

# VOCALIZATIONS OF THE RUFOUS-SIDED TOWHEE, *PIPILO ERYTHROPHthalmus OREGONUS*

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The Rufous-sided Towhee (*Pipilo erythrophthalmus*) is widely distributed in North America, ranging throughout the United States and extending well into both Canada and México. Such distribution invites studies on speciation, isolating mechanisms, the various effects of geographical isolation, and variation among subspecies and among populations within a subspecies. The sympatry that occurs between the Rufous-sided Towhee and some of the other towhees also suggests potentially significant investigations regarding speciation, some of which have been undertaken by Sibley (1950), Davis (1960), Marler and Isaac (1960), and Marshall (1964).

Several aspects of the biology of the Rufous-sided Towhee make it an ideal subject for a study of the vocal repertoire of a single individual. Such a study requires close observation, ideally conducted on birds in a cage that approximates the natural habitat as closely as possible. The race of the Rufous-sided Towhee in northwestern Oregon (*P. e. oregonus*) is nonmigratory. It nests on or near the ground, and spends most of its time on the ground, making it fairly adaptable to a confined existence. The natural diet is primarily of seeds so feeding the birds in captivity is simple. These factors, plus the distributional factors mentioned above, determined the choice of this particular species for vocalization studies.

Vocalization in birds, as in other animals, serves a variety of communicative functions. Thorpe (1961) makes a fundamental distinction between two types of avian vocalizations: songs and calls. More complex classifications have been proposed, but this simple subdivision seems most useful, and will be used in this paper with the addition of another category, quiet song (complex, very quiet vocalizations, made up of various song and call elements).

Any bird that lives in heavy vegetation, as does the Rufous-sided Towhee, would be expected to use vocal signals more extensively than visual signals. It is thus not surprising to find that the Rufous-sided Towhee is a highly voluble species, having a repertoire of many different songs and calls.

The principal objective of this study was to explore the repertoire of a single pair of adult towhees as completely as possible. The study did not include sounds made by nestling or juvenile birds, or by parent birds in connection with raising their young, and no attempt was made to explore the role of song in the life of the bird. The various vocalizations were tape-recorded and sonagrams were prepared of representative samples. An attempt was made to determine the meaning, or informational content, of each call. While this phase of the study was only partly successful, meanings have been assigned to many of the calls.

## MATERIALS AND METHODS

The towhees studied were maintained in a flight cage located on the north side of the Natural History Building, on the campus of Oregon State University, Corvallis, Oregon. An office window opened directly into the cage, and I could sit inside the office and observe the captive birds. The birds quickly became accustomed to my presence, so the window was not screened or curtained; the glass apparently provided an adequate barrier. The window was occasionally left open and on several occasions the birds entered the office. The birds were able to recognize me, but a stranger at the observation post either sent them into hiding, or produced a marked inhibition in their activities.

The cage was 7 ft high, 6 × 10 ft in floor area; it was made of a metal frame covered with ¼-inch hardware cloth. Approximately one-third of the space was occupied by a large boxwood bush (*Buxus sempervirens*), which provided dense cover from the ground to the roof of the cage. A small brush heap was piled in one corner. About 6 ft above the ground, directly above the brush heap, was a high perch that caught a maximum of sunlight during the winter months. A many-forked branch was propped against the side of the cage in an open area to provide additional perching sites. A plastic bowl held bath and drinking water.

The first male towhee was captured in a mist net on 17 January 1961 about seven miles south of Corvallis. A female was captured at the same spot on 31 March 1961. Both of these birds were members of a winter flock. The female died in July 1961 and was replaced on 27 October 1961 by a female caught in a box trap just a few feet from the flight cage. This new female was one of a pair whose territory was nearby and she had shown much interest in the captive birds, visiting the cage almost daily.

The second female adjusted quickly to captivity and was accepted by her new mate. In the summer

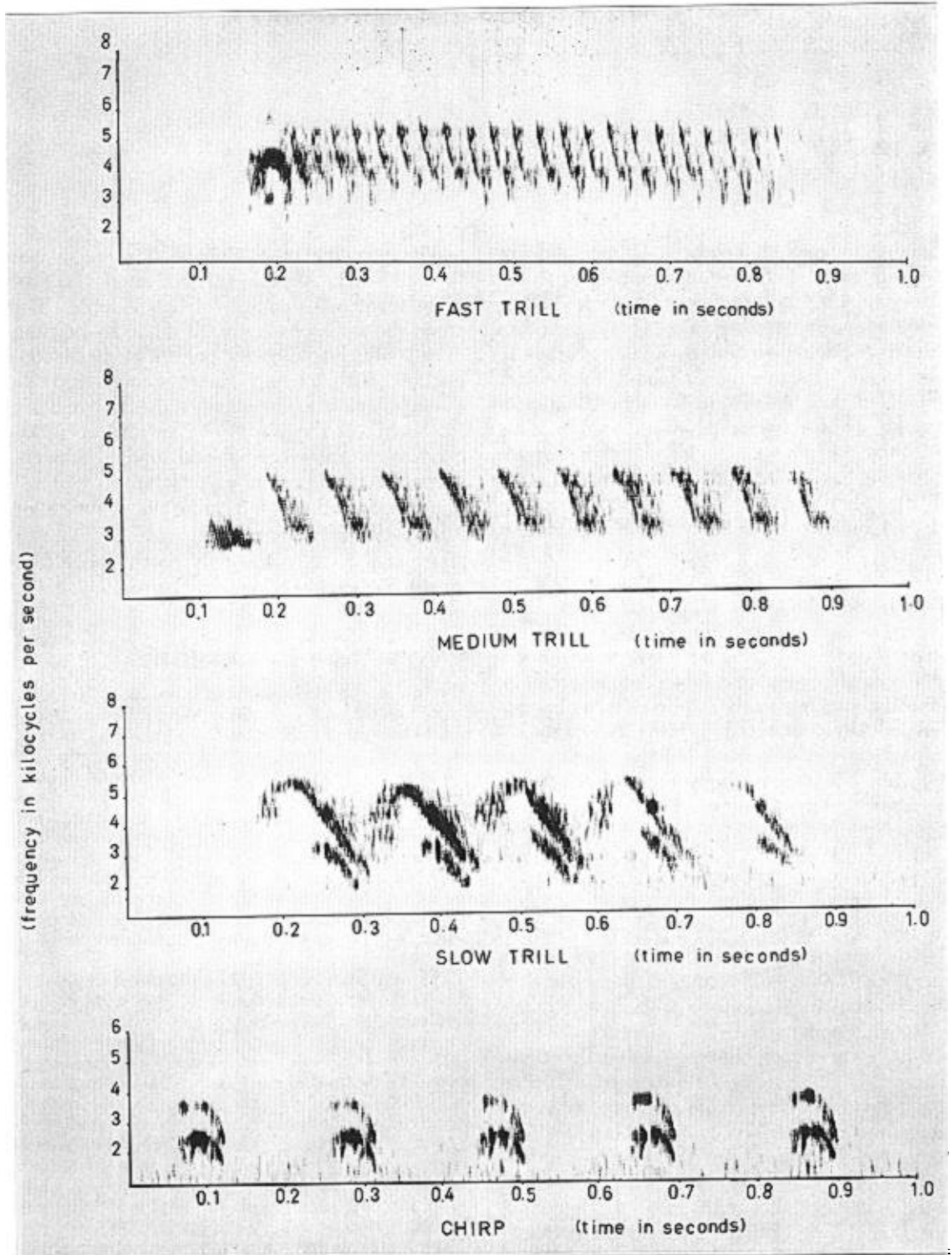


FIGURE 1. Sonograms of songs of the captive male Rufous-sided Towhee.

of 1962 they mated and nested, but no eggs were produced. For this reason the female was released in December 1962 and replaced on 10 February 1963 by a third female captured at a feeding station a few miles away. The captive male never fully accepted this substitute, and although they finally mated for the first time on 18 June 1963, no nest was ever built.

This final pair of towhees was maintained together in the flight cage until the end of July 1963. The birds were observed daily during this period, often for several hours each day. Notes were made regarding the behavior and activities of the birds in relation to their vocalizations, in an attempt to interpret the various sounds. Observations were also made in the

field to verify the occurrence of the various vocalizations under normal conditions, and in some cases these field observations gave clues to the significance of the sounds. No recordings were made in the field.

All recordings were made from the final pair of towhees, between November 1962 and June 1963. They were made with a VU Magnemite portable tape recorder, using an Altec Lansing Model 682A dynamic microphone and a tape speed of 7½ ips. The microphone was suspended from the roof of the cage and was within a few feet of any vocalizing bird.

Sonagrams of a representative series of each type of vocalization were prepared by Robert C. Stein and Donald J. Borror. The sonagrams accompanying this paper were made by Dr. Borror, using a Vibralyzer sound spectrograph; all were made with a wide-band filter.

## DESCRIPTIONS OF THE ADVERTISING SONGS

Five different song elements were recorded from the male bird, three types of trills, a chirp series, and a preliminary note. These were combined in different ways to make a variety of advertising songs. The female was never heard to use these vocalizations.

*Fast Trill* (fig. 1). The Fast Trill consisted of a series of some 20–30 bursts of sound, uttered at the rate of about 30 bursts per sec. The average duration of five trills analyzed was 0.90 sec. The Fast Trill was generally preceded by two preliminary notes, this pattern being the song most frequently used by the individual studied. The trill was sometimes used alone or preceded by a single preliminary note. This is probably the vocalization mentioned by Baumann (1959) as having a terminal “e-e-e” sound.

The first burst in the Fast Trill was louder and lower-pitched than the rest, but this was scarcely discernible to the human ear. One bird was observed in the field whose song was quite distinctive in that this preliminary low-frequency segment of the trill was prolonged and quite audible. Another towhee in the same general area had a barely perceptible pause between this initial segment and the trill proper, and the initial segment was very noticeable. Still another bird in a nearby area uttered a Fast Trill in which the initial segment was noticeably higher in pitch than the remainder of the trill.

The Fast Trill was usually sung loudly from a conspicuous perch. It was sometimes uttered quietly while the bird was foraging, and was used along with many other sounds during copulation. The quiet songs, discussed below, occasionally contained a very soft Fast Trill.

*Medium Trill* (fig. 1). The Medium Trill was made up of a series of some 10–12 bursts

of sound, uttered at the rate of about 12.7 per sec. The average duration of five trills analyzed was 0.91 sec. As in the Fast Trill, the first burst of sound included only the lower frequencies, but this could not be detected by the ear. This is probably the song to which Baumann (1959) refers when he writes of a set of songs “which end in a liquid consonant rrrrrrrrrr.”

The Medium Trill was generally used alone, or in a series of two or more different sounds alternately or at random. On one occasion a bird in the field was heard making unusual use of this sound to create a distinctive song consisting of a Fast Trill followed immediately by a Medium Trill. The result was quite unlike the usual Oregon towhee songs. This bird was seen and heard performing vigorously every morning for several days, but no female was ever seen in the area, and he then disappeared from the vicinity.

*Slow Trill* (fig. 1). The Slow Trill consisted of a series of four or five nearly identical sounds, uttered at an average rate of 6.77 per sec.

This trill appears to be the only song used by the male towhees in the field early in the spring, being sung loudly from conspicuous posts or from more or less hidden perches. Within a week or two the medium and fast trills began to be heard and the Slow Trill was heard less frequently. During this transition period, recorded Meow calls were usually answered by Slow Trills. If recorded Fast or Medium Trills were then played, the bird would respond by switching to the Fast or Medium Trill. I never succeeded in inducing a towhee to switch from a Fast to a Slow Trill.

*Chirp* (fig. 1). This vocalization is termed a Chirp because it sounded a little like the chirping of a Robin (*Turdus migratorius*). It was nearly always uttered in a series, a typical series consisting of five to seven chirps and lasting about 1 sec. It might also be described as a very slow trill.

The Chirp was used frequently by the captive male as an advertising song, for he usually sang it from the high perch, often for hours on end, frequently interspersed with the various trills. This song appeared to be used in the field to call attention to the singer.

*Preliminary Note* (fig. 2). The Preliminary Note was a clear, sharp, two-part sound, sometimes uttered singly, sometimes in pairs, and sometimes followed by the Fast Trill to make up the typical song.

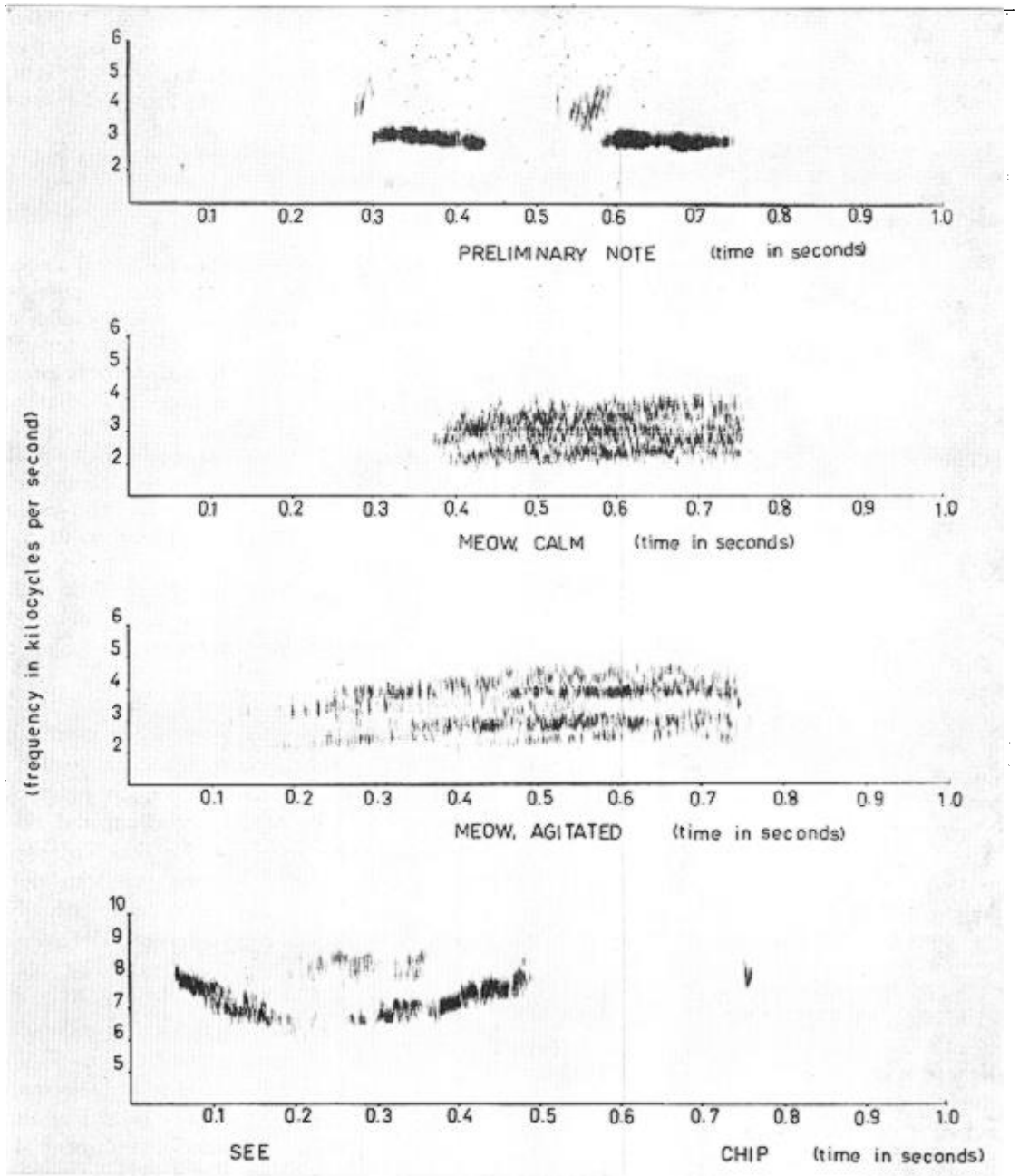


FIGURE 2. Sonograms of song elements (Preliminary Note) and calls (Meow, See, and Chip) of the captive male Rufous-sided Towhee.

The Preliminary Note was uttered frequently by the male in early spring before the full song was heard, both from singing posts and while foraging on the ground. Later, when the full song was in use, the male often used this note as a very simple advertising song, or combined it with one of the trills in various patterns to make up a more or less complex performance.

The three trills and the Chirp of the male studied may be regarded as separate points in

a continuum of songs with different modulation rates. Dr. Donald J. Borror informs me (in correspondence) that in 43 different "trills" he has recorded from Oregon towhees, the modulation rate (number of sound bursts or figures per sec) varies from 5.06 to 161.95. Any lines drawn between "fast," "medium," "slow," and "very slow" in such a series would be purely arbitrary. The male studied did not show such a continuum; his trill songs were of only four, readily distinguishable rates,

which I have termed Fast Trill, Medium Trill, Slow Trill, and Chirp. Field observations show the same thing, namely, that an individual bird utters trills of only a few readily distinguishable rates.

There are some differences between the songs of Oregon towhees and those of eastern races (Borror 1959). Songs of eastern birds nearly always consist of one or more introductory notes and a trill. Only rarely are the introductory notes or the trill uttered alone. Oregon birds frequently utter just the preliminary note or a trill. The introductory notes of eastern birds vary in number from one to four, and when there are two or more they are usually different. When the captive Oregon bird uttered two preliminary notes, they were the same. Modulation rates in the trills of eastern birds varied from about 5 to 35 per sec. About a third of the "trills" recorded by Dr. Borror from Oregon birds had higher modulation rates. Buzzy songs, rare in eastern birds, are relatively common in Oregon birds.

#### DESCRIPTIONS AND FUNCTIONS OF THE CALLS

Call notes are believed to be mainly of a communicative nature, each conveying certain information and understood by other birds of the same species, and perhaps, as in the case of certain alarm calls, by birds of other species. Nine different calls were recognized and recorded from the captive birds.

*Meow* (fig. 2). The Meow is perhaps the most familiar of all Oregon towhee sounds and is the call that has caused some westerners to give this bird the nickname "catbird." It is perhaps the most variable of the towhee calls. It apparently serves primarily as an attention-getter, and has been interpreted to mean "I see you," or "Look at me" (Baumann 1959). It may serve as a general alarm call as well. These interpretations are supported by observations of the captive birds.

Alarm or agitation was expressed in the Meow call by an increased rate and an increase in the duration and total frequency range, with the agitated Meow being uttered at a faster rate (up to about one call every  $1\frac{3}{4}$  sec), and having a harsher sound. Analyses of 10 agitated Meows showed an average duration to be 0.652 sec, while the average duration of nine calm Meows was 0.564 sec.

The following incidents illustrate the use of the Meow as a general alarm call.

31 May 1962. On this evening, just before dark, the male began calling "Meow," loudly, sounding quite agitated. He moved about constantly, flying

very little but walking in the open area, jumping onto several low perches, also using the high perch. Investigation showed that a cat was crouched on top of the cage. It was chased away, and the towhee was immediately calm again, and quiet.

14 October 1962. I went to the window to toss out some food, not realizing that the male was foraging just out of sight beneath the window. I apparently took him by surprise, for the sudden motion of my hand above him caused him to fly up with a "Meow." He flew to the perch where he called loudly, "Meow, Meow," several times more. A few moments later, when I had closed the window, he flew down and began to feed quietly.

The following incident illustrates the use of the Meow strictly as an attention-getter ("Look at me").

17 May 1962, 09:35. The female had been ill all morning. She lay on the ground, all hunched together, looking more dead than alive. At 09:00 she stood up, ate a few seeds, then sagged to the ground again. At 09:30 she drank some water, then returned to rest beneath the shelter of the bush. The male was constantly solicitous, inspecting her closely on repeated occasions.

As he was singing from the high perch, I changed their bath water. As usual, the male came at once to enjoy a bath, but this was no ordinary bath. Always before he had been completely silent while bathing, but on this occasion his ablutions were punctuated by many Meow calls. Moreover, the bath continued more than twice as long as usual. It sounded for all the world as if he were trying to cajole his mate into joining him.

After the bath he flew into the top branches of the bush where he cavorted in the sunshine, still calling frequently, for about 10 min. Normal procedure calls for silence during the sunning process as well as during the bath.

The female also utters the Meow call, but does not use it as often as does the male. The Meow apparently serves basically to indicate the presence of some disturbing factor. The context in which it is used, and perhaps some variation in the call itself, may serve to indicate more specifically just what is producing the disturbance, whether it is the presence of an enemy or simply general dissatisfaction with the current state of affairs.

*See* (fig. 2). The See is a soft, high-pitched, sibilant sound. There may be a rising or falling inflection, the tone may waver, or it may continue as a single steady note. It was always uttered singly; if repeated it was not in rapid series. It was heard at frequent intervals from both sexes, especially while they were foraging on the ground. I interpret it as a contact call.

*Chip* (fig. 2). This was a single, high, sharp note, fairly soft but clear, and carrying well. It was always repeated several times in rapid succession. The incidents noted below serve to indicate the meaning of this call.

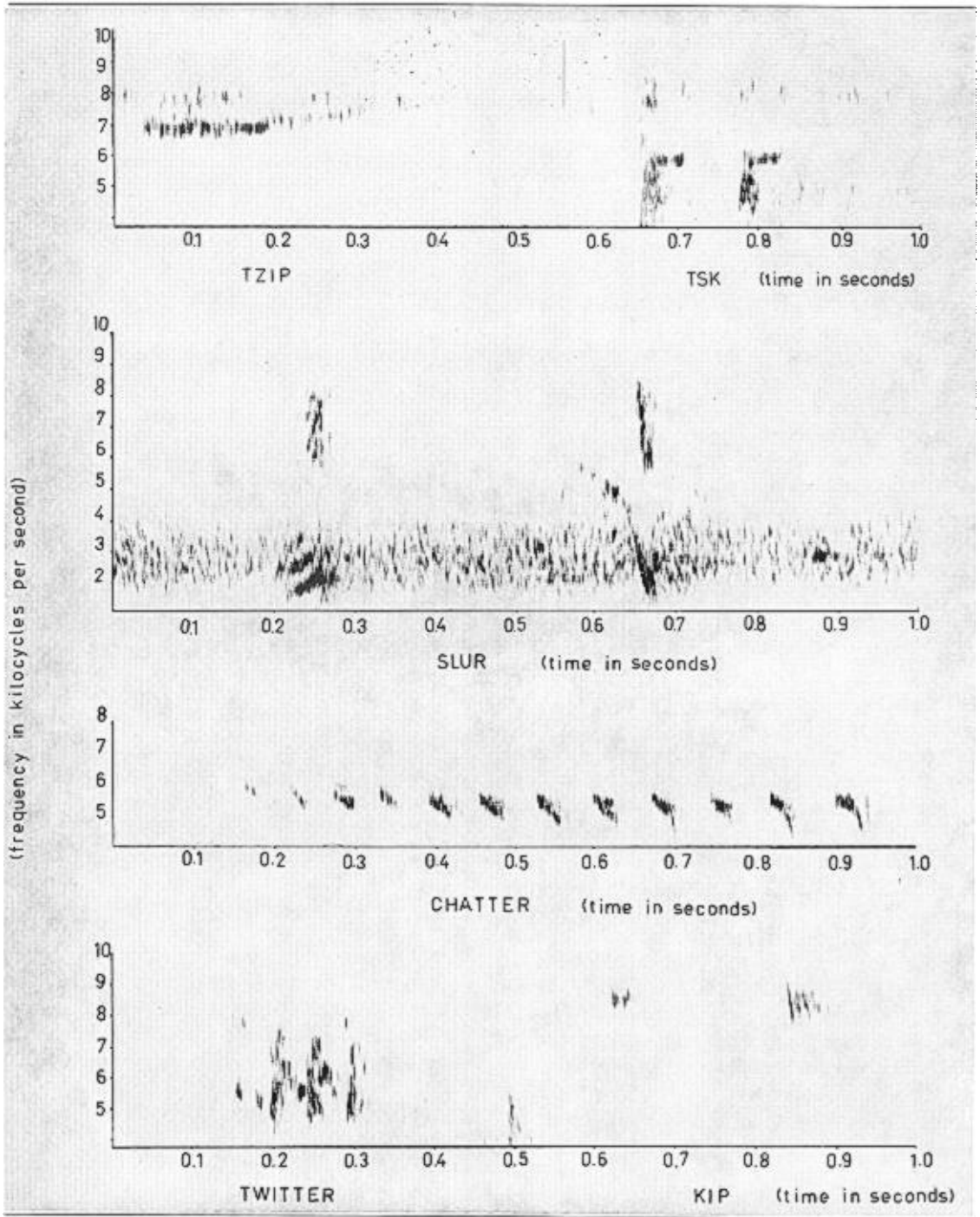


FIGURE 3. Sonograms of calls of the captive Rufous-sided Towhees. The Chatter and Kip were recorded from the female, the others from the male.

11 December 1962. A female towhee was captured in a box trap, in which she hopped wildly about until a cloth was used to cover the trap. She then remained quiet until the trap was picked up. Upon perceiving the motion, she called out several times, a very high, sharp, "Chip, chip, chip."

11 December 1962. The captured female was taken into the museum workroom in order to make tape recordings of this sound. I held her in my hand,

whereupon she called loudly, 10 times in rapid succession, "Chip, chip, chip, . . ." ceasing when she escaped from my hand.

The Chip is apparently used to express acute fear, or to warn of sudden danger.

*Tzip* (fig. 3). The *Tzip* was a single, brief, high-pitched note that was sometimes uttered

in a series, but never in rapid succession and seemed to indicate impatience or frustration. It was always very soft, but clear, sounding like a very short *See*. The following incidents illustrate the towhee's use of the *Tzip*.

28 June 1962. The female was trying to get something just outside the cage on the ground, possibly an insect, or a sunflower seed. She ran swiftly back and forth, three or four steps each way, made scratching hops at the edge of the wire mesh wall, reached through the wire with her beak, continuing all this activity for several minutes. At intervals she called "*Tzip*." The male stood just a few inches behind her, looking on with great interest.

14 October 1962. The food supply had not been replenished for two days, so both birds were presumably hungry and would be particularly eager for their favorite tidbits, sunflower seeds. I placed a handful of seeds and rolled barley just outside the cage. The male approached at once and ate two seeds and two flakes of rolled barley, which were all he could reach through the wire mesh. He attempted to reach the rest of the food, scratched around the area for a few minutes, then gave up to forage elsewhere. At that the female approached the area, but was unable to reach anything. She called "*Tzip . . . Tzip . . .*" at fairly long intervals as she scratched about in the area. Her calling continued for three or four minutes, even after she returned to foraging in a more productive spot.

*Tsk* (fig. 3). The *Tsk* was short, sharp, sibilant, and very soft; it was uttered with the mouth closed, often accompanied by marked chest movement. The sonagrams show its duration in each of three cases to be 0.06 sec. It is a curiously split tone, with the peculiar quality of dripping water.

The *Tsk* is frequently used as a component of the quiet songs; when used alone it seems to serve as a simple little quiet song.

*Slur* (fig. 3). The slur was a husky gurgle or a chuckling sound. Baumann (1959) speaks of a sound interpreted as "oikswée" or "uckstree" or "youksee," that is probably this call. This may be the sound referred to by Allard (1929) when he describes the "bubbling song" of winter and spring. It was always soft, so that the beginning and ending were often quite inaudible. The Slur was used primarily as a part of the quiet song, but was occasionally used alone, as in the following examples.

19 May 1963. This morning, while checking mammal traps, I spent several minutes searching for a trap which was set in a thicket near an active towhee nest. Both birds were excited by my presence, flying about, the male calling "*Meow*" many times. When I moved on to the next trap, I again had to spend some minutes searching for it, still fairly near the vicinity of the towhee nest. During this time the birds were fairly quiet, not moving about, but I heard the male vocalizing repeatedly, very softly, the Slur note.

19 June 1963. The captive male was singing from the high perch, while the female perched in the shrubbery near the ground. She began to call softly, "*Meow, slur, meow, slur, meow, meow.*" This was followed by a short invitational Chatter, to which the male responded immediately. However, she eluded him, and he returned to his singing. She remained quiet except for an occasional Slur note.

The Slur is an important component of the quiet song, where it seems, much of the time at least, to have a happy connotation. When it is uttered singly it seems to imply mild distress, frustration, or dissatisfaction.

*Chatter* (fig. 3). The Chatter was a very rapid twittering sound, usually quite soft, and generally all on about the same pitch. The body was often in the peculiar mating posture during utterance of this call, with the head and tail raised and the back arched. The entire body usually vibrated with the sound. The individual sounds in the Chatter were uttered at rates of 10–15 per sec; a given series lasted only a small fraction of a second, or several seconds. Two instances when the Chatter was used are described below.

12 May 1962. The female perched on a branch, holding a large dry leaf in her beak. She arched her back and began to chatter. The male approached, and copulation occurred. The vocalization continued, with decreasing intensity, for about 30 sec longer.

17 May 1962. The female towhee was ill today, and the male appeared quite concerned. Late in the morning I heard the invitational Chatter, which heretofore had been heard only from the female. On this occasion it was the male, standing on the ground, crouched a little, with head and tail raised in the typical female mating posture. His body did not quiver. The call was sustained for a full minute, after which he picked up a twig and repeated the performance, still standing on the ground. Next he jumped onto the brush pile, carrying the twig in his mouth, and "invited" a third time. Then he flew to his high perch, dropping the twig, and began to sing. Throughout all this the female lay prone on the ground, quite unresponsive.

The Chatter is undoubtedly an indication of sexual readiness, and it is used to indicate to the mate a readiness for copulation. Ordinarily it was the female that used this call to invite the male, but the roles were sometimes reversed. When the male used the invitational Chatter he assumed the female stance during vocalization. The Chatter of the male was never observed to arouse the female, but the female Chatter was usually effective in arousing the male.

*Twitter* (fig. 3). The Twitter was a brief, soft call, with something of a buzzing quality. The entire body sometimes vibrated when this sound was produced; at other times there was no body motion whatever. This pleasant note was used primarily as a part of the complex

quiet songs. When used alone it seemed to be just a simple quiet song.

*Kip* (fig. 3). The *Kip* was heard from the female on several occasions immediately after copulation. The notes occurred in a prolonged series lasting several seconds, with the rate at the beginning about one call per second. Both volume and rate gradually diminished until the sound finally died away.

No conclusion was drawn as to the meaning of this note, except that it seems to be a means of releasing excess energy. The period immediately after copulation varied greatly with regard to vocal expression by the female; it was completely silent, or punctuated with a *Kip* note series, a continuation of the *Chatter*, a series of *Meows*, or a complex song.

All of these calls except for the *Kip*, which was heard only from the female, were uttered by both sexes. I have never heard an Oregon towhee utter the "tawee" or "chewink" call (from which this bird gets its name) that is so common in eastern races of this species.

## QUIET SONGS

The term quiet song is used here for a varied assortment of advertising songs (or parts thereof) and calls uttered at a very low volume, with the various sounds separated by shorter silent intervals than when uttered at normal volume. These vocalizations might also be termed "whisper" songs, but this latter term has been used for soft vocalizations that have various connotations. The quiet songs were quite varied, being made up of different song elements and calls combined in a variety of ways; practically every sound the towhee can utter (except the *Chip*, *Chatter*, and *Kip*) has been heard in these songs. Quiet songs were sung with the beak closed, and the bird often engaged in some other activity, such as foraging or feeding, without interrupting the song.

The male bird studied had some favorite combinations repeated often enough to be recognizable as specific quiet songs. One such combination consisted of a rapid series of 5–10 *Chirps* followed by a low *Twitter*. Sometimes the *Chirps* were given so close together that they formed a sort of warbling sound. This song was heard dozens of times, sometimes continuously for as long as an hour, throughout February and March, and it was still used occasionally in July. The male usually perched in the bush, where it was well hidden but could look out toward the street during the performance. He was often so still while singing that it was difficult to determine

the source of the song. He also sang this song while walking about on the ground, moving in the foliage, or foraging.

Another characteristic quiet song by the male might be described as a "serenade" song, as shown by the following observations.

3 March 1963. The male had not accepted his new mate, obviously preferring his previous mate which kept returning to the cage after her release. On this date she flew past the cage, as usual throwing the male into great agitation. He flew to the high perch and there performed a long, soft serenade which was a complex song made up of three separate sounds: *Chirp*, *Tsk*, and the *Slur* note. Occasionally a *See* was interpolated. In its typical form the song was "Chirp, Chirp, Chirp, Chirp, Chirp, *Tsk*, *Slur*, *Tsk*, *Tsk*, *Tsk*." There were some slight variations in this pattern. Soon the visiting female returned to the flight cage, and the male flew to the ground where he promenaded with her along the edge of the cage, back and forth, with the wire mesh between them, singing all the while. The entire performance lasted some 15 min.

The quiet songs heard from the female were always amorphous, complex, and never followed any consistent pattern. Neither were there any simple repeatable songs as was the frequent case with the male. The following observations illustrate the singing of quiet songs by the female.

28 June 1963, 15:15. The day had been cool, with occasional showers and some sunshine. At the time of this observation it was cloudy but not raining. The male was on the high perch, singing his fast trill, while the female was walking about on the ground, foraging intermittently. She vocalized constantly, a very soft, very complex song. It was sweet and musical but lacked continuity, and it was so complex as to seem garbled. The song was recorded on tape and studied. The notes that could be recognized included the following:

(1) *Meow*; (2) *See*, variously inflected, some very long and steady; (3) *Slur* note; (4) *Tsk*; (5) series of single high notes, similar to the *Chip*; (6) brief *Chatter*; (7) *Twitter*, and (8) a slow, metallic, warbling sound.

Thorpe (1956:354–355) discussed subsong in the immature male Chaffinch (*Fringilla coelebs*), apparently equating this phenomenon with at least some of the quiet songs found in adult birds of other species. He stated that this is "clearly a low-intensity phenomenon linked in some way with a low but rising sex hormone production." He also suggested that this type of performance is "characteristic of sub-maximal motivation—either (a) appearing before the drive has built up to its full intensity, or (b) being dependent on the low-intensity motivation remaining when the consummatory act or situation has been early or easily attained."

Neither of these situations (a and b above)



TABLE 1. A continuous vocal performance of the captive male Rufous-sided Towhee, 11:40–11:55, 24 April 1963, during a light rain.

Activity or position	Vocalization	Number
On high perch	Meow	11
	Tsk (soft)	1
	Meow	3
	Tsk (soft), slow trill	2
	Meow	2
Flies to bush	Tsk (soft), slow trill	2
	Soft full song	2
	Tsk (soft), slow trill	1
	Soft full song	1
	Tsk (soft), slow trill	1
	Tsk (soft)	2
	Tsk (soft)	3
Feeds on ground	See (soft)	1
	Chirp	6
	Tsk (soft)	1
	Chirp	6
	Fast trill	1
	Chirp	6
	Tsk (soft), Chirp	4
	Fast trill	1
	Tsk (soft), Chirp	2

appears quite applicable to the quiet songs of the adult towhee. These songs are heard during the winter (situation a), but they continue throughout the spring and well into the summer. Situation b may apply to birds in captivity, whose needs are supplied with minimum effort by the bird, with the result that there is surplus energy to be used in this otherwise purposeless singing; but these quiet songs are also heard in the field, having been reported by several observers. Barbour (1941) mentioned an unusual song with a complex, elusive melody. Galloway (1897) described a "lengthy, fragmentary, soliloquizing song." Dawson (1903) said that this soliloquy "baffles any attempt at a description," and Allard (1928) observed a courtship scene accompanied by these "very low, sweet complicated windings, composed of the briefest notes."

Quiet songs in the towhee are not just a building up to a more intense full song. On several occasions the advertising song and quiet songs were intermingled in a brief singing period. The vocalizations during one such period are tabulated in table 1. This sort of variation can scarcely be attributed to changing hormone levels. Neither is it likely that changes in drive intensity account for changes in the type of vocalization uttered (loud or quiet), for both types occur in the excited vocalizing that often accompanies copulation (see table 2).

It is possible that the quiet songs are simply an outlet for excess energy and serve no communicatory function, but if so it remains

TABLE 2. Sounds uttered by the male Rufous-sided Towhee in less than 5 sec during and immediately after copulation 19 June 1963. The calls are listed in the order in which they were uttered, and were obtained from a recording.

Call	No. of Times Repeated
Tsk (soft)	1
See (soft)	1
Tsk (soft)	2
Chirp (loud)	7
Tsk (soft)	1
Chirp (loud)	2
Tsk (soft)	1
Medium trill (loud)	1
Slur (soft)	1

to be explained why the towhee finds so many different outlets. Vocalizations containing no information (Smith 1963) would be confusing to a bird, as they would obscure the informational content of communicatory sounds. One would expect that natural selection would act to remove any meaningless vocal embellishments, thus clarifying the meaningful vocalizations. Since this has obviously not occurred in the towhee, it would appear that either these quiet songs serve some (unknown) communicative function or they serve some function other than to convey information.

## SUMMARY

The purpose of this study was to explore, by means of tape recordings and audiospectrographic analyses of the recordings, the repertoire of vocalizations of a captive pair of Rufous-sided Towhees. Sounds of nestlings, juveniles, and adult vocalizations connected with parental care were not studied, nor was any attempt made to study the functions of the songs. Meanings were assigned to a number of the calls.

Five advertising song components were heard from the male only: Fast Trill, Medium Trill, Slow Trill, Chirp, and Preliminary Note. Individual songs consisted of just one of these components, or of one or two preliminary notes followed by a trill.

Nine different calls were heard from the birds studied; all but one (the Kip, heard only from the female) were uttered by both sexes. These calls, with the meanings when known, were as follows: (1) Meow, usually indicative of a disturbance; (2) See, highly variable but always soft, presumably a contact call; (3) Chip, indicative of intense fear or alarm; (4) Tzip, always soft, indicative of frustration or impatience; (5) Tsk, very soft, a frequent component of quiet song; (6) Slur, always soft, an important component of quiet song,

also indicative of mild distress; (7) Chatter, indicating a readiness for copulation; (8) Twitter, always soft, used mainly in quiet song, and (9) Kip, a post-copulatory note, heard only from the female.

Quiet songs were the very soft, usually complex vocalizations of both sexes, sung with the beak closed and heard only at very close range. They probably serve some function other than to convey information.

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