina kindly provided valuable field assistance. The following people and institutions provided access to specimen material: Gary Graves and Michael Braun, National Museum of Natural History, Smithsonian Institution; Mary LeCroy, American Museum of Natural History; Kenneth Parkes, Carnegie Museum of Natural History; Scott Lanyon and David Willard, Field Museum of Natural History.

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Accepted 28 October 1993.