

## GENERAL NOTES

**The behavior of two captive ostriches at a burning leaf pile.**—Two ostriches in the collection of the New York Zoological Society at Bronx Park have shown great interest in piles of leaves burning in their enclosure each fall. The two birds are exhibited with cranes and antelope on a large, enclosed, rolling meadow called "The African Plains."

A typical instance, recorded by movie camera and observer during the fall of 1958, occurred on the 3.7-acre African Plains Exhibit: a keeper ignited a pile of leaves about three feet in diameter and then retired. As he left, the ostriches approached the fire, the female leading, and, after several short pauses when the birds watched the fire closely, the female lowered her head and walked into the smoke directly before the burning leaves. The male continued to stand off, perhaps 15 feet away, watching. Flames could be seen plainly among the leaves as the female preened her neck, raised folded wings (over her back), and lowered herself on her tarsi. The bird's breast extended over the edge of the burning pile and smoke engulfed the forepart of her body. Glowing ashes and small flames were still visible very close to the bird. She kept her wings raised but waved them regularly in short movements over the back. The body plumage was moderately raised. Finally the bird lowered herself to her breast, protruding well into the smoking edges of the leaf pile, and continued to wave her wings. The neck was not extended nor was the mouth obviously open. When the female arose she preened her neck briefly and walked away from the smoking heap. The male approached her and began courtship display, eventually chasing her to the far end of the enclosure.

The female performs most often at the burning leaf piles, though keepers report that the male indulges in exactly the same activity. I have not observed the male at the fire. While these performances have not been timed and the character of the fire has varied from time to time, the ostriches rarely spend more than two or three minutes at the leaf pile. Frequent keeper observations confirm that the male often displays to and chases the female when she arises from the leaf pile. Crowned Cranes and a European Crane in the same enclosure have not been observed at the leaf piles. The female ostrich (*Struthio camelus australis* Gurney) was received as an adult in 1947. The male (*S. c. massaicus* Neumann) was acquired as a half-grown bird in 1955.

The motivation and degree of relationship of this behavior to anting, bathing, sunning, dusting or even smoke bathing is difficult to delineate. Smoke bathing as described by Ridley (1948. *Brit. Birds*, 41:83) for Jackdaws, White (1948. *Brit. Birds*, 41:244) for Herring Gulls, and Stevens (1948. *Brit. Birds*, 41:244) for the Black-headed Gull, for example, does not appear to be entirely of the same nature though it certainly may be related. Of course, the ostrich is a specialized form and differences in behavior may be expected. Ambient temperatures (fall) were usually low when the birds performed at the fire, but the female has performed on quite warm days. The birds' attitude and movement at the fire is somewhat reminiscent of dust bathing with wing movements, perhaps, inhibited by the fire. It might be that anticipatory dust bathing is implied in the short wing movements. In this connection, however, the birds have not been seen dusting in unburned leaf piles, or ashes from burned piles, and not even in warm ash piles. Actual visible flame has been present, in most cases, when the birds have become interested in the heaps. Furthermore, the action of the female seems the result of strong motivation, for she may be counted upon to perform with fair regularity despite the presence of observers in places where the birds are not used to seeing visitors. We seldom see normal dusting in these two captive birds. Such dust bathing as I have noted in other specimens and would expect to be normal, resembled the dusting behavior of gallinaceous birds such as quail. Ostriches and rheas may get down in scrapes in sand or earth, work themselves

over on one side, rub their necks upon the ground and throw, with their wings, considerable material over their backs and through the plumage. This sort of dusting is an activity easily inhibited by the presence of observers.

We cannot eliminate the learning factor in captive birds, or, for that matter, in wild birds, and the possibility remains that the lack of some natural element in the birds' wild environs may have provided a drive leading to artificial behavior. However, this possibility does not provide an explanation for the observed behavior.

The movement, posture and general attitude of the ostrich's activity do not suggest rigid stereotypy or the "ecstasy" reported in some birds during anting and sunning. Whitaker (1957. *Wilson Bull.*, 69:195-262) lists heat or the "thermogenic" element as "a probable factor in most anting situations," and Lanyon's (1958. *Wilson Bull.*, 70:280) observations on meadowlarks seem to establish heat rather than light as the major factor in the sunning behavior of this species. We believe heat to be a major factor in the ostriches' behavior, though their actions at the leaf pile did not resemble either of the two postures we have usually associated with ostrich sunning, and we know of no "anting" reports for ostriches. Ostriches, when sunning, may be seen standing with mouth partly open, plumage raised and wings slightly extended, or, occasionally, we see a bird resting upon its breast with wings partially extended on the ground and the head and neck folded over the back.

The leaf pile activities of the ostriches do not conform with examples in Whitaker's (*Ibid.*) anting compilation or with such anting behavior we have noted, either in an "active" or a "passive" sense.

Of course, the limits of behavior termed anting, bathing, dusting, or sunning are arbitrary at best. Chisholm (quoted by Whitaker) summed it up nicely: "Smoke-bathing may in fact be complementary to water-bathing, sun-bathing and dust-bathing, and all four may well be allied to 'anting' with acids." The Zoo Curator, working day-in and day-out with live birds, has great opportunity to watch bathing, sunning and even anting activities in many diverse species, and soon may tend to think of these behavior patterns as points on a continuum. For example, we may suggest a very close connection between anting and sunning and, perhaps, we may think of these activities as the same basic response varied by position and focus of stimulus. Thus "active" anting may be a response to an extremely localized "thermogenic" stimulus, while sunning, involving, as Lanyon (*Ibid.*) says: "sudden warming of the bird's immediate environment," may be a more general reaction to a more diffuse heat source. Thus, a bird ants with a hot match stick but suns to hot air. Between these two peaks of behavior, but within the same range, may we not also situate passive anting involving postures and reactions intermediate between sunning and anting with modifications perhaps dependent upon the moderately localized stimuli of numbers of ants rather than the focused stimulus of a single ant or wad of ants. Furthermore, those who have watched a diverse collection of captive birds will be familiar with the similarity of bathing and dust-bathing in a number of transitional forms. Many will have observed certain birds of prey and pigeons assuming the same postures during rainfall as during sunning and noted that dusting is most frequently associated with a heat factor. At the Zoo we find our quail and pheasants dusting in the sunny parts of their cages, in places changing with the movement of the sun where there is heat. We have observed birds dusting on ant hills and in warm oily soil, all of which provide connecting links in the chain of relationships of these behavior patterns. This general synthesis presents a problem for study long overdue.—WILLIAM G. CONWAY, *New York Zoological Society, New York 60, New York, January 21, 1959.*