

SEASONAL PATTERNS IN THE EPIGAMIC DISPLAYS OF SOME SURFACE-FEEDING DUCKS

BY A. OGDEN RAMSAY

THE elaborate epigamic display of the Mallard Duck (*Anas platyrhynchos*) and related species of the Anatinae, has been studied intensively by Lorenz (1941, translated by C. H. D. Clarke and published, 1951-53) and by Delacour and Mayr (1945). The following observations describe the frequency of display during the year. These observations were made on birds maintained in the J. Rulon Miller Wildlife Refuge, McDonogh School, Maryland. This refuge consists of a spring-fed pond 150 × 250 feet in area and 18 inches deep and is surrounded by a six-foot fence erected approximately 30 feet from the pond. Most of the ducks present are pinioned. The hand-reared, full-winged Mallards, Black Ducks (*Anas rubripes*) and Wood Ducks (*Aix sponsa*) do not migrate, but Pintails (*Anas acuta*) and Shovellers (*Anas clypeata*) are apt to disappear in the course of the spring migration.

The birds were observed for one-hour intervals from 7:30 a.m. to 8:30 a.m. from the middle of September, 1952, to the middle of April, 1953. Observation periods of one-half hour also were kept in the spring of 1952. The data obtained were the number of displays of various types per bird per hour. The distribution of these frequencies was by no means normal and hence averages were not suitable. After trying several technics, it seemed that the most appropriate measure was the percentage of days on which there were more than five displays per hour. The tables give these percentages and indicate the significance of particular differences. It is recognized that this test is not very sensitive. I would like to express my appreciation to Mr. E. Carey Kenney for drawing the frontispiece, and to F. K. Hilton for drawing the graph. Dr. David E. Davis is responsible for the statistical analysis of the data.

TYPES OF DISPLAYS

All of the species of surface feeding ducks show homologous movements in display. The most readily observed movements of the Mallard are shown in the frontispiece. These will be described briefly. Much more detailed descriptions have been made by Lorenz (1951-53) and by Delacour and Mayr (1945). In the following report the terminology followed will be that of Lorenz as translated by Clarke.

Preliminary head shake.—In the Mallard (Lorenz, 1951:164-182) and the Black Duck the males assemble in groups for social display. As excitement mounts, the feathers of the head become ruffled and the head is sunk on the body and shaken repeatedly. Then, if tension increases, one or more

The
MALLARD DUCK
Courtship Display



Starting Position

Preliminary Snaking



Down - up



*Complete
Start*



Grunt - Whistle



Head-up Tail-up



Female Inciting



Nod - Swim

drakes rear up high out of the water and flick the head forward. If tension continues to increase, this will be followed by one of the three forms of display mentioned below. Simultaneous performance of the same movement by all members of a group has never been observed.

Grunt whistle.—The bird rears high out of the water with its head arched forward. As it rises it rakes its bill through the water. Then the bill is pressed to the breast and the bird sinks slowly back to the water. This display is accompanied by a characteristic courtship call which is distinctive for each species.

Head-up tail-up.—The head is thrown back in an arched position and then jerked abruptly upward and turned toward the female. The tail feathers are erected vertically and spread. The wing coverts are lifted: this exposes the speculum. In the Mallard this movement is invariably followed by the nod-swim. In the Black Duck the nod-swim does not always follow. Otherwise the display of the two species is the same.

Down-up movement.—“. . . the drake thrusts his bill into the water as quick as lightning, and in the next movement jerks his head alone without lifting his breast, which is still low in the water. At the instant when the head is highest and the breast is deepest, there follows the whistle, just when there is greatest tension on the windpipe. In raising the bill a little fountain of water is often raised by the quick bill movement . . .” (Lorenz, 1951: 179). This movement is vestigial in the Gadwall (*Chaulelasmus streperus*) and absent in the Green-winged Teal (*Anas carolinensis*) and Pintail.

Nod-swim.—This is performed by both the male and female Mallard and Black Duck but is absent in the other species observed. The neck of the bird is stretched forward and it swims rapidly in a circle around the mate

TABLE I
SOCIAL DISPLAYS OF 10 FEMALE MALLARDS DURING 1952-53
Values given are the percentage of days on which
there were more than 0.2 displays per hour

Month	Days	Nod-Swim	Incite	Copulate	Nest Inspect.
September	17	18	12	0	0
October	31	13	29 ¹	0	3
November	30	0 ²	7 ¹	0	7
December	29	3	3	0	0
January	30	0	17 ¹	13 ¹	23 ¹
February	28	0	7	28 ²	21
March	29	0	0	0	7
April	10	0	0	0	0

¹This percentage is significantly different from the first preceding month's percentage at the 5 per cent confidence level.

²This percentage is significantly different from the second preceding month's percentage at the 5 per cent confidence level.

with the bill just clearing the water. In the males this movement appears as a post-copulatory display as well as in courtship movements.

Inciting.—The female follows her mate or intended mate; meanwhile she arches her neck and head toward the water and moves her head back and forth from the front to the side away from her mate and directed toward other males or rivals. It may be accompanied by short dashes of attack toward the rival. The females of all species incite.

Pre-copulatory display or “pumping.”—“. . . the precopulation display in both sexes consists of a bobbing up and down of the head, the bill touching the water at its lower course and always remaining nearly horizontal. Finally the female flattens herself, extends her neck and is mounted by the male.” (Delacour and Mayr, 1945:18).

Mock preening.—This display is difficult to observe (Lorenz, 1951:72–73) and was not included in this study.

VARIATIONS IN SOCIAL DISPLAYS BY MONTHS

Females.—Seasonal activities of the female Mallard are shown in Table 1. During the observations there were 10 females present. It was possible to record the activities of all the females fairly accurately, and the total was divided by 10 to give the activity per female per hour. It will be noted that inciting predominates in the female in the fall and winter. The descriptions of Lorenz (1951:167) and Delacour and Mayr (1945:18), suggest that inciting is connected with the establishment of the bond between the sexes. The female by this display announces her chosen sex partner and threatens any other male that may approach her. The female by this display also incites her mate to defend her from other males.

The females also do a great deal of nod-swimming in the fall. It seems likely that this behavior in the Mallard is analogous to the “charging” display of the American Coot (*Fulica americana*), as described by Gullion (1952: 86) and is a form of threat display. A female Mallard, while inciting, often makes short direct attacks in this position at males that may approach her. Both male and female Wood Ducks adopt a similar posture in attacking sexual rivals. A somewhat similar movement is described as threat-display and is the only epigamic display described for the Ruddy Sheldrake (*Tadorna ferruginea*) by Delacour and Mayr (1945:12).

The predominance of this display in the fall would also seem to indicate that in the female Mallard, the more aggressive or masculine tendencies are highest during that season. This supposition is supported by the fact that the females show some homosexual activity at this time. A number of female Mallards have been observed to mount and to copulate with other females. The more aggressive female did not grasp at the head of the ventral

TABLE 2
THE FREQUENCY OF DISPLAYS OF MALE DUCKS BY MONTHS
Values given are the percentage of days on which
there were more than 0.2 displays per hour

Month	Days	Gadwall	Green-winged Teal	Mallard	Black Duck
September	17	0	0	0	0
October	31	0	19 ¹	23 ¹	16 ¹
November	30	3	20	17	3 ¹
December	29	0	7 ¹	48 ¹	10
January	30	20 ¹	7	47	20 ²
February	28	32	39 ¹	21 ¹	4 ¹
March	29	14 ¹	24	4 ¹	0
April	11	0	18 ²	0	0

¹This percentage is significantly different from the first preceding month's percentage at the 5 per cent confidence level.

²This percentage is significantly different from the second preceding month's percentage at the 5 per cent confidence level.

female in a normal fashion but pecked at her head instead. Neither did the more sexually aggressive female nod-swim afterward. Homosexual unions were recorded on September 21 and October 16, 1951, and on October 21 and November 1, 1954. Other unions were observed but were not recorded.

Females may also sometimes be observed "pumping" together. This is recognized as a prelude or invitation to copulation.

Inasmuch as Lorenz (verbal communication, November 15, 1954) stated that he had never observed homosexual behavior in Mallards, it seems clear that the presence of an excess of females is the cause of this abnormality. We keep an excess of females in the refuge as a means of reducing the excessive sexual activity associated with captivity.

In the fall of 1954, for the first time, females laid a total of 28 eggs. Though they copulated in a normal fashion during this period (observed 17 times) none of the eggs was fertile. Females also show some interest in nesting sites in the fall, darting in and out of the nest boxes provided for them. The males show some definite but slight interest in nest sites in January, February and March.

In 1953 we experienced a warm, early spring; egg-laying started on February 13 and incubation on March 19. In 1955 egg-laying did not start until February 24 and the ducks dropped their eggs on the ice prior to its thawing.

Males.—Seasonal occurrence of epigamic display of males of several species of surface-feeding ducks is shown in Table 2 and Figure 1. This figure is based on data obtained by daily observations from mid-September, 1952, to mid-April, 1953. A separate data sheet was kept for each day and all forms of display were recorded. There were five male Mallards, two male Black

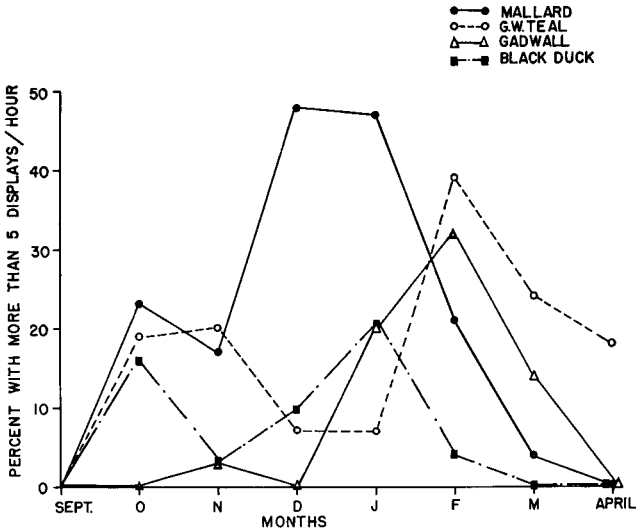


FIG. 1. The frequencies of displays by males in various months.

Ducks, one male Pintail, one male Green-winged Teal, and one male Gadwall under observation at this time. If two males of the same species were displaying, the display of both was recorded and then the total divided by two. If several males of a species were displaying, efforts were made to follow one male. It will be noticed that the several species have different periods of maximum display. The male Mallards started displaying in the fall and then reached a high level of intensity in December; the Black Duck had an autumn peak but most activity in January; the maximum for the Gadwall fell in February; the Green-winged Teal had peaks in fall and in spring.

In the male Pintail the sexual display of the male is directed at the female (Lorenz, 1952:10) and clearly seems to represent a form of sexual competition. During the spring of 1952, when there were two male Pintails present and no females, each male displayed more than five times per half-hour observation period 20 per cent of the time. In the absence of female Pintails, this display was directed at male and female Wood Ducks and one male formed a fertile union with one of these ducks. The next spring, with only one male and one female Pintail present, the male displayed more than five times per hour on only seven per cent of the days. Likewise, my solitary male Redhead (*Aythya americana*) seldom displays. When it lost its mate this male courted a female Mallard exclusively. The Green-winged Teal and Gadwall drakes display very actively in the absence of other males of their own species.

The data were considered from the viewpoint of temperature but no cor-

TABLE 3
 DISPLAYS OF MALE AND FEMALE GREEN-WINGED TEAL
 Values given are the percentage of days on which
 there were more than 0.2 displays per hour

Month	Days	MALE		FEMALE	
		Total Display	Tail-up	Total Display	Tail-up
September	17	0	0	0	0
October	31	19 ¹	13	3	3
November	30	20 ²	3	3	0
December	29	7	3	0	0
January	30	23	13	7	7
February	28	43 ²	11	0	0
March	29	27	14	3	3
April	11	18 ²	9	9	9

¹This percentage is significantly different from the first preceding month's percentage at the 5 per cent confidence level.

²This percentage is significantly different from the second preceding month's percentage at the 5 per cent confidence level.

relation was apparent that was not related to seasonal changes in frequency of display.

The display of the Green-winged Teal is similar to that of its European counterpart (*Anas crecca*) as described by Lorenz (1952:172-175) except for the fact that in the American species, the female responds to the preliminary shaking, grunt-whistle and head-up, tail-up displays of the male by also performing the head-up, tail-up display. Dr. Lorenz stated that he had never observed females to display in this fashion in *Anas crecca* or in any other species of waterfowl (verbal communication, Smithsonian Lecture, November 16, 1954). Meanwhile, the male and female slowly circle each other about one yard apart in a form of paired display. The males display alone as well as in the paired display but I have never observed the female to do so. The female occasionally goes through the preliminary head shaking movements (seven observations). As emphasized by Lorenz (1952:173), the male Teal displays at a very high level of intensity at the height of its courtship, 12 to 25 times in periods lasting from five to 10 minutes and separated by short rest periods. The females display at a much lower level of intensity, even when we compare homologous movement (Table 3). From Hochbaum's (1944:19-20) description it seems clear that he thinks that the display of the male Redhead and Canvasback (*Aythya valisneria*) is not competitive in the fall but that they engage in mutual or paired display in the spring.

SUMMARY

Numerical data are presented on seasonal differences in the epigamic display of several species of Anatinae.

In the female Mallard, inciting and nod-swimming predominate in the fall. These displays are concerned with the establishment of bonds between the sexes and with the establishment of territory. Females also showed some homosexual activity at this time but not after mid-November.

The periods of maximum display in the Gadwall, Mallard, Black Duck, and Green-winged Teal did not correspond. Peaks of activity were noted in the Mallard in December, the Black Duck and Green-winged Teal in January and the Gadwall in February.

Competition among males in displaying before the female was noted in the Pintail, Redhead and Gadwall, but not in the Mallard and Black Duck. A paired display was observed in the Green-winged Teal, in which the female responded to the display of the male by the head-up, tail-up display; meanwhile the male and female slowly swam about each other.

LITERATURE CITED

DELACOUR, J. AND E. MAYR

1945 The family Anatidae. *Wilson Bull.*, 57:3-55.

GULLION, G. W.

1952 The displays and calls of the American coot. *Wilson Bull.*, 64:83-97.

HOCHBAUM, H. A.

1944 The canvasback on a prairie marsh. Washington, D.C.; Amer. Wildlife Institute, xii + 201 pp.

LORENZ, K.

1951-53 Comparative studies on the behaviour of Anatinae. (Translated by C. H. D. Clarke from *Jour. j. Ornith.*, 89, 1941:194-294) *Avicultural Mag.*, 57:157-182; 58:8-17, 61-72, 86-94, 172-184; 59:24-34, 80-91.

MCDONOGH SCHOOL, MCDONOGH, MARYLAND, JUNE 29, 1955.