# SYMPOSIUM ON THE INDIVIDUAL vs. THE SPECIES[1]

## 1.—THE INDIVIDUAL vs. THE SPECIES IN BEHAVIOR STUDIES

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PROBABLY there never was a time within the past hundred years when the individual in relation to the species was not a fruitful subject for discussion. Certainly never were there more field workers in ornithology, and never were living individual birds handled in greater numbers than at the present time. Certain elementary facts about species and the problems to which they have given rise, should perhaps be mentioned. In the biological sense species are abstractions, or ideas expressive of relationship—since the only real or tangible things in the world of animal and plant life are individuals. Yet individuals, through all the spires of form from amoeba to man himself possess, we must believe, individual differences. No one any longer believes that all individuals, belonging to the same species, are cast in the same mold, and it is a fact of everyday experience that individual differences are often inherited.

Discussion of the species question, in some respects, has not advanced very far beyond the ideas expressed by Darwin in the second chapter of his 'Origin of Species,' which was first published seventy-nine years ago. He thought that slight individual differences lead to slightly marked varieties, and these to more strongly expressed and more permanent ones; while the latter are often the precursors of subspecies, and these in turn of true species. Although there may be no universal rule by which species can be certainly discriminated from varieties, Darwin regarded the latter as incipient species, and endeavored to show that species were gradually developed by the selection and accumulation of individual variations from the parent stock, with the aid of isolation. Moreover, in certain genera of both animals and plants variation seems to run riot, although in such cases the making of species may not be very definitely effected, while there are other genera which have been remarkably stable for long periods of time. Although well-marked varieties may be species in the making, unless conditions are favorable they can never reach that goal, but may either be extinguished or endure simply as varieties; as another alternative, Darwin thought that a species and variety might co-exist until both come, in the opinion of some naturalists, to rank as independent species. The species then is a term given to certain kinds of animals and plants, which agree in a number of more or less important characteristics, and are assigned to a more or less definite place between the genus and the subspecies or variety.

[1] Papers read before the American Ornithologists' Union, at Washington, D. C., October 18, 1938.

The worker in the field or laboratory or the systematist in his museum commonly deals with samples only of a species or natural population, the numbers of known individuals of which may be very numerous and widely distributed, or in the case of rare forms, few or even fragmentary. A numerous natural population of wide distribution is not commonly homogeneous, but individuals drawn from different stations are apt to show numerous differences, and may represent local races more or less differentiated from each other. It is therefore obvious that the true history of such a species cannot be known by studying a few individuals drawn from the same environment.

Thus, it might be expected that a full and exact record of the life history and behavior of a single pair of the Kirtland's Warbler, of which but a few thousand individuals are known to exist in a single limited environment, during the breeding season—this history to include the development of the eggs and young—would fairly represent the prime characteristics of this species as a whole; while far different might be the case with the American Robin, in which the total population is to be reckoned, not in thousands, but in the millions, and these distributed, during the period of reproduction, over a vast area, and living under the most diverse environments. To learn the possibilities of such a species, assuredly one would have to travel far and wide, and devote more than one season to careful investigation.

According to post-Darwinian researches, especially those of Hugo de Vries, new species can sometimes arise, not by slow, continuous and progressive changes, but abruptly to form mutations, and certain new forms, especially in plants, are considered to have arisen as the result of crossing. Notwithstanding the embarrassment that was bound to come from sexual dimorphism, which is very marked in the animal kingdom especially, the recognition of species has been usually based upon morphological, that is structural, differences; but divergence from parent stock can also be manifested in other ways, such as geographical distribution, in physiological characters, and probably in phases of behavior; all of which tend to show the arbitrary way in which species have generally been determined in the organic world.

What bearing does all this have upon the relations of the individual and the species in the study of bird behavior? I can answer this question best by illustrations drawn from personal experience, but first let me refer to a little book[1] which I have recently read on 'The Lore of the Lyrebird.' This shy, Australian rarity has been known for one hundred and forty years, but so imperfectly that its relationships have never been determined with certainty, and as recently as 1916 the species (*Menura novae-hollandiae*)

[1] By Ambrose Pratt, Melbourne, 1937.

has been divided into three subspecies, and assigned to an independent order, the Menuriformes. Among the remarkable things attributed to this extraordinary bird, the author states as his personal belief that, "*Menura* is possessed of a highly developed sense of smell by means of which he is warned of the approach of dangerous animals (such as the wild cat and fox, whose odors are offensive), and it is thus able to avoid them; and which, on the other hand, attracts and attaches him to places where flourish Australia's most sweetly scented herbs and shrubs." Having formerly placed its nest at a height of about four feet, after the introduction of the fox, it grew wiser, and went up higher and higher until one nest was found that stood at sixty feet from the ground. Apart from its unsurpassed powers of mimicry, the *Menura* is described as having more than thirteen distinct "conversational" calls; and the author thinks that it possesses the power to impart ideas by a form of speech; its friendship, he says, cannot be won by human beings with tempting offerings of food, as is so often the case with other birds and mammals.

These are some of the inferences drawn by the writer of this little book, but upon what are they based? In the main upon the behavior of a single male Lyrebird, with whom a woman, who lived in the country and had her garden close to the jungle where the Lyrebirds were at home, had formed what looked like a singular friendship. This bird came first for food to the garden where the woman was frequently at work, and then, when familiarity had banished fear, to the porch of her house where it would sing and display its remarkable plumes. Anyone who has seen the peacock or even the turkey cock display at any suitable stimulus need not be greatly surprised at this somewhat similar action.

I mention these things, not so much as a criticism of the author, who is both candid and modest, as to show the necessity of far greater knowledge of a species than is here displayed before its true story can be told or written. I like the author's narrative, but cannot accept his conclusions. One need not be a prophet or a clairvoyant to affirm that when the true history of the Lyrebird is eventually written, it will be fundamentally different from what is here prematurely offered as the truth.

In the study of birds in the field I have been mainly interested in the normal and exceptional behavior of adult and young birds, particularly during the nesting season, as well as in the development of instincts, habits, and intelligence, whether displayed in the nest or out of it. Of course I have been keen to note any departure from what was considered the normal behavior of the species; accordingly I have endeavored to study the nesting behavior of as many different individuals of the same species in different environments as time would permit.

I can now refer to but one of the problems which this work has brought

out, that of nest-building,[1] perhaps the most complex activity, and one which has been the most strangely neglected, in the whole field of bird behavior. The strength and perfection of inherited instinct, experience and habit, the age and sex, the vicissitudes and adaptability of the builder, as well as the character and time of the season in which breeding is accomplished, all enter as factors into the final product,—the nest itself, not to speak of changes which second or later broods may entail. While no two pairs, or no two individuals of either sex, are ever precisely alike, noticeable variations in behavior may seem rather trivial to anyone who has not followed these matters with close attention to detail.

Let us take as a capital illustration of what has just been said the nest-building practices of one of our commonest birds, to which I have already referred, the American Robin. This hardy migrant breeds over most of the vast area between Alaska and the Northern and Middle States of this country, as well as from Labrador through New England to as far south as North Carolina. "The first land-bird seen by me," said Audubon, "when I stepped upon the rugged shores of Labrador, was the robin; its joyful note was the first that saluted my ear." In New England, where I first came to know the Robin, the form and character of its nest are so uniform and familiar that, as Horace Greeley once said of grindstones, it is hardly necessary to picture or describe it. In New Hampshire and Ohio, where I have examined this bird's nests with particular care, the story is simple: dead weeds and grasses of the previous season are used to frame it, damp mud to mold its cup, and fine grass to line it, but the dead leaves of deciduous trees and shrubs so abundant everywhere are lacking. The only 'leaves' to strike the Robin's fancy in these parts are those 'leaves of grass,' the bleached, pliant blades of last-season's growth. Since twigs are usually absent also, the Robin in these sections might be considered a twig- and leaf-avoiding species, quite unlike the Catbird, the Wood Thrush and the Veery, all of which set great store by the old autumnal leaves, and all but the Veery frame their nests in part with twigs.

Now if we pass to a different environment, the Robin in the northern Maine woods takes quite kindly to twigs, but may find in leaf-mold a poor substitute for damp clay; while in Labrador or on the adjacent coast of Canada, it nests in stunted spruces, making a large dense frame of spruce twigs, moss, lichens or other such warming materials, while fine grass-blades and Polytrichum moss form as good a lining as could be desired.

In watching the nest-building behavior of eight different pairs of Robins

[1] On nest-building in birds, particularly the Robin, see the author's 'Home Life of Wild Birds,' ed. 2, pp. 146–166, 1905; for fuller accounts of the Robin, Red-eyed Vireo and Baltimore Oriole, see Journal of Animal Behavior, 1: 337–373, 1911; and for the Robin, Vireo, Oriole and Barn Swallow, with revisions, see 'Wild Birds at Home,' pp. 173–254, 1935.

in New Hampshire and Ohio, I came across a number of variations or eccentricities, as was to be expected, but can refer to but one of these now. In this instance the pair began building their nest on the top of a shutter of our house in Cleveland Heights, Ohio, on the morning of the 19th of May. When their work was examined at nine o'clock on the following morning the ground all about was sprinkled with the tender new foliage of the silver maple trees which had suffered in a violent storm of the previous night. Presently, as I stood watching the course of events, suddenly this Robin began to perform some quite unexpected and extraordinary acts: the female, who was then the sole worker here, repeatedly dropped to the ground, gathered up the young maple leaves by the beakful, and worked them into the frame of their nest. This was seemingly contrary to all rules of the 'Robin Guild' in this part of the world, for never before had I seen thus used any kind of a leaf, living or dead, larger than a blade of grass. Here then was a bird of a leaf-avoiding species taking a liking to forbidden material, and seemingly she could not get enough of it. This Robin soon showed another trick even more novel and surprising. Instead of going to Mother Earth, the unfailing source of these birds' building supplies, as all normal Robins in this region are supposed to have been doing for ages past, she soon began flying up into the maple trees, snapping off their tender, green leaves, and taking them direct to her nest![1] Unfortunately this bird was given a supply of strips of white cotton cloth, which was seized and conveyed to the nest with such eagerness that with the green leaves the whole affair soon became an unmanageable mess and was eventually abandoned.

Many birds, such as orioles, robins, cedarbirds, and flycatchers are often tempted to build what one might call 'freak nests'[2] when abundantly supplied with colored yarns, string or strips of white cloth. Why, I cannot say, unless it be that at certain times, such birds are particularly susceptible to stimulation from all such materials. If we ask what a bird like an oriole or a robin inherits with respect to the building of nests, I think the simplest answer must be—*definite ways of working, with a predisposition to draw from their environment any available materials suited to their methods and style.* If they happen to favor the stems and blades of dead grasses, it is not from any instinctive or inherited predisposition to use these particular things, but they take them because they are everywhere at hand, and experience has proved them to be suitable to their needs and building methods. At the same time birds are adaptable, and, as in the case of food, they are skilled in the use of substitutes. Certainly the Indian Crow does not inherit any predisposition to build its nest entirely of steel spectacle-frames, yet this is what a bird, attracted doubtless by their metallic glitter and shine, once

[1] See the author's 'Wild Birds at Home,' pp. 181–182, 1935.
[2] Ibid., pp. 250–254.

actually did when it purloined the stock of an Indian optician that was left unguarded outside his shop.

We must remember that the behavior of a bird or mammal, like that of a human being, is a resultant of numerous factors, such as age, environment, instinct, experience, habit and intelligence. We cannot write the true history of any species from a few imperfectly known samples. We must study, handle, weigh and measure many individuals, of different ages, and living under different conditions before we can generalize intelligently about the total population of any one bird or mammal, that is, about a species.

If it is asked how many individuals must be known before we can thoroughly know a species, we cannot answer the question, which is probably unanswerable. It will depend on the species, for which there is no applicable formula, and upon the student, who must use his judgment, which should be grounded in as wide experience as possible. For all such reasons the study of certain species is never likely to produce a closed and finished history. Individual variation will take care of that; and on the whole this is encouraging, since the field is always open for any young enthusiast to make some new discovery.

When we consider the vast number of individuals comprising many of the commonest species, the wide geographical range which they enjoy, together with the adaptability which they so abundantly possess, and never forgetting the grilling tasks required of all who would be thorough as well as accurate, we may be certain that it will be a long time before the last word upon this phase of the species problem has been spoken.

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