CORRESPONDENCE

Birds and Wind

Editor of 'The Auk':—

The writer has waited a considerable period for the impression to disappear but it refuses to do so: he refers to the thought that airman Neil T. McMillan oversimplified matters in his article 'Birds and the Wind' (Bird-lore, 40 (6): 397–406, Nov.–Dec. 1938). That author said, "Anything suspended in air cannot feel its movement." But surely birds are not suspended in air; they can remain there only through muscular exertion that in the great majority of cases is strenuous.

Again he says, "A flying bird, which is essentially part of the wind, cannot be struck by it." But must we forget that birds are solid flesh of many times the specific gravity of air? How can they be "essentially part of the wind"? As to not being struck by it, the fact is that they are sometimes so struck and killed.

There was a shower of birds at Baton Rouge, Louisiana, in 1896, hundreds of individuals of numerous species falling to the ground, all dead (Osprey, 1 (4): 56, Dec. 1896). Two similar phenomena were reported six years apart in Cedar Rapids, Iowa, the later in 1890 when twenty-one species were identified among those falling during a severe rainstorm (Oölogist, 7 (6): 109–110, June 1890). Over a considerable area about Lincoln, Nebraska, in 1922, large numbers of birds fell to the ground dead. Their plumage was not wet (C. G. Gammon, letter of March 3, 1922).

McMillan goes on to say, "Even if he rides a hurricane that is spinning at well over a hundred miles an hour, the bird will feel not an ounce more of pressure or have a single feather ruffled." I will let the assertion be answered by another written, presumably, by an expert on aviation. It is: "Pilots give thunderstorms a wide berth, if possible, for within their cores often lies turbulence in which no airplane can live" (Time, 37 (15): 19, April 14, 1941).

Our author admits that, "Long dirigibles, slow for their size, have been literally sheared apart when straddling strong opposing currents" and goes on to say, "It is possible that birds receive painful wrenches under like conditions." This should be recognized as a masterpiece of understatement.

The reviewer believes that ornithologists will do well to retain their traditional belief in the importance of wind in the bird world. Many stragglers have been recorded as birds blown off their wonted courses by the wind and in all probability that explanation is correct. Wind is a visibly unfavorable factor in the everyday life of birds, as we see them fly low, or collect in sheltered places, to escape its force.

Some of the most expert flyers seem to enjoy a gale but the majority of birds shun the wind. Does it then become their great and good friend, once they launch into protracted flight? The probabilities seem to be against that conclusion.

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Presentation of Nesting Data

Editor of 'The Auk':

Data on attentiveness of adults at the nest and frequency of feeding young are a necessary part of any study of nesting behavior. At present there seems to be a need for some agreement as to the methods of organizing and analyzing such data for publication. Only if methods are standardized can the data be of greatest value to future workers. The available literature on the subject, while extensive, defies thorough and consistently comparative summarization.

An attempt will be made here to provide a basis for the organization of data on attentiveness and feeding. The various topics on which information is to be sought will be outlined and accompanied by suggestions as to final analysis. The proposed system of summarizing and presenting data is adapted from the method used in a recent study (Pitelka, 1940: 11–12). Other studies should be consulted for a broader perspective of the problems involved; the papers of Baldwin and Kendeigh (1927), Hann (1937), Nice (1932, 1937), and Moreau (1939, 1940) contain suggestive discussions, tables, and graphs.

Attentiveness.—By attentiveness, we refer to the actual time spent at the nest by either or both members of a pair and to the periodicity of such time (Baldwin and Kendeigh, 1927: 216). One or both sexes exhibit sequences of attentive and inattentive periods; and, in turn, if both sexes are attentive, the nest receives a sum of attention from the combined activities of the members of the pair. Thus, for a complete analysis of this phase of breeding behavior, the following details are necessary:

1. Number of attentive and inattentive periods per total time of observation. (Use a single day or large fraction thereof as a unit. The problem of time units is discussed below.)

2. Mean length of respective periods together with extremes. (The mode may be added if extensive data are available; see Moreau, 1939: 113; 1940: 239.)

3. Hourly percentages of attentiveness vs. inattentiveness; daily percentages.

4. Analysis of the data provided by 1, 2, and 3 for hour-to-hour changes, day-to-day changes, and differences between various stages of the breeding cycle.

5. Determination of differences between sexes *per se;* the relation of each sex to total attentiveness and participation therein.

For clarity, compactness, and convenience to future workers, the data subjected to the above analyses should be organized in table form. (This, of course, applies also to feeding data considered below.) Graphs should merely *supplement* the tables.

Here is a suggested tabular organization of data on attentiveness. The figures used are hypothetical. The basic organization may, of course, be modified according to the relations of the sexes in the particular species under observation.

Time-advance of nesting: Incubation, 5th day (June 15, 1940)
Length of observation: 5 hours (8 a.m.—1 p.m.)

1. Both sexes:
   - Attentive periods:
     - Number, 7
     - Average time, 30.0 minutes
     - Extremes, 10 to 50 minutes
     - Percentage of total time, 70%
   - Inattentive periods:
     - Number, 8
     - Average length of time, 10.3 minutes
     - Extremes, 5 to 15 minutes
     - Percentage of total time, 30%

2. Male } Repeat under each of these as under 1.
3. Female }

Feeding.—An analysis of frequency of feeding young should include the following details:

1. Total feeding visits (per day or large fraction thereof) resolved into:
   a. Number of visits per hour (mean and extreme).
   b. Length of intervals between feeding visits (mean and extremes).
   c. Number of nestlings fed per visit (mean and extremes).
2. Analysis of data provided by part 1 for hour-to-hour changes, day-to-day changes, differences between various stages of the breeding cycle.
3. Sexual differences: feeding visits of male and female to be analyzed in the same manner as total feeding visits (parts 1 and 2).

Data on feeding may be organized in tabular form as follows:

Age of nestlings: 4 days (June 27, 1940)
Periods of observation: 5 hours (8 a.m.—1 p.m.)
Number of nestlings: 3
1. Total feeding visits, 8
    Average no. per hour, 1.6
    Extremes, 1–3
    Intervals, 6
        Average length, 40 minutes
        Extremes, 5–50 minutes
    No. of nestlings fed per visit:
        Known instances, 8
        Average, 2
        Extremes, 1–3
2. Male: Total feeding visits } Repeat under each as in 1.
3. Female: Ditto }

The need for modification of this basic tabular form will, of course, arise according to the problems encountered. Thus, feeding of young may be cyclic with more or less long periods between the feeding periods, as 60–150 minutes of inattentiveness vs. periods of active feeding once every 3–25 minutes in the case of the Belted Kingfisher, *Megaceryle alcyon* (Mousley, 1938: 12); here the final figure of average number of feedings over a long period of time is of limited value. Thus, where there is an alternation of active feeding periods with rest periods, it would be more nearly accurate to add up feedings for the definite feeding periods and then divide by the total time of the latter; the resulting figure would be number of feedings per unit time of active feeding, and to this would be added a summarization of the long intervals of inattentiveness (average and extremes) to complete the analysis.

General Discussion and Suggestions

Additional points to be noted while studying attentiveness and feeding are: (1) total number of visits to the nest as against actual feeding visits; (2) number of pieces of food or 'morsels' brought at a visit; (3) nest sanitation; (4) number of brooding visits during the nestling stage and their relation to feeding rhythm, time of day, and changes in environment; (5) variation in kind of attentiveness given the nest (*i. e.*, actual brooding as against mere perching at the nest). In each of these points, attention should be paid to sexual differences and to notable changes during stages of the breeding cycle.

Time units.—In both attentiveness and feeding, it seems best to use one day as the basic unit in summarizing hourly percentages and rates, respectively; that is, the data collected within one day should be summarized as against all other days rather than thrown together with several days' observations. In many species, incubation, feeding, and brooding rates change as the breeding cycle advances. If, however, there is good evidence for the absence of appreciable day-to-day changes, such data may be combined. Or, if data on daily rates have been given, significant facts may be obtained from summarizing and comparing segments of the data, *e. g.*, average feeding rate during the first as against the second half of the nestling period.

In studying swallows and swifts, Moreau (1939; 1940) uses a 200-minute unit to express feeding rate. This may be satisfactory for such species as swallows, which feed their young comparatively frequently; but for slower feeders, a longer period is needed. It seems more generally practicable to retain the hour unit for expressing feeding rate, but observations should extend over at least 5–8 hours.

Fragmentary observations of processes as feeding and attentiveness, the rhythms of which are discernible only over long periods, are of little value and should be subordinated to data on all-day or at least half-day observations. Emphasis should be weighed accordingly, for the writing up of fragmentary observations often takes more space than that of complete observations.

The above suggestions, if adopted by students of breeding behavior, should result in at least a partial standardization of published data. This should lift such details out of mere statistics and render them usable to future workers. Many facts of significance in general avian biology can be derived from comparable numerical data on attentiveness, feeding, and associated phenomena among different species.

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