Condor 85:453–460

NOTES ON THE BEHAVIOR OF THE MELODIOUS BLACKBIRD (*DIVES DIVES*)

GORDON H. ORIANS

ABSTRACT.—Both sexes of the Melodious Blackbird (*Dives dives*) defend territories by vigorous duetting, bill-up displays, and supplanting attacks. These birds forage primarily on the ground in open areas and also forage throughout canopies of tall trees, especially pines. Most food is obtained by gaping; much fruit is taken when available. Displays of this species resemble those of other icterids. Vocalizations are loud and clear and include many whistles. Most of the sounds are made by individuals of both sexes, but some are restricted to one sex. The Scrub Blackbird (*D. warszewiczi*) resembles the Melodious Blackbird in many respects, but several pairs occupy common foraging grounds and are tolerated near one another's nests.

The Melodious Blackbird (*Dives dives*) occupies a relatively restricted range on the Atlantic slope of Central America from Vera Cruz, Mexico, to northern Nicaragua. It inhabits primarily lowlands but occurs in pine forests to an elevation of nearly 2,000 m in Guatemala (Skutch 1954). The closely related Scrub Blackbird (*D. warszewiczi*), sometimes considered a race of *D. dives* (Paynter 1968), occurs in arid country in southwestern Ecuador and western Peru. Knowledge of the Central American form is limited to that gathered by Skutch (1954). Only distributional information has been published for the South American form.

Most investigations of icterids have been carried out on temperate-zone species, especially those with polygynous mating systems. Very little is known of mating systems and roles of the sexes among tropical species, many of which are probably monogamous. The monogamous Melodious Blackbird breeds in early successional habitats where changes in vegetation are rapid. Therefore, individuals may often have to shift their breeding sites from year to year. Under these circumstances, relationships between members of a pair and interactions among pairs may be particularly interesting and complex, even though populations of this species are believed to be resident throughout their range. In this paper I report my observations on the behavior, social organization and ecology of this little-known bird gathered during two visits to Central America.

METHODS

I watched *D. dives* in eastern Guatemala, 17–18 November 1971 and 16–17 June 1972; southeastern Mexico 2–10 April 1972; Blancaneaux Lodge, Mountain Pine Ridge, Belize, 14–30 April and 1–15 June 1972; and Siguatepeque, Honduras, 17–30 May 1972. In addition, I spent one day watching *D. warszewiczi* in the Andes of central Peru, 80 km ENE of Lima, near Matucana, Departamento de Lima (11°51'S, 76°23'W, elev. ca. 2,600 m). Sonograms were made from recordings provided by the Library of Natural Sounds, Cornell Laboratory of Ornithology.

My most extensive observations, and the only ones on breeding birds, were carried out in an open woodland of Caribbean Pine (*Pinus caribaea*) in the Mountain Pine Ridge, Belize. The territory of the pair I watched most of the time included the grounds of Blancaneaux Lodge, surrounding pine woodland, an airstrip, and a section of pine woods heavily grazed by cattle. Ground cover was composed primarily of several species of tough wiregrass (*Panicum* spp. and *Paspalum* spp. especially *Paspalum pectinatum*). The sparse shrub cover was dominated by *Clidemia rubra, Miconia albicans* (Melastomaceae), and *Byrsonima crassifolia* (Malpighiaceae). In shadier areas of dense pine woods there was a sparse ground cover of *Coccosypselum* sp. (Rubiaceae) and *Ageratum* sp. (Compositae). Mistletoes (*Arceuthobium vaginatum* and *Psittacanthus calyculatus*) were common on pine boles and were in flower in April.

The Honduras study site, one km W of Siguatepeque (elev. 1,080 m), consisted of a mixed-age stand of *Pinus oocarpa* about 25 m tall, adjacent to open pastures. Under gaps in the canopy there was a rich shrub flora dominated by *Calliandra houstoniana* (Leguminosae). Little grass and few herbs were in the forest even though it had not been grazed for many years.

I observed Scrub Blackbirds on 6 May 1974 on a terraced, agricultural hillside in otherwise rugged, arid mountain terrain. Most of the tall trees in the area were *Eucalyptus,* but there were also a few *Araucaria, Schinus, Ficus, Pru-*

nus, and others I was unable to identify. The non-agricultural areas were covered with low shrubby vegetation interspersed with large columnar cacti. The steeper slopes were largely bare ground but with frequent patches of terrestrial bromeliads. Flowering was prevalent at the time and the blackbirds were breeding.

RESULTS

NESTING

In eastern Guatemala in November 1971 I saw Melodious Blackbirds singly or in pairs along roads, in gardens, and in recently abandoned fields and brushy pastures. I heard a great deal of singing, but I saw no evidence of breeding. In April 1972 these birds were common from just south of Tampico through the drier parts of the Yucatan Peninsula. All were in pairs except for those in a large flock foraging in a dry, scubby forest in La Venta Park, Villa Hermosa. Although the birds at La Venta foraged in groups, they sang constantly for the 2 h I observed them, and birds appeared to be associating in pairs within the flock. At Blancaneaux Lodge and in eastern Guatemala in June I never saw groups larger than two. At Siguatepeque on 23 May, where I found up to four pairs foraging together on the ground under pines, the pair units were obvious. Although limited, these observations suggest that Melodious Blackbirds may remain permanently paired even in areas where they form flocks during the non-breeding season.

At Blancaneaux Lodge these blackbirds were highly territorial, taking up defense long before nesting began in spring. The pair at the Lodge duetted loudly and conspicuously in mid-April, a month before they built their nest, and they spent much time traveling around the periphery of their territory. Both members of the pair sporadically picked up nesting material in late April but did not build a nest. They often visited clumps of dead pine needles in two different trees, but neither tree was subsequently used for the nest. I was absent during the nest-building period, but the young hatched 2–3 June, indicating that egg laying began about 17–18 May. According to Skutch (1954), both sexes build.

The single nest I found was about 7 m above ground close to the trunk of a *Pinus caribaea.* It was slung from two very small adventitious needle clumps and rested on a third. The nest was built almost entirely of dead pine needles, with a modest lining of finer grasses, and appeared flimsy. The open nest-cup sloped toward the trunk, and the eggs were rolled to one side. The female entered from the trunk side and exited over the opposite edge. The four eggs were bright, robin's-egg blue with a few dark brown blotches at the larger end. One of the eggs, which failed to hatch, measured 26 × 18 mm and had six medium-sized dark blotches and about 10 very small ones.

The established territorial pair received considerable pressure from roving individuals. During three mornings in April (7 h of observation), I saw a vigorous territorial encounter with a second pair that lasted 23 min. During the incubation period, I saw three encounters 7, 3, and 9 min long, with other pairs during a 4.5-h morning watch. When young were in the nest, I watched four mornings for a total of 12.25 h, during which time I saw six encounters which lasted 2, 3, 4, 4, 4, and 6 min. Two of these encounters were with single birds; the others were with pairs. Since I watched almost exclusively at the nest itself during incubation and nestling stages, I could not see encounters near the boundary of the territory.

During the 4.5 h I watched the nest when it had eggs, only the female incubated. Unlike Skutch (1954), I did not see the male feed the incubating female. Both sexes fed the young, but the female was the chief provider, as Skutch found in Guatemala. During 12.25 h of watching at the nest with nestlings, I saw the female bring food 32 times, the male only 3 times. These data are biased, however, because the male was much more sensitive to my presence than the female, and when she came in with food, he often flew toward me and began strong scolding even though he had not been reacting to me in her absence. He seemed to dissuade the female from going to the nest on three occasions, and five times when he approached with food he failed to go to the nest.

The male never brooded the young after feeding them, but the female did so on 37.5% of her visits, brooding them 20.3% of the total time I watched the nest. Brooding continued until the young were six to seven days old, the last day of observation before the nest was depredated. During the incubation and nestling periods, the male spent most of his time guarding. Even when the female flew some distance to forage, the male usually remained within sight of the nest. When he did leave, it was only briefly. During the incubation period, he was out of sight of the nest only 47 min out of 4.5 h (17.4%). His periods of absence averaged 9.4 min (range 2–27 min). During the nestling period, he was absent for a total of 145 min, out of 12.25 hours (19.7%), and he was never gone longer than 16 consecutive minutes.

Guarding and reduced feeding by the male

may be adaptive because of high risk from nest predators, which may be deterred by an attending adult. At Blancaneaux Lodge the most serious potential nest predator was the Brown Jay (*Psilorhinus morio*), a group of which regularly foraged through the territory. Whenever jays came near the nest, the pair of blackbirds vigorously attacked them, but I cannot assess the effects of these attacks. Snakes were very rare in the Mountain Pine Ridge, and the only bird-eating hawk I saw was the Short-tailed Hawk (*Buteo brachyurus*), which is not likely to prey upon a nest within a forest.

FORAGING AND FOODS

Melodious Blackbirds obtain most of their food from the ground but also forage at all heights in shrubs and pine trees. On the ground they move entirely by walking, usually in a deliberate manner. At Blancaneaux Lodge they foraged on the ground only in very open areas, such as the sides of roads, airstrips and where lumbering had disturbed the soil. I never found them in sites with dense grassy understory. The blackbirds also regularly fed along the edges of streams. In areas of the Mountain Pine Ridge where there was little disturbance, Melodious Blackbirds were restricted to the vicinity of streams and seepage areas where the edge of the water provided the rich foraging upon which so many icterids depend. At Siguatepeque, Honduras, the birds preferred to forage in the shade of trees where the understory vegetation was sparse, rather than in more open areas, but they regularly foraged at all heights in the pines.

Terrestrially foraging Melodious Blackbirds find their food primarily by gaping. They gape constantly, turning over leaves, stones, sticks, pine branches, cones and cow chips. They also gape into herbaceous vegetation. Most objects were handled by inserting the bill underneath and then gaping vertically, but some leaves were moved by a sidewards movement of the head with the bill partly opened. At Blancaneaux Lodge both members of the pair regularly foraged on the backs, face, ears, and rumps of cattle, probably removing ticks from their skins.

In pines the birds foraged primarily by probing and gaping into needle clumps. On 25 May I watched a bird gaping into a *Tillandsia* about 15 m up in a large pine. The undersides of leaves of shrubs were examined from the ground.

At Blancaneaux Lodge in April the ripe fruits of *Clidemia rubra* were eaten regularly. Lower ones were taken by birds standing on the ground beneath the shrubs, while higher ones were taken from perches within the bushes. Each fruit was manipulated in the bill and the seed ejected before swallowing the pulp. In June, when berries of *Miconia albicans* were ripe, Melodious Blackbirds foraged regularly in these bushes. The berry-bearing branches are delicate, and the weight of the birds bent them so that they had to hang almost upside down to get the fruit. These green berries were swallowed whole with no attempt to eject the tiny seeds. At Tikal, Guatemala, on 17 June 1972 I watched a Melodious Blackbird eating seeds and arils from a ripe, opened fruit of *Stemadennia* sp. (Apocynaceae). *Curatella americana* fruits were ripe at Blancaneaux Lodge in June, but I did not see Melodious Blackbirds feed on them even though they were available close to the nest. Both Brown Jays and Yellow-backed Orioles (*Icterus chrysater*) took these fruits readily.

DISPLAY BEHAVIORS

Bill-up flight. During territorial encounters, individuals of both sexes performed a bill-up flight display much like that of the Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*; Nero 1964, Orians and Christman 1968). The flight was noisy, undulating, and very slow, probably close to stalling speed, with the bill held up at about a 45°-angle. Intermittent wing beats resulted in a series of undulations, each covering no more than ⅓ to ½ m. All contour feathers were either sleeked or at normal positions during this display.

Fluttering flight. Several times when attacking Brown Jays that were foraging near their nest, Melodious Blackbirds flew with rapid, shallow wing beats in a flight similar to the fluttering flights of territorial male Red-winged Blackbirds (*Agelaius phoeniceus*; Orians and Christman 1968). However, I did not see fluttering flight used in the context of territorial defense.

Tail flicking. This involved a rapid upward movement of the tail followed by a slower downward movement. In less vigorous tail flicks the tail was not spread. In more vigorous ones it was spread as it was raised, maximum spread occurring at the top, and was then closed as it was lowered. The behavior was associated with mild disturbance.

Song spread. Melodious Blackbirds sang frequently and loudly, and most singing was accompanied by display. In a low intensity song spread, the upper back and breast feathers were slightly ruffled, the head was pointed up at about a 45°-angle, and the wings were held against the body. The remainder of the contour feathers were held normally, and the tail was

not spread or moved. This type of song spread was given by birds of both sexes in trees and on the ground and by isolated individuals as well as members of the flocks at La Venta, 5 April 1972.

In a full song spread the back and breast feathers were fully ruffled, the wings were moved horizontally from the body, maximally at the shoulders and tapering toward the body to the rear, and the tail was strongly spread. The feathers of the forehead, crown and nape were sleeked, but those of the cheek were ruffled, causing the crown to appear gray while the cheeks appeared black. This striking two-toned appearance of the head was easily visible at a distance.

Pumping. Some songs were accompanied by a pumping movement caused by extension and flexion of the tarsi. During an introductory wheezy note, the tarsi were flexed, and the tail was rapidly raised. Then the tail was dropped, the body was raised on the tarsi, and the wings were lowered while the bird uttered a descending note. This rocking sequence, without the initial tail raising, was then repeated on each of the rising and descending notes of the song. Both sexes pumped, but at Blancaneaux the male did so much more often, and his pumping movements were much more vigorous than those of his mate. The vocalizations accompanying pumping are described later.

Sexual chasing. During the late April prenesting period at Blancaneaux, I saw three short sexual chases by the pair I watched intensively. I did not observe the start of any chase, and in two cases the birds flew out of sight. I think one chase was initiated by the female flying directly ahead of the male, and when they landed, the female went into a typical passerine solicitation posture accompanied by soft twittering while the male gave a full song spread. Copulation did not follow. During all three chases, the birds of both sexes gave loud *cheep* calls.

Bill-up display. In this display the contour feathers were all moderately sleeked, the wings were held against the body, and the tail was held in line with the body axis and closed. The tarsi were extended, and the bill was pointed upwards. The bird was stationary during the display, which was given regularly in territorial disputes. The birds often sat within a few centimeters of one another while displaying, normally face to face. Commonly, when perches allowed it, the birds jockeyed for a higher position and often moved upward through the tree, stopping to give this display between movements. A typical icterid bill-up agonistic posture, it was often interspersed with vigorous bill wiping.

VOCALIZATIONS

Melodious Blackbirds are very vocal (Sutton 1951, Skutch 1954). Both sexes utter most of the notes, but females' vocalizations tend to be wheezier. Longer songs are composed of a number of subunits, which can be combined in several ways. I first describe the basic units as I heard them at Blancaneaux Lodge and then deal with the song patterns that are produced using them. Recordings from elsewhere in Mexico and Central America reveal considerable regional variation in these vocalizations.

Chuck. Figure 1a, d. A soft note accompanied by tail flicks, and given with sleeked or normal plumage. I heard it from an intruding female sitting near the nest of the pair before she was chased and from the resident female when she may have been motivated to go to the nest but was deterred by my presence. I did not knowingly hear it from a male.

Cheep. Figure 1b. This loud and strident note was the common one-syllable call of the Melodious Blackbird. It was given during sexual chasing, and was the most common note given when scolding a person or possible predator near the nest. It often preceded and accompanied flight of a bird from one feeding or resting position to another, and it was given during chasing in territorial disputes. Often, but not always, the call resulted in movement of the mate toward the caller. This was always true during my observations when it was uttered in its more strident form. When the guarding male was moderately disturbed by my presence near the nest, he sometimes gave 30–40 of these calls in succession. This was usually the first call the male uttered at dawn. It was normally accompanied by tail flicking but not by erection of any contour feathers. The variety of circumstances in which it was given strongly suggests an association with a flight tendency even though flight does not necessarily follow.

Cardinal call. Figure 1c, g. This clear descending whistle was given by both sexes, but that of the female was wheezier. It was usually introduced by a short, chippy note. A loud variant of this call, which was longer, higher and thinner, was given during territorial disputes, both perched and in flight.

Like the previous call, this one appeared to be associated with a tendency to fly and was often given in flight. Also it was commonly given by birds of both sexes while perched near the nest when I was present. The female sometimes gave it when leaving the nest after an incubation session. In these instances I judged that my presence disturbed them. This call was often interspersed with the *Cheep* call and was

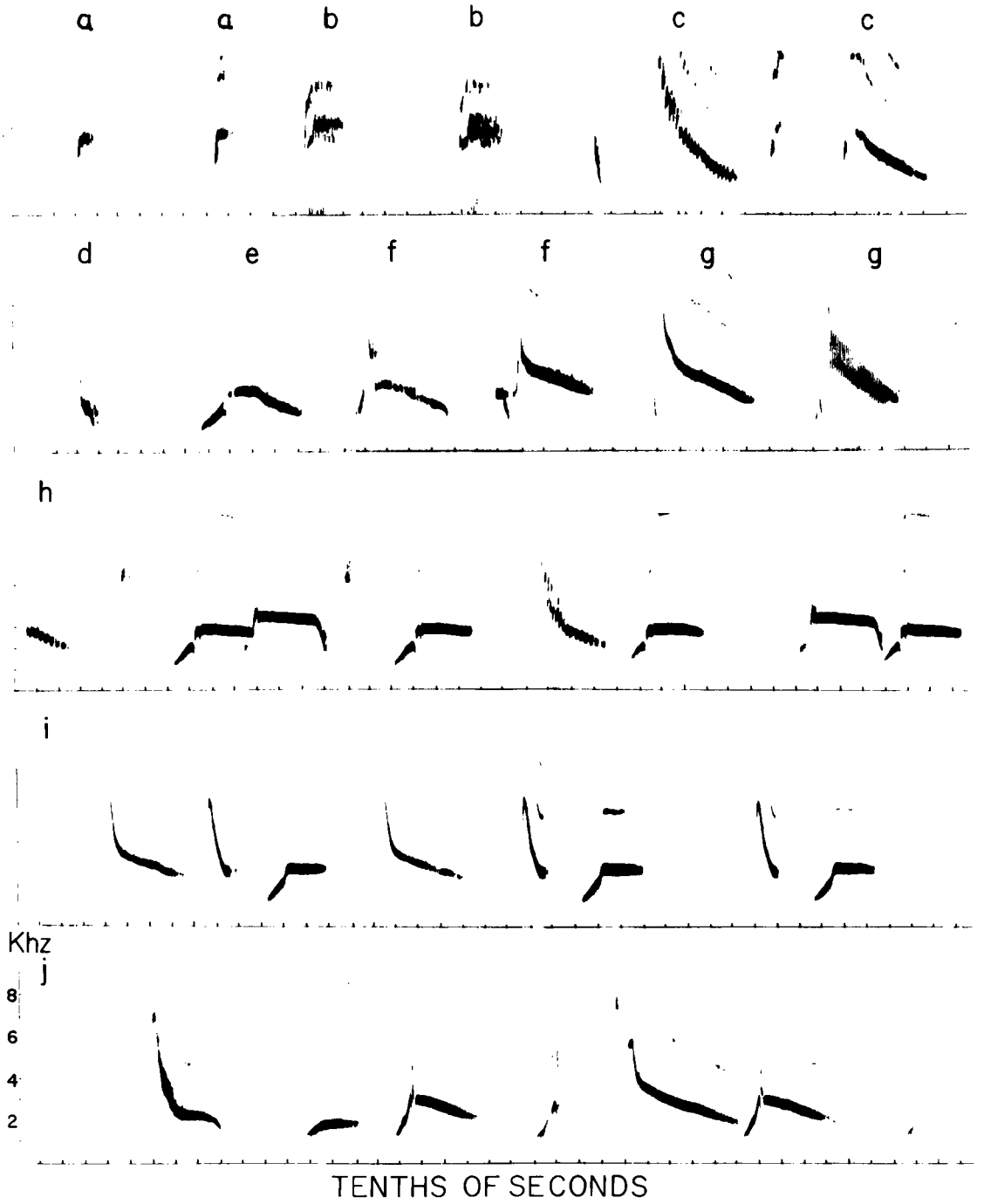

FIGURE 1. Vocalizations of *Dives dives*. a. *Chuck*, Vera Cruz, Mexico, 26 March 1974. Recorded by L. Irby Davis. b. *Cheep*, El Salvador, 14 May 1974. Recorded by W. A. Thurber. c. *Cardinal* calls with introductory chips, Vera Cruz, Mexico, 26 March 1974. Recorded by L. Irby Davis. d. *Chuck*, Vera Cruz, Mexico, 26 March 1974. Recorded by L. Irby Davis. e. *Seetup*, Vera Cruz, Mexico, 26 March 1974. Recorded by L. Irby Davis. f. *Seetups*, San Luis Potosi, Mexico, 25 May 1962. Recorded by L. Irby Davis. g. *Cardinal* call, El Salvador, 14 May 1974. Recorded by W. A. Thurber. h. Duet, El Salvador, 31 January 1972. Recorded by W. A. Thurber. i. Duet, El Salvador, 29 May 1974. Recorded by W. A. Thurber. j. Duet, El Salvador, 29 May 1974. Recorded by W. A. Thurber.

the most common note associated with bouts of cheeping.

See. Figure 1i. A rising note given either alone or, more commonly, as an introductory note to the *Cardinal* call or the *Seetup* call. For both sexes it was a wheezy note and was not accompanied by a special display.

Seetup. Figure 1e, f. A very common two-syllable note, the first a rising note similar to the *See* call, the second a lower, usually descending nasal note accompanied by pumping. Both sexes gave it, but the female version was wheezier than that of the male and was not as precise in its starting and stopping. Females also did not pump as vigorously as males while giving it. This call was often given in flight.

A typical song sequence started with a *See* call, followed by four or five *Seetups,* then another *See* followed by three or four *Seetups,* then another *See* followed by a further reduction in the number of *Seetups.* This continued until the last sequence had only one or two *Seetups.* I did not note a bout in which the number of *Seetups* in a sequence increased. Regularly, however, a song consisted of a single sequence of one to four *Seetups* and nothing more. These songs vary geographically. Both in November 1971 and June 1972 in eastern Guatemala, not very far from the Mountain Pine Ridge of Belize, I heard Melodious Blackbirds giving a song in which the two notes of the *Seetup* call were a full octave apart and were given with a much slower tempo. Recordings from Mexico and El Salvador (Fig. 1) reveal many differences in all vocalizations, but whether or not there are differences in how they are used is not known.

Gurgle-whistle. I heard this call primarily from the male. It was a clear whistle starting high, dropping in pitch, rising again and ending in a high-pitched *See.* The notes were sometimes a part of a duet initiated by the female with *See* and *Cardinal* calls. Usually a song was either of the *Seetup* type or the *Gurgle-whistle* type, but occasionally they were mixed. The *Gurgle-whistle* was the most common duet song in one territorial dispute.

Weet-weet. I heard this call only from the foraging female when the male was near, and it was not associated with any particular posturing. It consisted of a rising initial note followed by a drop and another rise to about the same pitch as the end of the first rise. The notes were moderately clear although not of a pure whistle quality. I did not hear this note until late in the nestling period and do not know what evoked it.

All song elements were regularly given during flight but none of them exclusively so.

DUETTING

Duetting was a characteristic feature of the behavior of the Melodious Blackbird. During the prenesting period at Blancaneaux Lodge, nearly all songs were duets. Sixty-five of 86 duets (75.6%) were started by the female with a *See* call followed by several *Cardinal* calls. The male generally followed with a *See* note plus a series of *Seetup* sequences. During the duet, the *Cardinal* calls and *Seetups* were alternated. Casual observations of other pairs indicated that this sequence was regularly used by most pairs in that area.

On 2 June 1972, the female was incubating during 73% of my observation time. During the 4 h 25 min period, there were 31 duets (6.9 per hour) and 28 song sequences by a single bird (6.2 per hour), 26 of them by the male. Most duets were given while the female was off the nest, and she initiated 62% of them. She occasionally sang from the nest in response to a song sequence started by the male (see also Skutch 1954). Of the eight duets started by the male, the female was incubating when he initiated five of them. For 10 duets I was uncertain which bird initiated them. Duetting was also the predominant form of singing during the nestling period.

TERRITORIAL BEHAVIOR

My observations indicated that Melodious Blackbirds were strongly territorial and that both sexes participated in defense. In April at Blancaneaux the pair moved around the periphery of the area while duetting, several times daily. Other pairs could be heard duetting in the distance, but usually these established pairs did not meet.

Encounters with invading birds (single birds on two occasions, mated pairs on eight) however, were sometimes vigorous and prolonged. Defensive behavior included loud and vigorous duetting accompanied by full song spreads, frequent bill-up displays, and supplanting attacks. The invaders gave the same displays but did not engage in supplanting attacks and generally yielded to them. The female initated most of the duets during disputes, but the male was more vigorous in pursuit of the intruders.

Melodious Blackbirds may have defended the area around their nests against Yellow-backed Orioles. The orioles were common in the pines in the vicinity of Blancaneaux Lodge, and their songs could be heard every day. Nevertheless they appeared to avoid the heart of the blackbirds' territory around the Lodge and detoured around the area where the blackbirds normally foraged. Once some orioles came fairly close to the eventual nest site, and

they were attacked and supplanted by the male blackbird. Whether the orioles are competitors or nest predators is not clear.

NOTES ON THE SCRUB BLACKBIRD

Scrub Blackbirds were common and they sang vigorously near Matucana, Peru, on 6 May 1974. I flushed a recently fledged young and found two active nests, both high in large *Eucalyptus* trees. The nests hung next to moderately sized, nearly vertical branches. One definitely contained nestlings because adults entered it several times with food. Foraging adults were difficult to watch because the vegetation obscured them most of the time, but I observed one bird extracting a large pupa from a tangle of cactus stems and watched another emerge from a shrub with a small lizard, which was then swallowed whole. Twice I saw birds with what looked like adult ant-lions in their bills.

Pairs of Scrub Blackbirds duetted regularly. In a vigorous song posture the head was thrown vertically during the first "chip." Then the bird flexed its tarsi, flared its neck and breast feathers, partly spread its wings and tail while uttering two more short notes, then extended the tarsi while flipping its head and began the cycle again. There were usually three to four bends to a song. A song was usually preceded by ruffling of the breast and flank feathers and it usually started with a chip note.

In Scrub Blackbirds, unlike Melodious Blackbirds, more than one pair used a given area. The birds at one of the nests I observed foraged regularly near the other nest or flew past it without evoking any response from the other pair. Two or more pairs also regularly foraged in the same shrubby areas. This use of space was associated with extreme clumping of suitable breeding sites, but the area in which I watched was strongly modified by human activity and is not typical of natural habitats. Nonetheless, suitable habitats in the arid Pacific slope of Peru, at least, were probably always very patchily distributed along watercourses.

DISCUSSION

The Melodious Blackbird may have a type of annual cycle that is common among tropical birds but rare at high latitudes. In Central America, pairs of Melodious Blackbirds breed in early stages of plant succession, or in areas where fires maintain a very open forest understory. Because of the brief average duration of suitability of any one site, mated pairs may often have to leave their territories and search for new areas. During my limited observations I observed wandering single birds twice, and wandering pairs eight times, attempt to take over the territory of an established pair. These observations are consistent with, but do not prove, the suggestion that these birds frequently shift their breeding sites.

In most monogamous icterids, males and females have about the same number of both displays and vocalizations. These numbers in the Melodious Blackbird are similar to those of other monogamous icterids (Orians, in press), making the species typical in this respect.

The forms of the visual displays of the Melodious Blackbird are also similar to those of other icterids. Bill-up postures are used commonly in agonistic encounters, as in nearly all well-studied blackbirds, and they also occur in territorial flight displays, as found in the Yellow-headed Blackbird (Orians and Christman 1968). General erection of contour feathers during song spreads, another characteristic of the family, also occurs. What is unusual about the Melodious Blackbird is the presence of precise duetting between members of a mated pair. Vocalizations are temporally correlated among members of pairs of Common Grackles (*Quiscalus quiscula*; Wiley 1976a, b), and Skutch (1954, 1972, 1976) has reported answering of the singing male by the incubating female in the Yellow-tailed Oriole (*Icterus mesomelas*), the Yellow-billed Cacique (*Cacicus holosericeus*) and the Scarlet-rumped Cacique (*C. uropygialis*). These duets are not precisely timed, and the songs of the females are shorter and less musical than those of the males. These three species are all monogamous, but the durations of their pair bonds are unknown. Melodious Blackbirds are likely to shift their territories fairly often because of successional changes in vegetation. Although other duetting tropical birds have been assumed to occupy their territories for long periods (Thorpe 1972), I know of no data from long-term observations for any duetting species. The function of duetting is uncertain, but among icterids at least it cannot be to maintain contact among members of the pair as they move through dense vegetation. Melodious Blackbirds and Common Grackles are nearly always in full view of one another when they exchange notes. This is not the case with the other tropical icterids, but with them, the location of the incubating female is certainly known to the male.

A functional significance of duetting can be suggested from this perspective. A duet in which individuals of the two sexes sing different parts signals that the area is occupied by an intact pair. If, on the death of one member,

the remaining bird sings its part of the duet, other birds can tell that it is mateless and which sex of mate it seeks. Whether or not this occurs is uncertain. A widowed captive Tropical Boubou (*Laniarius ferrugineus*) sang both parts of the pair's duets for about two weeks following the loss of its mate (Thorpe and North 1965), but vocal behavior of wild widowed birds has not been reported.

Despite their similar roles in territorial behavior, parental care patterns of males and females are different in Melodious Blackbirds. Although the male was in almost constant attendance at his nest, he did not incubate and he made a smaller contribution to feeding the young. His role appeared to be primarily that of a guard, both for the incubating female and for the nest and its contents in her absence. Also, the behavior of the male at Blancaneaux indicated that his constant presence helped the female to know, when she returned from a foraging trip, if it was safe to go to the nest. Heavy investment in guarding implies that much of the risk of nest predation comes from species that can be deterred at least occasionally by one or both of the adults, provided they discover the would-be predator in time. This might well be the case with moderately large passerines such as Melodious Blackbirds if the main predators are jays and small toucans, or small snakes. It should be less pertinent for smaller birds, who cannot deter the common predators of their nests. I saw no indication that a lower level of male parental care in Melodious Blackbirds is due to efforts by males to attract additional mates.

ACKNOWLEDGMENTS

My observations in Central and South America were supported by the Organization for Tropical Studies and the John Simon Guggenheim Memorial Foundation. Helpful comments on an early draft of the manuscript were made by Lynn Erckmann, John Terborgh, George Hunt, and Ken Yasukawa. Lynn Erckmann helped with preparation of the illustration.

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Department of Zoology and Institute for Environmental Studies, University of Washington, Seattle, Washington 98195. Received 13 February 1982. Final acceptance 7 May 1983.