

pletely suppressed, and this may be continued through adulthood. Fear suppressed by conditioning may become manifest to a greater or lesser degree by abuse in handling. Specific and individual variation in the intensity of the display of fear is observable, both in aviary-conditioned and wild birds.

*Erindale, Ontario*

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## A MOCKINGBIRD ACQUIRES HIS SONG REPERTORY

BY AMELIA R. LASKEY

MUCH has been written about the song performance of the Mockingbird (*Mimus polyglottos*), particularly its imitations of the songs of other birds. It has also been credited with imitations of many other sounds such as creaking wheelbarrows, human whistles, barnyard poultry, etc. However, diverse opinions exist on the 'imitation' phase of songs of this species. In his review of an article on Mockingbirds, Dr. Witmer Stone (*Auk*, 52: 344, 1935) says: ". . . . we should have welcomed more attention to imitations, as we have always thought that many so-called imitations recorded in print are really not imitations at all."

D. R. Dickey (1922) and J. Paul Visscher (1928) considered that the Mockingbird repertory is inherited rather than mimetic. Visscher, with the aid of Dr. Hoyt Hopkins, listed the more characteristic songs and calls of an exceptionally fine singer, identifying thirty-five like those of other species. He says that only a few of the species listed were common in that section of North Carolina but all occurred on the state list and "since the songs sung by the Mockingbird under observation were not those most commonly heard, since they agree in the main with the songs which are favorites of other Mockingbirds in widely scattered areas, and since there is such great variability in the vocal powers of different individuals, it seems probable that a Mockingbird does not as a rule consciously mimic songs but only possesses an unusually large series of melodies which it calls forth in wonderful perfection . . . but he [the author] only questions if these are 'conscious' and even 'purposive' endeavors, as has been claimed by many writers."

It should not be assumed, however, that individual Mockingbirds have occupied certain areas since birth. Bird-banding records prove there are movements, particularly among first-year birds. My own records, as well as an incomplete list of those on file in Washington, D. C., show recoveries of Mockingbirds at distances of 100 to 270

miles from the place of banding. This would make it possible for an individual to have been associated with many more than the local species and to arrive with a fine repertory already developed.

I have heard free-flying Mockingbirds repeat each other's songs. Observations of a captive Mockingbird, to be described later, indicate there may be 'conscious endeavor' in their singing of songs like those of other species.

Dr. George R. Mayfield (1934), from ten years' observation of about thirty-five individuals around Nashville, says the average Mockingbird has a repertory of imitations of thirty to thirty-five species which includes about 50 different imitations since several songs of some species are noted. He is of the opinion that "the Mockingbird inherits his repertory from many generations back and that from time to time, each individual will pick up some new songs or calls from his environment." On the other hand, Dr. Loye Miller (1938) of California, in charting songs of Western Mockingbirds, notes a low percentage of imitations of other species—only two to eleven per cent. He quotes Dickey (1922) who uses the term "adventitious similarity" as applicable to many of the so-called imitations. Dr. Miller suggests the term "fortuitous similarity" for the songs of the Mockingbird which are similar to those of other species but which he would not classify as true mimesis. He lists ten species whose notes he has recognized with a varying degree of certainty in the songs of a number of Mockingbirds but he considers only three to be true mimesis. He classifies the *klee klee* call of the Sparrow Hawk as given by his Mockingbirds as doubtful mimesis because "too highly pitched." He states that songs sounding like other species are usually given when these other species are neighbors.

Listening to many Mockingbirds, year after year, one learns there are portions of the song that are 'true Mockingbird' song because they are peculiar to that species and are given by all in that part of their range. Interspersed among their own song motifs, one recognizes songs like those of many species but there is considerable variation and individuality in the repertoire of individuals. While three color-banded males about my home were under observation, it was noted that many of their imitations were alike, yet only one used a song like the Yellow-billed Cuckoo. In Nashville's Warner Parks where Phoebes were common, Mockingbirds in two different places gave perfect 'phoebe' songs, but at home where no Phoebes nested, that song was never heard. In 'Birds of Oklahoma' (1931), Mrs. Margaret M. Nice says: "Not all Mockingbirds mock by any means,

and of those that do, many have only a limited repertoire . . . the most popular was the Blue Jay . . . the next the Scisstortail and after that the Robin—his scold, *not* his song.” She also says that a Mockingbird from the end of the Panhandle mocked six western species that nest in that area.

Observers differ in their attitude toward Mockingbird songs; some incline toward finding models for a majority of the phrases, while others take the more conservative stand of counting as imitations only those phrases markedly unlike the bird's own song and which also resemble known models.

Perhaps mechanical recordings of bird songs and calls will eventually furnish enough material for study and comparison to solve these perplexing questions. In ‘Bird Song Study Problems’ (1936), A. R. Brand says: “. . . in many instances it is quite impossible to evaluate what a bird's sound-production is by relying on the ear, for the ear is incapable of telling the whole story. Until another medium was found it was quite impossible to make objective studies of bird-song. The medium has now arrived. By adapting the machinery of the sound motion picture, it is possible to photograph bird-sounds. We can record the bird-song on sensitized film, and, after development, have an objective medium of study. There on the film is the picture of the bird-song; with the aid of a low-powered microscope we can study the details of time, pitch, and quality; we can count the vibrations and note the overtones and the relative loudness of the song.”

I have been observing a captive Mockingbird that may give some enlightening data on this fascinating problem. At various times I have raised young Mockingbirds to independence and released them; these had been rescued from impending danger. First songs from four of these were heard at 34, 43, 57, and 73 days of age. Another, a male, was kept for further observation and is now nearly four years old. His first song notes were heard at 27 days of age; since his cage was indoors, it is possible that they were detected earlier than the others. Early songs of all were utterly lacking in imitations of other species; they were very soft-toned, similar to the ‘whisper’ songs of adults, but sounded more primitive. They were given with closed beak. Mr. and Mrs. Harold Michener (1935, p. 138), Pasadena, California, say: “The young birds sing a faint soft song quite without imitations of other bird songs but distinctly a Mockingbird song.”

H. C. (for Honey Child), as my hand-raised bird is called, occupies a wire-mesh cage 42 inches long, 14 inches wide and 19 inches high, mounted on a movable table at window-ledge height. The cage is

kept on the screened porch except in winter when it is rolled indoors, but the bird is given periods of freedom almost daily in the house or porch. An attempt has been made to raise him as normally as possible; no effort has been made to train him to do tricks or to make a pet of him. He has no fear of people but resents being caught. He is in beautiful plumage, molts annually, and shows traits very similar to the outdoor birds in the various phases of seasonal behavior.

Notes on his songs reveal some surprising developments and may be of some value in illustrating the way he acquired his repertory. H. C. was one of four nestlings hatched in Percy Warner Park, five miles from our home, about July 23, 1939; he was hand-raised from August 1. On August 4 he left the improvised indoor nest; August 19 he gave his first song notes. Two days later he sang softly with closed beak for ten minutes, a series of almost inarticulate warblings and whistles, hardly audible in the next room. Songs continued daily after August 25 but it was not until September 1 that he sang while I was in the room. Previously he had changed to the begging whine at sight of me. October 29 (aged three months) he sang intermittently from 7:20 P. M. to 10:00 P. M. October 29 and 31 he again sang by moonlight in the otherwise dark room. Since then I have never heard any night singing except in a lighted room.

On November 9, for the first time, his songs contained sounds that reminded me of other species. December 11, when he was four and a half months of age, my notebook says: "H. C. sang much of the day, sometimes in loud tones, again very softly. The songs were interspersed with sounds like the Downy Woodpecker, Carolina Wren, Blue Jay, Catbird's *mew*, Flicker, Cardinal, Starling, Bob-white covey call, and Canary. Songs included whistles, trills, warblings, squawks. His 'imitations' are, excepting the Catbird which left in early October, all of birds he can see or hear from his indoor home. Are these true mimesis or his inherited Mockingbird song with accidental similarities to other species?" During this first song season, household noises, particularly that of the vacuum cleaner, often started his singing.

As spring approached, his songs increased in volume. April 12 notes read: "A varied and indescribable performance; songs are loud and long, starting at 5:30 A. M. (CST), continuing all day. Sometimes they sound like an aviary of chattering birds, sometimes there are whistles like Mr. L. calling the dog and others similar to a mailman's whistle. Songs sounded like Whip-poor-will, Killdeer, Wood Pewee, Cardinal, Carolina Wren, Downy Woodpecker, Crow, Blue Jay, Tufted Titmouse, Flicker, Robin, Starling, Bluebird, House

Sparrow, etc." All these sounds could have been heard by him excepting possibly the Whip-poor-will and Peewee which I cannot explain as these did not appear in my later notes. His songs gradually decreased as the mate-calling period waned. He preceded the outdoor birds in molt; his molt started the last of June. His singing that year was resumed before his new plumage was nearly complete. In July, territory songs were given (a very short, loud, harsh type heard from territory holders in autumn and mentioned by me, 1933, p. 247) and the 'contented,' moderate-toned fall singing started. He became silent in mid-November and, like the outdoor birds in winter, he used the sharp *click*, *chick*, and *chuck* calls morning and evening and at sight of Mockingbirds through the window. No artificial light was used in the room that winter (1940-41) but one previous winter and two later ones when days were lengthened by artificial lighting, some singing prevailed throughout the cold season when Mockingbirds are normally songless.

March 2, 1941, he began the soft singing of early springtime. Within the week his songs contained many of the calls of other birds previously listed. Unmusical sounds were added like the squeak that the washing machine downstairs had developed within the previous two weeks. During the next few weeks he had added more improvisations including Yellow-billed Cuckoo, Bob-white, Yellow-breasted Chat, and alarm call of the Meadowlark, and he was often using the *caw caw* of distant Crows; this type of Crow call was a common sound just as he had given it. People who heard it, although not familiar with birds' songs, did not fail to remark on his Crow calls. During March a caged young female occasionally joined him in subdued singing. This is the first time I have known of female song in spring. Females sing, however, in autumn.

March 28, 1941, a Cowbird gave its high-pitched song in trees nearby. On March 30, H. C. added an exact replica of that song to his repertory, using it often thereafter.

April 27, 1940, I noted his first 'direct imitation' when he was nine months old. He answered a Tufted Titmouse, giving the *peto* song immediately after it. The same day he answered Mr. Laskey's whistle in kind. These direct imitations continued. My notes contain a number of records for several species which were answered immediately in the same call notes or song each had just uttered: Tufted Titmouse, May 1, 1940, Jan. 27, 1942, Feb. 28, 1942 (three occasions), Mar. 4, 1942 (several), Mar. 5, 1942 (several), Mar. 6, 1942, Apr. 5, 1942, Feb. 27, 1943 (antiphonally); Cardinal, May 1, 1940, June 27,

1941, July 22, 1941, Sept. 22, 1941; Bluebird, May 16, 1940; Carolina Wren, May 17, 1940, Mar. 2, 1942; outdoor Mockingbird, Apr. 4, 1941, Oct. 2, 1941; Flicker, May 2, 1941, June 28, 1941, spring 1942; Blue Jay, June 27, 1941, Feb. 12, 1942 (antiphonally), Feb. 26, 1943; Downy Woodpecker, June 28, 1941, Feb. 27, 1943; Field Sparrow (first part only, never the trill), July 8, 1941 (three occasions), July 22, 1941; Catbird *mew*, July 22, 1941, Sept. 22, 1941; Junco (trill), Feb. 24, 1942; Red-bellied Woodpecker, Feb. 27, 1942; Towhee, spring 1942; Cowbird, Apr. 3, 1942; Canary, spring 1942.

While singing songs with many imitations on March 5, 1942, he carried twigs to the front windows, flying 36 feet, passing through three doorways to get there, where the outdoor pair perched in a tree. This is typical courtship behavior as described by me for outdoor birds (1933). H. C. was courting the female, mate of the male he had fought through the glass each winter since January, 1940, on their artificial territory boundary line. The manifestation of courting behavior was noted first on November 5, 1939, with a 'coaxing' song—a series of softly uttered, choppy, pleasing notes given as he stood with lowered head in a corner of his cage his body tilted forward so that head was down and tail high. The act is suggestive of the coaxing behavior of a cock in the poultry yard, but the Mockingbird never held food. He often grasped a toothpick, twig, or rootlet in his beak. On November 8, he held paper which he then placed in a corner; assuming a squatting position, he turned round and round as if shaping a nest. In his early life these coaxing songs were directed to me but the following year (1941) they were to the young, hand-raised female. At that time he started an animated running back and forth with a twig, singing loudly while wings and tail were spread in plumage display.

During the life of H. C., certain songs have been used for short periods and then dropped from his repertory. *Bob-white*, the whistles, and the washing-machine squeak are examples. While a fledgling Bluebird was being fed for several weeks near his cage, he used the Bluebird's call frequently, but the following spring that phrase was seldom introduced into his performance. In early spring of 1943, however, the Bluebird notes were often used and the washing-machine squeak occasionally. Other songs and calls, including the Yellow-breasted Chat, Crested Flycatcher, Meadowlark, and Goldfinch, appeared from time to time. Yet there were other common birds—Carolina Chickadee, Northern Yellowthroat, Yellow Warbler, and Orchard Oriole—whose songs were never heard in his repertory. If a Mock-

ingbird imitates a Tufted Titmouse, why does it not imitate its close relative, the Chickadee?

Among H. C.'s favorite phrases in 1942, three of the Flicker songs were used very often; several of the birds were around the house constantly in both winter and breeding seasons. On February 27, 1942, an incident occurred which was so unusual that I decided it must have been a coincidence; but when a repetition came a few days later, I was not so sure about 'coincidence' as the explanation. A Flicker flew to the driveway in direct view of the window where I stood beside the Mockingbird cage. As the Flicker started to drink from a tiny puddle in the snow, H. C. gave the *wicka* call. March 1, a Flicker landed in a tree near the same window; H. C. immediately greeted his arrival with several repetitions of *wicka!* At both demonstrations the Flickers were silent and the Mockingbird had not been singing. H. C. is very observant of life about him. Many times a day I can tell when an outdoor Mockingbird arrives within the line of vision of the caged bird, long before my eyes have separated its gray form from the gray trees of winter. H. C. begins his restless hopping but then quiets as soon as the other bird flies out of sight.

June 12, 1942, he sang from dawn at 5:00 A. M. (CWT) until complete darkness at 8:15 P. M., with scarcely any pause during the day. His songs were loud and thickly interspersed with many notes like those of other species. He sang with wide-open beak; sometimes the tips of the mandibles were at least three quarters of an inch apart. In one moment of frenzied performance, he repeated a phrase 106 times in 45 seconds. His ecstatic singing at that late date is comparable to free-flying, unmated males who are still holding territory and advertising their desire for a mate. At noon on June 19, Dr. G. R. Mayfield listened to H. C. for the first time, making notes from 12:10 P. M. to 12:26 P. M. He listed 143 calls or songs of other species, averaging nine imitations per minute, interspersed among H. C.'s own songs. In this lively performance, Dr. Mayfield identified 42 different songs of 24 species. This is a longer list than I had ever recognized, but my knowledge of bird songs is not so comprehensive as Dr. Mayfield's.

H. C., like the free-flying individuals of his kind, uses the food call of young Mockingbirds in his songs, but he has a peculiarity which is probably attributable to his being hand-raised. For a while each summer he reverts to babyhood habits while young birds of other species are being fed near him. He assumes the begging posture and with quivering wings, open beak, and food calls, begs from me.

But instead of waiting to have the food poked into his mouth as the very young do, he takes it in his bill. This behavior occurred in 1940 while I cared for a young Robin and a baby Mockingbird when H. C. was a year old; it happened in 1941 when a young Bluebird occupied the other cage, and again in 1942 when there was a baby Orchard Oriole.

I should like to have apparatus available to make sound pictures of H. C.'s songs for comparison with those of species he seems to imitate. In addition, it would be enlightening to raise other young Mockingbirds and record on sound film the expanding repertory for future study by experts to be sure that, in our interpretations, the ear is not misleading us. Sound film would show whether I actually heard Whip-poor-will and Wood Pewee songs in those early performances of H. C.

In 1924, Dr. Oskar Heinroth published in the *Journal für Ornithologie*, 72: 223-244, the results of his work in raising hundreds of species from babyhood to adulthood, mentioned in a review by Mrs. Nice (1935). He says that in the case of very simple songs, the song is inborn in the bird. With other birds, song must be learned. If raised alone, they do not sing like their wild fellows, and no one would guess their species from their song; but in the spring, if they hear one of their own species, they quickly learn the proper song.

#### SUMMARY

A male Mockingbird, hand-raised from nine days of age, gave first musical notes at 27 days of age and sang a ten-minute 'whisper' song when 29 days old, similar to adult song but without imitations. At three months he sang three evenings by moonlight but never afterward. When four and one-half months old, songs like those of other species were identified and later other sounds were recognized. In April, 1940, when nine months old, he started 'answering' outdoor birds in the same call or song each had just uttered; many more were noted thereafter, including Tufted Titmouse, Cardinal, Blue Jay, outdoor Mockingbird, and others. Twice he greeted the arrival of Flickers near his window with Flicker calls although they were silent. His repertory was gradually enlarged, but some songs were only temporary acquisitions while others were used intermittently. Imitation was clear in the acquirement of much of his repertory.



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## NESTING OF THE TURKEY VULTURE IN OHIO CAVES

BY VICTOR COLES

*Plate 8*

ALTHOUGH birds as a whole exhibit distinct differences in nest construction as influenced by their habits and the available material, there is a marked likeness within individual species in the selection of nesting sites regardless of the habitat in which they may be. The Turkey Vulture (*Cathartes aura septentrionalis*), in contrast, presents a diversified selection of nesting sites. One finds it nesting on the sides of steep cliffs as well as down in swamps, and it may be found in rocky caves or rugged hillsides or hidden in salt marshes. It places its nests in forests, shrub thickets, along water courses, in old and odd structures, and in various curious places. In fact, as Burns (1924) expressed it: "The Turkey Vulture nests indifferently in hollow trees, logs, moss crevices, and under thick coverts or in abandoned buildings remote and darkened."

In order to gain intimate knowledge of the nesting habits of the Turkey Vulture, the author spent the spring and summer of 1936, 1937, and 1938 in the central part of Ohio in what is known as the