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VOCALIZATIONS OF THE RUFOUS-BACKED THRUSH (*TURDUS RUFOPALLIATUS*) IN GUERRERO, MEXICO

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The family Turdidae is a widespread group having many members with elaborate songs and calls. Songs and vocalizations of several turdines have been studied, including the Blackbird (*Turdus merula*; Andrew 1961a, Hall-Craggs 1962), Mistle Thrush (*T. viscivorus*; Isaac and Marler 1963), *Hylocichla* (Stein 1956), and *Sialia* (Pinkowski 1971). Most reports on vocalizations of New World species of *Turdus* have come from studies covering broader aspects of the species' biology.

This study examined vocalizations of a Mexican species, the Rufous-backed Thrush (*Turdus rufopalliatus*). Since this species is poorly known, I investigated its life history and habits in order to understand the motivation, context, and function of its songs and calls.

MATERIALS AND METHODS

Field recordings and observations were made at a site 13 km NW of Pie de la Cuesta, Guerrero, Mexico, from 21 June–27 July 1975 and 24 June–25 July 1976. The study area is principally a coconut palm (*Cocos nucifera*) plantation. A few small, dense patches of native broad-leaved trees, shrubs, and herbs lie within the area, especially along fence rows. Recordings were made at 1.88 ips on a Sony cassette recorder model TC-55, using a Dan Gibson E.P.M. Model P-200 Parabolic Microphone. Copies of the tapes have been placed in the Florida State Museum Bioacoustic Archives. Sound spectrograms were made on a Kay Electric Company Sona-Graph 6061-B with H-S, wide band, log scale, and 80–8,000 Hz settings. Measurements of vocalizations were made directly from the sound spectrograms.

Song terminology used in this paper is as follows:

Phone. A continuous trace on a sound spectrogram.

Phrase. One phone or a group of phones separated by intervals of less than 0.075 s. The 0.075 s cut-off was set by measuring the intervals between all phones. A histogram of the lengths of these intervals showed large peaks on either side of 0.075 s but no readings at that point.

Song. One phrase or group of phrases separated from one another by an interval of 2 s or more. The technique for defining phrase and song is taken from Isaac and Marler (1963), and the terms are based upon those of Shiovitz (1975).

Phrase type. A unique phrase differing from others in one or more of the following: number of phones, frequency, length, and shape of phones. Tracings of all phrase types were made on transparencies and used for comparison with phrases of questionable type.

RESULTS

LIFE HISTORY

The habits of the Rufous-backed Thrush are typical of the genus. The birds forage in the trees and on the ground, eating earthworms, insects, berries, and other small items. The breeding season apparently lasts from mid-May through August. This roughly coincides with the rainy season in this region of Mexico. All but one of 14 nests found on the study site were situated at the bases of fronds in coconut palms. The exception was in a small lime tree (*Citrus aurantifolia*). Nests were constructed of mud and plant parts in typical thrush fashion (see Howell 1942, Wallace 1965). Six nests contained two nestlings, one had three nestlings, and one contained three eggs. This indicates a clutch size of two or three, which agrees with that found in other neotropical species of *Turdus* (Skutch 1960, Snow and Snow 1963).

Both sexes are somewhat territorial and a mated pair will defend a small area around its nest; mist-netting showed that the thrushes otherwise use areas in common. Some of this netting was near nests, so some "trespassing" near nests is tolerated. The Pale-vented Robin (*T. fumigatus*; Snow and Snow 1963) and American Robin (*T. migratorius*; Young 1955) have similar weak territoriality.

VOCALIZATIONS

I describe 18 different types of vocalizations given by the Rufous-backed Thrush. These represent most of the sounds in its vocabulary but additional calls may exist. I interpreted some sounds to be subtle variations of the main vocalizations listed here but they may be distinct calls, conveying their own information.

Cherrp. The most common vocalization can be represented orthographically as *cherrp*. It is a short call that varies in volume, length, and frequency, depending on the context in which it is used (Fig. 1, A–D). Differences in calls are not due to individual variations of voice since different birds gave spectrographically similar calls in similar situations. *Cherrps* used during defense of young and nests differ from those uttered while foraging in being longer and reaching higher frequencies. Generally, *cherrps* start higher in frequency than they end (Table 1). All adults use this call. Birds hold their bodies at a 10–35° angle above horizontal and jerk when calling. The wings

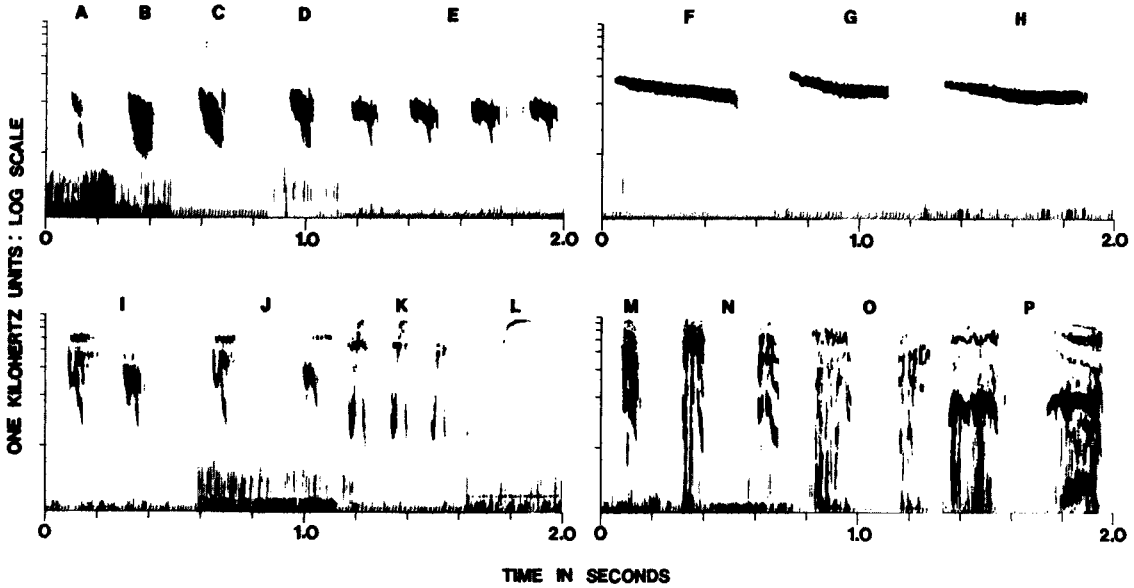

FIGURE 1. Audiospectrograms of several calls of *Turdus rufopalliatus*. A. *Cherrp* of a foraging bird. B. *Cherrp* of a bird during a possible courtship display. C. *Cherrp* of parental thrushes as I stood near fledglings. D. *Cherrp* of parental thrushes as I held a fledgling. E. *Re-re-re-re*. F. Whistle call. G. *Eeee*. H. *Eee-ah*. I. and J. *Chip-up* calls. K. Three *swit* calls. L. *Seeep*. M. *Chup*. N. Two juvenile cries. O. Two juvenile screams. P. Two adult screams.

are flicked slightly open and shut, the tail feathers flicked apart and together, and the whole tail bobbed up and down slightly. One bird turned back and forth 180° every call or two.

The call is given in many situations. Thrushes gave soft *cherrps* while foraging, after taking flight, when approaching and leaving nests, while feeding young, while caught in mist-nets, and upon release after netting. Louder and more intense *cherrps* were elicited by the presence of nearby animals that were apparently disturbing or frightening, including predators, conspecific territorial intruders, and people. *Cherrps* were often combined with other calls under these circumstances. Thrushes used *cherrps* throughout scolding bouts. Birds sometimes gave this call prior to and after attacking conspecific intruders in their territories. During three playback experiments I conducted, birds advanced and gave *cherrps* combined with songs or *re-re-re-re* calls (see below). Potential danger near nests or fledglings elicited rapid (e.g., 25 *cherrps*/10 s) series of *cherrps*, again in combination with whistle calls, *re-re-re-re*'s, or *eeee*'s. I once heard two thrushes give this call (with *eeee*'s and *re-re-re-re*'s (while perched, between mutual chases of what may have been a courtship display.

Re-re-re-re. This is a fairly common call used by adults. The call is a fast sequence of *cherrp*-like phones, usually with four, sometimes three, *re* phones in a series (Fig. 1E). *Re* phones are longer than *cherrps* and have a slight high-frequency overtone (not visible in Fig. 1E). Like *cherrp*, *re* tends to go from high to lower frequencies (Table 1). Birds sometimes gave *cherrp-re-re* calls. This, along with the similarity of characteristics, suggests that *re* is derived from *cherrp*. Audiospectrograms of *cherrps* grade into that of *re-re-re-re* as the situation changes and calls are given more excitedly (Figs. 1A–E). Thrushes gave the call in flight and while stationary. Flight intention movements, similar to those during *cherrps*, were exhibited during stationary calling. *Re-re-re-re* was used by parents when protecting nests and fledglings. It was given by a male flying to investigate a recorded playback of a thrush song and also by two thrushes during possible courtship behavior.

Whistle call. One of the most distinctive calls is a long, mellow sound that starts at a frequency of about 3 kHz and descends as the call proceeds (Fig. 1F, Table 1). A slight harmonic may be present at 5 kHz. The whistle call is used by all adults. Calling birds were always perched and gave wing

TABLE 1. Calls of *Turdus rufopalliatus*: duration (seconds) and frequency range (kHz).

Call type	No. of calls (no. of individuals)	Duration[a]	Lower frequency[a]	Upper frequency[a]
Cherrp	30 (11)	0.08 ± 0.01 (0.07–0.10)	1.1 ± 0.1 (0.8–1.3)	2.6 ± 0.2 (2.3–2.9)
Whistle call	7 (5)	0.45 ± 0.04 (0.39–0.50)	1.8 ± 0.1 (1.7–2.0)	3.0 ± 0.1 (2.8–3.1)
Re-re-re-re[b]	24 (4)	0.11 ± 0.01 (0.09–0.13)	1.1 ± 0.1 (0.9–1.2)	2.4 ± 0.1 (2.1–2.6)
Eeee	8 (3)	0.38 ± 0.07 (0.23–0.46)	2.0 ± 0.1 (1.9–2.2)	3.0 ± 0.2 (2.8–3.2)
Eee-ah	4 (1)	0.58 ± 0.05 (0.52–0.62)	2.0 ± 0.0 (all 2.0)	2.9 ± 0.1 (2.9–3.0)
Seeep	5 (1)	0.10 ± 0.01 (0.08–0.11)	5.2 ± 0.5 (4.4–5.7)	7.7 ± 0.3 (7.3–8.0)
Chip	4 (1)	0.06 ± 0.01 (0.06–0.07)	1.2 ± 0.1 (1.1–1.3)	4.4 ± 0.6 (3.5–4.7)
Up	5 (1)	0.06 ± 0.00 (0.06–0.07)	1.4 ± 0.2 (1.2–1.6)	3.6 ± 0.2 (3.3–3.9)
Swit	12 (1)	0.08 ± 0.01 (0.07–0.10)	1.1 ± 0.1 (0.9–1.3)	7.9 ± 0.2 (7.5–8.0)
Juvenile cry	4 (1)	0.08 ± 0.01 (0.07–0.09)	All frequencies up to 16 kHz	All frequencies up to 16 kHz
Juvenile scream	9 (1)	0.12 ± 0.03 (0.07–0.16)	All frequencies up to 16 kHz	All frequencies up to 16 kHz

[a] $\bar{x}$ ± SD (Range).
[b] Measurements are for individual *re*'s.

and tail flicks. The thrushes whistle called while mobbing or chasing other species of birds away from nests or fledglings, including Gray Hawks (*Buteo nitidus*), Great-tailed Grackles (*Cassidix mexicanus*), and San Blas Jays (*Cyanocorax [Cissilopha] sanblasiana*). Thrushes in the vicinity of mobbing gave this call also, although not directly involved in the activity. I noted whistle calls during a possible courtship display that included aerial and terrestrial chasing, "sparring" with feet while hovering, crouching, and foraging. Instances of actual intraspecific combat, chasing, and displacement were accompanied by whistle calling also. One female gave this call as she returned to the nest after being flushed from incubation. *Cherrps* were used concurrently in most of these cases.

Eeee. The *eeee* call (Fig. 1G) spectrographically resembles the whistle call but it averages somewhat shorter and does not dip in frequency at the end (Table 1). Two thrushes gave this call—in flight and while perched—as they mobbed an immature Gray Hawk. When perched, the caller's wings were drooped and spread; the tail was spread slightly and held a little above horizontal; the bill was directed forward and kept open, with the body horizontal. While calling, the bird opened its bill wider, flicked its wings and tail, and bobbed its tail up and down.

This call was uttered in the same situations as those already listed for other calls: when nests or fledglings were in immediate danger and also during a possible courtship display.

Eee-ah. This call sounds somewhat like *eeee* but is much longer (Table 1). Both sounds drop in frequency soon after they begin and then level off (Fig. 1H), unlike the whistle call. *Eee-ah* is given by adults with the body held approximately 20° above the horizontal and the tail kept straight out and stiff or bobbed twice in rapid succession with a slight flick.

This call, too (intermingled with *cherrps* and whistle calls), was used when danger threatened. One thrush gave this call slowly for several minutes while sitting in a hedge. A pair of nearby thrushes responded with the same call.

Seeep. The *seeep* call (Fig. 1L) is a high-pitched, brief whistle that is difficult for humans to hear (Table 1). It was given by adults while being chased by other thrushes. I noted it on three occasions, two of which involved territorial disputes.

Adult scream. This vocalization was giv-

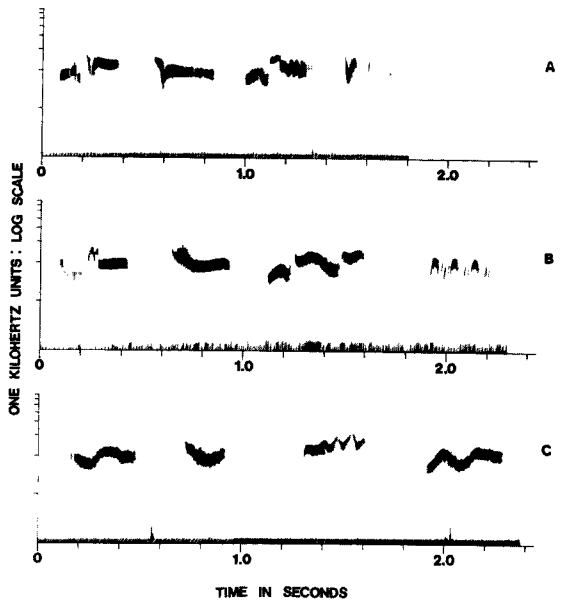

FIGURE 2. Audiospectrograms of songs of *Turdus rufopalliatus*. A. Song of individual 6. B. Song of individual 1. C. Song of individual 9.

TABLE 2. Phrase types of songs of *Turdus rufopalliatus*.

Individual	No. of songs	No. of phrases	No. of phrase types	Index of phrase variability[a]	No. of phrase types shared with other birds (% of total phrase types)
1	19	78	17	0.22	6 (35)
2	5	21	18	0.86	8 (44)
3	1	4	4	1.00	0 (00)
4	9	42	16	0.38	2 (12)
5	8	23	10	0.44	0 (00)
6	26	89	29	0.33	4 (14)
7	1	5	5	1.00	0 (00)
8[b]	6	42	23	0.55	10 (43)
9	9	35	5	0.14	4 (80)
All	84	339	109	0.32	16 (15)

[a] No. of phrase types/No. of phrases.
[b] Whispering song.

en by birds caught in nets or held in the hand. It contains sounds at many frequencies with the fundamental at about 2 kHz (Fig. 1P). Three calls of one thrush had durations of 0.17, 0.23, and 0.29 s.

Trill. I heard trilling only once. Two adults were chasing one another around a small palm, possibly in courtship activity. While perched and flying, they gave rapid, high-pitched trills.

Song and whispering song. Rufous-backed Thrushes possess complex songs with much variation in duration and number of phrases within and among individual repertoires (Figs. 2, 3; Table 2). Songs average 1.88 s long (N = 84) with four phrases per song (N = 83). Individual types of phones range in frequency from 1 to 7 kHz, mostly between 2 and 3 kHz. Among 339 phrases examined, I found 109 distinct types. Only 15% (16/109) were shared among two or more individuals. Of these, 13% (14/109) were shared between pairs of birds and 2% (2/109) were shared among three birds. Analyzed song sequences range from 1 to 11 phrases per series but longer sequences do occur. These phrases contain from one to several phones, some of which are repetitive. The largest number of phrase types found in one individual was 29.

I found no evidence that any birds other than adult males give the fully developed song. While singing, a bird held its body 30–60° above horizontal and its bill level. Wings were partially spread and drooped. The tail was either half spread or closed and held slightly downward.

I conducted six song playback experiments on several thrushes. I stood near the birds or their individual nests and played back either the bird's own song or that of another male. Two males responded with singing. Five birds, including one female, advanced toward the source of the sound. The birds that came in to investigate scolded with *cherrps*, *re-re-re-re*'s, and/or song. At least one of these thrushes held its body horizontally as it searched for the supposed intruder. This is a common threat position in Turdidae (Dilger 1956, Young 1956). Whether or not Rufous-backed Thrushes use singing when first delimiting their territorial boundaries was not determined, but the playbacks show that thrushes of either sex respond positively if the source of the song is within an area considered exclusive (i.e. defended) by them.

Songs were used in other contexts as well. One male, after giving various calls in response to my presence near its fledglings, suddenly began to sing only 3 m from me. Males often sang after being released from

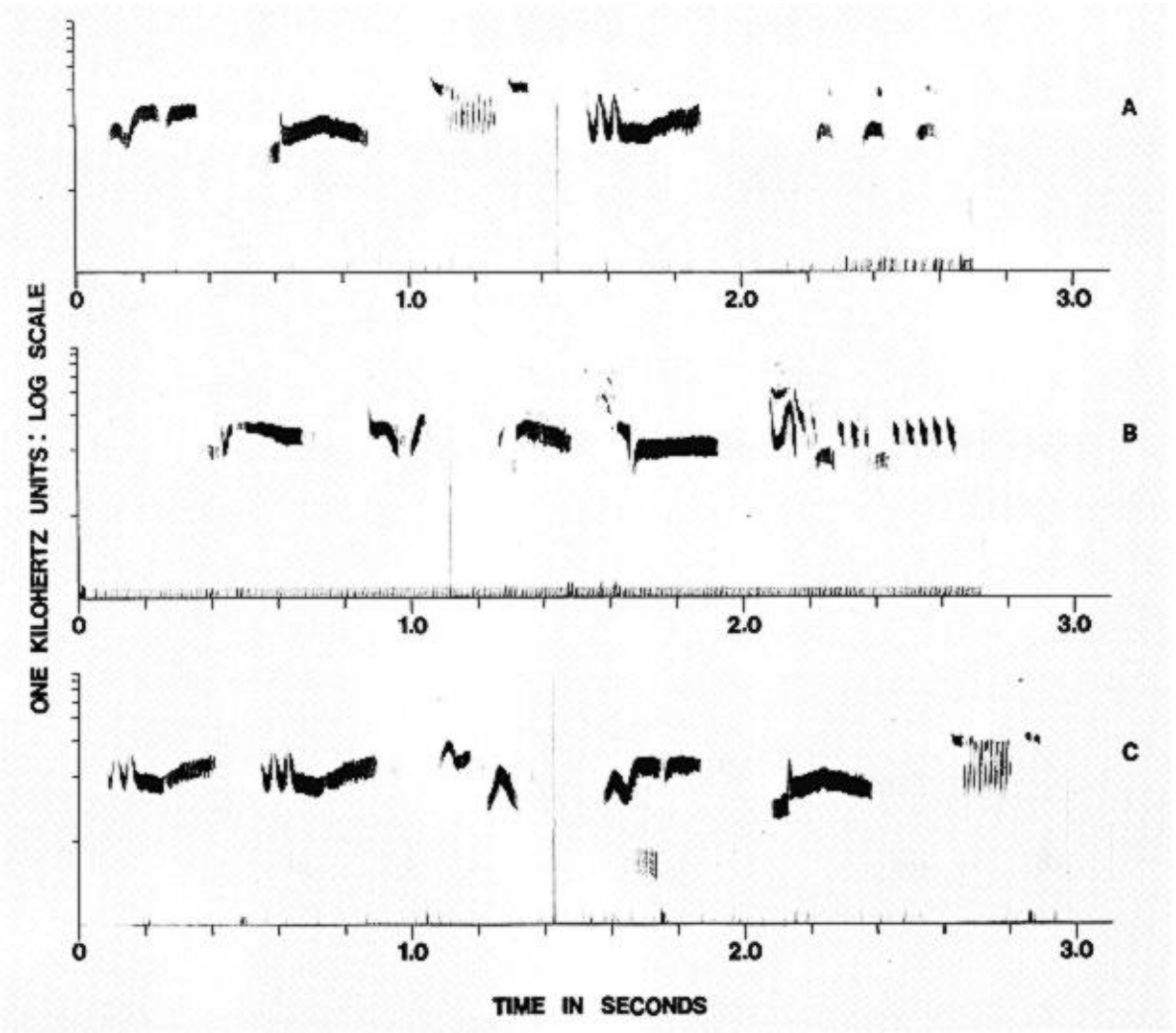

FIGURE 3. Audiospectrograms of songs and whispering song of *Turdus rufopalliatus*. A and C. Songs of individual 1. B. Whispering song of individual 8.

nets and one bird occasionally sang immediately after feeding its young.

I heard two males give very soft renditions of the normal song that were barely audible from 20–25 m away. These were probably what Lister (1953) called "whispering song" (Fig. 3B, Table 2).

Nestling peep. Nestlings utter a weak, high-pitched sound until about 10 days of age. It is the only call used for the first five or six days and then is combined with *chips* and *chip-ups*. *Peeps* were used particularly while the chicks gaped for food.

Nestling-juvenile chip, up, and chip-up. Chip is a medium volume, brief call (Figs. 1I, 1J, Table 1) given by nestlings (more than six days old) during the parents' absence. Fledglings continued to give the call at random when they hid within the foliage of trees. *Up* calls (Figs. 1I, 1J, Table 1) were used in situations seemingly identical to those of *chips*. *Chip-up* is a combination of these two calls (Figs. 1I, 1J). Three measured *chip-ups* had durations of 0.26, 0.29, and 0.41 s. All three calls were interspersed when used, but *up* calls were less common than the other two. Young thrushes ceased calling if approached too closely or if adults called (e.g., whistle called) nearby. Calling could be induced by the sound of sibs vocalizing or playback of recorded *chip-up* calls. Juveniles gave *chip-ups* loudly when parents approached with food.

Swit. This juvenile call is short and covers a wide range of frequencies (Fig. 1K, Table 1). Fledglings gave these calls while perching, while waiting to be fed, and during actual feedings. The tempo of *swit* calling increased as adults with food approached the juveniles.

Chup, juvenile cry and juvenile scream. These three calls are spectrographically similar and they form an intergrading series as the circumstances of the caller change. *Chup* calls were given by perched juveniles (Fig. 1M). Two calls had lengths of 0.06 and 0.08 s. *Chups* cover all frequencies up to 16 kHz with fundamental elements at approximately 1.5 kHz. Juvenile cries (Fig. 1N) were used when fleeing from danger. Duration of these calls seems to be somewhat longer than that of *chup* calls (Table 1). Cries graded into juvenile screams when young thrushes were actually held. Screams (Fig. 1O) are longer than either of the previous two vocalizations (Table 1).

DISCUSSION

Several of the calls listed by researchers for other turdines appear to be homologous with calls of the Rufous-backed Thrush. These matchings are based upon similarity of the orthographic representations given by the authors and particularly upon the similarity of the situations in which the different species use their respective calls. My conclusions about the function of each type of call are based upon my own observations and the functions assigned by others to the apparent homologues of each call.

Cherrp. Several seeming homologues of *cherrp* are described in the literature: "chirp" of *T. migratorius* (Howell 1942), "cluck" of the Great Thrush and the Black-billed Thrush (*T. fuscater* and *T. ignobilis*; Wallace 1965), "whip" of the Mountain Thrush (*T. plebejus*; Skutch 1967), and "veer" of the Veery (*Catharus fuscescens*; Dilger 1956). These calls are used in the same contexts, and often with the same bodily movements, as the *cherrp* call of *T. rufopalliatus.*

Cherrp apparently has different meanings depending on the form in which it is given. It probably serves as a "contact" or "location" call when given slowly (e.g., one bird called 4 times over a span of 33 s, with intervals of 4, 7, and 19 s, while foraging) and softly, alerting conspecific individuals to the caller's presence. Given loudly and quickly, it appears to convey a feeling of uneasiness evoked by potential danger near the caller.

Re-re-re-re. Dilger (1956) reported a "pit pit pit" call in the Wood Thrush (*H. mustelina*) that derives from "bup bup bup" as the level of excitement rises. I believe that a similar relationship exists between *cherrp* and *re-re-re-re. T. plebejus* has a "tock tock tock" call used in defense of young birds (Skutch 1967). *Re-re-re-re* is used in the same situation and is probably homologous to this call.

Whistle call. Skutch (1960) described similar vocalizations in the Clay-colored Thrush (*T. grayi*) and the White-necked Thrush (*T. assimilis*). Their calls are used when danger threatens the safety of offspring or nests, as is the whistle call. This call causes thrushes within earshot to respond in kind, young nestlings to gape for food, and calling juveniles to become silent.

Eeee. The Hermit Thrush (*Catharus guttatus*) uses an "eeee" call in strong attacks (Dilger 1956). The Clay-colored Thrush has a "seeeeee" call used as a "hawk alarm" (E. S. Morton, pers. comm.). The contexts of these calls are the same as those of *eeee.*

Eee-ah. I found no probable homologues of this call in other species. It resembles the whistle call and *eeee*, both in sound and spectrograms, and may be homologous to some of the calls listed as homologues of these two vocalizations.

Seeep. Lack and Light (1941) mentioned a "seep" note used by Blackbirds during territorial encounters. Clay-colored Thrushes give a "sceetch" call as an "appeasement" sound before and during flights through the nesting areas of other pairs (E. S. Morton, pers. comm.). *Seeep* is used under the same circumstances as these calls and also seems to convey fear, retreat, and appeasement.

Adult scream. This is a "distress" call indicative of great fear. Thorpe (1961) stated that "distress" calls attract other birds, both of the same and different species, whose mobbing of the predator may enable the calling bird to escape.

Trill. Andrew (1961a) reported a "trill" vocalization infrequently used by courting male Blackbirds. The activity that I observed when this call was used may have been courtship, but I am not certain.

Song and whispering song. As explained earlier, I found that Rufous-backed Thrushes react positively to conspecific songs originating near them. Singing during scolding bouts is an interesting behavior and is known to occur in other turdines as well (Bent 1949, Pinkowski 1971). In Blackbirds, Andrew (1961a) found that most calls are given in alarming or startling situations. Thus most alarm and contact calls may be grouped together as fear responses. Andrew (1961b) classified song as a "contact call," so it too is motivated by fear and alarm. If this is true, then its use by males when dan-

ger is near and after escaping peril can readily be explained.

The above discussion probably applies to whispering song as well. The function of this vocalization is unknown.

Nestling peep, nestling-juvenile chip, up, and chip-up. These calls seemingly serve as "hunger" indicators in communication between young thrushes and their parents. Howell (1942) mentioned a "chi-urp" call in young robins that is a "food call." *Chip, up,* and *chip-up* may indicate "location" as well.

Swit. This is possibly homologous to "tsip," a call used by young Clay-colored Thrushes (Skutch 1960, E. S. Morton, pers. comm.). Skutch stated that the young used it when parents did not bring food.

Chup, juvenile cry, and juvenile scream. Chup is apparently another type of juvenile "location" call. Juvenile cries and screams, like the adult screams, indicate fear and bring an immediate response from parents, who then mob and scold the source of danger.

Rufous-backed Thrushes are highly wary and excitable, as other researchers (Bent 1949, Andrew 1961a, Skutch 1967, Samuel 1972) have found in other turdines. In all of these studies, including my own, "alarming" circumstances elicited several different vocalizations by the birds involved. The use of most or all of the adult vocalizations, and their juvenile counterparts, seems to be correlated with fear or alarm. This is indicated not only by the situations in which the calls are given but by the postures of calling birds as well. Dilger (1956) found that the specific movements used by calling birds (species of *Catharus* and *Hylocichla*) depend on the level of conflict between the caller's tendency to attack or flee. A horizontal body position and open bill are postures of attack, while movements of the wings and tail indicate a tendency to flee. The motivational state of a calling bird is thus reflected by the type of call used and the associated body movements.

When a Rufous-backed Thrush gives *cherrp* calls, its posture appears to indicate low-intensity alarm. Posture during an *eee-ah* call probably indicates an excitement level somewhat higher than that during *cherrping.* Postures used during *eeee* calling seem to show a very high level of conflicting motivations, which is understandable because this call is used while mobbing predators.

On three occasions I noted the calls given by adult thrushes as I stood at various distances from fledglings or nests. In all cases, *cherrps* were the first vocalizations uttered as I approached and these were combined with *re-re-re-re*'s as I moved closer. When I stood in the hedge with the fledglings or at the base of the palms with nests in them, *eeee*'s, whistle calls, and/or *eee-ah*'s were added. These observations, plus those above, indicate that thrushes with low levels of motivational conflict give *cherrps,* and that *re-re-re-re*'s, *eee-ah*'s *eeee*'s and whistle calls are added as the level of conflict rises.

Marler (1955) classified vocalizations according to whether they facilitate or hinder locating the caller's position. Readily locatable calls are characterized by brevity, many changes of frequency, low frequencies, and abrupt beginnings and endings. Calls that are harder to locate have long durations, no sudden frequency changes, no discontinuities and gradual beginnings and endings. Using these criteria, I classified all calls of the Rufous-backed Thrush except the trill and nestling *peep.* Four types of vocalizations help hide the location of a calling bird: the whistle call, *eeee, eee-ah,* and *seeep.* All of the other vocalizations are more locatable. The four calls that mask a bird's position are given only when predators or conspecific rivals are nearby. The need for a calling bird not to reveal its location in these instances is obvious. The characteristics of the calls of *T. rufopalliatus,* relative to their contexts, conform well to Marler's findings in other songbirds.

SUMMARY

The Rufous-backed Thrush resembles other turdines in general habits; its food, foraging techniques, and nesting patterns are typical for the genus. Territoriality is weakly developed. The vocal repertoire consists of 10 adult and 8 juvenile sounds. Adult vocalizations include *cherrp, re-re-re-re, eee-ah, eeee,* the whistle call, song, whispering song, *seeep,* trill, and the adult scream. Juvenile calls are the *chip, up, chip-up, swit, chup, peep,* the juvenile cry, and the juvenile scream. The type of vocalization used in a specific situation apparently depends upon the degree of motivational conflict between a bird's tendencies to attack or flee. Sixteen types of vocalizations were classified as to whether they impede or aid in locating a calling bird. Only the whistle call, *eeee, eee-ah,* and *seeep* were found to hinder localization of a calling thrush.

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RECENT PUBLICATIONS

The Appendicular Myology and Phylogenetic Relationships of the Ploceidae and Estrildidae (Aves: Passeriformes).—Gregory Dean Bentz. 1979. Bulletin of the Carnegie Museum of Natural History, No. 15. Pittsburgh. 25 p. Paper cover. $2.00. Analysis of the limb muscles supplements other evidence that the Old World finches as a whole are probably monophyletic. Although this report is chiefly devoted to a necessary account of the muscles, most readers will probably concentrate on the new classification of the group that is proposed. A technical paper for anatomists and evolutionary taxonomists. Drawings of musculature and diagrams.

Die Vogelarten der Erde. 4. Lieferung.—Hans E. Wolters. [1979]. Verlag Paul Parey, Hamburg. 80 p. Paper cover. Subscription DM 38. Available: Verlag Paul Parey, 2 Hamburg 1, Spitalerstrasse 12, Postfach 106304, Germany. The fourth installment of a systematic list of the birds of the world, this part includes many oscine families, although in a somewhat novel sequence. The preceding parts were noted in this journal (78:149, 79:138, 80:456).

Handbook of the Birds of India and Pakistan. Volume 1. Second edition.—Sálim Ali and S. Dillon Ripley. 1978. Oxford University Press, Delhi. 382 p. $29.95. Hardly was the first edition of this ten-volume series completed (Condor 78:574) when the authors began revising it. This volume (loons to falcons) incorporates corrections, new information, and some taxonomic changes. Four new monochrome plates of birds of prey in flight have been added and one of the color plates has been redrawn.