

SONGS OF THE THRUSHES (TURDIDAE), WRENS (TROGLODYTIDAE), AND MOCKINGBIRDS (MIMIDAE) OF EASTERN NORTH AMERICA

DONALD J. BORROR

Department of Zoology and Entomology, The Ohio State University, Columbus 10

During the preparation of a phonograph record of the songs of eastern thrushes, wrens, and mockingbirds (Borrer and Gunn, 1963), I had an opportunity to study several hundred recordings of these birds, from 15 states of the United States and several provinces of Canada. Many of the songs in these recordings were analyzed by means of a Vibralyzer sound spectrograph, and the graphs obtained revealed many details of the songs and their variation. The purpose of this paper is to present brief accounts of the songs of these birds, based primarily on a study of recordings. Brief descriptions of these songs are given in many bird guides (e.g., Peterson, 1947), and in books on bird song (e.g., Saunders, 1951; Arlton, 1949); references to papers on the songs of individual species or groups are cited in the following accounts.

The majority of the recordings studied were made by me, and are in the collection of recorded animal sounds of the Department of Zoology and Entomology, The Ohio State University; additional recordings were loaned to me by Dr. William W. H. Gunn of Clarkson, Ontario.

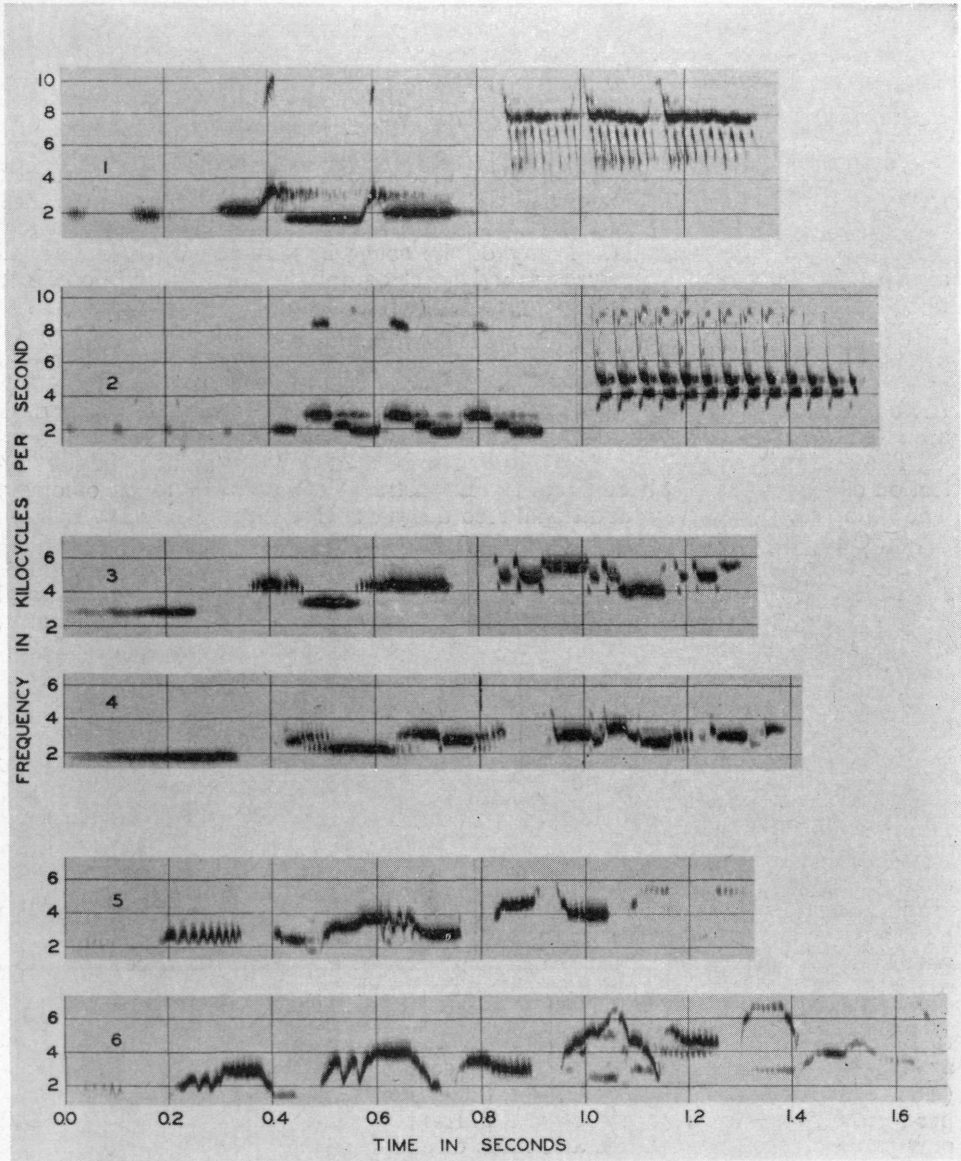
The term "song," as used in this paper, refers to what is usually described as the advertising or territorial song, which is usually uttered only by the male, and which is usually more complex in character than the bird's various call notes. In a few cases, reference is also made to some of the more commonly heard calls of these birds.

References such as "(II-5)" in the figure legends indicate that the graph is of a song on the record mentioned above (Borrer and Gunn, 1963); II-5 would indicate that the song graphed is the fifth song in the second example of that species on the record.

SONGS OF THE THRUSHES (TURDIDAE)

The songs of the thrushes in the genus *Hylocichla* have long been considered among the most musical of bird songs, and studies of them with a sound spectrograph (Borrer and Reese, 1956a; Borrer, 1961; Stein, 1956) have shown them to be quite complex. Each bird generally has a repertoire of two or more song patterns, but these patterns are usually not sung in any fixed sequence; the songs of different individuals are usually a little different.

Wood Thrush (*Hylocichla mustelina*) (fig. 1-2). Wood Thrush songs are 1.5 to 2 sec in length, and are generally sung at the rate of 12 to 15 per minute. They are typically three-parted. The first part consists of 1 to 4 (usually 2 or 3) short (0.04 to 0.07 sec in length), low, weak, buzzy notes, uttered at the rate of 8 to 10 per second; this part is often not heard unless the bird is fairly close. The second part of the song is the loudest and most distinctive part, and consists of 2 to 10 or 12 notes; these notes are usually all different, but in some songs this part contains repetitive elements. The notes in this part are usually clear whistles or buzzy, and their pitch changes usually follow our musical scale. The third part is a rapid series of complex notes that are generally very high-pitched or very low-pitched and often weak; this part usually sounds buzzy. Each bird has two or more variations of each part of the song, and these are combined to produce a number of different song patterns; the most patterns found in the songs of one bird was 24.



FIGURES 1-6.— Audiospectrographs of thrush songs.

FIGURE 1. Wood Thrush (I-6), Franklin Co., Ohio, July 2, 1954.

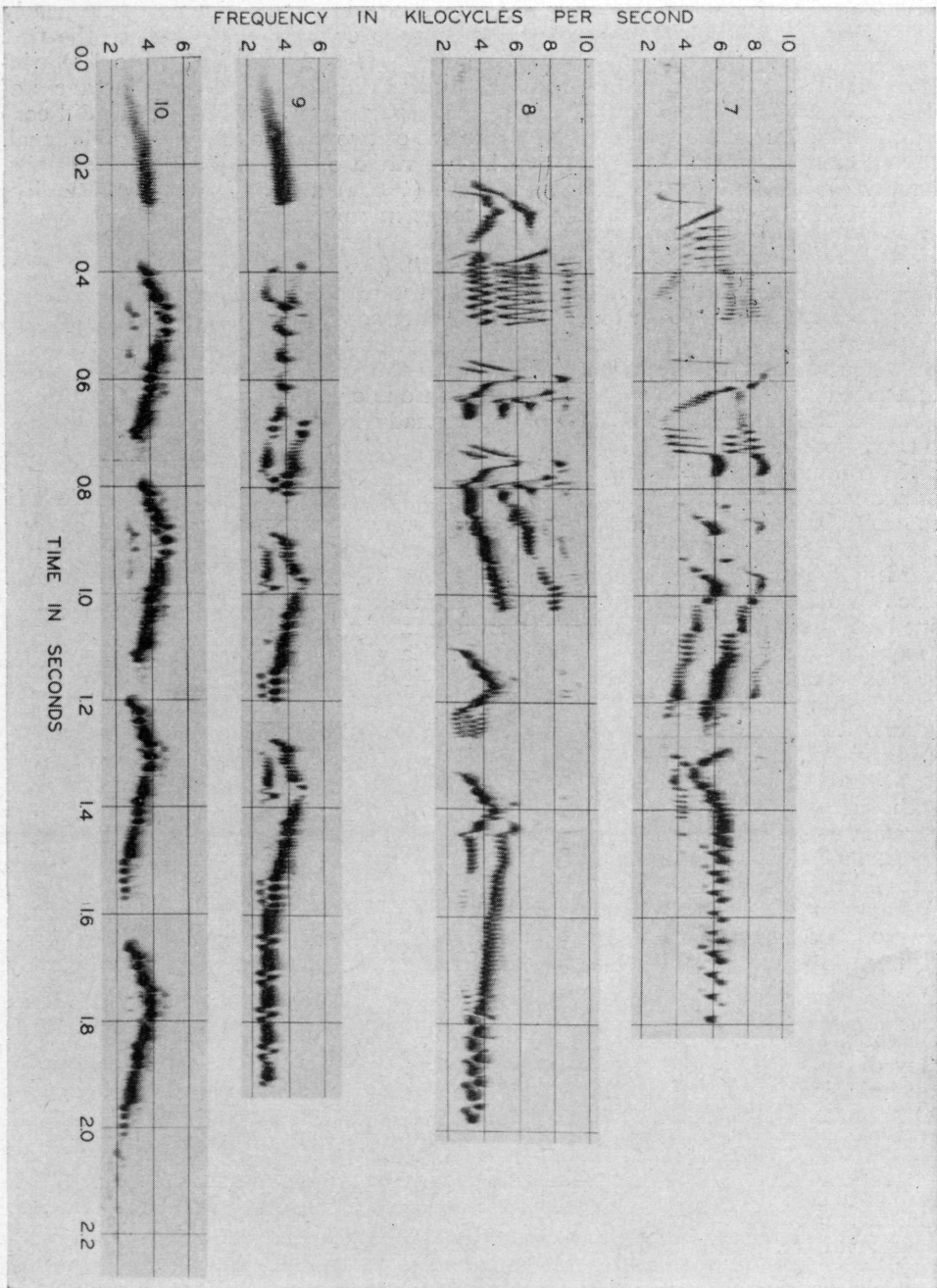
FIGURE 2. Wood Thrush (I-7), the next song of the same bird as in fig. 1.

FIGURE 3. Hermit Thrush (I-1), Lincoln Co., Me., July 19, 1956.

FIGURE 4. Hermit Thrush (II-6), Lincoln Co., Me., July 25, 1956.

FIGURE 5. Swainson's Thrush (I-2), Lincoln Co., Me., June 21, 1957.

FIGURE 6. Swainson's Thrush (III-1), Laurentides Park, Quebec, July 12, 1956.



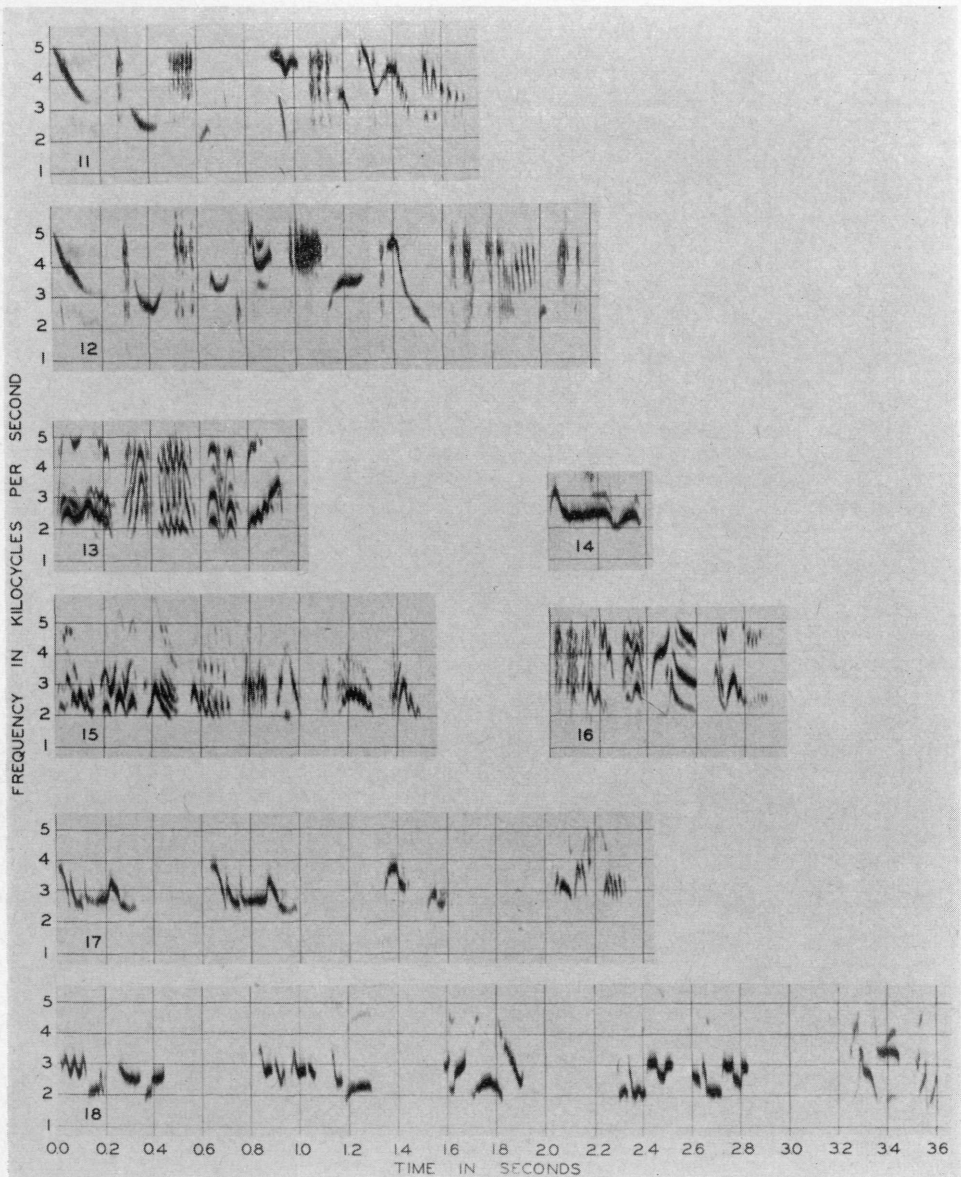
FIGURES 7-10. Audiospectrographs of thrush songs.
 FIGURE 7. Gray-cheeked Thrush (III-4), Mt. Mansfield, Vt., June 12, 1962.
 FIGURE 8. Gray-cheeked Thrush (II-5), Churchill, Manitoba, June 20, 1958.
 FIGURE 9. Veery (I-1), Lincoln Co., Me., July 1, 1958.
 FIGURE 10. Veery (II-5), Lincoln Co., Me., June 27, 1955.

These patterns are not sung in any fixed sequence, but successive songs are nearly always different. A given bird usually has two or three variations of the first part of the song, four to seven variations of the second part, and up to 12 variations of the third part. The recordings studied did not contain any instances of two birds with all three parts of any of their song patterns identical, but did contain instances of two or more birds having one or two parts of their songs identical. Descriptions of wood thrush songs and their variations, with audiospectrographs, have been published by Borror and Reese (1956a) and Stein (1956); Saunders (1961) has also described wood thrush songs in some detail, illustrating his descriptions with line graphs.

Hermit Thrush (*Hylocichla guttata faxoni*) (fig. 3-4). Hermit Thrush songs are 1.5 to 2 sec in length, and are sung at the rate of 6 to 8 per minute. The songs are typically two-parted. The first part consists of a single long (0.25 to 0.35 sec in length) clear whistled note that is steady in pitch, or (rarely) two such notes, the second a little higher in pitch than the first. The second part consists of a rapid series of notes that are grouped in one or two phrases. Nearly all the notes in the second part of the song are steady in pitch (only rarely are there slurred notes), and they vary in length from 0.01 to 0.10 sec. The second part often contains rapid series of two- or three-note groups, with the individual notes as short as 0.01 sec. The first note of the song is generally the lowest in pitch in the song, and the pitch range of the entire song is usually less than an octave; the pitch trend through the second part varies, but it is never consistently upward. The final notes are weaker than the rest, and often sound echolike. Each bird has a repertoire of several different song patterns (the most found in one bird was 13); these patterns are not sung in any fixed sequence, but successive songs are usually different. Some songs (of a given bird) are an octave higher in pitch than others. Descriptions of hermit thrush songs, with audiospectrographs, have been published by Stein (1956) and Borror (1960); Wing (1951) described the five patterns of a Yukon bird, using musical scores.

Swainson's Thrush (*Hylocichla ustulata swainsoni*) (fig. 5-6). The songs of this thrush consist of a series of 3 to 8 phrases, most of which rise and fall in pitch, with successive phrases often reaching higher frequencies so that the general effect is a rise in pitch through the song. The first phrase or two are generally weak, and the final one or two phrases are weak, high-pitched, and echolike. Each bird has three to six different song patterns which, in some birds at least, are sung in a fairly regular sequence. These different patterns usually differ in only one or a few phrases (with the other phrases the same in two or more patterns); the patterns of a given bird are very similar, and one must listen closely to realize that the songs are not all alike. The songs of this thrush differ from those of the Hermit Thrush in lacking the long steady note at the beginning of the song, and the different song patterns of a given bird are much more similar; they differ from those of the Veery in having the pitch trend through the song upward (downward in the Veery), and the quality is much less buzzy or wheezy. A Swainson's Thrush generally sings at the rate of 6 to 8 songs per minute. A description of the songs of this species, with audiospectrographs, has been published by Stein (1956).

Veery (*Hylocichla fuscescens*) (fig. 9-10). Veery songs are usually two-parted. The first part consists of a single up-slurred buzz about 0.25 sec in length, and the second part consists of 1 to 6 (usually 3 or 4) buzzy or trilly phrases uttered at the rate of about 2.5 per second. The first two phrases in the second part are usually very similar; the last two are lower in pitch, and the last phrase is usually prolonged by a rapid series of alternating pitch. The pitch trend through the second part of the song is downward. Most birds have two slightly different song patterns (one bird studied had four), which are not sung in any fixed sequence. The patterns of a given bird differ in the character of the phrases in the second



FIGURES 11-18. Audiospectrographs of songs of Turdidae.

FIGURE 11. Wheatear (I-6), Frobisher Bay, Baffin Island, Canada, June 17, 1961.

FIGURE 12. Wheatear (I-1), a song of the same bird as in fig. 11.

FIGURE 13. Eastern Bluebird (III-2), York Co., Ontario, early May, 1953.

FIGURE 14. Eastern Bluebird, flight call (IV-3), Delaware Co., Ohio, April 14, 1953.

FIGURE 15. Eastern Bluebird (II-10), Franklin Co., Ohio, April 27, 1956.

FIGURE 16. Eastern Bluebird (I-4), Franklin Co., Ohio, March 4, 1956.

FIGURE 17. Robin (II-1), Franklin Co., Ohio, April 15, 1955.

FIGURE 18. Robin (IV-4), Big Trout Lake, Patricia District, Ontario, July 5, 1960.

part; the differences between patterns are very slight, and are often not distinguishable by ear. A Veery usually sings at the rate of 6 to 8 songs per minute. A description of the songs of this species, with audiospectrographs, has been published by Stein (1956).

Gray-cheeked Thrush (*Hylocichla minima*) (fig. 7-8). The songs of this thrush are more or less two-parted; they consist of one or two scoldlike notes (the first part), followed by a series of five or six complex phrases (the second part). Most of the phrases in the second part contain buzzy elements, and their general quality is rather wheezy, reminiscent of someone sharpening a scythe. Each bird appears to have from 2 to 7 different song patterns, which are sometimes sung in a regular sequence; these different patterns generally differ in only two or three of their phrases, and hence are quite similar to the ear. This thrush usually sings at the rate of 6 to 8 songs per minute. A description of the songs of this species, with audiospectrographs, has been published by Stein (1956).

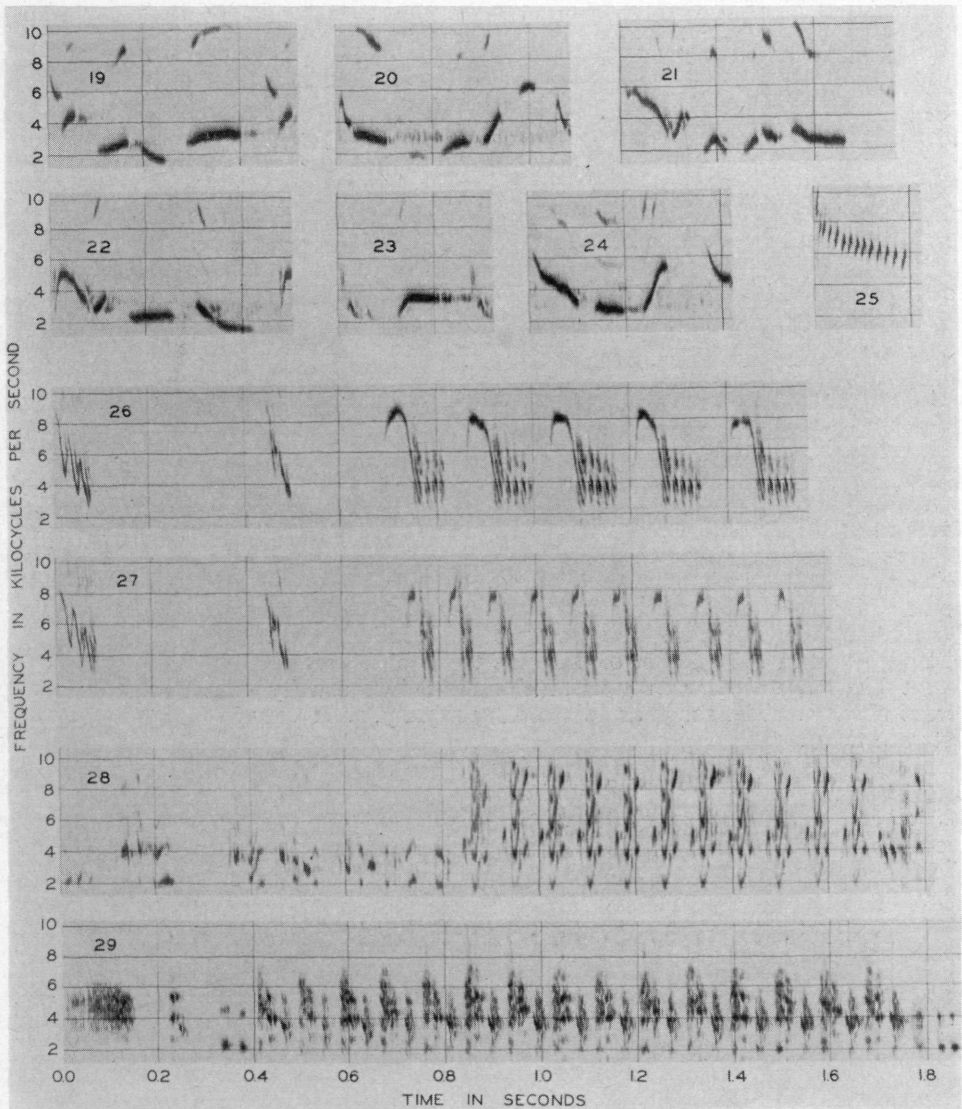
Eastern Bluebird (*Sialia sialis*) (fig. 13-16). Songs of this species might be described as a warble with a somewhat nasal quality. Individual songs vary in length from about 0.5 to 3 sec, and are uttered at the rate of about 20 per minute; the songs in some cases are nearly continuous. Individual songs contain from 3 to 15 phrases uttered at rates of about 4 to 7 per second; the silent interval between phrases is very short, and the phrases often sound run together. Most phrases are one- or two-noted (some may contain several notes); most notes are rapidly slurred or wavering in pitch, and often sound nasal or buzzy; relatively few phrases contain clear whistled notes. Some songs begin with 2 to 4 short harsh notes, usually uttered too fast to count. Each bird has a vocabulary of up to three dozen or more different phrases, which are arranged to form up to 15 or more different song patterns; some phrases or phrase sequences may occur in more than one pattern. The different song patterns are not sung in any fixed sequence, but successive songs are usually different. The phrases of different birds are similar, but usually not identical. A common call, usually uttered in flight, is a clear wavering whistle (fig. 14); this whistle is very similar in different birds.

Robin (*Turdus migratorius*) (fig. 17-18). The song is a series of phrases uttered at the rate of about 85 to 110 phrases per minute. Most phrases are loud and clear, with a warbled quality; a few are high-pitched and buzzy. The song is generally long-continued; the phrases are uttered in series of from 2 or 3 up to 20 or more; the pauses between series are of varying length. Individual phrases contain from one to several notes; most phrases contain three or four notes, and some contain repetitive elements. Most notes are slurred; a few are wavering in pitch, and a few are buzzy. Each bird has a vocabulary of a dozen or more phrases (the most found in one bird was 21); these are generally not sung in any definite sequence, but sequences of two or three specific phrases frequently appear in a bird's singing. Successive phrases are nearly always different in some birds, while in others a given phrase is sometimes uttered two or three times in succession; alternate phrases are often identical. The phrases of different birds are usually a little different.

Wheatear (*Oenanthe oenanthe leucorhoa*) (fig. 11-12). The song is a rapid series of notes, most of which are harsh, buzzy, and non-musical; the general effect is somewhat stuttering. The song usually begins with a short down-slurred note, and the clear notes in the song are usually slurred. The songs of a given bird vary in length (from about 1 to 3 seconds) and in the particular notes they contain; most songs begin with a characteristic sequence of notes, with the principal variation in different songs being in the last part of the song.

SONGS OF THE WRENS (TROGLODYTIDAE)

The songs of different species of wrens have relatively little in common. Some species (marsh and house wrens) have songs that are rattly or trilly and not very



FIGURES 19-29. Audiospectrographs of wren songs.

FIGURES 19-24. Individual phrases of Carolina Wren songs.

FIGURE 19. (I-9), Delaware Co., Ohio, May 11, 1956.

FIGURE 20. (I-12), Kanawha City, W. Va., May 8, 1962.

FIGURE 21. (I-8), Columbus, Ohio, March 31, 1957.

FIGURE 22. (I-10), Franklin Co., Ohio, April 28, 1957.

FIGURE 23. (I-13), Tallahassee, Fla., May 1, 1962.

FIGURE 24. (I-15), Franklin Co., Ohio, April 29, 1959.

FIGURE 25. Carolina Wren, call (III-2), Columbus, Ohio, April 7, 1957.

FIGURE 26. Short-billed Marsh Wren (I-1), Delaware Co., Ohio, May 17, 1958.

FIGURE 27. Short-billed Marsh Wren (II-5), Delaware Co., Ohio, May 17, 1958.

FIGURE 28. Long-billed Marsh Wren (I-2), Bloomville, Ohio, May 17, 1958.

FIGURE 29. Long-billed Marsh Wren (II-2), St. Marks Wildlife Refuge, Wakulla Co., Fla., March 22, 1961.

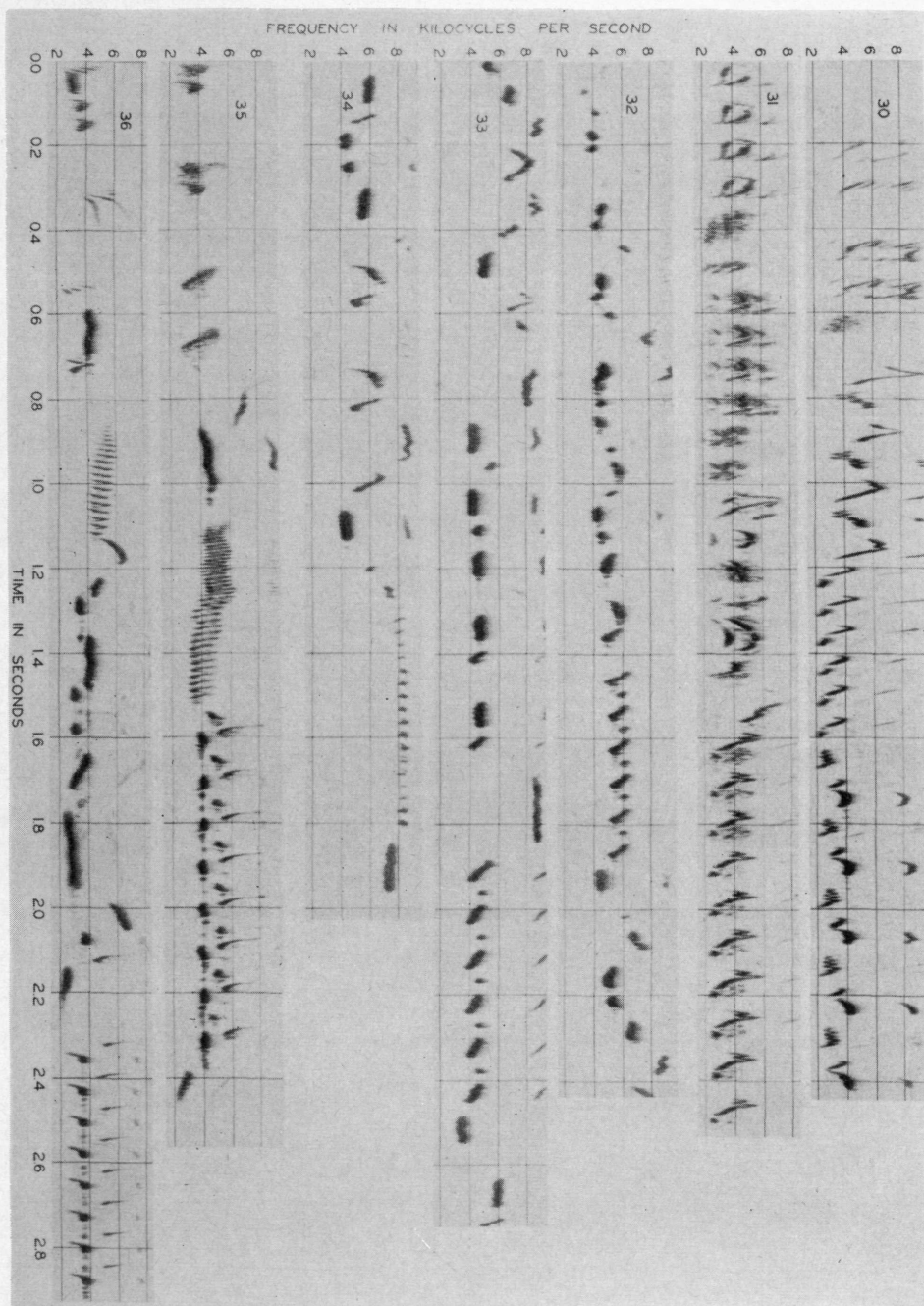
musical; the songs of the Carolina Wren are loud, emphatic, and consist of a series of similar phrases; the songs of the Bewick's Wren are somewhat similar to those of a song sparrow in quality and in the types of phrases they contain; the songs of the Winter Wren are loud and long, longer than the songs of most other passerine birds, and consist of rapidly uttered clear notes of varying pitch.

Short-billed Marsh Wren (*Cistothorus platensis*) (fig. 26-27). The songs of this wren consist of 1 to 4 (usually 3) introductory notes followed by a trill. The song is not musical, and is somewhat similar to the song of a dickcissel but the second part of the song is faster. The introductory notes are scoldlike, usually not all alike, and are uttered at the rate of about 3 per second. The trill phrases are usually somewhat buzzy in quality, and are uttered at rates of from about 8 to 15 per second (usually too fast to count). The final trill is lacking in some songs. Each bird has a vocabulary of four or five different notes that are used in the first part of the song, and these are generally uttered in a particular sequence; different songs may differ in the number of introductory notes. Each bird has a vocabulary of three to six or more different types of trill phrases; it usually sings one or a few songs containing one type of trill phrase, then a few containing a different type of trill phrase, and so on. In the longest recording studied (with 79 songs) there were 13 different types of trill phrases. The introductory notes and trill phrases of different birds are often very similar. The call notes are harsh in quality, and similar to the introductory notes in the songs.

Long-billed Marsh Wren (*Telmatodytes palustris*) (fig. 28-29). The songs of this wren consist of two to several series of harsh, non-musical notes or rattly trills. Some series are uttered slowly enough to count, but most are uttered at rates of from 10 to 20 per second. The songs of a given bird are similar, but may vary in length and in the number of different types of notes present; the songs of different birds are similar in general character, but usually contain slightly different phrases. The songs are often sung rapidly, with very little silent interval between them.

House Wren (*Troglodytes aedon*) (fig. 30-31). House Wren songs consist of 5 to 10 (usually 6 to 8) series of trill phrases, and have been described (Saunders, 1951: 117) as a bubbling chatter. The introductory notes are usually uttered more slowly than the rest (5 to 10 per second), and the pitch usually falls toward the end of the song. Most phrases are one- or two-noted, with the notes very abruptly slurred or buzzy, and are uttered at rates of from 10 to 20 per second. The songs of a given bird usually vary in length—due to the number of phrases in each trill, and/or in the number of different trill phrases—and may also vary in the sequence of the different types of trill phrases. The songs of different birds are nearly always a little different, but the differences are usually slight; many of the individual trills are similar or identical in the songs of different birds. This wren usually sings at the rate of 6 to 10 songs per minute. Audiospectrographs of House Wren songs have been published by Lanyon (1960) and Mayfield (1960).

Carolina Wren (*Thryothorus ludovicianus*) (fig. 19-25). Carolina Wren songs consist of a series of 2 to 12 similar phrases, each phrase containing from 2 to 8 notes. The notes are uttered rapidly, and the entire song usually lasts 2 sec or less. Each bird has a repertoire of two to several song patterns (the most found in one bird was 22); a given pattern is usually sung at fairly regular intervals (8 to 14 songs per minute) for a while, then the bird either stops singing or changes to another song pattern. The phrases in different songs are sung at rates varying from less than 2 to about 6 per second (slowly enough to count). A given song may begin and/or end in the middle of a phrase; the phrases are often such that it is difficult to determine which note marks the beginning of a phrase. Most of the notes are slurred, some very abruptly. The songs are loud, emphatic, and are sometimes relatively easy to paraphrase, e.g., *tea-kettle, tea-kettle, tea-kettle*;



FIGURES 30-36. Audiospectrographs of wren songs.

FIGURE 30. House Wren (I-3), Port Clinton, Ohio, May 20, 1961.

FIGURE 31. House Wren (III-3), Franklin Co., Ohio, May 5, 1956.

FIGURES 32-24. Winter Wren (III), Lincoln Co., Me., June 29, 1960; Fig. 33 begins at 2.2 sec from the start of the song, and Fig. 34 begins at 4.8 sec from the start of the song.

FIGURE 35. Bewick's Wren (I-2), Sinton, Texas, April 20, 1962.

FIGURE 36. Bewick's Wren (I-14), Adams Co., Ohio, May 12, 1958.

che-wortel, che-wortel, che-wortel; and the like. There is a great deal of variation in the songs of different birds (some 150 patterns were found in the recordings studied), but a given pattern may be sung by more than one bird. Considerable variation may occur in the songs in a given area, but on the average the songs of southern birds contain more phrases (which are shorter and more rapidly uttered) than those of northern birds. Variation in Carolina Wren songs has been discussed in some detail by the writer (Borrer, 1956). The common call is a down-slurred trill (fig. 25).

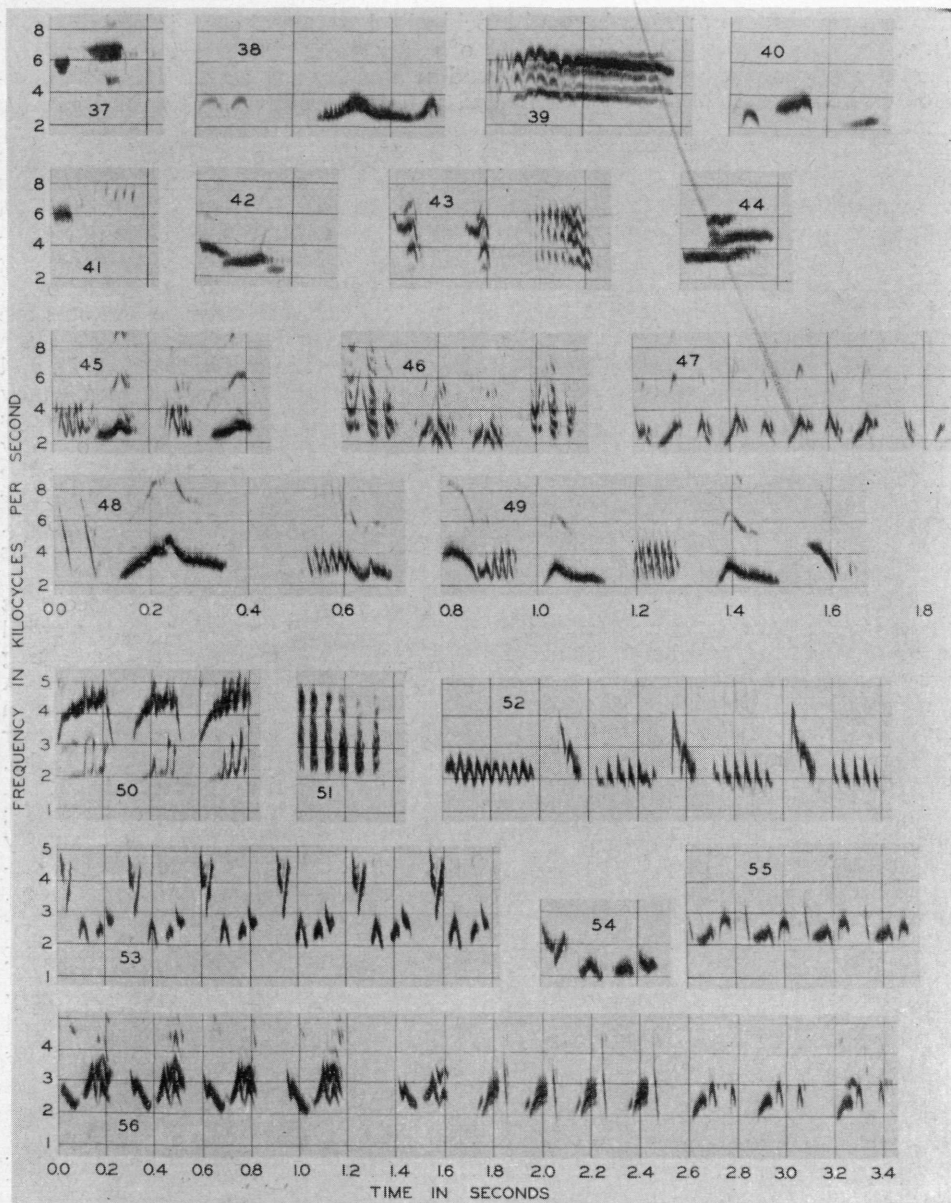
Winter Wren (*Troglodytes troglodytes hiemalis*) (fig. 32-34). The songs of this wren consist of clear whistled notes, some slurred and some steady in pitch, but the notes are sung so rapidly (10 to 20 or more per second) that the ear cannot detect all the detail in the song. The songs are loud and long, sometimes as long as 8 or 9 seconds. They usually contain one or more trills, rapid series of similar notes or phrases, and they often end in a very high-pitched trill; different trills usually contain different types of notes or phrases, and the phrases are usually two-noted. The songs of a given bird are usually very similar, containing the same phrases and phrase sequences, but often vary in length; the songs of different birds usually contain slightly different phrases. Winter Wren songs are generally sung at the rate of 3 or 4 per minute.

Bewick's Wren (*Thryomanes bewickii*) (fig. 35-36). Bewick's Wren songs are somewhat similar to those of a song sparrow in quality, but have a different rhythm or pattern; they are generally 2 or 3 seconds in length, and are sung at the rate of 8 to 10 per minute. They usually begin with 1 to 4 short, scoldlike, non-musical notes or phrases (which are generally not all alike), followed by a relatively loud series of rather musical notes (mostly 0.1 sec or less in length, and representing two or more different pitches) and often some slurred notes, and they nearly always end in a trill. Nearly all songs contain a buzzy note, longer than most of the other notes, either following the introductory notes or somewhere in the middle of the song. The final trill is a rapid series of similar phrases usually sung too fast to count; sometimes these phrases are uttered so rapidly that a buzzy effect is produced. Each bird has a repertoire of two to four different song patterns; one pattern is sung for a while, then the bird either stops singing or changes to another pattern. The songs of a given pattern are subject to variation in the number of introductory notes, in the presence or absence of certain notes or phrases, in the number of phrases in the final trill, and in length (where, along the series of notes and phrases, the song ends; some songs end before the final trill). Graphs of the songs of a western race of the Bewick's Wren have been published by Fish (1953).

SONGS OF THE MOCKINGBIRDS (MIMIDAE)

The songs of the Mimidae are long-continued, and consist of a great variety of phrases. The phrases of each species vary considerably in loudness, pitch, and quality, and some phrases may be very similar in the different species. All of these birds occasionally include in their songs what appear to be imitations of other birds; this feature is particularly marked in the songs of the Mockingbird.

Catbird (*Dumatella carolinensis*) (fig. 37-44). The song of this species consists of a series of varied phrases uttered at the rate of about 90 per minute; the song is long-continued, with the silent intervals between phrases usually less than 0.5 sec. Each bird has a great variety of phrases in its vocabulary (the most found in one bird was 117), and these are rarely sung more than once before the bird changes to another phrase; it is in this respect that the Catbird's song differs principally from the songs of the Brown Thrasher and Mockingbird. The individual phrases contain from one to six notes, and vary in length from 0.05 to 0.77 sec. In general, the different phrases in a bird's vocabulary are not sung in any fixed sequence. Many of the notes and phrases, relatively more than in



FIGURES 37-56. Audiospectrographs of notes and phrases of mimid songs.

FIGURES 37-44. Catbird (I, successive phrases, beginning with phrase 5); Columbus, Ohio, May 16, 1957.

FIGURES 45-49. Brown Thrasher (I, phrase groups 2, 4, 8, 10, and 14), Greensboro, N. C., April 15, 1960.

FIGURES 50-53. Mockingbird (III, successive phrase groups, beginning 18 seconds after start of example), Columbus, Ohio, May 18, 1953. The phrases in figure 50 are the last three in a series of 16. Figure 53 is an imitation of a Carolina Wren song; the fourth phrase of this series is shown in figure 54, graphed at the same scale as the graphs in figures 19-24; this Carolina Wren imitation is very similar to the song represented by figure 19, but the phrases are shorter.

FIGURES 55-56. Mockingbird (I, successive phrase groups, beginning 51 seconds after the start of the example), Palma Sola, Fla., March 18, 1957. Figure 55 is another imitation of a Carolina Wren song, similar to the wren song represented by figure 23.

the songs of the Brown Thrasher and Mockingbird, are nasal or whining in quality (e.g., fig. 39, 43, and 44). The quality of many notes changes in the middle of the note; part of the note may be clear, and part whiny or buzzy. The most common call note of a Catbird is a catlike nasal meow, from which the bird gets its name.

Brown Thrasher (*Toxostoma rufum*) (fig. 45-49). Brown Thrasher song is long-continued, and consists of a great variety of notes and phrases. The phrases are usually more or less grouped, in contrast to the song of the Catbird, in which the phrases are uttered in a rather regular succession with little evidence of grouping. The phrases of a group are separated by silent intervals of 0.25 sec or less; the phrase groups are separated by silent intervals of 0.25 to several seconds. The quality of the notes and phrases of this bird varies greatly; some notes are clear whistles (usually slurred), but most are buzzy or harsh in quality. Each bird has a large vocabulary of phrases (the most found in one bird was 137), and these are sung in a large number of different phrase groups; a given phrase may be sung in combination with a number of other phrases. Most phrase groups contain only two or three phrases, and these are frequently identical or very similar. The most distinctive feature of a thrasher's singing is the rhythm; the bird characteristically sings a few phrases (often two of the same or a very similar type), pauses a half second or more, then sings a few more phrases, and so on. The Catbird seldom repeats its phrases, and the Mockingbird usually repeats its phrases several times before changing to another phrase.

Mockingbird (*Mimus polyglottos*) (fig. 50-56). The song of this species is similar to that of the two preceding species, but is usually somewhat more musical in quality, with fewer harsh or nasal notes, and many of its phrases are sung several times in succession before the bird changes to a different phrase. A characteristic feature of Mockingbird song, more noticeable in northern than in southern birds, is the inclusion in it of notes and phrases similar to those of other species. This mimicry is remarkably accurate in many cases (Borror and Reese, 1956b), and is probably true mimicry rather than accidental resemblance. A Mockingbird retains its own singing habits, even when mimicking other birds; for example, if it sings Carolina Wren songs (fig. 53, 55) it sings them more rapidly (i.e., more songs per unit of time) than the wren, and may sing two or more different wren songs in succession (something the wren would seldom if ever do). It seldom sings more than three or four imitations of another species before changing to a different phrase. Each bird has a vocabulary of a large number of different notes and phrases, at least some of which (Laskey, 1944) are the result of listening to other birds; these phrases are not sung in any fixed sequence. Mimicry by the Mockingbird has been discussed by several writers, notably Borror and Reese (1956b), who describe its mimicry of the Carolina Wren using audiospectrographs, and Allard (1939).

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