

WHAT IS A BIRD SPECIES?

J. T. Leverich, Cambridge

In the April, 1973, edition of The Auk, the A. O. U. Committee on Classification and nomenclature published a supplement to the Check-list of North American Birds (1957, fifth edition), altering the taxonomic classification and the official name(s) of many birds. In the following 32 cases, only the English common name was changed:

<u>Old common name</u>	<u>New English name</u>
1. Fulmar	Northern Fulmar
2. Pale-footed Shearwater	Flesh-footed Shearwater
3. Slender-billed Shearwater	Short-tailed Shearwater
4. Leach's Petrel	Leach's Storm Petrel
5. Wilson's Petrel	Wilson's Storm Petrel
and nine other analogous changes within the family Hydrobatidae.	
15. Common Egret	Great Egret
16. Wood Ibis	Wood Stork
17. American Widgeon	American Wigeon
18. European Widgeon	European Wigeon
19. Shoveler	Northern Shoveler
20. Common Scoter	Black Scoter
21. Gray Sea Eagle	White-tailed Eagle
22. Pigeon Hawk	Merlin
23. Sparrow Hawk	American Kestrel
24. Harlequin Quail	Montezuma Quail
25. Upland Plover	Upland Sandpiper
26. Knot	Red Knot
27. Common Bushtit	Bushtit
28. Catbird	Gray Catbird
29. Robin	American Robin
30. Parula Warbler	Northern Parula
31. Yellowthroat	Common Yellowthroat
32. Mexican Junco	Yellow-eyed Junco

The above alterations were made for various reasons, but mostly to bring American terminology into greater conformity with already established international usage. None of these changes has any biological significance.

A change in the Latin name for a bird is significant inasmuch as it ordinarily reflects a shift in the biological classification of the bird. Fifty percent of these alterations have to do with the merging of one genus in another, or with the placement of a species within a different subfamily. Readers are advised that a reprint of the Auk article, with covers, is available for \$1.25 from: Treasurer, A. O. U., P. O. Box 23447, Anchorage, Ky. 40223.

Most readers will undoubtedly be primarily interested in those taxonomic modifications affecting the species status of certain birds -- in the vernacular, the "lumpings" and "splittings." To appreciate fully the nature of these alterations, one must have a suitable grounding in the modern theory of what a species is. This article and the ones to follow attempt to present this theory in laymen's terms.

Definition of a Species

A species is an evolved or irreversibly evolving aggregate of natural populations, actually or potentially freely interbreeding, genotypically distinctive as a group, and reproductively isolated from all other species.¹

We shall examine the various components of this definition in detail; but before doing so, let me hasten to emphasize that a species is NOT a "kind" of bird. Naturalists from 1750 to 1900 tended to think of species in such a fashion. To them, a species was a sort of abstract conglomeration of morphological characteristics,² epitomized by one particular bird (the type specimen) preserved in a certain museum collection. Other individuals were to be classed in the same species if they did not differ materially from the type specimen. Earlier taxonomists sometimes discarded variant individuals from their collections as "confusing."³ Whenever an individual differed drastically from the type specimen, it was inevitably described as a new species. (Most geographic sub-

species and color phases were originally described as separate species. Linnaeus originally described the male mallard as Anas boschas and the female as Anas platyrhynchos!

All in all, the classification system was too finely divided by modern standards, which is why each recent updating of the Check-list tends to show many more "lumpings" than "splittings."

Let us return to the more modern "biological species concept."

1. A species consists of one or more populations, each of which always displays considerable variation among its constituent individuals. Individual variation may be continuous, e.g., darker and lighter brown sparrows within one population, together with individuals of all intermediate hues. Similarly, the American population of the human species contains light blondes and dark brunettes together with all intermediate colorations. Again, individual variation may also be basically discontinuous, allowing the biologist to divide a given freely interbreeding population into distinct sub-classes. Reddish Egrets (Dichromanassa rufescens) appear in an all-white phase and in a dark rusty phase. There are no pink Reddish Egrets.

Discontinuous individual variation within a given population is known as polymorphism. It is of no greater biological significance than is the occurrence of blue or brown eyes among humans. There are three cases of newly-recognized polymorphism in the current Check-list Supplement. (Cf. Category I.)

2. A species consists of natural populations. The class of all toy poodles does not form a species, not even a subspecies, regardless of how well-marked and superbly pedigreed each such dog may be. Reason: the class does not form a natural population. Breed characteristics can only be maintained by an ever-vigilant segregation of all toy poodles from the other members of their natural population (the class of all house dogs) left to their own devices, toy poodles would speedily mongrelize the breed out of existence. (To reiterate, toy poodles manifestly form a distinct identifiable "kind" of dog; they do not form a species.)

Cage-birds (e.g., budgerigars) are sometimes artificially segregated and bred for particular characteristics.

3. A species is genotypically distinctive: or in laymen's language, a species communally shares a distinctive set of genes.

Biologists now recognize that a gene (locus) is a certain delimited section of a DNA-strand within the nucleic acid of a chromosome. Each gene is responsible for the manufacture or assembling of a certain biochemical, or a class of such biochemicals. In turn, each such biochemical participates in a series of life-process reactions. As a result, alteration of a single gene typically produces a wide variety of changes in the animal's characteristics, a phenomenon known as pleiotropy. These changes may be morphological, physiological, or even ethological (affecting instinctual behavior). A distinctive gene pool is usually recognizable on the basis of morphological characteristics alone, but not always. Pairs of species which are so similar morphologically as to confuse the ornithologist, causing him to overlook one of the pair for some time are known as sibling species.

There are three newly recognized sibling species pairs in the current Check-list Supplement. (Cf. Category II.)

4. A species is reproductively isolated, or irreversibly evolving toward that state.

The behavior of birds in captivity gives no evidence as to reproductive isolation. Little Egrets (Egretta garzetta) have repeatedly been hybridized with the Black-crowned Night Heron (Nycticorax nycticorax) in Japan. This proves nothing. In delimiting species the ornithologist is concerned not with whether or not two birds can hybridize; rather, he tries to discover whether they do so in the wild. In fact, today's ornithologist distinguishes between free and limited hybridization!

One currently accepted decisive test is that of random mating: if mates are chosen randomly from members of either of "two populations" with no decided preference being shown for a mate from the bird's own group, then in fact there is only one (intergrading) population under consideration, and the two bird "types" form a single species (however different they may appear to be). There are six cases of species merger in the current Supplement which fit this description. (Cf. Category III.)

5. A species consists of actually or potentially freely interbreeding populations. (Herein lie some of the thornier questions of classification.)

The Eastern Henslow's Sparrow (Passerherbulus henslowii susurrans) at one time bred in an area geographically isolated from the range of the Western Henslow's Sparrow (P. h. henslowii). Subspecific differences doubtless evolved during this time. They now meet and intermingle completely in central New York. This present case is now clear-cut: these are two geographical subspecies comprising a single species.

But what shall the taxonomist say of other populations which are geographically isolated from their nearest relatives? The easy way out would be to class all such geographic isolates as separate species, at least until such time as the birds themselves provide incontrovertible evidence to the contrary. This "solution" has two major flaws:

a. It leads to massive confusion in other branches of biology less directly concerned with taxonomic niceties, particularly certain areas having to do with ecological principles.

b. It seriously under-represents the advanced state of modern ornithology. The subjective judgments of today's scientist are by no means uninformed or arbitrary.

Hence, given a pair of closely related but geographically isolated populations, today's ornithologist tries to decide if they would freely interbreed were they to be brought into contact. When the decision is in the affirmative, the two populations are classed as one species, and where both groups were formerly recognized as species, the more recently described group must be demoted to the level of a subspecies of the other. There are seven cases which fit this description in the current Supplement. (Cf. Category IV.)

Specific changes in the current Supplement.

Category I: Polymorphism

1. The Great White Heron is now considered the white morph (white phase) corresponding to the blue morph Ward's Heron. Together they form a subspecies (Ardea herodias occidentalis) of the Great Blue Heron. Within the U.S., this population from the Florida Keys is the only one displaying the white morph. It also occurs, however, throughout the Caribbean.

2. The Blue Goose is the dark morph of the white phase Lesser Snow Goose. Together they form a subspecies (Chen caerulescens caerulescens) of the Snow Goose. Although the English name "Snow Goose" is retained, the Latin name for the species must be changed to Chen caerulescens (formerly the name for the Blue Goose), since this name is older than Chen hyperborea.

3. The Black-eared Bushtit is now considered a morph of the Common Bushtit. All forms will henceforth bear the English name "Bushtit." Within the U.S., the black-eared form is the only morph occurring within its population, which thus is also a subspecies (Psaltriparus minimis lloydi). Other Mexican subspecies display both morphs.

Category II: Sibling Species

4. Thayer's Gull (Larus thayeri) is split from the Herring Gull (Larus argentatus).

5. Traill's Flycatcher is split into two species:

a. Willow Flycatcher (Empidonax trailli), with vocalization "fitz-bew." This species includes all of the western population E. t. brewsteri and certain members of the population known as E. t. trailli. It breeds in somewhat open habitats.

b. Alder Flycatcher (Empidonax alnorum), with vocalization "fee-bee-o." All of these birds were formerly thought to have been members of the Eastern population Empidonax trailli trailli. It breeds in the boreal forests of Eastern United States, Canada and Alaska.

These two species may occasionally hybridize.

6. The Great-tailed Grackle (Cassidix mexicanus), which is the light-eyed form ranging from western Louisiana into Mexico, is split from the Boat-tailed Grackle (Cassidix major), which ranges from eastern Texas east and up the Atlantic seaboard.

Category III: Zone of massive hybridization, with random mating.

7. Green-winged Teal (Anas carolinensis) + Common Teal (Anas crecca) = Green-winged Teal (Anas crecca). The hybrid zone is in Alaska.

8. Red-tailed Hawk + Harlan's Hawk = Red-tailed Hawk (Buteo jamaicensis).

9. Yellow-shafted Flicker + Red-shafted Flicker + Gilded Flicker = Common Flicker (Colaptes auratus).

Where the first two of these former species meet, the wing-color passes smoothly from yellow through gold, orange and salmon to reddish.

10. Myrtle Warbler + Audubon's Warbler = Yellow-rumped Warbler (Dendroica coronata).

11. Baltimore Oriole + Bullock's Oriole = Northern Oriole (Icterus galbula).

12. White-winged Junco + Slate-colored Junco + Oregon Junco + Guadalupe Junco = Dark-eyed Junco (Junco hyemalis).

A study is under way to determine if the Gray-headed Junco (Junco caniceps) should be included in this grouping.

Category IV: Demotion of geographical isolates.

13. Bahama Honeycreeper is now to be a subspecies of the Bananaquit (Coereba flaveola).

14. San Lucas Robin is demoted to a subspecies of the American Robin (Turdus migratorius).

15. Socorro Warbler (=Olive-backed Warbler) becomes a subspecies of the Tropical Parula (Parula pitiauyumi).

16. McGregor's House Finch and Guadalupe House Finch become subspecies of the House Finch (Carpodacus mexicanus).

17. Ipswich Sparrow is now a subspecies of the Savannah Sparrow (Passerculus princeps).

18. Dusky Seaside Sparrow and Cape Sable Sparrow become subspecies of the Seaside Sparrow (Ammospiza maritima).

19. Baird's Junco becomes a subspecies of the Yellow-eyed Junco (Junco phaeotus).

Category V: Unclassified

20. The game bird known in this country as the Chukar was imported from stock in Asia. Its A. O. U. Latin name was Alectoris graeca, which is the proper name for the Rock Partridge of Europe. Foreign ornithologists have now separated the Asiatic birds into a new species, called the Chukar (Alectoris chukar), for reasons unknown to me. The Check-list Supplement follows suit.

Readers are warned that the present changes in species status as detailed in the current Check-list Supplement may be no more than the tip of an iceberg. I have been able to identify 7 potential "splittings" and in excess of 14 "lumpings", which may be made before the sixth edition of the Check-list is published. Those eager to anticipate the future are urged to buy

Mayr, Ernst and Lester L. Short, Species Taxa of North American Birds, Publications of the Nuttall Ornithological Club No. 9 (Cambridge, 1970),

which is available from the Museum of Comparative Zoology for \$4.00.

In closing, I would like to emphasize that I am an amateur in all areas of biology. Corrections of the above material by professionals and well-informed amateurs would be appreciated. Follow-up articles on polymorphism, sibling species, isolating mechanisms and hybridization, and isolate subspecies are under consideration. Suggestions from the readers would be welcomed.

FOOTNOTES

1. The species definition is basically that of A. E. Emerson, "Taxonomic Categories and Population Genetics," *Ent. News* 56 (1945), with various minor modifications suggested by points made in more recent literature.
2. Morphological characteristics are, roughly, those characteristics which remain obvious in preserved museum specimens -- study-skins, skeletons, or even eggs! Thayer's Gull (*Larus thayeri*) was originally distinguished from other gulls on the basis of an unusual egg coloration.
3. So says Ernst Mayr, former curator of the Museum of Comparative Zoology in his book *Animal Species and Evolution* (Cambridge, Harvard University Press, 1963, p. 139).
4. See Footnote 2.
5. Physiological characteristics are those relating to the life processes of the individual, e.g., blood type, susceptibility to disease or injury, allergenic reactions, "normal" temperature, tolerance to external heat or cold, etc.
6. R. S. Palmer, *Handbook of North American Birds*, Vol. 1 (New Haven: Yale University Press, 1962), p. 463.

SO WHAT DO WE COUNT?

I'm sure this question is raised whenever the AOU Check-list is revised. I'm also sure every lister has pondered the matter, not only as a beginner but time and again as his proficiency in the sport grows.

Of course, organizations such as ABA have specific rules as to what one can list. But where does that leave the millions of other birders who have never heard of ABA or of any other formal organization? As for me, I'll count any species, race, or morph that can be reliably identified through field marks, voice, or habitat.

For most birders, listing is as personal as choosing a brand of toothpaste. I feel we should not become preoccupied with the fine points of taxonomy, but rather with what we are able to recognize in the field. Sir Arthur Conan Doyle must have been a good birder, and I am sure Sherlock Holmes could have distinguished an Oregon Junco from a Slate-colored.

That is not to say that Mr. Leverich's excellent review should be taken lightly -- to the contrary, it should be most carefully studied. For only by doing so will a birder gain an appreciation and understanding of what he is looking at.

Yet, if everyone were to lump the two largest herons in North America, we would never know the relative abundance and distribution of the Great Blues and the Great Whites; also, we would not be aware of how many Common (Eurasian) Teals cross the Atlantic to North America; and we would not be so keen to appreciate the subtle differences of the Red-shafted, Yellow-shafted, and Gilded Flickers.

All of these birds will stay on my personal life list. And to me that's the name of the game -- PERSONAL.

L.J.R.