

AVIAN BIODIVERSITY: HOW MANY SPECIES AND SUBSPECIES OF RECENT BIRDS EXIST(ED)?

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ABSTRACT.—Mayr and Gerloff's (1994) recent estimates of the number of species and subspecies of modern birds are examined and found to be overly conservative, for a variety of reasons herein discussed and exemplified.

The basis of any biological science must be knowledge of its component taxa, their characteristics, relationships, and distributions. Birds, often relatively large, conspicuous, and diurnal, offer a key to understanding biological phenomena such as biotic regions and areas of endemism. A better grasp of the actual numbers of avian species and subspecies would aid in the urgent task of cataloguing what we can of the diversity of life on earth and what is needed for its preservation. In this regard, do we truly “now have a rather accurate estimate of the number of species of birds,” as claimed by Mayr and Gerloff (1994)? And how accurate is their tally of avian subspecies, based on those enumerated in the 15 volumes of the **Check-list of birds of the world** (CBW; begun by James L. Peters in 1931 and completed by various authors in 1986)—supplemented with Mayr's continuation and modification thereof?

Mayr's earlier estimates of total avian species have varied over time, with the lowest being 8519 (Mayr and Amadon 1951) and the highest 9700 (Mayr and Gerloff 1994)—the latter extrapolated from the 9672 of Sibley and Monroe (1990). However, even when finally admitting that 153 “good new species” had been described from 1938 to 1985 (Villeumier and Mayr 1987:145), the total was still incomplete—e.g., due to ignoring several recently-extinct insular forms (see Phillips 1991:xxiii-xxiv). Furthermore, Mayr's (1963) claims were erroneous as to when the last new species had been described on different continents, as set forth in Phillips (1986:xliv). As to species and subspecies, Mayr and Gerloff (1994) estimate the total of validly-named forms as 27,000 to 28,000. This is based on a total of 26,206 such taxa in the CBW (see above), which is the combination of 3963 monotypic species plus 22,243 subspecies (in 4931 polytypic species). In accepting the CBW's 26,206 species/subspecies as their “standard,” Mayr and Gerloff (1994) do so with five caveats. Of these, those that affect the totals of these taxa are the inclusion of invalid forms described in the so-called “subspecies-splitting period” (1920s to 1950s), any errors they may have made in compiling taxa, and the absence in their compilation of species/subspecies described since the issuance of given volumes of the CBW.

These caveats probably vary in terms of their affects on the species/subspecies totals from the CBW, such as the inclusion of invalid taxa from the subspecies-splitting period. In this case, it should be recognized that this was accompanied and succeeded by a “lumping” period. Therefore, the periods are probably largely offsetting, so that overall subspecies totals are probably little changed one way or another. Concerning their compilation errors, I can only guess that these are minimal in number and impact on the totals. As for the omission of more-or-less recently described species/subspecies (after 1934 in some families), this no doubt leads to significant underestimation of the current total of such taxa—especially subspecies (see below). Furthermore, it should be noted that even if material existed showing additional subspecies, the latter were not discovered by the hasty, chiefly bibliographic reviews of most authors of the CBW volumes.

Other factors also affect estimates of the total of avian species/subspecies, whether from the CBW or more recent sources. One is the long-held geographic bias as to areas

where ornithological studies have been concentrated over the years, namely in more temperate regions of the earth—especially the northern hemisphere. As students of ecology and recent geologic history know, Pleistocene glaciation surely reduced and simplified the numbers of species of plants and animals in these areas—where most museums are located. In other words, we know most about the biota of the least rather than the most diverse regions of the earth! In addition, collecting of material for proper subspecific and other studies has waned, especially from the scale of exploratory expeditions of the 19th and 20th centuries. As a consequence, vast tropical and many temperate regions remain poorly explored. Furthermore, birds were often not collected primarily for taxonomic studies, but for their beauty (often emphasizing breeding adult males), exhibition, ease of finding (including under conditions of pleasant weather) and of preparation, local rarity at the season, etc. They seldom showed the genetically-based characteristics seen in fresh, unworn, and unsoiled plumages. In dimorphic species, adult males commonly show the least geographic variation. Furthermore, even if present ornithologists *do* collect in the north, they are apt to stop and return to university classes in September, when plumages are best!

Instructive of the problems with subspecies treatments in the CBW is the handling of *Sitta carolinensis*, where the following explanation is given for synonymizing the northeastern subspecies *cookei*: “This population is distinguished only by a single character of a slightly paler back which is to be seen only when large numbers of specimens taken north of New Jersey are compared with Florida birds” (Greenway 1967:139) As is well-known, nuthatches are tree-creeping birds. Contact with charred wood and other dirty surfaces will soil their plumage in time, and comparisons with mixed museum series are thus misleading. When only fairly clean skins are compared, the paler back and especially crown (in females) are evident in *cookei*, these areas contrasting more strongly with the black marks on the tertials than in the nominate form of the southeastern United States (Phillips 1986:102). This case may be rather extreme, but it is fairly typical of the approach taken by many authors of the CBW, often due to pressures for them to complete their contributions for publication. Thus, even for well-collected forms, these check-lists are at times quite incomplete. But are these incomplete lists any basis to judge the real number of subspecies (and species) in the world around us? And what about the CBW’s doubtful synonymizing of *Sitta nagaensis tibetosinensis*, because only “the single character of a longer wing distinguishes this population” (Greenway 1967:132). After millions of years of evolution, biodiversity can be revealed in many and variable ways; so if a population is distinct, it is distinct, period!

As for subspecies discovered, described, or recognized since issuance of CBW volumes, these will no doubt prove far more numerous than expected by Mayr and Gerloff (1994). For example, in North and Central America and a few islands, I (Phillips 1991:178-180) recognized 11 races of *Vireo pallens*, plus one less certain (left unnamed) and pointed out peculiarities of the lone Tabasco specimen available. By contrast, the CBW (= Blake 1968) recognized four, while a fifth (*approximans* Ridgway) was considered a race of *V. crassirostris* (Bryant)! In the Red-eyed/Yellow-green Vireo group, Blake recognized four subspecies (not all valid) in my area versus my seven. But perhaps the most enlightening case of all is that of the northern Pacific-slope *Vireo huttoni*. Its range is not only well-explored but was a center of activity during the subspecies-splitting period referred to by Mayr and Gerloff (1994; also see Phillips 1986 and 1991 for synonyms). *V. huttoni* has but one molt annually and no pronounced age or sexual variation, after the juvenal plumage. Nesting in woodlands, its range is interrupted by the semiarid Sacramento Val-


ley and the lowlands of Baja California, but it includes various offshore islands. From 1890 to 1904, three races were separated from nominate *huttoni*, plus a putative species on Santa Cruz Island, California (*V. mailliardorum* Grinnell). Of these, only *insularis* Rhoads (Vancouver Island, British Columbia) was recognized by the A.O.U. (e.g., 1957), all other populations southward to northern Baja California being regarded as nominate *huttoni*. This treatment, of course, was based on the usual museum series, largely worn, soiled, or faded spring and summer specimens, which even the “splitters” could not subdivide geographically.

Then Amadeo M. Rea began his careful taxonomic studies of Pacific-slope *huttoni*, which were ultimately based on 300 fall and winter specimens—including 140 freshly collected from northwestern Washington to southwestern California. This taxonomically useful material demonstrated the existence of no less than six subspecies in the area involved (Rea 1991)! Three were new; another (*insularis*) had been named on the basis of soiled (sooted) skins! Only one separation prior to Rea’s studies was found to be valid, that being *oberholseri* Bishop—which had apparently never been accepted by other ornithologists! As for other members of the Vireonidae, several subspecies recognized by Blake (1968) were found to be invalid (Phillips 1991:152-219), leading to an overall decrease in several species. For example, *Vireo hypochryseus* fell from three to two subspecies, *V. griseus* from six to five (another form recognized doubtfully and one pointed out but not named), and *V. solitarius* (if all one species) from nine to eight. But subspecies in most species remained the same or rose by one subspecies—often new. Those rising by more than two included *Hylophilus decurtatus*, *Vireo gundlachii*, *V. pallens* (from four to 10, plus one questionable), *huttoni*, and the Red-eyed/Yellow-green and Warbling groups. Taken as a whole, about 86 vireonid subspecies (including the nominate ones) were recognized in the CBW, compared to 114 (plus seven questioned) in Phillips (1991). This represents a total increase of 28 (31%), despite my synonymizing at least four of those in the CBW (others questioned) and not having named several probable races.

If the case of the Vireonidae is at all typical, the 27,000-28,000 avian species/subspecies postulated by Mayr and Gerloff (1994) represents only a fraction of the number that actually exists (or existed)—as well-illustrated in the case of *Vireo huttoni*. What must be the proportion undetected taxa in little or unexplored, biologically more diverse regions, especially of subspecies and/or among inconspicuous or difficult to collect birds? In fact, our knowledge of subspecific variation in birds is still so incomplete and fragmentary that even an educated guess about their numbers is quite premature at present. Furthermore, human destruction of the planet is now so great that we can never know its full biotic diversity. Nonetheless, I am confident that it involved over 30,000-40,000 species and subspecies of Recent birds, based on what I have learned over the years. This includes a number of undescribed species I have personally seen (and once nearly stepped on) in supposedly well-known Mexico (see Phillips 1991:xvii). Furthermore, to learn about the earth’s remaining biotic richness, we must go afield en masse before it disappears, facing the discomforts of stinging and biting arthropods, poisonous reptiles, etc. This will clearly be difficult, in part because support for badly-needed exploration has dwindled or vanished just when it has become more urgent. Coupled with this has been a marked decline in ornithological interest in avian biodiversity, at least in terms of subspecies (for sad details see Phillips 1986:xx-xxi and 1991:xxii-xxiv.) A noble exception is the **Bulletin of the British Ornithological Club**, where new subspecies of birds are still the rule; indeed, six are described in the same issue as that containing Mayr and Gerloff’s (1994) paper discussed above.

LITERATURE CITED

- A.O.U. 1957. Check-list of North American birds. 5th ed. Amer. Orn. Union, Baltimore, MD.
- BLAKE, E.R. 1968. Family Vireonidae. Pp. 103-138 in R. A. Paynter, Jr., (ed.)
Check-list of birds of the world, Vol. 14, Harvard Univ., Worcester, MA.
- GREENWAY, J.C., Jr. 1967. Family Sittidae. Pp. 125-149 in R.A. Paynter, Jr. (ed.),
Check-list of birds of the world, Vol. 12. Harvard Univ. Press, Worcester, MA.
- MAYR, E. 1963. Animal species and evolution. Harvard Univ. Press, Cambridge, MA.
- _____ and D. AMADON. 1951. A classification of birds. Amer. Mus. Nov. 1496.
- _____ and J. GERLOFF. 1994. The number of subspecies of birds. Bull. Brit. Orn. Club
114(4):244-248.
- PHILLIPS, A.R. 1986. The known birds of North and Middle America, etc., part I.
Published by the author, Denver, CO.
- _____. 1991. The known birds of North and Middle America, etc., part II.
Published by the author, Denver, CO.
- REA, A.M. 1991. Geographic variation (1) small Pacific Coast races [of *Vireo huttoni* Cassin].
Pp. 183-186 in A. R. Phillips, Known birds of North and Middle America, etc., part II,
published by A. R. Phillips, Denver, CO.
- SIBLEY, C.G. and B.L. MONROE, JR. 1990. Distribution and taxonomy of the birds
of the world. Yale Univ. Press, New Haven, CT.
- VILLUEMIEUR, J. and E. MAYR. 1987. New species of birds described from 1976 to 1980.
J. fur Orn. 128(2):137-150.

 ¹ Deceased on 26 January 1996, at San Nicolás de los Garza, Nuevo León, Mexico. This manuscript was integrated, expanded somewhat, and edited by John P. Hubbard from two typescripts and several pages of handwritten notes left by Dr. Phillips. Hopefully, it conveys what he wished to say, but any errors of commission or omission should be attributed to the editor.