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Caracas
Venezuela

ANTING BY FOUR SPECIES OF BIRDS

BY HERVEY BRACKBILL

SINCE anting by birds became a prominent topic several years ago and I first became aware of the act, I have seen fifteen performances by four species of birds in the wild. This experience bears out the suggestion of Mrs. Margaret M. Nice (1945: 302) that anting may be comparatively common and merely overlooked by ornithologists, partly because it is not always done ostentatiously. The performances I saw varied greatly in both manner and duration.

The birds I have seen ant are the Southern Robin (*Turdus migratorius achrusterus*), twice; Starling (*Sturnus vulgaris*), twice; Catbird (*Dumetella carolinensis*), four times; and Purple Grackle (*Quiscalus quiscula stonei*), seven times; the last-named species has not previously been recorded as anting with ants. The dates have ranged from May 15 through all the spring and summer months to August 30, in the years 1943 to 1947, inclusive. Except for one in Prince George's County, Maryland, all of the observations have been made in Baltimore City.

For identification of the ants used, and comment on some maimed specimens, I am greatly obliged to Mr. M. R. Smith, Associate Entomologist, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. I am also indebted to Mrs. Nice and Mr. H. R. Ivor for criticism of the present paper, and to Mrs. Nice for the loan of A. H. Chisholm's *Ibis* paper of 1944.

My observations are as follows.

STARLING

August 30, 1943. Time: 5:15 p. m., Eastern Standard. Place: lawn in Walbrook section of Baltimore. Ant: *Lasius niger* var. *neoniger*. Observation: from third-floor balcony 50 yards away; 8 × binocular.

Half a dozen Starlings and a male Purple Grackle were foraging over the lawn when one of the Starlings began anting. It would snatch at the grass, draw quickly back and very erect while at the same time opening a wing and moving it forward so that the primaries were practically vertical, then make a rapid downward stroke of the bill along the under side of the wing's outer edge. At the start of the stroke the Starling's neck was stretched upward to the utmost; at that moment, extremely erect and elongated, it was in a penguin-like pose in which it seemed to have backed up upon its tail, and with each downward stroke of the bill it almost toppled over backward. After the single stroke it would snatch again at the lawn, then repeat the performance. It anted four or five times, usually the left wing. What it did with the insects afterward I could not tell; I could find no maimed or dead ones where it had worked. The other birds, only a few yards away, paid no attention but went on foraging until, a few minutes later, all of them flew away toward a roost.

June 21, 1945. 5:25 a. m. Lawn in Howard Park section of Baltimore. *Formica fusca* var. *subsericea.* Watched from ground 25 yards away; naked eye.

This Starling would pick at the ground, raise one wing slightly above the horizontal and twist it forward a bit, then deliver a backward stroke of its bill. With details sometimes obscured because it faced away from me or went behind tufts of tall grass, the Starling anted several times, using both wings. In an attempt to improve my view I started toward the bird; at that it ran away a few feet, but when I then retreated it returned and anted one more time, clearly delivering a single stroke of the bill somewhere along the wing's under surface. Then it walked away. At no time had it risen erect or threatened to topple like my first Starling; its body remained practically parallel to the ground and only its head was raised any distance—for the start of the stroke. I was again unable to tell what was done with the ants used.

ROBIN

June 16, 1946. 7:40 a. m. My own lawn in Forest Park section of Baltimore. *Lasius umbratus mixtus aphidicola.* Watched from second-floor window 20 yards away; binocular.

This Robin, while foraging, came to a part of my back lawn that had been inhabited for at least a year by the ants named and had repeatedly been the scene of anting. Without taking any awkward or erect poses, the Robin a number of times opened a wing about horizontally and then dabbed at the under side; on the only occasion

that the bird's position permitted a good view, the stroke appeared to be delivered about halfway back from the bend and an inch or so in from the outer edge. A couple of other times the breast seemed to be dabbed, but I could not be sure that the bill actually touched it. This bird did no squirming among the rather numerous ants, as some observers have seen Robins do, but once or twice it did 'sit' briefly as if holding its vent to the lawn. The anting lasted only a minute or two and was desultory; the bird sometimes moved about between performances. Its dabs at the ground, furthermore, were so few that ants must have been used for more than one stroke, or else the mere odor of them caused the anting actions. Finally the Robin hopped away from the ant region and disappeared.

A few minutes later a color-banded male Robin foraged briefly on the edge of the ant area without performing.

ROBIN AND CATBIRD

July 26, 1944. 6 a. m. Clump of scrub pines near Branchville, Prince George's County, Maryland. *Formica fusca* var. *subsericea.* Watched from first-floor window 25 yards away, chiefly with binocular.

As many as three Robins and two Catbirds sometimes occupied this anting ground simultaneously, but more often only a single bird, and I never saw more than one perform at a time; whether this was always the same bird of each species I could not tell.

The Robin was usually directly facing me when it anted; it never rose abnormally erect to start the stroke, nor backed up much upon its tail that I could see. After snatching up an ant it would merely open a wing and bring it forward a bit, then deliver a preening-like stroke of the bill back somewhere along the wing's under side. Only one stroke was made with any one ant, and I could never tell what was done with the insect afterward. Anting was seldom done twice in quick succession; between performances the Robin foraged about and apparently ate, and even in this intermittent way the activity seldom continued for more than one or two minutes at a stretch. After the scene had once been entirely deserted, however, birds did shortly return and again ant briefly.

The Catbird's anting was lightning-like. This bird would pick up an ant and then, while standing normally, would merely *flip* one wing and, during the instant that it was open, dart its bill back at the under side and forward again. The whole act was performed in a flash. It was done several times in exactly the same way, and both wings were used. After one stroke the bird raised its head and made eating motions of the bill, undoubtedly swallowing that ant; what was

done with the others used I could not tell. Like the Robin, the Catbird foraged between times; when walking about in those intervals it held its neck and head higher than normal—with bill pointing upward at about 30 degrees. Ants proved to be both few and scattered on this needle-carpeted ground; I could find no maimed or dead ones.

In Baltimore on May 30, 1946, a Catbird dropped from a 'bird' cherry tree in which it had been eating very sour fruit, and on the lawn below ate a few ants of this same species without doing any anting.

CATBIRD

May 15, 1946. 5:57 a. m. My lawn in Forest Park. *Lasius umbratus mixtus aphidicola.* Watched from second-floor window 20 yards away; binocular.

This Catbird, a color-banded male on his territory, alighted on the lawn (which was wet from a night rain) and hopped about for a few seconds, foraging; then began to ant. He seemed to half squat throughout the performance, not actually resting on the ground but not standing normally, either. After a dab at the lawn he would raise the right wing about horizontally and probably move it forward a bit, then give a dab beneath it. In contrast to my first Catbird's lightning-like performance, this bird took perhaps half a second to a second for each anting. The half-dozen or so performances were unevenly spaced, and in some of the intervals the bird sang a couple of phrases. I could not tell what was done with the used ants. The anting lasted less than three minutes; after it, the bird ate what seemed to be a slender larva, then flew out of sight.

Although this Catbird in 1946 held territory through July 25 and had two nests only 25 and 35 yards from the ant colony, he was never again seen to ant in that year. He did ant again, however, in 1947; my observation then was as follows:

May 24, 1947. 6:20 a. m. Lawn adjoining my own. *Lasius niger* var. *neoniger.* Watched from second-floor window 20 yards away; naked eye and 8× monocular.

During foraging over the lawn, which was very wet with dew, the Catbird paused at one place and anted four times. He again appeared to take a half-squatting position, and kept his tail stretched out behind him on or just above the grass, bent a bit to the right. After a dab at the ground, he would partly open a wing and then make one stroke of the bill back along its under side at about normal preening speed. After the four antings he resumed his foraging and soon worked his way out of my view.

This color-banded bird in 1947 had returned to his previous territory on May 2 and at the time of the anting had a nest with eggs 26 yards from the scene. From the day of his return he had spent much time in the part of his territory that included the ant colony, but without being seen to ant.

July 22, 1946. 6:43 a. m. My lawn in Forest Park. Ants presumably *Lasius umbratus mixtus aphidicola;* no specimens collected. Observation from second-floor window 20 yards away; naked eye.

An unbanded Catbird flew down to the lawn (again wet, from rain) began foraging, and shortly anted twice, at an interval of possibly half a minute. It took no unusual posture; with its body about horizontal, it each time partly opened its right wing for a second or less and made one stroke of the bill back beneath it. After the second anting the bird foraged again in the grass for some seconds, then for five minutes alternately fed and idled at a feeding station close by, then flew away.

PURPLE GRACKLE

June 27, 1945. 3:25 p. m. My lawn in Forest Park. *Lasius umbratus mixtus aphidicola.* Watched from second-floor window 20 yards away; binocular.

A male Purple Grackle, coming upon the ant colony while foraging in my yard, anted from about 3:25 to 3:33 p. m. This bird anted not only the under side of the wing, but many other parts of its plumage. From my vantage point well above ground level I had two perfect views of the rump being anted while the grackle was facing directly away from me. I had also, from a '7 o'clock' angle, perfect views of the lower breast being anted, and in profile saw the extreme upper breast anted a couple of times. The scapulars were also unmistakably anted. Other strokes appeared to be directed to the belly and thighs.

At no time did the bird back up so that it trod upon its tail; it did rear back occasionally so that its tail lay flat on the ground behind it. It never rose completely erect in a penguin-like pose, although it did stretch its neck and head high to ant the extreme upper breast. All in all, it assumed the positions and performed the motions of simple preening, although most of its bill strokes were more vigorous than usual; it even scratched its head a few times during the anting, as during simple preening. The wing, when the under side was anted, was raised and twisted forward only moderately, and I am practically certain that the strokes were not confined to the outer primary but were delivered at least as often to more central feathers.

Usually the grackle made only one stroke with a single ant, but

sometimes more. What it did with the ants afterward I could never see during the performance, but later I found three maimed ones at the scene; one of these I succeeded in collecting without further injury. A few minutes after the anting, a grackle that I believe was the same one went to a near-by garden pond and drank.

At 6:05 p. m. a male Purple Grackle was anting at the same place in my yard, but flew away almost as soon as I discovered it.

July 4, 1945. 5:04 and 5:26 p. m. Place, ants and observation as on June 27.

Two male grackles flew down to the lawn. One began to forage; the other gave a song, with display, then it also began to forage; shortly both began anting. They performed steadily from 5:04 to 5:10 o'clock; frightened, then, by noise near by, they flew away, but at 5:26 both returned (undoubtedly the same birds, for they alighted directly at one side of the anting area) and at once one, and at 5:28 the other, resumed anting and continued until 5:34, when they were again disturbed and flew away for good.

For the most part, these birds during their anting 'sat' on the ground as if resting on the entire tarsus, with their tails stretched out flat behind them. Sometimes they made three and four strokes with a single ant—thrusts is a better word than strokes, for like the June 27 bird these usually dug their bills deeply into their plumage and not infrequently the act was of appreciable duration and the bill was moved about inside the plumage, as in ordinary preening. Again their actions in general were those of simple preening, and again there was absolutely no question but that other spots than the under edge of the wing were anted. The places were the upper breast; belly; possibly the side of the body beneath the raised wing; apparently some part of the wing's under side; some spot at the base of the tail (it apparently was beneath the root of the tail but reached from above with the tail bent aside out of the way); apparently the proximal inch or two of the tail's upper surface or coverts; upper rump; and scapulars. The birds now and then scratched their heads during the anting. I saw no hint of eating; on the contrary, this time I occasionally saw the birds snap their heads after anting strokes as if flinging the ants away, and I later succeeded in finding one maimed ant on the scene. Twice, when the birds were close to each other, they raised their heads high with bills pointing steeply upward.

Fifteen minutes after the anters had disappeared, a male grackle visited a near-by bird bath and drank repeatedly, then flew into a tree and preened for 22 minutes. During this period a second male drank at a garden pond. These were presumably the anters, for I never saw more than two birds in the neighborhood,

July 8, 1945. 6:25 a. m. Place, ants and observation as before.

Two male grackles were already anting when I discovered them. One stopped almost immediately and disappeared. The other anted intermittently for two minutes, wandered some yards away, after two minutes returned and anted once more, then foraged away. These grackles stood normally during their anting, which oftenest consisted of one quick stroke delivered somewhere on the under side of the wing, although a few times the birds also seemed to stroke the thigh, and once the base of the tail was anted with the 'digging' action of the bill. Once five strokes, or thrusts, were made after a single dab at the ground. One bird at one time worked its way to the outer edge of the anting area and there ate a cutworm, then returned and resumed anting. Once when they were within a foot or so of each other these birds raised their heads high, with bills pointing upward. The grackle that did the principal anting foraged away afterward and was still roaming about, feeding, when lost to view 10 minutes later.

August 8, 1946. 4:15 p. m. A third lawn in Forest Park. *Lasius niger* var. *neoniger.* Watched from only a few yards; naked eye.

So close to me that at times I was unable to focus my binocular, a grown juvenile grackle anted desultorily about half a dozen times, at intervals that probably were always half a minute or more. It anted the scapulars, the breast twice, the side, and the under part of the wing somewhere. The motion of the bill was usually the 'digging' one, rather than a 'stroke.' Some of the antings were executed in apparent excitement and with distorted postures. The ants used always seemed to be eaten afterward, and some were also eaten without being anted with.

Same day. 5:28 p. m. A concrete walk in Forest Park. *Lasius* (*Acanthomyops*) *murphyi.* Watched from second-floor window 30 yards away; binocular.

Like the other grackles I have watched, this one—a male, which was molting (its head was almost bare)—anted the scapulars, upper breast, rump at the base of the tail, and once apparently the under side of the base of the tail, as well as the under side of the wing—which last it anted more frequently than any other spot, however, and more frequently than any other grackle I have seen. As many as three strokes were made with a single ant. The bird did not work with its tail stretched out flat on the ground behind it, like some of my other grackles, but often held its tail bent to one side—to the right, particularly—during a stroke or while reaching far back with the ant; it did not take any otherwise distorted poses, or do any toppling. During the anting it scratched each side of its head about twice. It

anted busily for 6½ minutes, then flew up into an oak and preened—including more scratching of the head—for two minutes, then flew down to a lawn and foraged away. While the bird was working I could not see what it did with the ants it had used, but when it had gone I found more than a dozen scattered over the sidewalk, crippled or dead; some of these I collected.

DISCUSSION

Numerous as my observations of anting have been, I am no more able than other observers to go beyond conjecture in explaining the activity. I had hoped that examination of the maimed ants I collected, by Mr. Smith, the entomologist, would be helpful. It does not seem to be, but as I have found only one other published statement on this point, I give Mr. Smith's comments.

Of one maimed *Lasius umbratus mixtus aphidicola* used by a Purple Grackle on June 27, 1945, and one used by the same species July 4, 1945, he said: "One worker with left side of head and prothorax crushed in. Other worker with head gone and prothorax crushed in. Both of these specimens were seized by birds near the anterior part of the body, that is, the head and prothorax."

All of 12 *Lasius murphyi* that I collected after the grackle's anting on August 8, 1946, were maimed or dead ones. Eleven of these were females and one a worker. Mr. Smith said of three: "Two individuals with the gaster slightly crushed at the base and another specimen with one leg (left front) missing and the gaster also slightly crushed at the base."

Chisholm (1944: 395) noted that after a group of Starlings had anted with *Camponotus consobrinus* the scene "was bespattered with dead and maimed ants, some 50 per cent. of which had their abdomens burst, while the others were more or less intact."

It is easier to discredit some of the anting theories already advanced than to propose better ones. Thus, my observations deal a further blow to the food-carrying theory. The color-banded Catbird of May 15, 1946, and May 24, 1947, was known to be on its nesting territory, and the Catbird of July 26, 1944, which apparently ate at least one insect during its anting, was probably on its nesting territory, for there was a nest with eggs only about 35 yards from the scene of the anting. Judging by the dates, the Starling of June 21, 1945, the Robin of June 16, 1946, and possibly even the Robin of July 26, 1944, were also probable breeders.

The food-cleansing theory likewise is further impaired since, just as Chisholm found maimed and dead ants numerous after Starlings

anted, I readily found three maimed ones after the Purple Grackle anting of June 27, 1945, one after the grackle anting of July 4, 1945, and twelve—I could have gathered more—after the grackle anting on August 8, 1946. The grackles, like Chisholm's Starlings, were definitely not eating the ants, at least with any regularity.

I find myself inclining to suspect that Kelso (1946) has hit upon the explanation: "The habitual spreading of oil on the feathers for the function of irradiation and vitamin development and later ingestion [through preening] also offers an explanation for 'anting,' the occasional smearing of the feathers with ant exudations, vegetable juices, or other organic matter . . . Many organic liquids are affected by exposure to natural or artificial ultra-violet radiation. They can also absorb products of previous radiation."

That explanation would account for the 'typical' manner of anting, which otherwise is so puzzling. For example, Chisholm (1944: 397) notes that "the wiping or rubbing is always [?] done on less accessible spots, particularly the ventral surface of the primaries and the under tail-coverts. It can scarcely be supposed that the mere desire to cleanse food would cause the birds to take such pains—involving grotesque contortions and sometimes actual falls—in their efforts to apply ants to particular parts of the plumage."

Similarly, Ivor (letter, written before Kelso published his paper) says: "We are faced, according to my experiments, with the fact that two parts of the plumage only are anted. With the exception of the head, these two parts are obviously the most inaccessible to the bill of the bird. (This accounts for the contortions of the body.) This, in my opinion, precludes the possibility of accepting any of the heretofore suggestions as to the biological significance of anting, with the possible exception of pleasure derived. Even this does not seem logical, for were it done for pleasure, there are many parts of the body more readily accessible."

Later (recent letter), intensive observation of preening convinced Ivor that he had misjudged the inaccessibility of the two parts of the plumage to which he referred, namely, the under sides of the primaries and of the tail; he watched birds preen both of these "with no more difficulty than they experienced in reaching other accessible parts of the plumage." "The queer thing now seems to be," he writes of the anting performances, "why the tail is brought forward under the body in many instances. Apparently the position of the tail accounts for the tumbling, and not the position of the wing."

With that statement on the general accessibility of the remiges and rectrices to a bird's bill I agree, although it is pertinent here to

remark that plainly the remiges are more easily reached than the rectrices. This correction of view, however, merely adds significance to the parts of the plumage that are 'typically' anted; two things are to be noted:

First, the remiges and rectrices are the stiffest feathers a bird possesses; they are the ones against which an ant could be rubbed most forcefully, and so most effectively if the (instinctive) purpose were (*a*) to mash from it, or make it eject, a fluid for irradiation and (*b*) at the same time to keep that fluid on the surface of the plumage where it could best be exposed to the sun. (An ant rubbed hard against the body plumage would, it seems likely, be driven down into the soft feathers—my grackle antings perhaps illustrate this, although I do not know—and exude its juices there.)

Second, the ventral surface of the wing, and to a lesser extent the ventral surface of the tail, are directly exposed to the sun in one form of Passerine sun-bathing—the bird leans over on one side and opens the opposite wing's under side to the sun, also generally spreads its tail with the under side more or less exposed, while it fluffs out its body plumage and bends its head up and sideways, often with bill open and eyes narrowed or closed.

Is it not possible that just as the act of sun-bathing has thus become formalized (and into a most contorted and uncomfortable-looking pose), so the spreading of ant and other acids on the plumage for irradiation has also become formalized? The wiping of the ant or other object upon the easily-reached under side of the wing would seem to be the 'typical,' formalized gesture, which is elaborated upon to varying degrees by some genera or species of birds, or some individuals.

For it is not possible to apply to all birds, in the wild, Ivor's finding (1943: 54) with his controlled birds that ants "were rubbed only on the ventral surface of the primaries"—"or," he adds in a letter, "on the ventral surface of the tail, this last rarely." The various observations on grackles (Chisholm, 1944: 394; Parks, 1945; Groff and Brackbill, 1946; present paper) all show these birds anting or anointing the body, and usually the entire body. Also, Nichols (1943), Van Tyne (1943) and I (this paper) report a total of five Robins pressing their bodies to the ground in one way or another during their anting; this is not an act that could easily be misobserved.

The enthusiasm with which Ivor's birds ant, and the desultoriness of many wild birds' performances, appear, incidentally, to be in contrast. "From the middle of April until near the end of July," he says (1943: 54), "all of the birds which anted did so enthusiastically. . .

During the height of the anting season the act of anting seemed to engender a state of ecstasy so overwhelming that even domination and enmity were forgotten." All but three of the antings I have seen occurred within the seasonal range that Ivor mentions; nevertheless, many of them—those of the Robins, for instance, and that of the Starling of June 21, 1945—were so desultory that had I not already been familiar with anting, I should never have realized that these birds were doing it. Nice (1945) likewise stresses the casual and inconspicuous nature of June performances by the Cowbird (*Molothrus ater*).

Disinterest of another sort was shown, as I have already mentioned, by my color-banded Catbird, which in 1946 had nests through July only 35 yards from the ant colony and yet was seen to ant only on May 15, and in 1947 reoccupied his territory on May 2 but was never seen to ant until May 24. This lack of further records is not attributable to lack of watching; the ant colonies were only a few yards from my permanent banding trap—to which the Catbird each year often came for food—and had the bird anted with any frequency at all, I should certainly have seen him on more of the occasions. Similarly, other birds of half a dozen species that are known to ant, fed in my trap or foraged across the ant colonies without performing.

As for the forgetting of enmity by birds during anting, one of my male grackles sang and gave a typical display before another on the anting ground, while on each occasion that two males were present simultaneously both birds indulged in the act of raising the head, with bill pointing almost straight upward, that I take to be a dominance or intimidation display. The Catbird of July 26, 1944, also gave the latter display. The birds I have seen have also generally been calm enough to rove about, and feed, between antings.

Possibly when the true significance of anting has been determined, these apparent differences between the behavior of semi-captive and of wild birds will be explained. It would seem that laboratory workers might determine, now, the actual validity of Kelso's irradiation suggestion.

SUMMARY

Fifteen performances of anting by Robins, Starlings, Catbirds and Purple Grackles, in the wild, are described in detail; the Purple Grackle is an addition to the list of known users of ants for this purpose. The desultoriness of many of these anting performances, and some variations in the manner of anting, are contrasted with the high excitement and fixed pattern that have been reported for some semi-captive

birds. The rubbing of the ant on the under side of the wing is, however, regarded as the 'typical' anting gesture and the belief is expressed that, as another writer has already suggested, the purpose of anting may be the irradiation of certain fluids for the production of vitamin D; the behavior patterns of anting and sunning appear to be complementary.

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THE LAST PASSENGER PIGEON

BY WILLIAM C. HERMAN

THE passing of the last Wild, or Passenger, Pigeon at the Cincinnati Zoological Gardens on September 1, 1914, was an event noted by ornithologists throughout the world. The story of the total extinction of this wonderful American bird is one of the tragic chapters in the history of American ornithology; and its effect is even more far-reaching. It seems incredible that a species which was found over such a large territory in such enormous numbers could be completely destroyed.

Scarcely any other wild bird has attracted so much attention as the Passenger Pigeon, partly because it existed in such large numbers, and because its final extinction was so rapid. Volumes have been written on it and one feature always mentioned was that the birds congregated in large companies during the entire year—nesting, roosting, and feeding together. Flocks of a billion or more were recorded by reliable