

Singing Pattern of the Common Chaffinch, *Fringilla coelebs* Linn.

IN a recent communication¹ describing the results of research carried out at Cambridge on song learning in *F. coelebs gengleri* it is stated that the natural song of this bird has a length of 2-2.5 sec., followed by a silent interval of 10-20 sec. Systematic records of the singing pattern of *F. coelebs* obtained here over a number of years suggest that Cambridge results quoted above may not be fully representative of the native chaffinch population of the British Isles.

The present communication describes the results obtained from detailed records of chaffinch song at Sidmouth covering three breeding seasons—1946, 1953 and 1954. Values of the 'song interval', defined by the time taken to utter the characteristic tri-phrase song once, have already been reported for the season of 1946². The results presented here include new data on the rate of singing obtained in 1953 and 1954 based on a total of 9,435 records of individual birds belonging to the same local population as that used in 1946.

From the combined data, grouped mean values of total singing time, T_s , and total silent period T_q (both expressed in sec. per min.) have been derived for 10-day intervals during the breeding cycle. Additionally, 10-day mean values of the quantity, $100 (T_s/T_q)$, designated hereafter the 'song ratio', have been computed to provide a useful index of singing activity. Table 1 summarizes the results obtained during the most active period of breeding song for 55 until 125 days from the onset of singing.

Table 1. SEASONAL MARCH OF SONG ACTIVITY (*F. coelebs* LINN.)

Days from onset of singing	Song interval (sec.)	Song frequency (per min.)	T_s	T_q	Song ratio (per cent)
55	2.00	6.4	12.8	47.2	27
65	2.05	6.8	14.2	45.8	31
75	2.15	7.1	15.3	44.7	34
85	2.20	6.6	14.5	45.5	32
95	2.20	5.5	12.1	47.9	25
105	2.15	4.8	10.3	49.7	21
115	2.10	4.7	9.9	50.1	20
125	2.00	4.7	9.4	50.6	19

Both duration of song and rate of singing are seen to vary in response to the biological stimulus of the breeding cycle. The former exhibits a flat maximum at 85-95 days from onset of singing, while the latter passes through a more pronounced maximum phase at 75 days from onset. There is also a significant increase of the time spent by each bird in actual song (relative to the rest period) as the peak of the breeding cycle is approached, maxima of T_s , and 'song ratio', occurring at 75 days from commencement.

Turning now to the observed march of singing activity as reflected by the percentage values of the 'song ratio' entered in the last column of Table 1, it is seen that between the sixty-fifth and eighty-fifth days a consistently high level of activity is sustained, the maximum reaching almost 35 per cent at the seventy-fifth day.

It is of further interest to compare the mean values of the 'song ratio' for the whole period of 70 days with that computed from the Cambridge data already mentioned¹. Table 2 shows clearly that the average song activity found at Sidmouth is about 10 ± 5 per cent greater than the corresponding level of activity for Cambridge.

Table 2. COMPARATIVE SONG DATA FOR CAMBRIDGE AND SIDMOUTH

Locality	Mean song duration (sec.)	Mean rest period (sec.)	Mean song ratio (per cent)
Cambridge (eastern counties)	2.3	15.0	17 ± 4
Sidmouth (south-west England)	2.1	8.2	26 ± 5

Reference to the third column of Table 2 shows that the principal cause of this difference is the shortened rest-period observed at Sidmouth, with an average duration only about one-half of that reported for Cambridge.

These results suggest that significant differences in the level of breeding song activity may well exist between bird populations in different parts of the country, birds native to south-west England, for example, being consistently more energetic songsters than those resident in the eastern counties.

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¹ Thorpe, W. H., *Nature*, **182**, 554 (1958).

² Barber, D. R., *Nature*, **161**, 277 (1948).

Population Differentiation within Plant Species in Response to Soil Factors

THE possible existence of populations within a single species adapted to different soil conditions has long been realized and they have been termed 'edaphic ecotypes'¹. However, few cases of their occurrence have been described, and very few of these are in relation to soil conditions normally encountered², most being in relation to special soil conditions such as in soils of serpentine origin or contaminated by heavy metals^{3,4}. This is surprising in view of the fact that a major difference between many closely related species is often that of soil preference.

In an effort to determine if such differentiation occurs within some ecologically wide-ranging species we have used two techniques; first, the effect on growth of contrasting natural soils and, secondly, the analysis of individual factors, which are probably acting in these soils, by a sand-culture technique, thus allowing a more critical approach⁵.

The populations so far studied have been: *Festuca ovina* (a) from a chalk escarpment at Melcombe Bingham, Dorset, and (b) from an acid peat area on the slopes of Pen yr Oleu Wen, Caernarvonshire; *Agrostis tenuis* (a) from an acid peat area, slopes of Carnedd Llewelyn, Caernarvonshire, (b) from an acid peat area, slopes of Plynlymon, Cards., (c) from a moderately base-rich woodland, Ruislip, Middlesex, and (d) from a moderately base-rich pasture, Waxham, Norfolk.

When tested in both a Hampshire chalk downland soil and an acid upland peat under greenhouse conditions, yields (dry weight) were as shown in Tables 1 and 2.

These results show conclusively that reaction to the widely contrasting soils is markedly different in the two populations of *Festuca ovina* (soil \times population interaction significant at 0.1 per cent level). In contrast to this, however, *Agrostis tenuis* populations show no difference in reaction to the two soils (soil \times population interaction not significant).

Some of the populations have also been tested for response to a range of calcium-levels in sand culture.