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Migrant bird participation at an army ant swarm in montane Jalisco, Mexico

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ABSTRACT.—The arthropod-flushing behavior of above-ground swarming army ants (tribe Ecitonini) provides Neotropical birds with a unique food resource. The extent to which birds exploit this resource varies geographically, because of the variable swarming behavior of different army ant species and their distributions. During the winter, Neotropical-Nearctic migrant birds may have greater opportunity at higher latitude army ant swarms because of a lack of dominant, obligate ant-following resident birds. Here we report observations of migrant birds foraging at a northern high tropical latitude, high elevation army ant (*Labidus praedator*) swarm. *Received 1 May 1997, accepted 3 Oct. 1997.*

The extent to which different groups of birds exploit the prey-flushing behavior of army ant (*Eciton burchelli* or *Labidus praedator*) swarms in the Neotropics varies with latitude. Bird species that are obligate followers of army ant swarms decrease in frequency northward from the equator, until none occur north of southeastern Oaxaca, on the Pacific slope of Mexico (Willis and Oniki 1978). Only several non-obligate, but "regular," army ant-following species occur farther north (Willis and Oniki 1978). Both obligate and regular army ant-following birds are generally associated with swarms of *E. burchelli* because of that species' predictable and reliable swarming behavior (Willis 1966, 1967; Willis and Oniki 1978). In contrast to *E. burchelli,* above-ground swarming by *L. praedator* is irregular, unpredictable, and generally does not support obligate species of ant-following birds (Willis 1966, 1967; Willis and Oniki 1978). Irregular, facultative foraging by resident and migrant birds, however, frequently occurs at raids of *L. praedator* (Willis 1966, Willis and Oniki 1978), and *E. burchelli* when dominant, obligate ant-following resident birds are absent (see Coates-Estrada and Estrada 1989).

While investigation of bird-army ant interactions has been extensive in the lowland tropics (reviewed in Willis and Oniki 1978, 1992), much less has been reported from northern higher latitudes (Greene et al. 1984, Coates-Estrada and Estrada 1989) and higher elevations. We present observations made on 13 January 1996, at a *L. praedator* raid near Autlan de Navarro, Jalisco, Mexico (19° 46′ N, 104° 22′ W; approximately 1500 m above sea level). Flock composition at this ant raid is of special interest because of the large number of individuals and migrants present. None of the participating species has been previously reported at army ant raids (cf., Willis 1986a, b; Willis and Oniki 1992). Observations from this *L. praedator* raid add to the scarce data regarding facultative foraging by birds at army ant raids in western Mexico, and to the poorly-documented trends of increased migrant participation at raids north of where obligate ant-following birds occur.

The leading edge of the ant swarm was approximately 3 m wide, and moved over the ground through non-deciduous oak (*Quercus* spp.) forest with a closed canopy of 8–10 m in height and little-developed understory. Eight bird species totaling 30 individuals were found to be actively foraging on prey flushed by the activity of the ant swarm. At least five species (25 individuals) were wintering migrants, including Nashville (*Vermivora ruficapilla*), Yellow-rumped (*Dendroica coronata auduboni*), Black-throated Gray (*D. nigrescens*), and Townsend's (*D. townsendi*) warblers, and Bullock's Oriole (*Icterus bullockii*). Two Hepatic (*Piranga flava*) and two Flame-colored (*P. bidentata*) tanagers were likely permanent residents (cf., Howell and Webb 1995). One probable migrant American Kes-

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trel (*Falco sparverius*) was also attending the army ant swarm, but may have been attracted by the presence of the attendant passerines.

Yellow-rumped (Audubon's) Warbler was the most abundant species at the ant raid, with 20 individuals present compared to 1–2 individuals of each of the other attendant species. Unlike all other participants, Yellow-rumped Warbler and American Kestrel were not found in any of the numerous non-army ant-associated mixed-species flocks in the area. Yellow-rumped Warblers foraged vigorously, and close to the ground (< 1 m), staying directly above the area of highest ant activity and perching on small-diameter stems and branches. Nashville, Black-throated Gray, and Townsend's warblers also foraged at the center of ant activity (zone A as described by Willis and Oniki 1978), remaining below 4 m and making frequent attacks to the ground or low foliage near the leading edge of the swarm. Flame-colored and Hepatic tanagers and Bullock's Orioles perched higher in the sub-canopy (4–7 m) and farther from the center of activity (zone B; Willis and Oniki 1978). A lack of dominance by the larger resident participants may have allowed occupancy of the richest area of the swarm by smaller species. The warblers took small insects, including adult moths (Lepidoptera) and Diptera, while the larger species, such as tanagers and orioles, were observed feeding on larger arthropods, including Orthoptera. We did not determine prey items of the American Kestrel, as it retreated from the ant swarm with our approach. It may have been attracted to the birds as much as to the arthropod prey, although many large Orthoptera and scorpions (Arachnida) were observed fleeing the ant raid.

Migrant birds very rarely occur at Amazonian army ant swarms (Willis and Oniki 1978), but may compose up to 30% of ant-following bird flocks at *E. burchelli* raids in Panama (Willis 1966). Based on their observations of 62% migrant composition at an *E. burchelli* raid in Guerrero, Mexico, Greene and coworkers (1984) proposed that migrants may have more opportunities at army ant raids farther north in the absence of aggressive obligate ant-followers.

In the case of *L. praedator* raids, Willis (1966) found migrant participation in Panama to reach 50% during peak fall periods. Our flock in Jalisco was composed of 87% overwintering migrant birds, the highest value reported to date, and represents one of the northernmost records of migrant birds attending an army ant swarm on the Pacific slope (see also Hardy 1974). In addition to the high proportion of migrants, our flock had a very large number of participants. Willis (1966) found a high of only 5.1 migrant individuals (average; 0.2–5.1) at *L. praedator* swarms in Panama. Coates-Estrada and Estrada (1989) reported a mean (±SD) of 1.6 ± 1.5 migrants per *L. praedator* swarm, and 1.9 ± 1.3 per *E. burchelli* swarm, in Veracruz, Mexico. The presence of several "regular" ant-following residents on the eastern slope of Mexico, however, may limit migrant participation at this northern site (Coates-Estrada and Estrada 1989).

In addition to a latitudinal gradient in migrant participation at northern army ant swarms, elevation may also affect migrant accessibility at montane swarms. Increased facultative participation at higher elevation swarms has been described by Hilty (1974) and has been attributed to a similar lack of obligate ant-following bird attendance at higher elevation swarms.

Because of the unreliability of *L. praedator* ant swarms in the highlands of western Mexico, Neotropical migrants probably follow them only opportunistically. Despite this unpredictability, *L. praedator* raids, as well as those of *E. burchelli,* may provide an important occasional resource for migrants. Our observations suggest that bird-army ant interactions at high tropical latitudes are worth attention because of their importance as a sporadic food resource for wintering Neotropical migrants, especially in areas of high migrant density such as western Mexico (see Hutto 1987, 1992).

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