

THE WIDEAWAKE CALENDAR, 1953 TO 1958

BY JAMES P. CHAPIN AND LEONARD W. WING

In "The Calendar of Wideawake Fair" (Auk, 74: 1-15, 1954), the senior author presented evidence, based on eleven years of records, showing that on Ascension Island in the Atlantic ($7^{\circ}57'S.$, $14^{\circ}22'W.$) the Sooty Terns, *Sterna fuscata*, (locally called "Wideawakes" because of their nocturnal noisiness), breed at intervals of about 9.6 months. This is very different from the cycle of the same species at other localities studied, where individual birds, so far as known, have an annual breeding cycle.

After he read that report it occurred to the junior author that 292.6 days (or 9.61 months of our calendar) are all but equivalent to ten lunar months (295.3 days). Might not the moon in some way or other serve as the regulator of the breeding cycle of *Sterna fuscata* at Ascension Island? At about the same time Dr. Charles Hetzler wrote from Brown University to Dr. R. C. Murphy pointing out the same correlation.

Meanwhile the senior author, residing for several years in Africa, continued his efforts by correspondence to secure records of each successive nesting period of the Wideawakes on Ascension.

In the present report our aims are twofold:

(1) to continue the calendar of Wideawake Fair from the end of the year 1952 through the year 1958, during which period its regularity is just as surprising as in the preceding decade; and

(2) to discuss the likelihood that each tenth period of bright moonlight inaugurates a new period of reproduction and thus serves as the "regulator."

DATA FOR 1953-1958

The information collected since 1952 indicates that the intervals between nestings on Ascension are close to 9.7 months (fig. 1).

Frequent changes in European personnel by Cable and Wireless, Ltd. (our main source of information in Ascension) and the fact that Wideawake eggs are laid only at some little distance from the cable station of Georgetown offered difficulties in obtaining exact dates for the very first eggs. A check is often provided by the applications of St. Helenians employed in Ascension for export licenses to cover small shipments of the fresh eggs to their friends on St. Helena. Applications are never made before some eggs have become available, and so the dates of the licenses are always a few days later than the laying of the first eggs by Wideawakes.

1953: There are excellent reasons for believing that a new season of oviposition began on schedule about 9.7 months after the start of the one in April, 1952, that is to say in the middle of February, 1953. The first application for the export of

eggs was dated February 23rd, as Chapin was kindly informed by J. R. Bruce of Cable and Wireless. On April 7, 1953, Harry A. Franck, an old friend, called at Ascension and found the Wideawakes still had lots of eggs. The last application for the export of eggs was dated April 21st.

1954: F. J. Atkins of Cable and Wireless wrote that although he personally had not noticed any Wideawakes flying about in December of 1953, the first request to export eggs was dated January 4, 1954. Laying must have commenced before New Year's Day. In May of 1954 all the Sooty Terns took their departure from the "Fair."

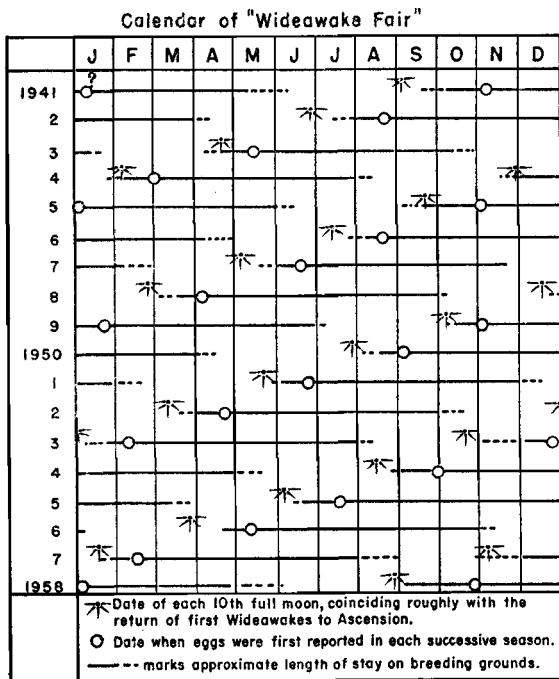


FIGURE 1. Calendar of nesting by *Sterna fuscata* on Ascension Island 1941-58.

By the first day of September, 1954, a few terns were again noticed; and on September 30th one of the English staff found a single egg, doubtless one of the first laid. By the end of November chicks were numerous on the ground. On January 24, 1955, many of these were half-grown, still short-tailed; and by March 17th most of the terns had departed.

1955: Later in the year F. J. Atkins reported that on July 23rd a St. Helenian collected three dozen Wideawake eggs, so laying must have begun a week or more previously. Yet the first license to export eggs was granted only on August 8th of that year. The terns had probably all left by mid-January of 1956.

1956: During the year of 1956 J. R. Bruce wrote Chapin that new eggs were again reported on May 13th. Returning Wideawakes had first been heard on April 10th, and by the end of November 1956 none remained about Ascension Island.

1957: It was in mid-January that the terns began to be heard again, and their first eggs were found in mid-February, Mr. Bruce informed Chapin. At the beginning of August some of the young could fly, others could not, and a few eggs were still to be seen. By the end of September all the terns had left.

In early October, 1957, Bernard Stonehouse and Philip Ashmole, advance members of the B. O. U. Centenary Expedition, arrived at Ascension to conduct a detailed study of its avifauna. In the last week of October, they reported to Chapin, the Wideawakes began circling the breeding grounds night after night. By November 16th Ashmole was able to take a flashlight photograph showing numbers of the birds sitting close together on the ground where later they would breed.

1958: On the basis of his long series of records, Chapin had expected egg-laying to begin in December 1957; but it was only on January 2, 1958, that Ashmole finally found his first egg. The date was kindly telegraphed to Chapin by J. E. Packer of Cable and Wireless. The members of the B. O. U. Expedition were to make a protracted stay on Ascension Island and thus were on hand for a second breeding period of Wideawakes in 1958. This we expected to start in the second half of October; Ashmole found that the first egg was laid about October 25th.

DISCUSSION

When the records of the past six years are added to the diagrammatic calendar published in 1954, they emphasize the impressive regularity exhibited during the previous eleven years. At the base of this striking behavior, we feel, there must be a strongly developed physiologic cycle of some 9 to 10 months in the birds themselves. The extremely tight social bond so characteristic of every population of *Sterna fuscata* throughout the warm oceans of the world would tend to keep breeding on any particular island closely synchronized. But wherever there is any marked seasonal change, terns of this species normally come back to begin laying again at intervals of 12 months, not 9.7 months, as we now find the average period to be at Ascension. This island is exceptional in that any month of the year is favorable for nesting by *Sterna fuscata*. In most other places the birds may have to wait till 12 months elapse; not so at Ascension. Elsewhere the annual change would seem to act as the regulator of the terns' inner cycle.

Now for the correlation with the moon: the close relationship of the breeding cycle of Wideawakes at Ascension with the period of 10 lunar months, as pointed out by the junior author, suggests that on Ascension one period of brilliant moonlight in every ten must have a decisive influence in regulating a strong physiologic cycle. How might it work?

Residents of the island have long known that for six weeks or more before any eggs were to be found in the "fairs" the sooty terns would

again be heard flying about during the night. Hence the popular name of "Wideawake." Soon they would be seen to come in and settle on the ground toward dusk, and to pass the night there. This is just the time when a bright moon, near the full, should encourage them most effectively to reoccupy the nesting grounds, to court, form pairs, and prepare for oviposition. There would be another period of bright moonlight, to be sure, before many eggs had been laid; but after that the production of eggs, incubation, and gathering food for chicks are all going ahead regardless of the phases of the moon. Only that period of full moonlight when the terns are gathering around the island, and have again the urge to settle on the traditional breeding grounds during the night, would seem really to act as "regulator." It could do so only because of the birds' well-defined internal rhythm and the extremely strong social bond.

On the calendar offered in Figure 1, which extends from 1941 to 1958, the dates of full moons that preceded the first eggs by a month or more are indicated. All these are in a regular series of 10th full moons, the ones that would seem to encourage the Wideawakes to reoccupy their nesting areas.

To test the cycle of ten lunar months, we append Figure 2, a time chart used for initial measurements of possible cycle-length in a time series. It is rather well suited to a record that gives only dates of occurrence but no amplitude, as in the egg-laying dates of the Wideawakes.

Across the top, the time chart has intervals that are the length of the cycle being tested, in this case ten lunar months or 9.7 calendar months (actually 9.702 months),

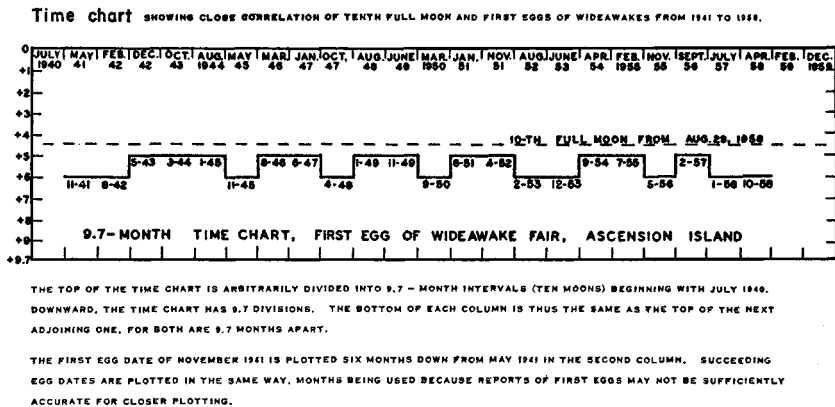


FIGURE 2. Correlation of cycle of ten lunar months with commencement of egg-laying by *Sterna fuscata* on Ascension, 1941-1958.

beginning arbitrarily with July 1940. Downward, the time chart has 9.7 positions in each column. The bottom of each column is therefore 9.7 months from the top, as are also the respective tops of the succeeding columns. Because of the general problem of preciseness in getting the exact date of first eggs, the egg dates are plotted by months of occurrence. This appears to be as close as presently possible. The first egg date, that of November 1941, is plotted at six months down from the base of May 1941, at position six in the second column. Succeeding egg dates are plotted in the same way, the plottings forming a band across the time chart. It is the forming of a band that indicates the presence of a cycle.

It is not inconceivable that in the warm Atlantic Ocean around Ascension there might be some cyclic change affecting the supply of small fish, upon which the Wideawakes feed exclusively. But thus far no oceanographer has called our attention to any such cycle of 10 lunar months. Even if every tenth period of brilliant moonlight is the "trigger" or the "regulator" of the Wideawakes' cycle of reproduction it would seem strange that the birds might not occasionally "slip a cog" and make a new start only after eleven lunar months. Certainly nothing of that sort has occurred during the last sixteen years, although such a slip may well be expected at any time in the future.

Is the case of the Wideawakes really so unique as has been said? It will not surprise us if the B. O. U. Expedition finds that other seabirds at Ascension such as noddies, boobies, tropic-birds, or frigate-birds, nest without paying any attention to our conventional calendar, at intervals that best suit their tastes and needs, presuming that their off-season time is spent where no seasonal change might serve as a control.

What do we really know of the reproductive cycles of many kinds of birds dwelling in the narrow belt close to the equator, where seasons are all but non-existent, especially in the rain forests of Africa and South America? Where there is no strong social bond or post-nesting movement, individual pairs of many bird species may be found nesting in such a region in any month of the year. When does any given individual cease breeding and molt—as of course it must—and how long a time elapses between successive periods of reproduction?

SUMMARY

The Sooty Terns or Wideawakes (*Sterna fuscata*) of Ascension Island in the Atlantic (7° 57' South, 14° 22' West) since 1941 show a breeding cycle corresponding to the period of ten lunar months. This suggests an internal rhythm triggered or regulated by the night-activity of Wideawakes during the brightness of the tenth lunar

month. Egg-laying dates between 1953 and 1958 show that the birds have continued the breeding rhythm previously shown for 1941-1952. It is suggested that other non-annual rhythms may be expected of birds in the narrow equatorial belt where seasons are all but non-existent.

American Museum of Natural History, New York, N. Y.; and 3875 Vorhies Road, Ann Arbor, Michigan.

This article is dedicated to Professor Erwin Stresemann on the occasion of his seventieth birthday.