THE SPECIES CONCEPT IN ORNITHOLOGY

PART II

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The Subspecies. "The subspecies, or geographical race, is a geographically localized subdivision of the species which differs genetically and taxonomically from other subdivisions of the species." Since only identical twins can be said to be genetically exactly alike the problem of races becomes an almost entirely subjective problem. Some widespread species are different enough at the extremes of their ranges but show regular intergration from the one extreme to the other. This smooth gradation is called a cline.

There are several interesting rules applying generally to subspecies: Bergmann's Rule, that subspecies are larger as climate is cooler; Allen's Rule, that extremities like feet and tail are shorter as climate is cooler; Gloger's Rule, that pigmentation increases with humidity. Some additional rules applying strictly to birds: (1) more eggs per clutch in cooler climate; (2) wings longer with cooler climate or higher altitude; (3) migration instinct more marked in cooler regions; and (4) longer bills on insular forms.

Differentiation of subspecies and species is, of course, an evolutionary matter. Mutations (discontinuous changes in chromosomes with a genetic effect) may produce adaptive or non-adaptive characteristics. Adaptive characteristics made for better survival, and selection (or the horrid sounding survival of the fittest) tends to lead to strains relatively well adapted to particular ecological niches. Such adaptations are often obscured in nature by changes in environment. Unfortunately early evolutionists exaggerated the importance of mutations which were so great as to produce aberrant individuals. Such gross changes virtually never fit the evolutionary picture. For that reason some systematists use the term micromutation.

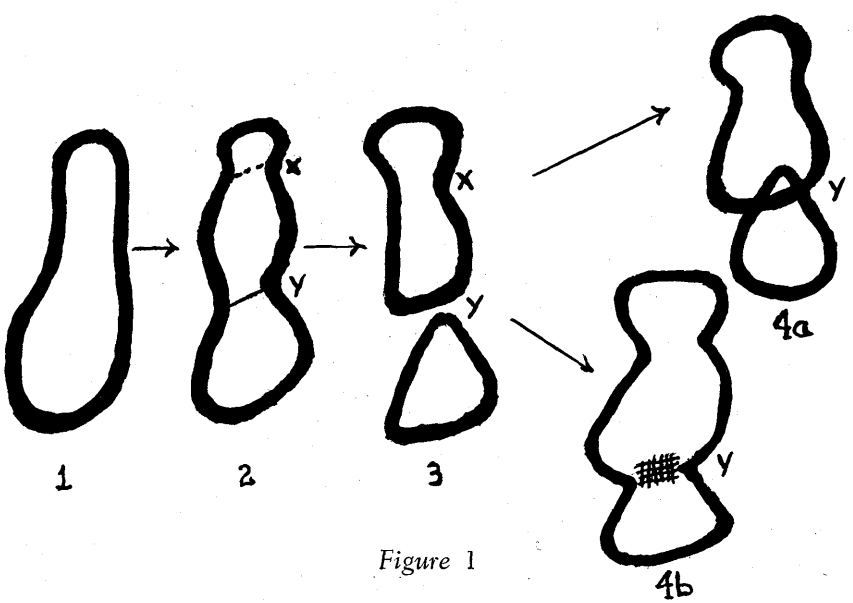

Figure 1

We cannot witness the total picture of speciation or evolution except perhaps in the case of rapidly multiplying bacteria or insects. So once again we have an era of the species problem which becomes subjective. Perhaps the closest we can come to witnessing this process is in paleontology, the study of the fossil records. Almost invariably, however, the fossil record is itself far from complete and provides us with at most another cross-section but at a different time.

This means that the history of Figure 1 and in fact any such consideration of evolution must contain much that is of speculative nature. This problem especially applies to the question of primary (x on the diagram) or secondary (y) contact. Especially in the case of diagram 4b — remembering that this is the only picture we see in modern times — what right have we to assume that there was a real break and that this is not a primary contact? We really have no objective evidence to which to turn and we must make the best decision we can based on our present evidence. In addition we must be ready and willing to accept revisions of our thinking based on later findings.

Darwin's Finches. An almost unique opportunity to reach the very core of the problem of speciation in the western hemisphere is found in the group known as Galapagos finches. David Lack suggests that in relatively modern times (in evolutionary terms but probably thousands of years ago) a mainland finch species made its way from South or Central America across the 600 miles of open ocean to this small island group. Here on these remote volcanic islands with few natural enemies and little competition from other species of birds this initial strain of finches radiated to fill many ecological voids left open to them. Some of the fourteen evolving species took on interesting characteristics: one those of a woodpecker, one a warbler. Lacking the adaptive tongue of the woodpecker, the woodpecker-finch carries a twig with which it forces the sought-for insect out of its hole.

Although this group would seem to substantiate the possibility of speciation occurring without isolation, Lack's careful study has led him to believe that even here isolation was necessary. The various islands afforded the isolation needed even though they are within eyesight of one another. And his studies show that the more remote an island is from the others the more divergent the species on that island. Some statements from Lack's summary should complete his theses:

"Island forms of the same species show every gradation from extremely small differences in average size to differences as great as those which separate some of the species. The differences and to be greater the greater the degree of isolation. Some of them are adaptive and others seem non-adaptive.

"New species originate when forms differentiated in geographical isolation later meet in the same region and keep distinct. . . . There is not as yet any evidence that new species of birds arise in other ways. . . .

"When two related bird species meet in the same region, they tend to compete, and both can persist there only if they are isolated ecologically either by habitat or food. All of Darwin's finches are isolated from each other ecologically. . . .

"The meeting of two forms in the same region to form new species must, when both persist, result in subdivision of the food or habitat, and so to increased specialization. The repetition of this process has produced the adaptive radiation of Darwin's finches. A radiation similar to that of

Darwin's finches is not found in the land birds of single oceanic islands, because these provide no opportunities for the formation of new species in geographical isolation. Instances are rare even on other archipelagos, probably because most archipelagos are too accessible to fresh colonization by more efficient birds from outside areas.

With this further insight we can once again return to our diagrams in Figure 1. The important point here is that the filling of new ecological niches is caused by competition after the birds have become reproductively isolated. At the time of the secondary contact in a situation like that of 4a, the birds may possibly not have diverged morphologically at all. Much of the divergence would come now as the birds are competing in the same area for survival. In the case of the Galapagos finches the adaptation took the form of changing food habits, in the case of some of our game birds and the ducks it has taken the form of striking plumage differences in the males in order to compete for mates. Thus the female plumages resemble one another rather closely. In fact, as Sibley pointed out in a talk to the Wilson Club meeting in Buffalo, an insular form of the mallard not in competition with other waterfowl species, resembles very closely the female in plumage.

An interesting situation in this connection is that of sibling species, species which have become isolated reproductively but which have virtually identical characteristics. This phenomenom is rare in avian systematics, although we amateurs would probably like to think it is the case with the *Empidonax* flycatchers. There are several possible causes of such a situation, one being that we are witnessing the early history of the secondary contact. Another would be that the breeding grounds of these species are actually separate and that they are only together, say, during migration.

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So what? Certainly what has been said here does not vitally affect us in our field studies. Still I am convinced that it is well for us to understand within our ability and to appreciate the work of the ornithological taxonomists and systematists. The research on this paper has led me to believe that systematics is important and that those engaged in it are of high calibre. If nothing else I am certain that I'll be more appreciative of the systematic studies in the ornithological journals and a little more tolerant toward the occasional check-list revisions.

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