

his first opportunity for his interest to be aroused by the reptiles of the southwest and we all know how keenly he was interested in the fauna of this region until his death, 53 years later.

Last spring, the first time I visited the National Museum after L. S.'s death, his devoted assistant, Miss Cochran, showed me his exquisite drawings of birds from Bering Island, Japan and Kamchatka which proved that he had indeed a talent which rivaled that of Robert Ridgway as an artist. Had his time not been so completely occupied he would have made a reputation for himself in still another field. I believe very few people know that these drawings exist or that there is any such tangible proof of his first love—the birds.

It is difficult not to be trite and to say the obvious when one attempts to appraise Stejneger or even to set forth his extraordinary versatility and the diversity, range, and depth of his talents and attainments or to attempt to praise the modesty, simplicity, dignity and innate kindness of his character. He was sparing only in expressing his dislike of unworthy actions or unworthy deeds. To say that he was the greatest naturalist who has ever trod the halls of the Smithsonian Institution is to step on fairly safe ground. To say that he was a great friend, a benefactor, and one who aided hundreds of members of the rising generation of investigators, is sheer understatement. It would take more than the tongues of men and of angels to sing his praise.

Cambridge

Massachusetts

BIRDS' FEAR OF MAN

BY H. R. IVOR

THE following paper is intended to record occasional observations made on certain passerine birds with respect to this display of fear; it is not based on any formal series of experiments. The birds observed were native species, largely individuals either confined in my aviary or fostered there and allowed daily freedom. A few observations concern wild, native birds. I have used the term 'fear' to mean, simply, alarm. More completely the term is defined here as an objective manifestation of the self-preservation instinct, usually displayed by crouching or retreat.

I wish to make grateful acknowledgement to L. L. Snyder, Assistant Director, Royal Ontario Museum of Zoology, for his critical review of this paper.

In May, 1939, a pair of Rose-breasted Grosbeaks (*Hedymeles ludovicianus*), which were aviary conditioned but not held captive, built a nest in the aviary. On May 23, the first egg was deposited, the second on May 24, and the third (and last) on May 25. On the morning of June 6, two nestlings were in the nest. Since neither was hatched on the previous evening (June 5) it is evident that they emerged about the same time, or in quick succession during the night or early morning. At about 6:00 P. M. of June 6 the third egg was observed to be chipped and the bill of the nestling protruded through the shell.

I visited the nest several times on June 13 at which time the two first-hatched young were approximately seven and one-half days old. On my first visits the young evidenced no fear. On a later visit, after a lapse of ten minutes following the previous one, the two older youngsters crouched, but when spoken to, opened their bills for food as did the youngest which had not displayed fear. On several subsequent occasions that day, the two older youngsters crouched in the nest when visited, with the crouch on each succeeding occasion more pronounced. Fear had apparently progressively developed on the eighth day of their life and seemed fully developed by the end of the eighth day. Fear was expressed entirely by the crouch. They did not give vocal evidence of fear even when touched. The youngest in the nest had not yet displayed evidence of fear.

By the morning of the 16th, the two older youngsters, both of which proved to be males, had become accustomed to me and would utter their calls and take food from me as readily as from their parents. The youngest, which proved to be a female, was now approximately nine and one-half days old. When I put my hand near her she sprang 'screaming' from the nest. This was her first manifestation of fear. Fear, apparently had either developed instantaneously or had accrued since my last visit the previous evening at which time she was nine days old.

In this case we have fear becoming manifest in two young males when they were approximately seven and one-half days old, and the expression of fear seeming to show a gradual development of that instinct. In the same nest a young female did not manifest fear until she was nine and one-half days old; her expression of fear seemed to indicate a peak of development when observed.

My second case concerns another family of Rose-breasted Grosbeaks. A pair nested and produced young in June, 1939. On June 15, I observed four nestlings in the nest. Of the oldest two, I knew

one to be eight days old and the other was believed to be a few hours older. I observed that the manifestation of fear by these youngsters was evident on this visit. Observation of their behavior suggested that the expression of fear in their case was only begun.

The bird first hatched was a female; the other three were males. It is evident that the oldest youngsters in the brood under discussion did not first manifest fear until they were twenty-four hours older than the oldest youngsters previously described. There is, then, variation in the age at which fear becomes manifest in a particular species—variation within a brood, and between broods of different parents.

As my third case, I record a typical experience with young Blue Jays (*Cyanocitta cristata*), a species I have observed breeding in my aviary for six years.

In 1934, a pair of Blue Jays hatched two eggs on July 2—one in the morning and one in the afternoon. A third egg hatched on July 3 and a fourth on July 4. Fear began in the two oldest youngsters on July 16 when they were approximately fourteen days old. Fear was evidenced first by slight crouching, a performance which persisted for only a few seconds at a time. On the following day (July 17) fear was much more markedly expressed by a more protracted crouch.

On July 18, only two youngsters remained in the nest—the first-hatched and the third-hatched. The second oldest had disappeared, and the fourth, the youngest and smallest, had died in the nest apparently from starvation. By this time the third-hatched nestling manifested fear strongly. Both the remaining youngsters crouched deeply and the crouch was protracted, but the third-hatched bird expressed fear much more markedly than did the oldest. The latter had become somewhat accustomed to me and apparently its expression of fear was consequently weaker. On my talking to the youngsters for a few moments, fear subsided but it was again evident on each subsequent visit.

On July 21, little fear was exhibited by either of them, as expressed by crouching, but neither of them would accept offered food. Fear was more evident on July 25 and subsequently increased to such an extent that, on August 1, it was not possible to approach either of them closely. Neither of these birds ever showed tameness, and by 'tameness' I do not mean simply tolerance but confidence expressed by such behavior as voluntarily perching and remaining on one's finger. It may be remarked here that both parents were 'finger-tame.'

It seems to be generally understood that the younger a bird is, when it is subjected to close human association, the more readily it is tamed.

My experience does not show that this is always so. There is much individual variation in the susceptibility of birds to become tame; however, it seems obvious that certain species are more susceptible than others.

On July 6, 1938, the writer discovered the nest of a wild Wood Thrush (*Hylocichla mustelina*) in which were three eggs. On July 16, the nest contained three youngsters. Two appeared to be virtually of the same age, a coincidence which seems common enough; *i.e.*, the first two eggs deposited hatch about the same time. These two were judged to be about twenty-four hours old and the third had apparently just hatched.

On July 24, when about nine days old, the two oldest nestlings showed fear. Though its manifestation was not pronounced in either, it was slightly more noticeable in one than in the other. No fear was displayed by the third. I took two nestlings—one which displayed the least development of fear and the youngest which had not displayed fear—to hand-rear them. The elder of the two later proved to be a male and the other a female. Both took food readily and the male, subsequently, never exhibited signs of fear. At about the age when these birds could fend for themselves, the female was observed to display fear for the first time. She is now four years old and, though more or less tame, still shows fear. She will neither accept a mealworm from my fingers nor allow me to approach her closely. The male, which had been taken after fear was displayed in the nest, is one of the most fearless birds I have ever possessed. He does not as much as show fear to humans to whom he is unaccustomed. By way of comparison, I can remark that another female of this species, taken as a nestling before she had displayed fear, displays no fear.

My next case concerns the Bluebird (*Sialia sialis*). Two nestlings, of wild parentage, when taken from a cavity in a willow tree, one on May 22 and the other on May 24, 1938, were each about nine days old. It was impossible to observe the reaction of these youngsters in their natural nesting cavity but they soon took food readily and I detected no signs of fear. Subsequently, when they had developed to the point where I ceased hand-feeding them, fear was displayed. One was released but the other was retained for study. It proved to be a male and in the four and one-half years that I have possessed this bird it has continued to be fearful of me. It will now hesitatingly grasp a piece of food from my fingers but will not permit the close approach of humans strange to it.

Two other nestling Bluebirds of wild parentage were taken from a

bird house in my garden on May 24, 1938. Both showed fear, but this was manifest for only a few minutes after they were obtained and handled. When they were reared to an age where they could fend for themselves, a recurrence of the fear display did not take place. One of these birds, a male, was retained for study. He has never showed signs of fear and will perch on the hand of a stranger as readily as on my own.

Another young Bluebird, in this case a female, showed fear for a few hours after being taken as a nestling, but the reaction ceased and did not return after she had been hand-reared. This individual became very tame.

Still another nestling female Bluebird reared by me never developed fear and became one of those exceedingly rare song-birds which not only submit to being held in one's hand but appear to coax for it. To illustrate the extent to which the fear instinct can be submerged, it may be well to describe the behavior of this individual rather fully.

Each evening at dusk this female would fly to a particular roosting shelf. If I entered the room near the hour of dusk she would often leave her perch and come to nestle in the hollow of my hand—even close her eyes and go to sleep there. On occasion, when I have entered the room after dark, she would still leave her perch and, with difficulty in the gloom, come to rest in my hand. I usually had difficulty in returning her to the roosting shelf. She would cling to my fingers and utter low notes of protest even while her mate was insistently calling her to their roost.

During the spring of 1940 I was absent from the aviary for three months. On my first visit after my return, this female appeared to remember me but she would not perch on my hand. The following day, however, she did so, and even nestled in the hollow of my hand as had been her habit. During my absence she had not attempted this familiarity with persons attending the aviary.

This bird resumed her extraordinary display of fearlessness and a manifestation of attachment to a human. If I were within sight of her at dusk, she would utter her call, and if I entered the room she would fly to my arm, run along it and nestle in my hand. If she had not settled on her shelf for the night she would make repeated trips from my shoulder to the perch where she would seem to settle herself and adjust her wings in the manner of a bird moulding a nest, but if I did not show further attention she would return to my shoulder or hand. If I placed my hand over her on the perch she would remain there quiet and contented.

This individual Bluebird would allow me to take hold of her beak, lift her wings or stroke her without any display of fear or resentment. This unusual behavior toward man apparently did not affect the status of this individual bird among its aviary associates. She was not fearful of the larger birds such as Catbirds, Grosbeaks, and European Blackbirds. The American Robin, the most pugnacious bird in my aviary, showed a decided inclination to avoid her. Although a Brown Thrasher was inclined to attempt domination of this Bluebird, the latter was somewhat indifferent to these attempts. Toward other humans she displayed some fear. When there were strangers near at hand she would not behave toward me as described above, although on one occasion she did nestle in the hand of a human being strange to her—one who was intensely fond of birds.

Her mate of 1942 was so tame that he would perch on the hand of a stranger, yet the two nestlings which this exceedingly tame pair of birds reared in 1942 showed a marked difference in their behavior so far as fear was concerned. When the two were able to leave the nest, the male would not take food from me, but showed considerable fear. The female took food readily. In a few days this behavior was reversed. The male became as tame and fearless as his father, and the female, although willing at six months of age to perch on my hand when food was offered, developed a decided mistrust of me although she had never been handled.

Further evidence as to the extent to which the natural instinct of fear can be suppressed by close association, even in adult birds, is illustrated by my experiences with the Rose-breasted Grosbeak. I have already mentioned, in connection with my remarks on the development of fear in nestlings, two pairs of this species which I have fostered. Both the adult male and female of the first pair were exceedingly tame. When they showed evidence of nesting in 1938 I brought them a supply of twigs. They were highly selective of this material although I attempted to secure for them such as their wild kindred would use. Usually before I could scatter the twigs over the ground for them to choose, both birds would fly to my hand and pick out certain ones. The female would even permit me to assist with nest-building. I could take a twig she had chosen but which was too long for her to handle conveniently and put it in place. The bird would then complete the arrangement.

During the period when I was making observations on the eggs and young, I had no difficulty in lifting her high enough with my finger to allow me to peer at the eggs in the nest. Nor did the female or

the male, while brooding the young, resent being raised so that I could see the nestlings. Neither of the parents later showed alarm when I fed their youngsters in the nest. The male of the second pair was extremely disturbed if I approached the nest; the female, undisturbed. She, however, showed unmistakable evidence of mistrust of my good intentions in feeding her young, even to the extent of taking the food from their mouths.

A further description of the degree of tameness of these Rose-breasted Grosbeaks is offered. They have a habit of standing on my shoulder. In this position they will bite the lobe of my ear. It is my belief that they have associated this performance with food; biting my ear results in my offering them some favored tidbit. One male in particular bites very hard and I am aware that if I do not give him food this behavior does not weaken in the least; it rather becomes intensified.

The male Wood Thrush, mentioned above as one of my most fearless birds, performs in a similar manner. He will take the lobe of my ear in his beak and shake it. This will be continued until he is fed. It is interesting to note that sometimes when this bird, or the male Rose-breasted Grosbeak previously mentioned, becomes rather overly 'enthusiastic' in the ear-lobe performance, I find it necessary for my own comfort to grasp him in my hand and remove him from my shoulder. This handling does not induce the display of fear. He will immediately perch on my finger or return to my shoulder.

An instance can be related of an entire lack of fear in a native species unconditioned by captivity. A pair of House Wrens (*Troglodytes aëdon*) nested in the garden during June, 1940. These birds had not been fostered in any way other than by the provision of a nesting box. When their five young became old enough to reach the entrance of the box, I successfully attempted to feed them insects from my fingers. They displayed no fear. On July 1, they left their nest shelter. The writer and another observer, who was not a regular part of their environment, successfully fed the youngsters from their hands. The parent birds at no time uttered the scolding notes characteristic of the species. Gradually the family of young followed their parents farther afield. We followed and picked up one of the youngsters which perched on my finger and chirped but showed no evident sign of fear. It was fed insects from my fingers. Each of the others was handled in turn. When a finger was put under the breast of any one of these youngsters, it would hop upon it. Not one of the five showed the least sign of fear. With all our handling, photographing, and

feeding of the young, the parents, which remained close at hand, showed no signs of being disturbed.

Most of the instances related in the foregoing account suggest that fear is suppressed, or confidence is established between man and bird, by close and continuous association. But there can be a return or rebirth of fear as a result of abuse or break in the comfortable relationship experienced by the bird.

A pair of Catbirds (*Dumetella carolinensis*) was kept in a compartment of my outdoor aviary. This pair of birds was tame; they could be approached closely and would come to perch on my hand. However, they could not be handled without a display of fear. One morning when I visited the aviary I found that a rat had entered the enclosure and killed several birds. I began at once to cage the remainder. Capture was effected rather hurriedly by the use of a net, not by the usual slow method of a box trap. My method of capture necessitated handling the birds. The Catbirds were greatly disturbed by being caught in this way. Although they were not subsequently disturbed in any way they both showed fear of me, and it was two years before they would perch on my finger. Other species handled in the same way, at the same time, reacted in a variety of ways. In some, handling did not produce fear for longer than the time the birds were imprisoned in the land. Others showed fear for a time but not for long—certainly not for a period as long as that needed by the Catbirds.

One observation which seems worthy of record here is that captive birds seem to focus their attention on the hand of a human associate. I have had birds in my aviary which had never been touched by hands. They had acquired confidence in my person and would allow a close approach. One's head might be bent close toward them without exciting their fear, or one might step about cautiously without any sign of fear being aroused by one's moving feet, but if the hand was extended toward them they distinctly showed fear.

It seems evident from the casual observations reported above that instinctive fear becomes manifest in certain nestling passerine birds at about the age when they are physically capable of leaving the protective environment of the nest. These observations suggest that fear becomes functional by a gradual, yet rapid, development. By continuous and close association with young birds, fear can be inhibited past the nest-leaving stage. There is a tendency for fear to become manifest at a second period, at a slightly later age, when young birds would normally become completely independent. Some individuals can be conditioned to the point where fear of man is almost com-

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

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