

GROUP VARIATION AND BIRD-SONG.¹

BY FRANCIS H. ALLEN.

MR. CHAUNCEY J. HAWKINS in his paper in 'The Auk' for January, 1922, makes the interesting suggestion that bird-song has been evolved by a process of group variation, i. e., simultaneous variation in one direction by a number of individuals. He points out difficulties in the way of an acceptance of the sexual selection theory. The difficulties are certainly there. It is hard to see why individual variations should not be swamped in transmission from one generation to the next. Doubtless only those variations which inhere in the chromosomes could be thus transmitted. But is there any good reason why such heritable variations, or "mutations," should not be acted upon by sexual selection as well as by natural selection? The argument, also, that, if sexual selection were operative, each pair of birds, provided they possessed any individuality either in song or in plumage, would be a starting point for a new group of individuals and shortly a new species would be formed, so that eventually nothing would be left of the original species—this argument seems not unanswerable. It might with equal force be used against the group variation theory, unless the group to vary were co-extensive with the species itself. It leaves out of consideration various factors that tend to conservatism, such as natural selection and the herd instinct. As a matter of fact, there is local variation in the songs of many, if not all, species of birds, but this, in my opinion, is due not so much to sexual selection as to another factor.

But let us examine this new theory of group variation and see if it be tenable. Mr. Hawkins quotes the following as from T. H. Morgan's 'Evolution and Adaptation': "If a number of new forms appeared at the same time and left a number of descendants, then the probability that the new group might perpetuate itself is greater, and the chance that such a group would arise is in proportion to the number of individuals that vary in the same direction simultaneously. In this case the new species has not come from a single individual or even from a pair of indi-

¹ Read, in an earlier and much shorter form, before the Nuttall Ornithological Club.

viduals, but from a number of individuals that have varied more or less in the same direction."

Certainly, the conclusion follows naturally on the hypothesis. But how often does this happen? And through what process does it happen? The many subspecies of Fox Sparrows and Song Sparrows in the West may have originated in some such way through the direct action of climate on the chromosomes, though through just what mechanism this would come about is not clear. It may even be that *Melospiza melodia* and *M. georgiana*, species inhabiting, roughly speaking, the same range though quite different local habitats, became differentiated in the same way, though this presents even greater difficulties. But it is the application of this theory of group variation to the songs of birds that I especially wish to call in question, for Mr. Hawkins thinks he finds in it the solution of the problem of the evolution of song. He holds that the impulse to excel itself urges the bird on to better and better expression in song. "Singing at its best," he says; "the 'craziness' of the bird compels it to sing a better song. This is not only true of the individual; it is true of every individual of a species or a subspecies. Thus the improvement . . . is not made in one bird but in a group of birds." But why, I ask, should the improvement all go in the same direction? What directs it? And again, what, to the bird, is improvement? Is it more noise merely? Evidently not. But why, under Mr. Hawkins's theory, should it not all be no more than mere noise? What has turned it into music? Excitement, "craziness," of itself does not produce beauty. It may induce an exaggerated self-expression, but there must be some appreciation of the beautiful to turn that self-expression into a pleasing form. And if beauty of tone and melody pleases the male bird when he utters his song, shall we deny an equal appreciation of it to the female? And if the female appreciates the beauty of the male's song, why should she not discriminate between the songs she hears and succumb most readily to the ardor of the finest singer? Can the poor or indifferent singer so easily break down the reluctance, overcome the coyness, of the female? Will he not fail more often than the better singer, and perhaps go unmated? It is not necessary to assume the existence of any conscious rivalry

on the part of the males or any conscious choice on the part of the female. Have those who do not believe in sexual selection given due consideration to this aspect of the case? Mr. Hawkins, in his paper in 'The Auk' for October, 1918,¹ dismisses it with a few words: "If the purpose of song is excitation of the female to break down her coyness, this very act may compel her to exercise an unconscious choice and thus sexual selection may exert a limiting and directive force in the life of the bird." Groos, however, whom he cites on this matter of overcoming the coyness of the female, attaches much more importance to the rôle of sexual selection, as also does C. Lloyd Morgan, who says: "It can scarcely be doubted that such antics, performed in presence of the female and suggested at sight of her, serve to excite in the mate sexual appetite. If so, it can, further, scarcely be doubted that there are degrees of such excitement, that certain antics excite sexual appetite in the female less fully or less rapidly than others; yet others, perhaps, not at all. If so, again, it can hardly be questioned that those antics which excite most fully or most rapidly sexual appetite in the female will be perpetuated through the selection of the male which performs them."

Now let me call attention to the fact that the variations called for in this matter of bird-song are not morphological but psychological, or at least chiefly so, and that, moreover, they concern not only capabilities and degrees but manifestations. For song, like speech, is a manifestation, or expression, of the psychology of the individual that uses it. It is a *psychological* manifestation, and while every psychological process has a physical basis and is subject to the laws of cause and effect, it is easy to see that the possibilities of variation are almost infinitely wider than they could be in the field of morphology. One has only to consider the infinite range of the human mind and the vast differences between the thoughts and speech of various races and conditions of mankind and compare them with the homogeneity of human bodies all over the world. It is said that there has been little, if any, actual progress in intelligence among mankind during the historical period, and human psychology in that sense has made a minimum of advance, but the *manifestations* of human intelligence

¹ Auk, XXXV, 421-437.

have, by the process of *social* evolution, made tremendous advances. These advances have infinite possibilities, and, aside wholly from any advance or progress, the varieties of expression of human thoughts are infinite. Think of the vast number of languages that man has developed, the vast number of words in those languages, and the vast—the infinite—number of combinations of those words, fitted to convey all sorts of communications. Think, too, of the possibilities of combinations of tones into what we call music. Those combinations, also, are infinite in number. And those combinations, so far as melody is concerned, are open to the birds.

Now, what is the chance of two or three or more birds hitting independently upon the same combination of notes and then mating and passing this particular combination down to the next generation? For it is not merely the capability of producing these combinations that Mr. Hawkins believes can thus be transmitted but the actual combinations themselves. Is it not simpler to assume that nature availed herself of the originality and inventiveness that birds undoubtedly possess in common with the other higher animals, together with the imitativeness which is also universal in the higher groups, to accomplish the development of song through *social*, instead of biological, evolution?

Is it not sound scientific reasoning to attribute the evolution of bird-song to factors which, like invention and imitation, are well known to exist in nature rather than to set up a new hypothesis like this of group variation which may be difficult if not impossible of proof?

Mr. Hawkins seems to have overlooked this one important item in my enumeration of the probable factors in the development of bird-song—invention on the part of the singer. At least he directs his argument against imitation as if that were held to be the only aid to sexual selection in the development of song. It is *invention* and imitation that, in my view, account for the forms of the songs, every singer being a potential inventor of new notes and phrases as well as an imitator of the songs of other birds of the same species. Growth in the song of a species comes by each improvement being initiated by some inventive individual and then adopted in turn by that bird's offspring or neighbors.

I have said that birds are both inventive and imitative animals. Will that statement be questioned? Not so far as imitativeness is concerned, I am sure. We are all familiar with examples of this instinct. As to inventiveness, some who place emphasis on the automatic character of bird-behavior may be more doubtful. But, reduced to its simplest terms, invention is merely an exercise of the individual will. Every bird's life is, as I conceive it, largely made up of original acts, acts of the will. When a migrating bird alights in one particular apple tree in your orchard, he has made a choice of that tree among the others. It is no mere tropism that has drawn him to it, nor is it pure chance. His choice may be capricious and without much deliberation, but it is none the less a choice, a carrying-out of the bird's will. So, when a bird utters a call-note or a song, he makes the choice at that moment between utterance and silence. We cannot question that, I think. And when he sings, if he is not a mere automaton, he *may* exercise some originality in the matter and the manner of his song. Of course, he is restricted by habit, by herd instinct, by the capacities of his vocal organs and of his psychology, and only the exceptional bird departs appreciably from the normal song of the species, but every bird is potentially an inventor in the matter of song, exercising his own will in this as in others of his activities.

Many species of birds have two or more distinct songs. Some of these songs are characteristic of certain seasons, but in many cases the bird changes from one song to another in what is evidently a purely arbitrary fashion, such as no mere automaton would be at all likely to follow.

Even in the matter of imitation we find a certain amount of willing, of inventiveness. The Mockingbird, for instance, is no mere phonograph or echo. He exercises a choice and *selects* the new notes that he adds to his vocabulary. It is not simply the last bird-note he hears that he repeats. Indeed, he makes each addition to his repertoire his own, and may retain it long after the bird he imitates has left the neighborhood. And he has no hard and fast programme of imitations, but varies the order and intersperses them among his own Mockingbird phrases *ad libitum*.

Mr. Richard Hunt, in his suggestive paper on "Musical 'Taste' in the Brown Towhee" (*Condor*, November, 1922) lays the emphasis on imitation as opposed to invention, but the imitation he writes of is really a selective imitation which, so far as the singer is concerned, virtually amounts to invention, for it is not the mechanical repetition of what the singer has heard but the adoption of the new notes as a part of its own vocabulary and their deliberate addition to its previously acquired song. It is, of course, only the really inventive individuals that use this sort of imitation. The average bird keeps on in the well-worn path of the species, imitating its own kind and exercising that conservative influence which is so necessary in bird life as in human life.

It is important, of course, to bear in mind the distinction between individuality and originality in the sense of inventiveness. We cannot assume that all individual variation in bird-song is due to invention on the part of the singer. Some of it may be congenital or acquired by imitation of another aberrant singer, but such a case as that of the European Blackbird, narrated by Mr. Charles A. Witchell, seems clearly to point to invention. "What seemed an interesting example of progressive variation in the song of a Blackbird," says Mr. Witchell, "occurred directly under my notice. In 1888 a pair of Blackbirds reared their brood in a nest only a few feet distant from the window of the dining-room at my residence; and the young ones must have heard, for an hour or two every day, the notes of a piano, and sometimes those of other instruments, played in the room. Early in 1889 a Blackbird in the garden (the only male, and a bird born in the previous year) sang little more than the following notes, which he would repeat dozens of times at short intervals: [here a bar of music] . . . As spring advanced the bird acquired a few other notes, always uttered after the others, but the same phrase was still the main theme. Next year it constituted about one-half of the songs of the old Blackbird in our garden; and in 1891 it was often repeated, also in 1892. In 1893 I heard the same phrase sung three times in succession by an old Blackbird in the garden. Blackbirds are with us throughout the year, and always roost in the same spots, which circumstances give occasion for the surmise that the same singer was with us throughout four years,

and elaborated his notes from one kind of song to many others."¹ The same writer gives a similar instance of a House Sparrow: "Early in July, a male House Sparrow, which apparently lived near my bedroom, acquired a new note: it was seemingly a shout, and resembled the very rapid upwardly-slurred whistle, sounding like the word 'twit,' so frequently uttered in early spring by the male Chaffinch. The Sparrow repeated this cry every morning with the greatest persistence, and his manner of looking about during the performance indicated some pride in it. After ten days or so had elapsed he seemed to tire of the cry, and he gradually abandoned it. I never heard another House Sparrow utter this note."²

I had not supposed that it would be necessary to prove the existence of inventiveness among birds, and perhaps all this may be a work of supererogation, but as Mr. Hawkins has overlooked this phase of the subject, I have ventured to give these few instances.³ The imitative instinct being also granted, we have these two factors of invention and imitation acting through social, not biological, evolution to produce the variety and fix the forms and characters of bird-songs. Back of them is the song-impulse derived from the hormones which are secreted by the male sex glands; and working with them, as I believe, is sexual selection, "evolving, through both structural and psychological changes, beauty of tone and proficiency in execution."

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SOME NOTES ON THE BIRDS OF THE BRANCHPORT, N. Y., REGION IN 1922.

BY VERDI BURTCH.

Sterna caspia imperator. CASPIAN TERN.—This Tern can now be safely called a regular spring visitant on Lake Kenka at Branchport. It was first seen this year, May 1, when one appeared flying over the street with a lot of screaming Ring-billed and Herring Gulls. May 6, one

¹ 'The Evolution of Bird-Song.' London, 1896, pp. 148, 149.

² *Op. cit.*, p. 153.

³ On the subject of "perceptual volition" in animals see C. Lloyd Morgan 'Animal Life and Intelligence,' pp. 458-463.