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NEST-SITE SELECTION, NEST, AND EGGS OF THE STOUT-BILLED CINCLODES (*CINCLODES EXCELSIOR*), A HIGH ANDEAN FURNARIID[1]

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The Stout-billed Cinclodes (*Cinclodes excelsior*) has a relictual distribution in the páramo and puna grasslands of the Andes. Subspecifically differentiated populations are known from three widely separated areas (Peters 1951, unpubl. observ.): (1) *C. e. columbiana* from the Nevado del Ruiz/Nevado del Tolima volcanic complex in the Central Cordillera of Colombia; (2) *C. e. excelsior* from southern Colombia on Nevado del Cumbal south through northern and central Ecuador to the province of Chimborazo; (3) *C. e. aricomae* from southern Peru in the departments of Puno and Cuzco. Despite its extensive distribution in open habitat formations, almost nothing has been published on its biology. The eggs and nest have not been previously described (Vaurie 1980; L. Kiff, pers. comm.). In this paper, we combine our observations made independently in April 1982 (Arango) and January 1986 (Graves) of nesting cinclodes on Nevado del Ruiz, Department of Caldas, Colombia.

NEST-SITE SELECTION

The Stout-billed Cinclodes is a common and conspicuous inhabitant of the páramo from 3,550 to 4,300 m. In January and April, pairs of cinclodes were actively digging and attending burrows (nesting and roosting) in vertical banks and cliff faces formed by roadcuts. A majority of the burrows seemed to be located in pale-colored strata composed of decomposed pumice from past volcanic eruptions, rather than in the darker, dense, alternating layers of paleosol (Fig. 1). To verify our initial impressions, we independently categorized the placement of burrows on different sections of the road crossing the northwestern flank of the Ruiz strato cone.

In April 1982, Arango censused cinclodes' burrows along the roadcut between Arenales and Aguacerales (3,800 to 4,300 m), and estimated the color, texture, and hardness of the stratum from which the burrow was excavated, as well as its vertical placement on the roadcut. Color was originally classified into one of six categories (ranging from cream-colored to black). However, because Graves later distinguished only "dark" paleosols and "light" pumiceous strata, Arango's data have been reduced to two categories for statistical comparison (Table 1). As noted previously, texture and hardness of strata were highly correlated to color. The pale pumiceous layers were porous and friable and eas ily excavated with a trowel. Paleosols were harder and heavier and more difficult to work.

In January 1986, Graves counted cinclodes' burrows, and the type of strata (dark vs. light) they were excavated from, along a 2-km section of the Murillo-Gualí Road (3,900 to 4,100 m) about 6 km east of Aguacerales (Table 1). The threat of volcanic eruption prevented the measurement of burrow placement. This locality is less sheltered from wind and less humid than Aguacerales.

Although there were highly significant differences in strata selection between sites ($\chi^2 = 74.9$, df = 1, $P < 0.001$), these data show that cinclodes in both areas prefer pumiceous strata as burrow sites. Both surveys included abandoned burrows as well as those in use. Roadcuts were constructed in the 1950s and 1960s at Aguacerales, and during the 1970s east of the Río Gualí. Burrows persist for many years until the cliff or bluff face erodes away, thus documenting generations of nest-site selection. We hypothesize that pumiceous strata were chosen not only for ease of excavation, but also because drainage there is better than in paleosols. We note parenthetically that the known distribution of *C. excelsior* in the northern Andes coincides with volcanically active regions.

The majority of burrows were excavated within 1 m

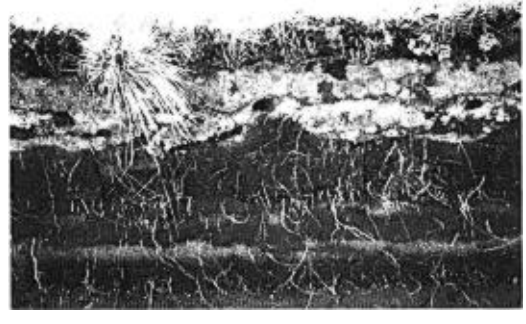

FIGURE 1. Section of roadcut on Nevado del Ruiz showing alternating pumiceous strata (pale) and paleosols (dark). The entrances of three cinclodes burrows can be seen in upper pumiceous stratum.

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FIGURE 2. Cracked egg and thin mat of dried grass taken from slightly enlarged terminal chamber of burrow.

of the top of the roadcut (Aguacerales; $n = 285$, $\bar{x} = 0.5 \pm 0.3$ m, range = 0.05–2.3 m); three to six alternating layers of pumice and paleosol wide enough for burrow excavation occur in this section. The average height of burrows above the foot of the roadcut was 2.3 ± 1.2 m (Aguacerales; $n = 285$, range = 0.8–10.0 m). In many places tussock grass overhangs the bank edge above the burrow entrances providing some degree of protection from rain. Because of the steepness of the roadcuts (usually greater than 70°), burrows are somewhat inaccessible to terrestrial predators. We suspect that the consistent selection of the upper quartile of the roadcut for burrow excavation is influenced by both factors. We noted only two burrows excavated on natural slopes or cliffs away from roadcuts. This suggests that a limited amount of road building may actually be beneficial to this species. At Aguacerales, the minimum horizontal distance between burrows was 0.65 m. There was no vertical overlap (i.e., one directly above another) of burrows in either locality. We speculate that the greater usage of denser paleosols at Aguacerales may be due to the saturation of "prime" pumiceous strata with old burrows. Patterns of soil stratification did not appear to differ grossly between the two sites.

NEST AND EGGS

Arango excavated five burrows from previous nesting seasons (i.e., no signs of recent use). Park rules prevented the examination of active nests. Varying in length from 0.65 to 1.10 m, they sloped gently upward and lacked a noticeable terminal chamber. A thin bed of decayed vegetable material was observed at the terminus of the burrows. The presence of a low lip at the burrow entrance was variable.

While censusing birds on January 29 in an area devastated by the 13 November 1985 eruption of Ruiz, Graves excavated a burrow (0.95 m in length) that appeared to have been recently occupied. The construction was similar to those examined by Arango except that the burrow terminated in a slightly enlarged nest chamber floored with a thin mat of dried grass. The internal diameter of the burrow varied from 70 to 90 mm (burrow entrances are somewhat larger). The chamber contained an egg with hairline cracks and a crushed egg (Fig. 2). The cracked egg, which could not be salvaged, was cream-colored, immaculate, slightly glossy, and measured 22.0 × 28.5 mm. It contained a decayed, well-developed embryo. Because one egg was well-incubated, and the remains of only two eggs were observed, we suspect that the clutch may have been two eggs. Abandonment of the nest may have been caused directly (death of the birds) or indirectly (emigration) by the eruption.

TABLE 1. Placement of burrows by *Cinclodes excelsior* on Nevado del Ruiz. Burrows in paleosols and those from paleosol/pumiceous boundaries are pooled for within-locality binomial tests (large sample approximation).

Stratum	Aguacerales (1982)	East of Río Gualí (1986)
Paleosol	143	6
Paleosol/pumiceous	—	5
Pumiceous	171	154
Binomial test	$z = 1.58$ $P < 0.057$	$z = 11.13$ $P < 0.0001$

The excavated burrows were identical in external appearance to active nests along the same roadcuts. Judging from the uniformity of burrow diameter and placement, we suspect that nearly all the burrows were excavated by cinclodes. (The Bar-winged Cinclodes, *Cinclodes fuscus*, is widespread in the Colombian Andes, but does not occur in the Ruiz/Tolima volcanic complex in the Central Cordillera.) The only other burrow or cavity-nesting species observed above 3,800 m elevation on Ruiz were Brown-bellied Swallows (*Notiochelidon murina*) and the rare Rufous-fronted Parakeet (*Bolborhynchus ferrugineifrons*) (see Graves and Giraldo 1987). Active swallow nests, however, were placed in small crevices in rocks or in rounded cavities at the base of tussock grass overhanging cliff edges. No signs of rodent usage were seen in burrows excavated from the face of vertical roadcuts. Other bird species commonly observed in páramo on Nevado del Ruiz build cup-like or enclosed nests in shrubs, at the base of tussock grass, or in shallow cavities (e.g., *Leptasthenura andicola, Asthenes flammulata, Grallaria quitensis, Ochthoeca fumicolor, Turdus fuscater, Catemenia inornata, Phrygilus unicolor, Zonotrichia capensis*).

All species of *Cinclodes, Geositta,* and *Upucerthia* for which information exists construct burrows, utilize natural cavities or crevices, or adopt rodent burrows for nesting (Vaurie 1980).

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RESUMEN

El barranquero de páramo o cinclodes de pico gruezo (*Cinclodes excelsior*) es un habitante conspicuo y co-

mun de los páramos de la Cordillera Central de los Andes Colombianos entre 3550 y 4300 metros de altitud. A lo largo del talud de corte de los carreteables de la zona se observa su preferencia por excavar las galerìas de anidación y descanso en los estratos claros formados por mantos de cenizas volcánicas de erupciones pasadas, mas que en los estratos oscuros y densos de los paleosoles. Los mantos de cenizas volcánicas son porosos y friables siendo facilmente excavados por cinclodes. La mayoria de las galerìas han sido excavadas cerca del borde superior del talud ($n = 285$; $\bar{x} = 0.5 + 0.3$ m desde arriba). La altura media desde la base del carreteable es de 2.3 + 0.3 m. Las galerìas comprendidas entre 0.6 y 1.1 metros de longitud ascienden suavemente y terminan en una camara ligeramente mayor. En una galerìa recientemente abandonada se encontraron dos huevos (uno agrietado y otro roto).

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A HIGH INCIDENCE OF BROWN-HEADED COWBIRD PARASITISM OF WILLOW FLYCATCHERS[1]

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Key words: Willow Flycatcher; Brown-headed Cowbird; brood parasitism; Colorado; Empidonax traillii; Molothrus ater.

Brown-headed Cowbirds (*Molothrus ater*) parasitize both Willow (*Empidonax traillii*) and Alder (*E. alnorum*) flycatchers (Friedmann et al. 1977, Friedmann and Kiff 1985). These two flycatchers were considered a single species until 1973 (AOU 1973), which has masked information about the frequency with which each is parasitized. Whereas several studies of the superspecies (Traill's Flycatcher) have focused on or included details of cowbird parasitism, most were of eastern populations, and most reported frequencies of parasitism ≤21% (Hicks 1934, Berger 1951, Berger and Parmalee 1952, Walkinshaw 1966, Holcomb 1972). Friedmann et al. (1977:13) suggested that western populations (Willow Flycatchers) are parasitized only about half as much (ca. 10%) as eastern populations (Traill's Flycatcher superspecies). This note describes a high rate of cowbird parasitism within a population of Willow Flycatchers in northcentral Colorado. We include details of responses to parasitism and host vs. cowbird fledging success.

STUDY AREA AND METHODS

The study was conducted in northcentral Colorado on the Arapahoe National Wildlife Refuge (ANWR), located in North Park, a high elevation (2,500 m) intermountain glacial basin. We studied Willow Flycatchers along a 7-km stretch of the floodplain of the Illinois River. Willow Flycatchers are common in North Park, occurring wherever there are extensive stands of healthy shrub willows, *Salix* spp. (Knopf and Sedgwick, unpubl. data). Eight species of willows characterized the woody community at ANWR (Cannon and Knopf 1984) with Woods rose (*Rosa woodsii*) and golden current (*Ribes aureum*) being minor components of the woody community. Common timothy (*Phleum pratense*), blue flag (*Iris versicolor*), and several species of sedges (*Carex* spp.) dominated the herbaceous layer.

As part of a larger study of avian populations and habitats, we surveyed the avifauna of the willow community using point transects after Reynolds et al. (1980) during June of 1985 and 1986 (see Knopf et al. 1988). Population densities of common species, including Willow Flycatchers and Brown-headed Cowbirds, were calculated using program TRANSECT (Burnham et al. 1980) adapted for point transect data (K. P. Burnham, pers. comm.).

We located most nests during construction or early in the egg-laying period. Intensive nest searches were conducted daily following avian censuses. After several censuses, virtually all territories were identified and we narrowed the scope of our search to activity centers within territories. We followed females to locate most nests; other nests were found by searching individual bushes within territories. Nests were visited every 1 to 2 days during the period of maximum susceptibility to parasitism (nest building through egg laying) and at

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