

# COMPARISON OF ANTING RECORDS FROM TWO LOCALITIES IN NORTH CAROLINA

DORIS C. HAUSER<sup>1</sup>

Between March 1964 and September 1968 Eloise F. Potter (1970) recorded 25 episodes of anting by 45 wild birds of 9 species at Zebulon, Wake County, N.C. Between June 1958 and June 1966 I saw 48 episodes of anting by 59 wild birds of 13 species at Fayetteville, Cumberland County, N.C. While Fayetteville and Zebulon are only 65 air miles apart, they are in distinctly different geographic zones. Zebulon is at the eastern edge of the piedmont plateau, and its sandy-loamy soil supports upland mixed pine-hardwood forest. Snowfall can be expected several times each winter, but extended periods of subfreezing weather are rare. Fayetteville lies in the coastal plain slightly southeastward from Southern Pines and Pinehurst, sharing the sandy soil and mild temperatures that made these North Carolina resorts famous. The Sandhills region generally has not more than one good snowfall each winter. Dominant tree species are the long-leaf pine (*Pinus palustris*), loblolly pine (*P. taeda*), turkey oak (*Quercus laevis*), and blackjack oak (*Q. marilandica*).

## METHODS

All but three of the anting episodes described in this paper took place in the yard of my home at Fayetteville, where ground-level and elevated feeders have been maintained since 1956. A windowed bay gives a full view of the sloping backyard, and I am usually able to keep watch there from 08:00 to 1800. Unusual activities are verified by use of a 7 x 35 binocular.

## DEFINITION OF TERMS

The definitions given by Potter (1970) are used in this paper. "Active anting" refers to a bird's picking up live ants with its bill and inserting them among the feathers. In "passive anting" the bird remains, often with body flattened against the ground in a sunbathing posture, where ants can crawl among the feathers and subsequently removes the ants with typical anting motions. "Typical anting motions" are the peculiar twisting of wings and tail accompanying the insertions of ants among the feathers in active anting or their removal in passive anting. A "treatment" in active anting is the capture of an ant (or ants) and the subsequent insertion of the bill among the feathers. In passive anting a treatment includes each period of waiting for the ants to crawl upon the bird and their subsequent removal from the plumage. An "episode" refers to one or more treatments by one or more individuals without any significant interruption. (Two birds anting simultaneously or one immediately after the other are participants in a single episode.)

In addition to the terms used by Potter, I classify anting according to intensity. "High intensity anting" includes those episodes in which birds appear to be in a state of ecstasy, tumble over, or continue the activity for more than 5 minutes without significant interruption. In "medium intensity anting," birds exhibit some of the above

<sup>1</sup> Deceased 30 March 1972.

behavior characteristics, but the episode as a whole is more like "low intensity anting," which is brief, casual, or half-hearted, possibly consisting of only one treatment.

## RESULTS

During six consecutive years (June 1958 through November 1963) and in June 1966, I saw altogether 48 episodes of active anting by 59 wild birds of 13 species (Table 1), namely: Mourning Dove 3, Red-bellied Woodpecker 6, Red-headed Woodpecker 1, Yellow-bellied Sapsucker 1, Blue Jay 14, Brown Thrasher 1, American Robin 5, Starling 7, House Sparrow 2, Common Grackle 3, Cardinal 11, Rufous-sided Towhee 4, and White-throated Sparrow 1. Records are listed in Table 1 and in the descriptions below according to calendar months to facilitate discussion of the seasonal aspects of anting behavior.

*March.*—On 22 March 1961 I saw House Sparrows feeding and pressing their breasts into the soil where an ant bed had been located in 1959 and 1960. A few tiny ants could be seen carrying food, apparently corn meal from the feeder. Occasionally an individual among the flock of 6 to 10 sparrows would ant its wings, breast, and back.

*April.*—I have no record of anting in April although my notes contain many records of sunbathing for this month.

*May.*—On 31 May 1960 an adult Blue Jay anted briefly at 11:10, picking ants off its legs and treating primaries.

On 31 May 1961 three Starlings and two adult Common Grackles were foraging on the front lawn at 09:20. One grackle anted the under side of its primaries while walking about on the ground. Grackles were among seven species of birds that sunbathed the previous day.

On 14 May 1962 at 14:20 an adult Mourning Dove that was walking slowly in the shade began anting with jabs into breast, belly, tail, and rump. Mourning Doves, Blue Jays, and Cardinals had been sunbathing off and on since 12:20.

On 15 May 1962 at 12:10 an adult Mourning Dove anted at the squirrel sprawl. The bird ate with steady pecks, then snatched two or three times and dug into breast, belly, and back plumage. Birds of five species had been sunbathing off and on since 09:45. Sunning behavior occurred frequently on 16 and 18 May, occasionally on 19 and 20 May, and frequently 21, 22, and 23 May.

At 15:30 on 23 May 1962 an adult female Red-bellied Woodpecker flew to the pine tree at the porch and began to peck under the bark plates and especially from a scar which later investigation showed to be plugged with hard sand. After each peck the bird would dress its plumage. A male Red-bellied Woodpecker had sunbathed at 13:15.

*June.*—On 5 June 1958 at 13:40 an adult female Red-bellied Woodpecker anted while clinging to the outside of the entrance to the nest cavity where she and her mate were taking turns incubating eggs. She would peck some unseen object from the rim or interior of the hole and use it to dress her wings and body plumage. There was no ecstasy, just a methodical pulling of her feathers through her bill after each peck. She was in full sun on a cloudy day.

On 28 June 1958 at 13:55 several Starlings were sunning on the lawn. Two others were walking with bills wide open, picking ants from the ground, and running bills down the inner side of the primaries with typical anting motions. The wide open bill position of these two birds suggests that they were experiencing more body heat than the other birds present in the yard that afternoon. Sunbathing on this date was mostly confined to minor fluffing of feathers.

On 13 June 1960 a juvenile Red-bellied Woodpecker anted with something pecked from the bark of a dead crotched branch in the ailanthus (*Ailanthus altissima*), popularly called tree-of-heaven.

On 21 June 1960 a male Red-bellied Woodpecker pecked into the dead perch limb

above the nest hole in a stumpy dead branch high in a living pine tree. The bird repeatedly dug into the wood and preened in the manner of anting.

On 5 June 1963 at 17:30 an adult female Common Grackle anted, treating one wing two or three times, then the other. A young grackle fed at the same ant bed but did not dress its plumage. At 17:40 the female returned and made one treatment.

Mrs. John Stewman reported having observed anting in her yard at Fayetteville for a period of several days during the early morning hours. On 18 June 1963 I visited her home. Cardinals had anted wildly at 08:15, prior to my arrival. Mrs. Stewman said one had tumbled downhill from the spot where winged ants were emerging from a rotting stump. At 09:20 an adult American Robin in molt ate ants and anted. Another robin (with white of under-tail feathers thrust upward through tail) anted its shoulders and back. Two female Cardinals anted excitedly, mostly treating primaries and bend of wing. One of the previously mentioned robins anted for 5 minutes without pause except to change position. The bird then ate ants for a long time. Ants remaining on the robin's body and feet occasionally incited an anting gesture. I never saw any of these birds discard an ant after a treatment.

Around noon on 24 June 1966 I saw a Red-headed Woodpecker anting on the ground in bright sunlight. Repeatedly the bird would pick up a tiny ant and zip down the wing. The woodpecker was low to the ground with wings outspread and plumage not fluffed.

*July.*—At 14:05 on 4 July 1959 House Sparrows were dusting lengthily in full sun at the ant bed. Large reddish ants were very active, perhaps repairing nests after rains of 2 and 3 July. One sparrow hopped into the midst of the ants, jumped and pecked wildly at its legs, then flew about 6 feet away and continued removing ants from legs and belly, eating some and rubbing some through plumage. The bird jumped violently at times, apparently having been stung by ants still on its body. House Sparrows and seven other species sunbathed during the remainder of the afternoon, but I saw no further anting activity.

On 19 July 1960 at 09:30 an adult Common Grackle, after feeding, flew to an ant bed, snatched ants, wiped primaries with swift strokes three times, and walked away.

On 27 July 1960 at 08:45 I discovered a molting juvenile American Robin anting with high intensity, picking up ants and running them through plumage, sitting on its tail, and falling over. Anting continued for 3 minutes after I arrived at the window. No other robins were in sight.

On 16 July 1961 at 16:00 a Mourning Dove was walking in the yard and anting with quick gestures.

On 17 July 1961 at 12:15 an adult Starling anted using large red ants and stripping through primaries with lightning fast movements. The bird moved from sun to shade, walking fast and remaining in constant motion. It treated primaries of both wings with the same bill contents, added more ants, and again stripped through primaries of both wings. The partly closed bill was shaggy with protruding ants. Every now and then the bird paused to eat all the accumulated ants, collected another bill full, and resumed the treatments. It never treated the body plumage or any area other than the wings.

On 19 July 1961 at 12:15 a molting juvenile Blue Jay anted its primaries, belly, and under-tail coverts. In treating the crissum the jay would snatch an ant, hop back to sit on its tail, thrust with bill, and up again to snatch another ant. After about 2 minutes the bird flew into a tree, but it returned in a minute and anted actively for 3 minutes. While on the ant bed the jay moved about constantly, snatching ants from its feet and legs to use for dressing plumage. The bird was obviously aware of being stung by the ants.

Much sunbathing took place on 7, 8, and 9 July 1962 even though skies were overcast all three days. At 09:30 on 9 July a molting juvenile American Robin was feeding at an ant bed. Twice it anted primaries.

On 27 July 1962 at 14:35 I saw anting by an adult Starling in almost complete winter plumage. Many species of birds had sunbathed in the hour prior to the anting episode.

TABLE 1. Anting by 59 birds of 13 species at Fayetteville, N.C., 1958-1966.

| Date/Time                      | Species of Bird  | Weather Conditions   | Species of Ant               |
|--------------------------------|--|--|------------------------------|
| 22 March 1961<br>No time given | House Sparrow, <i>Passer domesticus</i>                        | Torrents of cold rain previous day<br>and night                  | <i>Pheidole morrisi</i>      |
| 31 May 1960<br>11:10           | Blue Jay, <i>Cyanocitta cristata</i>                           | Thin sun through clouds  | <i>Pogonomyrmex badius</i>   |
| 31 May 1961<br>09:20           | Common Grackle, <i>Quiscalus quiscula</i>                      |  |                              |
| 14 May 1962<br>14:20           | Mourning Dove, <i>Zenaida macroura</i>                         | Clear, warm  |                              |
| 15 May 1962<br>12:10           | Mourning Dove  | Clear, hot   |                              |
| 23 May 1962<br>15:30           | Red-bellied Woodpecker, <i>Centurus<br/>carolinus</i>          | Overcast, hot  |                              |
| 5 June 1958<br>13:40           | Red-bellied Woodpecker   | Cloudy   |                              |
| 28 June 1958<br>13:55          | Starling, <i>Sturnus vulgaris</i> (2)                          | Clear, hot   |                              |
| 13 June 1960<br>No time given  | Red-bellied Woodpecker   | Clear, hot   |                              |
| 21 June 1960<br>No time given  | Red-bellied Woodpecker   |  |                              |
| 5 June 1963<br>17:30           | Common Grackle   | Overcast, hot  | <i>P. badius</i>             |
| 18 June 1963<br>08:15          | Cardinal, <i>Cardinalis cardinalis</i> (2)                     | *Cool and overcast following rain                                | <i>Lasius umbratus</i>       |
| 18 June 1963<br>09:20          | American Robin, <i>Turdus migratorius</i><br>(2), Cardinal (2) | *Cool and overcast following rain                                | <i>L. umbratus</i>           |
| 24 June 1966<br>12:00          | Red-headed Woodpecker,<br><i>Melanerpes erythrocephalus</i>    | Bright sun   |                              |
| 4 July 1959<br>14:05           | House Sparrow  | *Heavy rain during night of 2-3 July;<br>clearing during episode | <i>P. badius</i>             |
| 19 July 1960<br>09:30          | Common Grackle   | Overcast, mild   | <i>P. badius</i>             |
| 27 July 1960<br>08:45          | American Robin   | *Clear and warm  | <i>P. badius</i>             |
| 16 July 1961<br>16:00          | Mourning Dove  | Hot  |                              |
| 17 July 1961<br>12:15          | Starling   | *No data   |                              |
| 19 July 1961<br>12:15          | Blue Jay   | *Overcast, sultry  | <i>P. badius</i>             |
| 9 July 1962<br>09:30           | American Robin   | Overcast   | <i>P. badius</i>             |
| 27 July 1962<br>14:35          | Starling   | Clear, cool  |                              |
| 1 Aug. 1960<br>08:25           | Blue Jay   | *Overcast  | <i>P. badius</i>             |
| 28 Aug. 1960<br>16:55          | Rufous-sided Towhee,<br><i>Pipilo erythrophthalmus</i>         | *No data   |                              |
| 30 Aug. 1960<br>08:40          | Rufous-sided Towhee  | Clear, hot   | <i>Iridomyrmex pruinosus</i> |
| 14 Aug. 1961<br>11:30          | American Robin   | Overcast, cool   |                              |

| Date/Time                    | Species of Bird  | Weather Conditions                                      | Species of Ant                |
|------------------------------|--|---|-------------------------------|
| 22 Aug. 1961<br>13:30        | Blue Jay   | *Torrential rain through morning;<br>overcast; soil wet | <i>P. badius</i>              |
| 2 Sept. 1960<br>13:20        | Cardinal   | Overcast, misty rain                                    |                               |
| 5 Sept. 1960<br>09:05        | Red-bellied Woodpecker                                   | Sunny   |                               |
| 15 Sept. 1960<br>08:15       | Rufous-sided Towhee                                      |   |                               |
| 28 Sept. 1960<br>10:17       | Red-bellied Woodpecker                                   | Cloudy but bright, coolish                              |                               |
| 5 Sept. 1961<br>10:05        | Brown Thrasher, <i>Toxostoma rufum</i>                   | Hot, sunny  | <i>P. badius</i>              |
| 13 Sept. 1961<br>13:30       | Blue Jay (2)   | Cloudy, hot   | <i>Crematogaster ashmeadi</i> |
| 18 Sept. 1961<br>17:45       | Rufous-sided Towhee                                      | Overcast, mild  |                               |
| 9 Sept. 1962<br>15:30        | Starling   | Heavy rain at 13:30; hot and sultry                     |                               |
| 10 Sept. 1962<br>08:10       | Blue Jay (2)   | *Overcast, humid after rain of<br>9 Sept.               | <i>P. badius</i>              |
| 27 Sept. 1962<br>16:55       | Starling   | *No data  |                               |
| 1 Oct. 1959<br>18:00         | Blue Jay   | *No data  |                               |
| 4 Oct. 1961<br>17:15         | Cardinal   | Mild  |                               |
| 6 Oct. 1961<br>09:30         | Starling   | Cool, sunny   | <i>Camponotus socius</i>      |
| 9 Oct. 1961<br>17:15         | Cardinal   | Very warm   | <i>L. niger neojniger</i>     |
| 3 Oct. 1962<br>16:05 & 17:20 | Cardinal (2)<br>Cardinal (2)                             | *Rain at 12:00, showers<br>through afternoon            |                               |
| 26 Oct. 1963<br>16:50        | Blue Jay   | *Following overnight rain                               | <i>C. socius</i>              |
| 13 Nov. 1959<br>15:15        | Blue Jay (2)   | Sunny, warm   |                               |
| 25 Nov. 1961<br>16:40        | Yellow-bellied Sapsucker,<br><i>Sphyrapicus varius</i>   | Clear, sunny, very cool                                 |                               |
| 5 Nov. 1963<br>17:10         | White-throated Sparrow,<br><i>Zonotrichia albicollis</i> | *Cool, misty rain                                       | <i>Acanthomyops claviger</i>  |
| 17 Dec. 1959<br>12:30        | Blue Jay (2)   | *Overcast, mild   |                               |

\*High intensity anting during episode(s).

*August.*—On 1 August 1960 at 08:25 a juvenile Blue Jay anted with full sweeps through the primaries into the belly, sitting on its tail and falling over.

On 28 August 1960 a molting juvenile male Rufous-sided Towhee anted for fully 5 minutes beginning at 16:55. The bird would snatch an ant and thrust its bill through the partly black primaries or make a sharp dab at the vent while sitting on its tail. After anting, the towhee sunbathed in Level III (Hauser, 1957).

On 30 August 1960 the same young male Rufous-sided Towhee, marked by black primaries and secondaries broadly banded with white, anted again but with only medium intensity.

On 14 August 1961 at 11:30 a molting juvenile American Robin anted its primaries briefly while foraging in the yard.

On 22 August 1961 at 13:30 a juvenile Blue Jay anted with high intensity.

*September.*—On 2 September 1960 an adult female Cardinal, in molt, anted briefly at 13:20. The bird treated the primaries with three series of three treatments each, moving to a new area for each series.

On 5 September 1960 at 09:05 a juvenile Red-bellied Woodpecker, still with no red on its head, perched on a cone at the top of the tall dead pine in the front yard. The bird probed into the cone and treated its plumage with the substance removed from it, digging into the breast and flanks. Suddenly the bird fluffed its belly and fanned its wings and tail for a brief sunbath in Level III (Hauser, 1957). It made one more anting treatment and flew away to feed.

On 15 September 1960 at 08:15 a juvenile male Rufous-sided Towhee, possibly the same individual that anted on 28 and 30 August of this year, anted by the feeder until a Mockingbird (*Mimus polyglottos*) chased it away.

On 28 September 1960 at 10:17 an adult male Red-bellied Woodpecker anted at dead crotched limbs in the alanthus where I saw a juvenile of the same species anting on 13 June 1960. After each peck into the bark the bird carefully and slowly preened first the bend of the wing, then the breast, shoulders, and primaries. While the bird was anting the sun broke through what had been solidly overcast skies. After carefully dressing the neck and shoulders, the woodpecker leaned back to expose these areas to the sunlight. The bird moved to two other dead limbs and continued pecking and preening with deliberate strokes until 10:30.

On 5 September 1961 at 10:05 a Brown Thrasher anted with several quick thrusts through the primaries, then resumed feeding.

On 13 September 1961 at 13:30 two young Blue Jays anted at low intensity while feeding. One jay chased the other away at intervals.

On 18 September 1961 at 17:45 a molting juvenile Rufous-sided Towhee anted while feeding on the lawn. Only about four or five treatments were made. The anting motion included a swish of the tail to left or right side of the body and a collapse of lower belly plumage to the ground just as the bill, with ant, ran through primaries on the side toward the tail. Potter (pers. com.) has noted that a collapse of belly plumage regularly precedes the anting stroke made by American Robins.

On 9 September 1962 a juvenile Starling anted its primaries at 15:30.

At 08:10 the next day, 10 September 1962, two Blue Jays anted at the ant bed. One bird was especially active, treating only primaries but tumbling over in its enthusiasm. The other bird made a few treatments of low intensity. A Starling and a Mockingbird watched the activity but did not ant.

On 27 September 1962 a Starling, apparently an adult bird, anted on lawn near feeder for about 5 minutes beginning at 16:55. The bird assumed the typical anting posture for each treatment. Appearing to use its wings for support, the bird directed the beak full of ants toward the anal area with forceful sweeps.

*October.*—On 1 October 1959 at 18:00 one Blue Jay from a flock of eight anted with high intensity and remained in the yard after others left. The bird treated primaries, breast, belly, and crissum, bringing the tail forward inverted beneath the body and using

wings for support while treating belly and crissum. Crown feathers were fully raised, but body plumage was not fluffed.

On 4 October 1961 at 17:15 a female Cardinal anted primaries briefly while feeding on the lawn.

On 6 October 1961 at 09:30 a Starling anted while perched alternately on the ground and on a tree trunk, clinging to the bark about 14 inches above ground.

On 9 October 1961 at 17:15 a female Cardinal anted deliberately, treating primaries of one wing four to six times and then treating the other wing. The tail was tucked under body to bird's left throughout the episode.

On 3 October 1962 at 16:05 a male and a female Cardinal, both adults, anted vigorously while sitting on their inverted tails. The male definitely was treating his primaries, but often the thrust of the bill appeared to reach the anal area, which was the location of the wing tip during the episode. While the male exhibited high intensity anting, the female was less vigorous in her treatments, which were mostly confined to the primaries. The treatments continued for 15 minutes. Some ants were eaten, either after a treatment or instead of it; but others were tossed aside after use.

Later the same afternoon (17:20) a male Cardinal anted primaries in a standing position. He was replaced by another male at 17:25. The second male anted vigorously until displaced by a Common ("Yellow-shafted") Flicker (*colaptes auratus*).

On 26 October 1963 a Blue Jay anted its primaries continuously and excitedly for 8 minutes beginning at 16:50. Cardinals approached within 10 inches and ate some ants. A female flicker edged to within 3 inches of the anting bird, but she left without anting or feeding.

*November.*—On 13 November 1959 at 15:15 two Blue Jays anted actively until squirrels approached. Both birds flew, but one returned to ant some more. It made one to three jabs at the under side of its primaries with each ant picked up, flicking the wing back to an extra tight position at its side following each treatment. After six to eight treatments the bird moved from the location near the wall to an exposed oak tree root and anted for about 3 minutes.

On 25 November 1961 at 16:40 a Yellow-bellied Sapsucker anointed its breast and wings with a substance removed from the rotting wood of a tall dead pine stump at the shore of Forest Lake.

On 5 November 1963 at 17:10 Derb Carter Jr. called my attention to the behavior of a White-throated Sparrow that had just been chased into the yard by a neighbor's Mockingbird. As soon as the mocker departed, the sparrow dropped to the lawn and immediately began to ant its primaries with quick gestures and a continuous switching of the tail from one side to the other. The bird anted for 5 minutes without pause. When we went to collect specimens, Carter commented on the strong pungent odor of the air around the ant nest.

*December.*—On 17 December 1959 two Blue Jays anted their primaries with high intensity for 5 to 7 minutes, usually making 3 to 10 treatments of one wing before switching to the other. Although all applications were to the primaries alone, birds still settled back each time with the tail twisted to the side and under the body. Thrusts were directed toward the base of the primaries with the sweep of the bill going only part of the length of the feathers. The bill often held tiny wisps of dried weed or leaf picked up while grasping an ant. Some ants were taken from the top of a plant stalk 3 inches high. The jays ate each ant before picking up the next one. To the best of my knowledge this episode is the only account of anting by wild birds in December in temperate North America.

## DISCUSSION

Anting appears to be a widespread and stereotyped form of avian feather maintenance behavior that surely must be advantageous to birds in some manner, although its purpose has not yet been determined. Potter (1970) found no evidence to support once

generally accepted hypotheses that birds ant either to control ectoparasites or for the pleasure of self-stimulation. She did find that birds are more likely to ant when they are molting than at any other season of the year. The significance of this seasonal peak of anting activity is unquestionably strengthened by data from Fayetteville.

*Species of birds anting.*—Potter (1970) listed 21 species of birds known to have anted in the wild in temperate North America. The present paper adds to this list the Mourning Dove, Red-bellied Woodpecker, Red-headed Woodpecker, Yellow-bellied Sapsucker, and White-throated Sparrow. The White-throated Sparrow has long been known to ant in captivity (Ivor, 1943), but I am not aware of any published anting records for wild birds of this species.

Anting by doves and woodpeckers may be more common than the literature suggests. These short-legged heavy-bodied birds do not ant in the classic postures that make the behavior almost unmistakable in passerines. To further complicate matters, woodpeckers have long bills and extremely extensible tongues that make it very difficult to tell what they have picked up and which feathers they are treating, even when the bird is viewed at close range. If woodpeckers ant while perched at the top of a dead tree, their movements may be adequately observed even though collecting the ants or other substance they may have used is completely out of the question. For woodpeckers, under all but the most favorable conditions, the alternate pecking and preening should be accepted as evidence of active anting behavior. Passive anting presents a more difficult field problem because it may be confused with sunbathing. Only exceptionally well documented accounts of passive anting in doves and woodpeckers should be accepted for publication.

*Species of ants used.*—Table 1 lists the species of ants used in anting episodes at Fayetteville when positive identification could be obtained. *Pheidole morrisoni*, *Pogonomyrmex badius*, and *Crematogaster ashmeadi* represent significant additions to the list compiled by Whitaker (1957). All three of these Myrmicinae possess a functional sting, and Mrs. Whitaker's captive oriole found ants of this subfamily unacceptable for anting. At Fayetteville, however, the Florida harvester ant (*P. badius*) was used by anting birds more frequently than any other identified species. In addition to its sting, this species gives off a pungent odor that may cause birds to select it for anting in spite of the risk of being stung.

*Iridomyrmex pruinosus* has a vestigial sting and exudes a repugnatorial liquid as do the several Formicinae on my list (*Camponotus* sp., *Lasius* sp., and *Acanthomyops* sp.).

According to Brimley (1938), the Florida harvester ant reaches the northern limit of its range in southeastern North Carolina. This species, along with several others in Table 1, probably has not been mentioned in the literature on anting previously because anting observers have taken very few specimens of ants from the southeastern United States.

*Feathers treated.*—Weisbrod (1971) states that his captive Blue Jays did not ant the tail or vent region directly. He suggests that published reports of this activity are attributable to observer error. I concede that anting treatments are most often directed toward the wings and that rapid movements make field observations difficult. However, I do not believe there was any observer error in the following episodes: 19 July 1961, molting juvenile Blue Jay, under-tail coverts; 1 August 1960, juvenile Blue Jay, belly; 28 August 1960, molting juvenile Rufous-sided Towhee, vent; 27 September 1962, Starling, anal area; and 1 October 1959, Blue Jay, belly and crissum.

Sometimes anting birds sit on their inverted tails with the wing tip touching the crissum so that the full sweep of the bill along the under side of the primaries ends at or near the vent. In these cases one cannot determine whether the treatment is intended for the wing, the vent, or both. For an account of this type of anting, see the description of Cardinals anting on 3 October 1962 in the present paper. At other times the bill does not touch the wing at all, and the thrust is made directly toward the crissum. Potter (1970 and pers. com.) reports having seen several birds bring the tail forward between the legs and thrust the bill, without touching the wings or breast, into the crissum with such vigor that they tumbled over backwards.



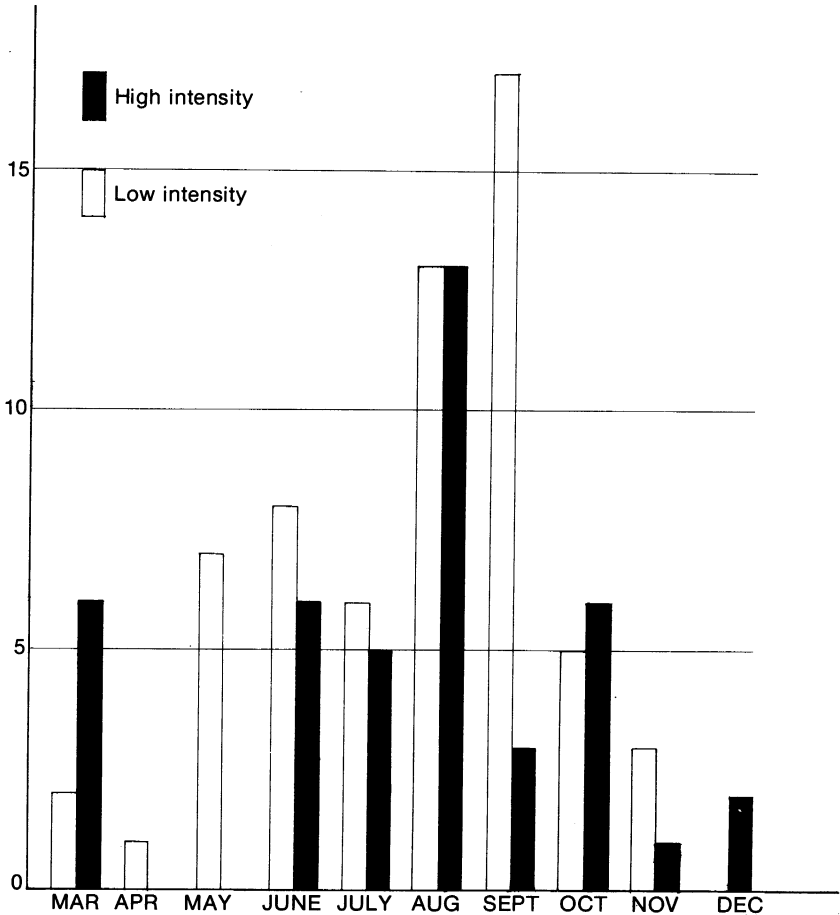


FIGURE 1. Monthly distribution of high and low intensity anting by 104 wild birds at Fayetteville and Zebulon, N.C., 1958-1968.

While there may be a few inaccurate sight records in the literature, anting treatments directed toward the anal and caudal feather tracts have been described by too many reliable observers to be dismissed for want of motion pictures.

*Anting and weather conditions.*—Potter (1970) reports a correlation between heavy or prolonged rainfall and high intensity anting behavior. Weather data in Table 1 also suggest a relationship between anting and rainfall. Of the 39 episodes for which I recorded weather data, 25 (64%) took place within 24 hours after rainfall, during misty rain, or under cloudy skies. I have weather data for 13 of the 17 high intensity anting episodes. Eight of the 13 (62%) took place within 24 hours following heavy rainfall, one during misty rain, three when skies were overcast, and only one under clear skies. Thus 92% of the high intensity anting episodes for which I can supply weather data took place during periods of high humidity. While low humidity does not preclude either anting

(Potter, 1970) or sunbathing (Hauser, 1957), high humidity does appear to increase significantly the frequency and intensity of both activities in wild birds.

*Diurnal peak.*—The 45 anting records for which I noted the time of day are distributed as follows: hour beginning at 08:00, 6 episodes (4 of these high intensity); 09:00, 6 (1); 10:00, 2; 11:00, 2; 12:00, 5 (3); 13:00, 5 (1); 14:00, 3 (1); 15:00, 3; 16:00, 6 (4); 17:00, 6 (1); and 18:00, 1 (1). Potter (1970) found birds more likely to ant in the early morning hours before 10:00 than at any other time of day. She noted lesser peaks of anting activity in late afternoon and at midday. My hours of observation (08:00 to 18:00) greatly reduced the probability of my seeing early morning anting, but my data still indicate the same three diurnal peaks of anting activity. The lull between 10:00 and 12:00 is particularly noticeable, this being a 2-hour period when I saw only four episodes and no high intensity anting at all.

*Seasonal peak.*—Potter (1970) noted an “abrupt onset of major anting activity at mid-May, continuing through June and July to a peak in August, declining slowly in September, and virtually stopping the first week in October.” Records from Fayetteville (Table 1) generally support this description of the anting season. I saw anting only once earlier than 14 May, and I noted only five episodes later than 9 October. One of these was extremely late and appears to be the only published record of anting by wild birds during the month of December in temperate North America. It extends the known dates of anting in North Carolina from 3 March (Potter, 1970) to 17 December.

One major discrepancy exists between my data from Fayetteville and those from Zebulon (Potter, 1970). I found more anting in June, July, September, and October than in August. A comparison of the species recorded anting at the two localities offers a plausible explanation. One-fourth of the birds anting at Fayetteville were Blue Jays, but only 5 of the 45 anting at Zebulon were of this species. American Robins constituted over one-third of all the birds Potter saw anting, while only 5 of the 59 anting at Fayetteville were of this species, two of these having been seen at the Stewman residence. My yard does not attract the flocks of molting juvenile robins that Potter found prone to ant following heavy rainfall in August.

Of the 59 birds that anted at Fayetteville, 49 (83%) did so between 14 May and 9 October. Of the 45 birds anting at Zebulon (Potter, 1970), 37 (82%) did so between the same dates. Thus the mid-May to early October anting season appears to be valid for both localities, although the peak may vary according to seasonal weather conditions, local habitat, and the species of wild birds most frequently present in the study area. Fayetteville and Zebulon data combined (Figure 1) indicate a peak in late summer (August and September), with a greater proportion of high intensity anting in August than in September.

*Anting and the cycle of molt.*—All Fayetteville anting records were accumulated before I learned that Potter (1970) had detected a relationship between the peak of anting activity and the peak of postnuptial and postjuvenile molts in wild birds. Even though I made no consistent effort to note plumage conditions in anting birds, I can offer some additional evidence in support of the theory that birds ant to soothe skin irritated by new feather growth (Southern, 1963; Potter, 1970).

The species seen anting most frequently at Fayetteville is the Blue Jay. My 10 episodes of anting by jays are distributed as follows: 31 May, 19 July (molting juvenile), 1 August (juvenile, high intensity), 22 August (juvenile, high intensity), 10 September (2 unaged birds, high intensity), 13 September (2 juveniles), 1 October, 26 October (unaged bird, high intensity), 13 November (2 unaged birds), and 17 December (2 unaged birds, high intensity). Bent (1946) states that a partial postjuvenile molt takes place “when the bird is between 50 and 90 days out of the nest.” According to the same source, adult Blue Jays have a complete postnuptial molt between June and September. Although I detected postjuvenile molt in only one of the young birds anting at Fayetteville, individual jays probably can be found in various stages of molt from mid-July through late autumn, the species being double-brooded in our region (Sprunt and Chamberlain,

1949). Potter (pers. com.) has banded one adult and one young of the year that were just beginning to molt in early October. Thus late October to mid-December anting by Blue Jays is not inconsistent with a probable relationship between anting and molting.

I have seen Rufous-sided Towhees anting on four occasions: 28 and 30 August 1960 (juvenile, same bird both dates), 15 September 1960 (juvenile, possibly same bird that anted in August), and 18 September 1961 (juvenile). In all four instances the birds were obviously undergoing the postjuvinal molt.

Cardinals anted at Fayetteville on 18 June (2 episodes, high intensity), 2 September, 3 October (2 episodes), 4 October, and 9 October. Potter (pers. com.) reports adult Cardinals molting at Zebulon as early as mid-May and juveniles molting from August through October. Elizabeth Teulings (pers. com.) says that some Cardinals are still molting in early December.

*Anting and sunbathing.*—In a previous paper (Hauser, 1957) I described voluntary sunbathing (deliberately undertaken by the individual bird) and compulsory sunbathing (unpremeditated and irresistible to the bird). Voluntary sunning is used in conjunction with other normal feather maintenance activities, but the compulsory response to sunlight under extreme conditions of heat and humidity is usually followed by immediate flight to shade. Four levels of response to sunlight were noted, ranging from Level I (contour feathers erected, wings drooped, tail spread) to Level IV (exaggerated sun position with bird apparently near collapse).

During 6 years of regular watching for anting at Fayetteville, I continued to note birds' sunbathing activities. Some winter residents sunbathe in late fall and from February until migration in April or May. Permanent resident species may sun from March to October, but they do so most frequently in June and July.

I have recorded sunbathing for the Red-bellied Woodpecker at Fayetteville from 2 May (1961) through 28 September (1960) and anting from 23 May (1962) through 28 September (1960). A young Red-belly both anted and sunned on 5 September 1960, and an adult engaged in both activities on 28 September 1960. A molting juvenile Rufous-sided Towhee that anted with high intensity on 28 August 1960 also sunbathed. I have recorded no other instances when an anting bird also sunned.

While both anting and sunbathing frequently occur following heavy precipitation and the two activities are obviously not mutually exclusive, a sharp increase in one does not presage a similar increase in the other. I have recorded both anting and sunning on the same days only 11 times, three of these being represented by the two woodpeckers and one towhee that combined the two activities. Six of the other eight times the sunbathing was intensive, involving many individuals of several species on a single day or occurring frequently on several successive days. These six dates were 31 May 1961, 14, 15, and 23 May 1962, and 9 and 27 July 1962. On all six occasions the accompanying anting was of low intensity.

Although there are not yet enough data to make a positive statement regarding the relationship of anting to sunbathing in birds, my records indicate that permanent resident species prefer sunbathing to anting from April through July and that more individuals of more different species sun in June and July than in any other months of the year. The August-September peak of anting coincides with a period of declining frequency of sunbathing, though the latter activity certainly is not unusual in late summer.

## SUMMARY AND CONCLUSIONS

In the course of 6 years of regular watching for anting and during subsequent random observations, I witnessed 48 episodes of anting by 59 wild birds of 13 species at Fayetteville, N.C. These 13 species include five not previously reported as anting in the wild. Among the ants used were three species from the subfamily Myrmicinae that possess functional stings and were previously thought to be unacceptable for anting purposes.

Anting data from Fayetteville correspond very closely to data from Zebulon, N.C. Both Potter (1970) and I found major anting activity to begin at mid-May and to end in early October with the peak in August and September, although occasional episodes occur as early as 3 March (Zebulon) and as late as 17 December (Fayetteville). Records from Fayetteville offer additional evidence that birds are more likely to ant while molting than at other times of the year.

Although on occasions birds may sunbathe in conjunction with anting, I find that sunning occurs most frequently among permanent resident species during the two months immediately preceding the August-September peak of anting. Additional records of both anting and sunning with adequate details on plumage and weather conditions are required before the significance of the seasonal fluctuations in relative frequency of these two behavior patterns can be understood. Future students of either anting or sunbathing in birds should carefully consider the relationship of these two activities to each other and to the cycle of molt.

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Barbara Hauser Bryan, though only a casual bird watcher, recognized the value of her mother's ornithological data and took the initiative in arranging for the posthumous publication of the anting paper. Brian Potter prepared the graph, and Elizabeth Teulings supplied banding records of birds in molt. To all these people I am sincerely grateful.—ELOISE F. POTTER, 15 July 1972.

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