

Zoo. The full account of this work, of which this communication is a summary, will be published shortly<sup>3</sup>.

Comparison of five species of small owls with two species of hawks and five species of doves of corresponding size showed that the owls were all silent at ultrasonic ranges, whereas all the hawks and doves were noisy at these levels. Three species of medium-sized owls also tested were all silent at ultrasonic ranges. With large owls such as species of the genus *Bubo*, the wing beats were found to be mostly silent but ultrasonic noise was occasionally heard at the time of take-off. It has long been known<sup>4</sup> that the fishing owls of tropical Asia, genus *Ketupa*, which feed not on small mammals but principally on fish and crustaceans, have lost the three main modifications of the feathers thought to be responsible for eliminating flight noise. These are the fringe on the leading edge, the trailing edge fringe, and the downy upper surface. It was therefore of interest to find that the flight noise of an Asiatic fishing owl was significantly higher in the ultrasonic range than that of other owl species of approximately the same size. The same appeared to be true of the rufous fishing owl of Africa (*Scotopelia ussheri*). It seems, therefore, that the wing beats of the smaller and medium-sized owls are as effectively silent at ultrasonic frequencies as they are in the sonic ranges. Moreover, the fishing owls both of Asia and Africa, consequent on taking to a diet of fish and crustaceans, have become un-silenced at all frequencies.

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<sup>1</sup> Thorpe, W. H., and Griffin, D. R., *Ibis*, **104** (in the press).

<sup>2</sup> Schleidt, W. M., *Naturwiss.*, **39**, 69 (1952).

<sup>3</sup> Thorpe, W. H., and Griffin, D. R., *Ibis*, **104** (in the press).

<sup>4</sup> Graham, R. R., *J. Roy. Aeronaut. Soc.*, **38**, 837 (1934).

### Ultrasonic Frequencies in Bird Song

THERE is much circumstantial evidence that, in the majority of birds at least, the communicative function of call notes and song depends principally if not entirely on those frequencies which fall within the range of normal human hearing<sup>1</sup>. Nevertheless, the limitations of the recording apparatus which has so far been used in the study of bird song are such that any ultrasonic frequencies present would probably have escaped detection. It seemed worth while, therefore, to take advantage of a recent opportunity to use apparatus designed for the recording and analysis of the ultrasonic cries of bats to study some representative examples of bird song which are known to contain fundamentals of high frequency and in which it was suspected, on more or less good evidence, higher frequency harmonics might also be found. The design and performance of the microphones and tape recorders used in this study will be fully described in a forthcoming publication on the subject<sup>2</sup>. They allowed reasonably accurate estimates of amplitude from about 50 c./s. to well over 100 kc./s.

In the first place, songs and call notes of about twenty species of small birds (fifteen of them in the wild, the rest in captivity) were tested qualitatively for the existence of frequencies between 15 and 50 kc./s. About ten of these, including robin (*Erithacus*

*rubecula*), grasshopper warbler (*Locustella naevia*), corn bunting (*Emberiza calandra*), reed warbler (*Acrocephalus scirpaceus*), canary (*Serinus c. canarius*) and blue honeycreeper (*Cyanerpes cyaneus*), gave evidence of strong ultrasonic components. It was found, however, that there was no very close relation between the height of the fundamental notes and the presence of these components. Nor was it possible to establish any correlation between the systematic position of the bird or its habitat and the presence of ultrasonic components. Perhaps the most surprising result of these tests was that the high-pitched songs of many small birds such as willow warbler (*Phylloscopus trochilus*), swallow (*Hirundo rustica*) and great tit (*Parus major*) should lack these components at detectable intensities. Accurate studies of relative intensity at different frequencies were accomplished in the case of two species, the robin and the canary. In this case simultaneous records with two microphones, one of them exactly calibrated, were made on high-speed twin-track tape. In all cases the results were afterwards analysed by sound spectrograph.

From these investigations it is concluded that although many small birds undoubtedly have high-frequency components present in their songs and call notes, these are—in the examples studied—always associated with, and are at very much lower amplitude than, the sonic frequencies. In the canary the evidence suggests that the drop in amplitude greater than 15 kc. is of the order of 20 decibels at least. This being so, and although frequencies up to 50 kc./s. were easily detectable, it seems extremely unlikely that the ultrasonic frequencies have any major communicative function; for at this level of intensity their carrying power would be very limited and they would be easily interrupted by foliage and other obstacles. This in itself, however, does not necessarily imply that they are completely functionless since, provided that the hearing organs of the birds in question are sufficiently sensitive at the higher ranges (an assumption which the present evidence seems to render highly doubtful), these high frequencies could be providing a significant component to the tonal quality of the notes as perceived by the birds themselves. However, even if this view is correct, it would seem most improbable that these tonal differences could be perceived at any great distance. So in the unlikely event of their being significant in the life of the bird, they must presumably play their part only in those notes which serve for inter-specific communication at very close quarters. The full details of this investigation are in the press<sup>2</sup>.

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<sup>1</sup> Thorpe, W. H., *Bird Song: the Biology of Vocal Communication and Expression in Birds* (Cambridge, 1961).

<sup>2</sup> Thorpe, W. H., and Griffin, D. R., *Ibis*, **104** (in the press).

### Thyroid Dysfunction in Aborted and New-born Calves

A SYNDROME of full-term still-births unassociated with any consistent evidence of infections or other specific causes is one which clinically has been associated with thyroid abnormality in cattle<sup>1-3</sup>. In a preliminary report on hypothyroidism in cattle<sup>3</sup> it was pointed out that the evidence was insufficient to allow any conclusion on the significance of the