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CHAPTER 7

REVISITING SPECIES AND SUBSPECIES OF ISLAND BIRDS FOR A BETTER ASSESSMENT OF BIODIVERSITY

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Abstract.—Outdated and overly lumped alpha taxonomy among the world's island birds has serious consequences for scientific research and conservation. The underestimation of biodiversity on islands obscures their role as speciation laboratories, distorts sampling in genetic studies, biases research planning, leads to neglect of endangered island species mistakenly classified as subspecies, and reduces potentially valuable information that might be gathered by recreational birders. Suggestions such as abandoning the biological species concept and the subspecies category in favor of the phylogenetic species concept create new problems and disrupt widely understood terminology. I review avian taxonomic history in the Hawaiian Islands, speciation patterns in Pacific island pigeons and doves, and patterns of variation in the widespread Polynesian Starling (*Aplonis tabuensis*) to demonstrate that the biological species concept, if applied with consideration of potential isolating mechanisms, vagility, and degree of geographic isolation, along with the judicious use of subspecies, produces hypotheses of island biodiversity that meet research and conservation needs. I suggest a thought process for evaluating biological species limits in island birds that is less subjective and more repeatable than previous methods, and use the Fiji Shrikebill (*Clytorhynchus vitiensis*) as a working example. A review of taxonomic history in the Bridled White-eye (*Zosterops conspicillatus*) complex in Micronesia shows that while genetic data are useful for testing hypotheses of species limits based on other data, alone they are insufficient for the purpose and should not be considered essential in species revisions.

Key words: biological species concept, island birds, isolating mechanisms, speciation, subspecies, taxonomy.

Revisitar las Especies y Subespecies de Aves de Islas para una Mejor Evaluación de la Biodiversidad

Resumen.—La taxonomía alfa desactualizada y exageradamente agrupada de las aves isleñas del mundo tiene serias consecuencias para la investigación científica y la conservación. La subestimación de la biodiversidad de las islas oscurece su papel como laboratorios de especiación, distorsiona los muestreos en los estudios genéticos, sesga el planeamiento de las investigaciones, lleva a desatender especies isleñas amenazadas clasificadas erróneamente como subespecies y reduce la cantidad de información potencialmente valiosa que puede ser recolectada por los observadores de aves. Las sugerencias como el abandono del concepto biológico de especie y de la categoría de subespecie a favor del concepto filogenético de especie crean nuevos problemas y alteran la terminología ampliamente utilizada. Revisé la historia taxonómica de las aves de las Islas de Hawái, los patrones de especiación en las palomas de las islas del Pacífico y los patrones de variación en la especie ampliamente distribuida *Aplonis tabuensis* para demostrar que el concepto biológico de especie, si se aplica considerando los mecanismos potenciales de aislamiento, la capacidad de dispersión y el grado de

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aislamiento geográfico, junto con el uso juicioso del concepto de subespecie, genera hipótesis sobre la biodiversidad de islas que contemplan las necesidades de investigación y conservación. Sugiero un proceso razonado para evaluar los limites biológicos de las especies en las aves isleñas que es menos subjetivo y más repetible que los métodos anteriores, y empleo a la especie *Clytorhynchus vitiensis* como un ejemplo de trabajo. Una revisión de la historia taxonómica en el complejo de *Zosterops conspicillatus* en Micronesia muestra que mientras los datos genéticos son útiles para evaluar hipótesis de los límites entre especies basados en otros datos, por separado son insuficientes para este propósito y no deben ser considerados esenciales en las revisiones de las especies.

We who study the world's island birds are burdened with an outdated and overlumped taxonomy that has serious consequences for the assessment and conservation of biodiversity (Collar 2005). Many island endemics that would qualify as biological species by modern standards remain subsumed in what might be called "megaspecies" that reflect the biases of mid-20th-century taxonomy (Collar 1997, 2005; Pratt and Pratt 2001; Chikara 2002; Rheindt and Hutchinson 2007). Despite our increasing knowledge of these birds, most species limits among most island taxa have not been reassessed in the light of new information. A taxonomy that would not pass muster by modern standards remains entrenched, and efforts to alter it often meet resistance. This problem has serious consequences for both science and conservation. Using a series of examples, I discuss the history of species-level taxonomy among island birds and the special nature of allopatry on islands, and suggest a revised methodology for evaluating biological species and subspecies limits among oceanic island birds. I also make a plea for authors and editors not to denigrate species revisions that are based solely on phenotypic characters.

The Problem as Illustrated by Micronesian Flycatchers (*Myiagra*)

In his influential field guide *Birds of the Southwest Pacific*, Mayr (1945) lumped four previously recognized species of flycatchers in Micronesia (*Myiagra erythrops*, from Palau; *M. freycineti*, from Guam; *M. oceanica*, from Chuuk; and *M. pluto*, from Pohnpei) as subspecies of *M. oceanica*, but he observed that they were "so distinct that they might also be considered 4 different species" (Mayr 1945:296). Mayr had no knowledge of these birds in life, and he presented no evidence that they form a monophyletic group, let alone one species. Baker (1951) noted differences in overall size, color, and bill size but accepted Mayr's one-species taxonomy uncritically and thus set the pattern for decades.

In *A Field Guide to the Birds of Hawaii and the Tropical Pacific*, Pratt et al. (1987), drawing on considerable field experience in the region, reversed Mayr's (1945) equivocal lumping and recognized the original four species, which exhibit color variation as broad as that of the entire genus (Burn 2006) and also differ strikingly in size, voice, and, to a lesser extent, habitat. These four inhabit the four high islands found along an east–west (Pohnpei–Palau) axis. With interisland distances ranging from 765 km (Pohnpei-Chuuk) to 1,912 km (Chuuk-Palau), the chance that any of these now highly sedentary birds will ever encounter each other in the wild is almost nil, despite the fact that their ancestors must have crossed large water gaps. Except for Guam, which lies north of the main axis, the Micronesian high islands are closer to potential colonization sources in northern Melanesia than to each other, so origins from different ancestral species for the four forms seem at least as likely as interisland dispersal by a common ancestor. The four-species classification has been used for decades within the region (Pyle and Engbring 1985, Pratt et al. 1987, Wiles 2005), probably because it makes sense to those who know the birds in the field, and it is also followed in some major world check-lists (Sibley and Monroe 1990, Clements 2000, Gill and Wright 2006).

However, in the authoritative *Handbook of Birds of the World*, Gregory (2006) reverted to Mayr's (1945) taxonomy and Burn (2006) depicted three of the nominal subspecies as far more similar than they really are (*M. freycineti* was by then extinct and not included, further distorting the view presented). The third edition of the Howard and Moore checklist (Dickinson 2003) also considered these disparate birds conspecific. Dickinson (2003) stated that those involved in preparing the checklist were unaware of a detailed review of the taxonomy, despite citing Pratt et al. (1987). The original decision to lump these species (Mayr 1945) was based on their occurrence in the same region and the author's preference for polytypic species, not on any review of evidence for conspecificity. The obvious potential isolating mechanisms among these birds should justify restoration of the original four species, but overlumped taxonomy in island avifaunas remains exasperatingly entrenched (Rheindt and Hutchinson 2007). Examples of polytypic bird species in need of revision can be found throughout the tropical Pacific and include, but are not limited to, *Ptilinopus porphyraceus*, *Todiramphus chloris*, *T. cinnamomina*, *Coracina tenuirostris*, *Pachycephala pectoralis*, *Clytorhynchus vitiensis*, *Chasiempis sandwichensis*, *Myiagra azureocapilla*, *Rhipidura rufifrons*, *R. spilodera*, *Cettia ruficapilla*, *Turdus poliocephalus*, *Aplonis tabuensis*, *Myzomela cardinalis*, *Foulehaio carunculata*, *Gymnomyza viridis*, *Zosterops cinereus*, and *Erythrura cyaneovirens*.

Resistance to changes in species limits reflects (1) a widespread belief among non-systematists that species-level taxonomy is irrelevant, (2) an understandable desire for list stability (Sangster 2000), and increasingly (3) the reluctance of editors to publish revisions that do not include genetic data (even though such data may be irrelevant at the species level, as I discuss below). The failure to recognize that many island subspecies are actually species has several unfortunate consequences that are far more serious than simply misleading illustrators or inconveniencing list-makers.

Repercussions of Ranking Species as Subspecies

From a scientific perspective, the most damage occurs when authors of theoretical studies wrongly assume that published species lists for taxonomically long-neglected island regions are essentially equivalent to those of well-studied ones. Underestimation of species-level diversity on islands obscures their important role as speciation laboratories and their importance in the preservation of biodiversity. Modern DNA studies, especially those that require complete taxon sampling, are especially vulnerable to overlumped taxonomy because they may include only one representative of an overlumped polytypic species and assume, falsely, that including others would not change the result. Especially egregious is the conflation of data from subspecies that later turn out to be separate species. For example, Amerson et al. (1982) combined data from the two forms of *Aplonis tabuensis* in American Samoa that, as discussed below, are probably different species, in which case the statistics become meaningless. Research planning may also suffer from underestimation of species-level biodiversity. For example, Fiji's four largest islands are relatively close together but have distinctive avifaunas. The three islands that have endemic species (Viti Levu, Taveuni, and Kadavu) receive most of the attention of both professional and amateur observers. Vanua Levu, the second largest, whose endemics are all currently ranked as subspecies, is relatively poorly known and visited much less often. Incredibly, I have heard several biologists say that the loss of Guam's entire avifauna (as documented by Savidge 1987) is less regrettable because most of the island's endemics were subspecies.

Unfortunately, given our uncertainties about species limits among island forms, the species category also holds an iconic status among conservationists (Sangster 2000), recreational birders (Pratt 1990), and the general public. Many authors (e.g., Collar et al. 1994, Hazevoet 1996, Myers et al. 2000) have decried the fact that nongovernmental organizations such as World Wildlife Fund and BirdLife International often focus only on endangered species and ignore even highly distinctive endangered subspecies that might turn out to be species. Recreational birders also rely on existing species lists, whether the limits are well constructed or not. These dedicated amateurs are often our only source of new information on remote island endemics, yet they routinely ignore distinctive island subspecies, despite advice to seek out those that are potential splits (Pratt 1990). Popular writers such as Cokinos (2000) usually concern themselves only with species, even when subspecific examples may be equally important and instructive for conservation. The Newfoundland Red Crossbill (*Loxia curvirostra percna*) was driven to extinction by the ill-advised introduction of Red Squirrels (*Tamiasciurus hudsonicus*) to the island (Benkman 1989, 1993b; Parchman and Benkman 2002), but its demise was largely unnoticed at the time because it was only a subspecies. Now that the Newfoundland bird appears to have been an endemic island species (Benkman 1993b), its lessons will perhaps be better appreciated.

Concepts, Species, and Subspecies

Hazevoet (1996) suggested that species chauvinism actually promotes extinction of island endemics, and he advocated abandoning the biological species concept in favor of the phylogenetic species concept because the latter would reclassify nearly all island subspecies as species.

Peterson (2006) suggested that adoption of the phylogenetic species concept would not only increase the number of species but would reveal such information as previously overlooked centers of endemism. Although I agree that many endemic island species are being neglected because of faulty taxonomy and that current classifications obscure important information, I also agree with Collar (1997:133) that we should "not allow frustration with the misapplication of one concept to result in complete dependence on another." Sangster (2000) suggested that the problem was not a faulty species concept, but rather the fact that avian taxonomy is not as well documented as non-systematists seem to believe. Also, the subspecies concept is quite useful for showing varying levels of differentiation among an array of allopatric populations. Adoption of the phylogenetic species concept would produce a degree of taxonomic inflation that would be just as problematic for conservationists (Collar 1996, Sangster 2000, Pratt and Pratt 2001, Isaac et al. 2004) as current practice under the biological species concept. Noteworthy is that Hazevoet's (1995) phylogenetic reclassification of birds of the Cape Verde Islands was rejected by BirdLife International (Collar 1996).

The biological species concept is fundamentally operational rather than typological or evolutionary in its application. It is not based on degrees of difference, whether morphological, behavioral, or genetic, but rather on how such differences affect (or, in the case of allopatric forms, might affect) the ability of two forms to interbreed. In other words, the criterion is whether the differences are, or are likely to be, isolating mechanisms (I use this widely understood term despite Mallet's [1995] objections). The biological species concept has always had difficulty with allopatric, but obviously related, populations because operational tests are usually unavailable. Mayr (1969) suggested comparisons with related sympatric species pairs as a way of evaluating degrees of difference in allopatric forms, a method Rheindt and Hutchinson (2007) called the "yardstick approach" and used effectively to evaluate some Moluccan birds. Unfortunately, that method is often unavailable. Johnson et al. (1999) suggested a modification of the biological species concept that considers some aspects of the phylogenetic species concept such as diagnosability and genealogy, and stressed the importance of what they termed "independent evolutionary trajectories." Helbig et al. (2002) provided practical guidelines that supported, more or less, Johnson et al.'s (1999) proposals, but they focused on continental species, or continental species with island populations, rather than on archipelagic taxa with multiple allopatric populations that differ in varying degrees. For these, Helbig et al.'s (2002) guidelines need some modification because, as Steadman (2006:415) stated, "oceanic islands . . . and continental islands or continents . . . have some fundamental differences in geologic development, evolutionary histories, and barriers to colonization." The following examples will show, as did Pratt and Pratt (2001), how an updated application of the biological species concept to island taxa, including effective use of subspecies, can accomplish Hazevoet's (1996) desired goals and more accurately represent the biodiversity of island birds without undermining a long-established and widely understood species definition and without overwhelming endangered species lists with trivially differentiated nominal species. I do not advocate adjusting taxonomy to accommodate attitudes that value species over subspecies, nor do I advocate treating species and subspecies equally when it comes to preserving biodiversity in a world with priorities to set, but we should strive to recognize all biological species as such because their survival may depend on it.

The Hawaiian Islands: A Well-studied Example

The Hawaiian avifauna is particularly instructive in this context (Pratt and Pratt 2001) because it is arguably the most thoroughly studied archipelagic fauna, and our knowledge of it is enlightened by both a rich subfossil record (Olson and James 1982, 1991; James and Olson 1991; Burney et al. 2001) and an ever-growing body of genetic data (Fleischer and McIntosh 2001; Fleischer et al. 1998, 2008) with some studies that combine both lines of evidence (Fleischer et al. 2001, Paxinos et al. 2002). Amadon's (1950) classification, which exhibits the overuse of polytypic species typical for its era, was the standard for many decades. Beginning in the 1980s, most of Amadon's polytypic species were dismantled (Pratt and Pratt 2001) on the basis of new behavioral, ecological, and morphological (Pratt 1982, 1989, 1992), as well as paleontological (Olson and James 1995) and genetic (Tarr and Fleischer 1994, Fleischer et al. 2007), information. As a result, his 25 passerine species comprising 56 named forms have become 51 biological species with only 5 forms remaining as subspecies (as reviewed by Pratt and Pratt 2001). Not counted in this tally are three intra-island subspecies of *Chasiempis sandwichensis* (Pratt 1980) of which Amadon was unaware. If, as ongoing genetic studies (R. C. Fleischer pers. comm.) suggest, all three subspecies of *Loxops coccineus* are elevated to species rank as Pratt (2005) suggested might happen, only three subspecies will remain among Hawaiian passerines. Encouraging is the fact that DNA studies have, to date, corroborated species limits based on phenotypic characters in every case, although they have revealed some strikingly misleading examples of convergence at generic (Reding et al. 2008) or higher (Fleischer et al. 2008) levels. As numerous authors have noted, populations on islands are more strongly isolated than allopatric mainland populations (Phillimore and Owens 2006, Steadman 2006) and the severely restricted gene flow can drive rapid speciation (Moyle et al. 2009). We should expect island birds to exhibit a greater ratio of species to subspecies than continental avifaunas. Even though the Hawaiian example is the extreme, it suggests that Mayr's (1942b, 1969) clearly articulated when-in-doubt-lump precept is the wrong approach when applied to islands. Indeed, as Pratt and Pratt (2001:69) stated, the opposite bias "is more likely to result in a species list that will stand up to independent corroboration." Interestingly, by proper use of the biological species concept, Hawaiian species limits are now nearly the same whether we use the biological or the phylogenetic species concept (Pratt and Pratt 2001), but that will not likely be the case in less isolated archipelagoes.

The Importance of Geography

The Hawaiian Islands are so remote that successful colonists are immediately isolated from their source populations. In other parts of the tropical Pacific, distance from a mainland or island source plays an important role in the degree of differentiation possible, with remote populations likely to become species while those closer to colonization sources may only differentiate to the level of subspecies because of episodic or continuing gene flow. The avifaunas of Micronesia and Polynesia have many large polytypic species whose component taxa occupy islands in more than one archipelago scattered over vast expanses of ocean (e.g., the aforementioned Micronesian Flycatcher). These species can exhibit many levels of differentiation among several allopatric populations. Amadon and Short (1976) introduced the term "megasubspecies" in an effort to improve the description of such variation, but only a few recent studies (e.g., Mayr and Diamond 2001) have used it extensively, and subspecies on oceanic islands are still too often regarded as essentially equivalent within a species (Phillimore and Owens 2006, Phillimore et al. 2008), especially by non-systematists.

For Helbig et al. (2002), all allopatry was essentially the same regardless of distances involved, but the dynamics of island biogeography clearly modify evolutionary trajectories. Uniformity across a large oceanic region can indicate a recent expansion and colonization, or ongoing gene flow, or a combination of the two. Deciding the role of each of these processes can be difficult, but environmental, behavioral, geographic, historical, and paleontological information can provide inferences. Evaluating the degree of isolation of a population involves the interplay of vagility and distance, and such judgments are subjective because vagility cannot be measured precisely and birds differ widely even within taxa. Paradoxically, selection against dispersal begins immediately upon successful colonization (Carlquist 1974, Moyle et al. 2009), producing the seeming contradiction that although rails (Rallidae) are highly vagile colonizers of even the most remote islands, most endemic island rails are flightless (Steadman 2006). Pigeons and doves (Columbidae) are excellent island colonizers, distributed throughout Polynesia and Micronesia to some of the most remote islands (Pratt et al. 1987, Steadman 2006). Because columbids live on both atolls and high islands, they can take advantage of intervening stepping stones that many land birds cannot. Both the Pacific Imperial Pigeon (*Ducula pacifica*) and Micronesian Imperial Pigeon (*D. oceanica*) apparently move across large water gaps frequently enough to prevent genetic differentiation across vast regions. One observer in Fiji (V. Masibalavu pers. comm.) reports seeing pigeons flying seaward from Viti Levu in large numbers after passage of a particularly devastating typhoon that destroyed the fruit crop. Perhaps dispersal after such storms drives regional genetic homogenization and slows population differentiation in large pigeons. Archeological evidence indicates that *D. pacifica* is a post-human arrival in Tonga and the Cook Islands (Steadman 2006), perhaps because it was able to colonize only after anthropogenic extinction of other *Ducula* spp., so its lack of geographic variation results from both high vagility and recency of dispersal. Pacific fruit doves (*Ptilinopus* spp.) appear to be somewhat less vagile because their species limits tend to coincide roughly with archipelagoes rather than regions, but the most remote forms, such as the Henderson Island Fruit Dove (*P. insularis*) and Rapa Fruit Dove (*P. huttoni*), are distinctive single-island endemics (Pratt et al. 1987). Clearly, geographic remoteness plays a role in speciation, even in highly vagile birds.

Archipelagoes sometimes sample variation in a way that resembles a series of snapshots taken along a cline. Perplexingly, a trend across an island chain may result from an environmental gradient, as in a true cline, but without any continuing interisland gene flow. Cline-like archipelagic variation is infrequent (none of the former polytypic species in Hawaii resembled fragmented clines). Geographic variation in the Polynesian Starling resembles a fragmented cline in some characters but not in others (Mayr 1942a). This small starling is distributed on high islands from the Santa Cruz group (eastern Solomons) eastward through Fiji to Samoa and Tonga. Western populations have brown eyes, eastern ones yellow, with the shift occurring within Fiji, where some populations have both eye colors. Overall coloration varies from mostly brown in the west to mostly gray in the east, but several populations break the flow of this trend. The prominence of pale shaft streaks on the breast feathers also varies, as does overall size, but with no discernible directional trends. One of the largest and most prominently streaked forms is *A. t. tutuilae* on Tutuila, American Samoa. Immediately to the east, on the isolated Manu'a Islands, *A. t. manuae* represents the end of the line for the species. It is much smaller and darker than *tutuilae*, lacks breast streaks altogether, and has pale feather edges that impart a scaly look unique in the complex. Such sudden shifts in characters between neighboring forms, especially if one is a geographic outlier, may signal the existence of previously unappreciated species.

Reevaluating Species and Subspecies among Island Birds

Collar (2006a, b; 2007b) used a numerical scoring system for phenotypic characters to determine species limits, similar to Rheindt and Hutchinson's (2007) "yardstick approach," apparently trying to accomplish the same goals I am advocating here (splitting of distinctive allopatric subspecies) and bring some objectivity to the process. I agree with Peterson and Moyle (2008) that Collar's method is essentially a phylogenetic species approach used in a biological species context. Furthermore, Collar has failed to factor in such things as the role of characters as potential isolating mechanisms and the degree of geographic isolation. Peterson and Moyle (2008) also decried the amount of subjectivity in what is supposed to be an objective process. But Collar (2008) rightly pointed out that all species-limit judgments that involve allopatric forms are, at some level, subjective. The model I offer is an attempt to add geographic and biological dimensions to the process and reduce the inevitable subjectivity so that the decisions reached will be repeatable by other disinterested scientists, but setting biological species limits among allopatric taxa can never be a mindless or mechanical exercise under the biological species concept.

I recommend a thought process wherein any oceanic island bird population is considered a species (or allospecies) if (1) at least one age or sex class is distinct from sister taxa in at least one qualitatively discrete phenotypic character (populations that differ only quantitatively are more likely to be subspecies unless measurements show no overlap or proportions are very different, as in one population having a proportionally larger bill, in which case other criteria come into play); and (2) the population is so isolated geographically that present or future gene flow between it and another related population is nearly impossible (i.e., the likelihood of phylogenetic reticulation is extremely low); and (3) it possesses one or more obvious potential isolating mechanism; or, if not strongly isolated geographically, it possesses two or more functionally independent potential isolating mechanisms (i.e., a plumage difference plus a vocal or morphological difference).

This thought process is not operationally different from Mayr's (1942b) earliest suggestions, but it differs philosophically by placing the burden of proof on the lumper rather than the splitter. Mayr's (1969) comparison method is a valuable tool, although underused in the past, for determining whether a difference is likely a potential isolating mechanism, but when no closely related sympatric species pairs exist, that technique cannot be applied. However, one can use such an approach with more distantly related species to infer the kinds of isolating mechanisms likely to operate in a given taxon. For example, the kinds of isolating mechanisms that separate species of nocturnal burrow-nesting petrels are likely to be very different from those among diurnal forest passerines. In practice, Mayr and his followers rarely considered potential isolating mechanisms among island taxa, perhaps because, at the time, these birds were not well known biologically. The most frequently observed potential isolating mechanisms among terrestrial island birds are differences in appearance, vocal differences, morphological differences, differences in breeding biology, other behavioral differences, and ecological differences.

Differences in appearance.—Though often denigrated by earlier taxonomists (e.g., Amadon 1950), color differences in plumage and soft tissues remain the most obvious and predictive indicator of species limits in island birds (Pratt and Pratt 2001). So far, genetic studies have shown that remote island birds that look different to humans in the field usually are different species. Appearance also includes the presence or degree of sexual dimorphism (Pratt 1989, 1992), variation in maturational stages (i.e., distinctive juvenal or immature plumages), or variation in molt timing or sequence (Banks and Laybourne 1977), all of which can indicate species boundaries.

Vocal differences.—As with coloration, birds that sound different to humans, in song or call notes, often are different species. Darwin's finches are a good example of birds that are not highly variable in color but distinguish themselves with different songs (Grant and Grant 2008). Slabbekoorn and Smith (2002) have shown that song can play a prominent role in speciation even in birds whose songs are not innate, but vocal differences are less significant among birds that learn their songs (e.g., oscine passerines) than among those that inherit them. Island birds have been in the forefront of historical playback studies among birds that look similar but sound different (e.g., Lanyon 1967, Pratt 1982), but note that such experiments do not address the important issue of female choice. Recent studies of crossbills (Snowberg and Benkman 2007, Edelaar 2008, Benkman et al. 2009) suggest that call notes as well as songs can serve as isolating mechanisms.

Morphological differences.—Variation in bill shape and relative size may indicate differences in diet and foraging behavior (Benkman 1989; Pratt 1992, 2005; Smith and Benkman 2007) that are potential isolating mechanisms. The Hispaniolan Crossbill (*Loxia megaplaga*) was recently split almost entirely on the basis of differences in bill size and shape that indicated distinctive food sources (Benkman 1994), and such differences were the first clue that the Kauai Amakihi was a separate species (Pratt et al. 1987, Tarr and Fleischer 1995). Such different physical attributes may also produce differences in appearance (above).

Differences in breeding biology.—Even if two birds can form an initial pair-bond, they will not breed successfully if their nesting habits are incompatible. Important considerations include nest composition and location, different laying and hatching schedules, and differences in roles of the sexes. Nest placement (terminal leaf clump vs. cavity), along with vocal and visual potential isolating mechanisms, were important in splitting the Akekee (*Loxops caeruleirostris*) from the Akepa (*L. coccineus*; Pratt 1989).

Other behavioral differences.—These can be anything from the numerous well-documented examples of differing mating displays to differential response to predators (mobbing vs. hiding; Pratt 1992) and variation in flocking behavior (Smith et al. 1999).

Ecological differences.—These can be such obvious things as differing habitats or differential response to disturbance, as in the case of white-eyes (*Zosterops* spp.) on Saipan and Rota in the Mariana Islands (Fancy and Snetsinger 2001) or the Elepaio (*Chasiempis sandwichensis*) on Kauai and Oahu (VanderWerf et al. 1997, VanderWerf 1998).

A Working Example: The Fiji Shrikebill Complex

The Fiji Shrikebill (Monarchidae: *Clytorhynchus vitiensis*; Fig. 1), with a dozen allopatric subspecies, provides a good model for the reassessment of species limits in a large, widely distributed complex (but I do not regard this exercise as an actual revision because the data have not yet been completely analyzed). Shrikebills are skulking denizens of the forest understory that forage for insects in dead vegetation such as leaf clumps, vine tangles, or tree bark (Watling 2001). Their bills are more or less wedge-shaped and laterally compressed, with a slightly upturned look produced by the shape of the lower mandible, and resemble those of Neotropical antshrikes (*Thamnophilus* spp.). Shrikebills are generally solitary, but they join mixed-species foraging flocks on some

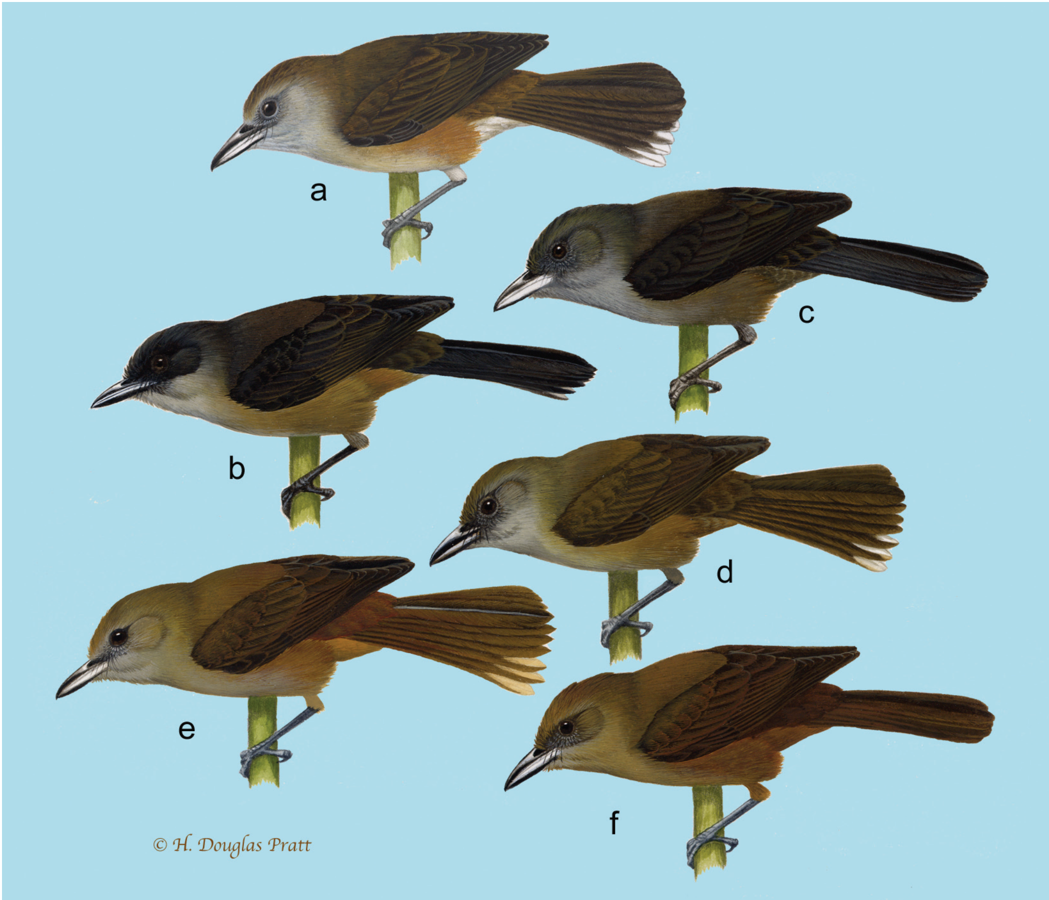

Fig. 1. Representative geographic variation in the Fiji Shrikebill (*Clytorhynchus vitiensis*) complex: (A) *C. v. fortunae*, Futuna and Alofi; (B) *C. v. powelli*, Manu'a Islands, American Samoa; (C) *C.v. keppeli*, Niuatoputapu, Tonga; (D) *C. v. vitiensis*, Viti Levu, Fiji; (E) *C. v. compressirostris*, Kadavu, Fiji; and (F) *C. v. layardi*, Taveuni, Fiji.

islands (Watling 2001). The Fiji Shrikebill is plain and rather featureless in gray and russet, but intensity and hue vary geographically and, less so, individually. The presence or extent of broad pale tips to the tail feathers and a white stripe along the side of the bill also show geographic variation. The characteristic song is a long, quavering, descending whistle usually described as plaintive or melancholy (Pratt et al. 1987, Watling 2001). Seven subspecies are found among the main islands of Fiji, and three more are found on the neighboring islands of Rotuma (*C. v. wiglesworthi*; ~360 km northwest), Futuna and Alofi (*C.v. fortunae*; ~220 km northeast), and Tonga (*C. v. heinei*; ~250 km southeast). The other two subspecies are isolated outliers: *C. v. keppeli* on the remote northern Tongan islands of Niuatoputapu and Tafahi, >300 km from the next nearest population; and *C. v. powelli*, ~400 km east of Niuatoputapu on the Manu'a Islands at the far eastern end of the Samoan Archipelago (shrikebills are unknown on the geographically intervening, larger Samoan islands). Within Fiji, many characters vary within and between shrikebill taxa in a bewildering mosaic that makes it "rather difficult to work out subspecies that are well defined and geographically restricted" (Mayr 1933:6). Watling (2001) considered most of the subspecies unidentifiable in the field, and some are connected by intermediate populations (Mayr 1933). The Rotuma and Tonga forms are not strikingly different from most of those in the core range.

On the other hand, at least four forms are megasubspecies with consistently distinctive characters.

Clytorhynchus v. fortunae is the smallest and palest form, with the most prominent and sharply defined white tail tips, unique faint gray streaking in the throat, a nearly white belly, contrasting bright tawny flanks, and a thinner, less wedge-shaped and only slightly compressed bill with a very bold white stripe mostly on the lower mandible. Its song, imitated in the local name *tikilili*, comprises metallic notes (Guyot and Thibault 1987) that are apparently very different from shrikebill songs in Fiji, which could not, in the broadest sense, be called metallic (H. D. Pratt pers. obs.). On Kadavu, the southernmost of Fiji's larger high islands, lives *C.v. compressirostris*, a form with plumage, including the pale tail tips, strongly tinged tawny throughout and a long, thin, and very strongly compressed bill as reflected in its epithet. This distinctive bill shape suggests that this population has rather different feeding habits, but no direct observations of such have been reported. Vocally, *compressirostris* generally resembles other Fijian taxa (H. D. Pratt pers. obs.), but I have not made direct comparisons.

Two remote outliers are even more distinctive than *fortunae* and *compressirostris*. Both *keppeli* and *powelli* are much darker than the core group of subspecies, *powelli* being nearly black on the crown, and both have very restricted white tail tips, but otherwise they do not closely resemble each other. On Niuatoputapu, *keppeli* is nearly uniform dusky gray, slightly paler below, with a prominent white base to the bill that is the most noticeable field character (M. LeCroy pers. comm.). The bill is as large as those of Fiji/Tonga birds but not strongly wedge-shaped and only slightly compressed laterally. The only behavioral information available comes from field notes made by M. LeCroy (pers. comm.) in 1997. She described a flock of 8–10 birds "calling, whistling, giving a trill and squawking." Such a large conspecific flock has never been reported for any other shrikebill, and the vocalizations seem quite different, although in an unexpected social context, from those in the species' core range. The Samoan *powelli* is more colorful than *keppeli*, with a strong tinge of russet in the flanks and a pale gray throat that contrasts sharply with the very dark crown and cheeks. The bill is black, with only a thin white line along the tomia (H. D. Pratt pers. obs.), and a strikingly different shape compared to the bills of other populations: relatively shorter without the upturned look, resembling the bills of more typical monarch flycatchers. The different shape suggests distinctive feeding behavior, but comparative studies have not been done. Importantly, the Samoan bird's songs are only vaguely similar to those given by shrikebills in Fiji (H. D. Pratt pers. obs.; details to be published elsewhere).

Under the guidelines proposed here, the Fiji Shrikebill would be broken up into several allospecies. The Samoan Shrikebill (*C. powelli*), Dusky Shrikebill (*C. keppeli*), and Futuna Shrikebill (*C. fortunae*) qualify as species unequivocally, but the case of *C. compressirostris* is not so clear-cut. Its plumage differences approach those seen in other nearby populations, although most individuals would be identifiable on that basis alone, so whether coloration is a potential isolating mechanism in this complex is questionable. Likewise, its vocalizations may not be sufficiently different to be a potential isolating mechanism (they have not been thoroughly analyzed). Its different bill shape is quite striking, however, and suggests ecological differences that might affect the survival of hybrids should it become sympatric with a neighboring subspecies. So it is a borderline case, best regarded as a megasubspecies until we have more data on additional potential isolating mechanisms. The other subspecies in Fiji (including Rotuma, although its isolation suggests the need for further investigation) and Tonga seem clearly to be conspecific, and some probably do not warrant recognition even as subspecies. The small islands in the Lau Archipelago of eastern Fiji are numerous and close together, which suggests that gene flow may be producing a true fragmented cline in that region. As this case demonstrates, while many island species are wrongly classified as subspecies, the category is still valuable in describing diversity on islands.

The Paraphyly Dilemma

The influence of phylogenetic thinking has recently set back the cause of island species revision. Many taxonomists are reluctant to recognize well-differentiated peripheral isolates of large complexes, even when they are obviously good species, because doing so might render the remaining complex paraphyletic. Such thinking allows the perfect to become the enemy of the good. Funk and Omland (2003) showed that more than one in five currently recognized species are paraphyletic, so avoidance of paraphyly is hardly a reason to obstruct progress. In my opinion, the fact that we do not yet understand the evolutionary patterns within a large complex should not deter us from recognizing that some peripheral isolates have clearly diverged to the level of species. If that leaves a paraphyletic group, which Rheindt and Hutchinson (2007) called a "Swiss cheese lump" because some forms have been removed from the complex, leaving holes as in Swiss cheese, it may reflect genuine biological processes and the fact that we have more work to do, but at least the island endemics will receive proper conservation attention in the meantime.

An example of the paraphyly problem is the Rufous Fantail *Rhipidura* [*rufifrons*] complex (see front cover), a huge conglomerate with 30 named forms (Mayr and Moynihan 1946, Schodde and Mason 1999), mostly on islands but with a few on continental Australia. Variation in this group is complex, with many forms that look rather similar found throughout the range but with very distinctive ones imbedded within it or on the periphery. Because two of the rather similar-looking forms are sympatric in northern Australia, the complex was split into two species distinguished mainly on tail shape rather than color pattern, *R. rufifrons* with 19 subspecies and *R. arafura* with 11 subspecies (Schodde and Mason 1999). The very distinctive peripheral form *kubaryi* on Pohnpei has been long recognized by many (Pratt et al. 1987, Sibley and Monroe 1990, Clements 2000, Wiles 2005) as a separate species. It is the most isolated of the forms in the *rufifrons* complex (1,625 km from nearest other member of the group), and the most distinctive in color. Nevertheless, according to Boles (2006:231), it is

> sometimes considered a separate species, based on geographical isolation, vocalizations, and lack of rufous in plumage [i.e., exactly the criteria outlined herein]; however, almost certainly derived from other populations within the *rufifrons* cluster, and separation at species level presents complications.

Yet in the same publication, he split the much less distinctive Manus Island form *semirubra* without comment, apparently solely on the basis of a report that its vocalizations were distinctive! That form is the nearest neighbor to *R. kubaryi* and lies between it and other subspecies of *R. rufifrons* and thus presents all the same complications and more. Application of the steps outlined above would alleviate such inconsistencies. In my opinion, recognition of all the strongly differentiated peripheral isolates (the aforementioned plus *ugiensis* [Ugi, Solomon Islands] and *utupuae* [Santa Cruz Islands]) as allospecies, along with the split of *rufifrons* and *arafura*, would be the most informative interim taxonomy for the Rufous Fantail group.

The Role of DNA in Determining Species Limits

Recent genetic studies suggest that the methodology I recommend would hypothesize species limits too conservatively, the large number of resulting splits notwithstanding. The technique cannot reveal species that have differentiated genetically to a level usually found in species but have not differentiated sufficiently in obvious phenotypic traits such as plumage and voice (Cibois et al. 2007, Rheindt and Hutchinson 2007, Phillimore et al. 2008). To date, the few genetic studies of archipelagic birds have consistently broken up large polytypic species, often yielding more species splits than were apparent on phenotypic grounds (Freeland and Boag 1999; Cibois et al. 2004, 2007; Filardi and Moyle 2005; Filardi and Smith 2005). On the other hand, effective isolating mechanisms can result from only slight genetic changes, and thus populations can remain close genetically but still be reproductively isolated as good biological species (Freeland and Boag 1999, Rheindt and Hutchinson 2007, Grant and Grant 2008, Moyle et al. 2009). No measurement of genetic distance can determine whether two populations are species or subspecies under the biological species concept, although large distances suggest that speciation has occurred. How the genes express themselves phenotypically can drive speciation even in cases of limited genetic divergence. Genetic evidence is therefore a "single-edged sword," as characterized by R. Fleischer (pers. comm.). When DNA reveals huge genetic differences or branching patterns that are inconsistent with current taxonomy, we can use it to modify species limits. But when it reveals only slight genetic differentiation, we cannot then say automatically that the taxa in question are conspecific. Therefore, genetic data should not be regarded as a deal-breaking essential feature of species-level revisions.

The "typical" white-eyes (*Zosterops*) of Micronesia provide an example of both the use and misuse of DNA data for setting species limits. While dividing them into three groups, Baker

(1951) followed Stresemann (1931) in combining all seven taxa, from the Marianas in the north to Palau in the southwest, to Pohnpei in the east, as the Bridled White-eye (*Z. conspicillatus*). Every high island has its own form, and they vary in plumage almost as much as the genus varies worldwide (Pratt 2008). Not only do they look different, they sound different in both calls and songs, and some forms apparently lack territorial songs (Pratt et al. 1987, H. D. Pratt pers. obs.). As with the "Micronesian Flycatcher," Pratt et al. (1987) began the process of dismantling this conglomeration by splitting it into three species along geographic lines that corresponded to the three groups mentioned by Baker (1951), except that they considered the Rota form *rotensis* conspecific with the other two Mariana Islands taxa (*Z. c. conspicillatus* on Guam and *Z. c. saypani* on Saipan and Tinian). The Rota bird resembles the birds of Palau (*Z. s. semperi*), Chuuk (*Z. s. owstoni*), and Pohnpei (*Z. s. takatsukasai*) in having all-yellow underparts, but it differs from them strikingly in vocalizations and in colors of soft parts. This classification was tested in a pioneering DNA study by Slikas et al. (2000), who largely upheld Pratt et al.'s (1987) species limits. However, on the basis of genetic distance that indicated a divergence time of 2 million years, they suggested that the Rota White-eye be given full species status. They detected a much shorter period of separation (~10,000 years) between *conspicillatus* and *saypani*, which bracket Rota geographically, and considered them conspecific. This arrangement has now been widely accepted (Stattersfield and Capper 2000, Dickinson 2003, van Balen 2008). Though not as different from each other as from the Rota White-eye, the two other Mariana Island forms differ in size, color pattern, and especially in voice to the same degree (using Mayr's comparison approach) as many sympatric white-eye species (Pratt et al. 1987). These differences are, in my opinion and in the context of white-eyes worldwide (van Balen 2008, Moyle et al. 2009), sufficient potential isolating mechanisms to warrant species status for each, inasmuch as white-eyes have been shown to speciate more rapidly than most birds (Moyle et al. 2009). Although not yet widely accepted, a newly described crossbill species may have diverged from its closest relative as recently as 5,000 years ago (Benkman 2007, Benkman et al. 2009). Slikas et al.'s (2000) argument that the Saipan and Guam birds are not different enough genetically to be separate species misses the point. Biological species have no minimum number for either time of divergence or genetic distance. On the basis of classic Mayrian criteria, these two birds' variety of potential isolating mechanisms can be expected to keep them on their separate evolutionary trajectories, and greater genetic divergence would develop in due course. Sadly, we can never test this hypothesis because the Guam bird is extinct (Savidge 1987).

The Rota White-eye was rare and restricted to habitat remnants on the island's central plateau by the 1970s (Pratt et al. 1979, 1987). Later, it experienced a precipitous population decline (Craig and Taisacan 1994, Fancy and Snetsinger 2001, Amar et al. 2008). In the meantime, BirdLife International, which maintains the world's Red List of endangered birds (Collar et al. 1994), made no mention of it because, as a subspecies, it was not within their purview. Only after publication of Slikas et al.'s (2000) study was the bird included in BirdLife International's listings (Stattersfield and Capper 2000), and it is now regarded as one of the world's most critically endangered birds (Hirschfeld 2008). The Rota White-eye was overlooked primarily because my own team (Pratt et al. 1987) was overly timid in making splits. I will not make that mistake again. Island birds worldwide are poised for a splitting spree, and we should get to it. Time is not on our side.

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LITERATURE CITED

Agapow, P.-M., O. R. P. Bininda-Emonds, K. A. Crandall, J. L Gittleman, G. M. Mace, J. C. Marshall, and A. Purvis. 2004. The impact of species concept on biodiversity studies. Quarterly Review of Biology 79:161–179.

Aldrich, J. W., and F. C. James. 1991. Ecogeographic variation in the American Robin (*Turdus migratorius*). Auk 108:230–249.

Allen, J. A. 1871. On the mammals and winter birds of east Florida, with an examination of certain assumed specific characters in birds, and a sketch of the bird-faunæ of eastern North America. Bulletin of the Museum of Comparative Zoology 2: 161–450.

Amadon, D. 1949. The seventy-five per cent rule for subspecies. Condor 51:250–258.

Amadon, D. 1950. The Hawaiian honeycreepers (Aves, Drepaniidae). Bulletin of the American Museum of Natural History 95:155–262.

Amadon, D. 1966. The superspecies concept. Systematic Zoology 15:245–249.

Amadon, D., and L. L. Short. 1976. Treatment of subspecies approaching species status. Systematic Zoology 25:161–167.

Amadon, D., and L. L. Short. 1992. Taxonomy of lower categories—Suggested guidelines. Bulletin of the British Ornithologists' Club 112A:11–38.

Amar, A., F. Amidon, B. Arroyo, J. A. Esselstyn, and A. P. Marshall. 2008. Population trends of the forest bird community on the Pacific island of Rota, Mariana Islands. Condor 110:421–427.

American Ornithologists' Union. 1886. The Code of Nomenclature and Check-list of North American Birds Adopted by the American Ornithologists' Union. American Ornithologists' Union, New York.

American Ornithologists' Union. 1895. Check-list of North American Birds, 2nd ed. American Ornithologists' Union, New York.

American Ornithologists' Union. 1910. Check-list of North American Birds, 3rd ed. American Ornithologists' Union, New York.

American Ornithologists' Union. 1931. Check-list of North American Birds, 4th ed. American Ornithologists' Union, New York.

American Ornithologists' Union. 1955. Thirtieth supplement to the American Ornithologists' Union *Check-list of North American Birds*. Auk 72:292–295.

American Ornithologists' Union. 1957. Check-list of North American Birds, 5th ed. American Ornithologists' Union, Baltimore, Maryland.

American Ornithologists' Union. 1986. Check-list of North American Birds, 6th ed. American Ornithologists' Union, Washington, D.C.

American Ornithologists' Union. 1998. Check-list of North American Birds. 7th ed. American Ornithologists' Union, Washington, D.C.

Amerson, A. B., Jr., W. A. Whistler, and T. D. Schwaner. 1982. Wildlife and wildlife habitat of American Samoa. II. Accounts of flora and fauna. U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C.

Anderson, B. W. 2007. Breeding birds, wintering birds, and subspecies of White-cheeked Geese. Bulletin of the Revegetation and Wildlife Management Center, vol. 2.

Anderson, D. R., K. P. Burnham, and W. L. Thompson. 2000. Null hypothesis testing: Problems, prevalence, and an alternative. Journal of Wildlife Management 64:912–923.

Anderson, M. G., J. M. Rhymer, and F. C. Rohwer. 1992. Philopatry, dispersal, and the genetic structure of waterfowl populations. Pages 365–395 *in* Ecology and Management of Breeding Waterfowl (B. D. J. Batt, A. D. Afton, M. G. Anderson, C. D. Ankney, D. H. Johnson, J. A. Kadlec, and G. L. Krapu, Eds.). University of Minnesota Press, Minneapolis.

Ashton, K. G. 2002. Patterns of within-species body size variation of birds: Strong evidence for Bergmann's rule. Global Ecology and Biogeography 11:505–523.

Atwood, J. L. 1988. Speciation and geographic variation in Black-tailed Gnatcatchers. Ornithological Monographs, no. 42.

Avise, J. C. 1989. Gene trees and organismal histories: A phylogenetic approach to population biology. Evolution 43:1192–1208.

Avise, J. C. 2000. Phylogeography: The History and Formation of Species. Harvard University Press, Cambridge, Massachusetts.

Avise, J. C. 2004. Molecular Markers, Natural History, and Evolution, 2nd ed. Sinauer Associates, Sunderland, Massachusetts.

Avise, J. C. 2006. Evolutionary Pathways in Nature: A Phylogenetic Approach. Cambridge University Press, Cambridge, United Kingdom.

Avise, J. C., J. Arnold, R. M. Ball, Jr., E. Bermingham, T. Lamb, J. E. Neigel, C. A. Reeb, and N. C. Saunders. 1987. Intraspecific phylogeography: The mitochondrial DNA bridge between population genetics and systematics. Annual Review of Ecology and Systematics 18:489–522.

Avise, J. C., and R. M. Ball, Jr. 1990. Principles of genealogical concordance in species concepts and biological taxonomy. Oxford Surveys in Evolutionary Biology 7:45–67.

Avise, J. C., and K. Wollenberg. 1997. Phylogenetics and the origin of species. Proceedings of the National Academy of Sciences USA 94:7748–7755.

Bacon, J. P., and N. J. Strausfeld. 1986. The dipteran "giant fibre" pathway: Neurons and signals. Journal of Comparative Physiology A 158:529–548.

Badyaev, A. V. 2005. Maternal inheritance and rapid evolution of sexual size dimorphism: Passive effects or active strategies? American Naturalist 166:S17–30.

Badyaev, A. V., and G. E. Hill. 2000. The evolution of sexual dimorphism in the House Finch. I. Population divergence in morphological covariance structure. Evolution 54:1784–1794.

Bailey, R. C., and J. Byrnes. 1990. A new, old method for assessing measurement error in both univariate and multivariate morphometric studies. Systematic Zoology 39:124–130.

Baird, S. F. 1858. Catalogue of North American Birds. Smithsonian Institution, Washington, D.C.

Baker, A. J., and H. D. Marshall.1997. Mitochondrial control region sequences as tools for understanding evolution. Pages 51–83 *in* Avian Molecular Evolution and Systematics (D. Mindell, Ed.). Academic Press, San Diego, California.

Baker, R. H. 1951. The avifauna of Micronesia, its origin, evolution, and distribution. University of Kansas Publications, Museum of Natural History, no. 3.

Baldwin, S. P., H. C. Oberholser, and L. G. Worley. 1931. Measurements of birds. Scientific Publications of the Cleveland Museum of Natural History, no. 2.

Ball, R. M., Jr., and J. C. Avise. 1992. Mitochondrial DNA phylogeographic differentiation among avian populations and the evolutionary significance of subspecies. Auk 109:626–636.

Ballard, J. W. O., and M. C. Whitlock. 2004. The incomplete natural history of mitochondria. Molecular Ecology 13:729–744.

Bandelt, H.-J., P. Forster, and A. Röhl. 1999. Median-joining networks for inferring intraspecific phylogenies. Molecular Biology and Evolution 16:37–48.

Banks, R. C., and R. C. Laybourne. 1977. Plumage sequence and taxonomy of Laysan and Nihoa finches. Condor 79:343–348.

Barraclough, T. G., and S. Nee. 2001. Phylogenetics and speciation. Trends in Ecology and Evolution 16:391–399.

Barrowclough, G. F. 1980. Genetic and phenotypic differentiation in a Wood Warbler (genus Dendroica) hybrid zone. Auk 97:655–668.

Barrowclough, G. F. 1982. Geographic variation, predictiveness, and subspecies. Auk 99:601–603.

Barrowclough, G. F., J. G. Groth, L. A. Mertz, and R. J. Gutiérrez. 2004. Phylogeographic structure, gene flow and species status in Blue Grouse (*Dendragapus obscurus*). Molecular Ecology 13:1911–1922.

Barrowclough, G. F., and R. M. Zink. 2009. Funds enough, and time: mtDNA, nuDNA and the discovery of divergence. Molecular Ecology 18:2934–2936.

Beattie, M. 1994. Endangered and threatened wildlife and plants; 1-year finding for a petition to list the Pacific Coast population of the Cactus Wren under the Endangered Species Act. 59 Federal Register 45659, FR Doc. 94-21785.

Behle, W. H. 1973. Clinal variation in the White-throated Swifts from Utah and the Rocky Mountain region. Auk 90:299–306.

Belliure, J., G. Sorci, A. P. Møller, and J. Clobert. 2000. Dispersal distances predict subspecies richness in birds. Journal of Evolutionary Biology 13: 480–487.

Bellrose, F. C. 1980. Ducks, Geese and Swans of North America. Stackpole Books, Harrisburg, Pennsylvania.

Benedict, N. G., S. J. Oyler-McCance, S. E. Taylor, C. E. Braun, and T. W. Quinn. 2003. Evaluation of the eastern (*Centrocercus urophasianus urophasianus*) and western (*Centrocercus urophasianus phaois*) subspecies of Sage-Grouse using mitochondrial control-region sequence data. Conservation Genetics 4:301–310.

Benkman, C. W. 1989. On the evolution and ecology of island populations of crossbills. Evolution 43:1324–1330.

Benkman, C. W. 1993a. Adaptation to single resources and the evolution of crossbill (Loxia) diversity. Ecological Monographs 63:305–325.

Benkman, C. W. 1993b. The evolution, ecology, and decline of the Red Crossbill of Newfoundland. American Birds 47:225–229.

Benkman, C. W. 1994. Comments on the ecology and status of the Hispaniolan Crossbill (*Loxia Ieucoptera* [sic] *megaplaga*), with recommendations for its conservation. Caribbean Journal of Science 30:250–254.

Benkman, C. W. 2007. Red Crossbill types in Colorado: Their ecology, evolution and distribution. Colorado Birds 41:153–163.

Benkman, C. W., J. W. Smith, P. C. Keenan, T. L. Parchman, and L. Santisteban. 2009. A new species of the Red Crossbill (Fringillidae: *Loxia*) from Idaho. Condor 111:169–176.

Bensch, S., T. Andersson, and S. Åkesson. 1999. Morphological and molecular variation across a migratory divide in Willow Warblers, *Phylloscopus trochilus*. Evolution 53:1925–1935.

Benton, M. J. 2000. Stems, nodes, crown clades, and rank-free lists: Is Linnaeus dead? Biological Reviews 75:633–648.

Benton, M. J. 2007. The PhyloCode: Beating a dead horse? Acta Palaeontologica Polonica 52:651–655.

Bergmann, C. 1847. Ueber die Verhältnisse der Wärmeökonomie der Thiere zu ihrer Grösse. Gottinger Studien 3: 595–708.

Berry, O., M. D. Tocher, and S. D. Sarre. 2004. Can assignment tests measure dispersal? Molecular Ecology 13:551–561.

Berthold, P., A. J. Helbig, G. Mohr, and U. Querner. 1992. Rapid microevolution of migratory behaviour in a wild bird species. Nature 360:668–670.

Bickford, D., D. J. Lohman, N. S. Sodhi, P. K. L. Ng, R. Meier, K. Winker, K. K. Ingram, and I. Das. 2007. Cryptic species as a window on diversity and conservation. Trends in Ecology and Evolution 22: 148–155.

Bierregaard, R. O., Jr. 1988. Morphological data from understory birds in *terra firme* forest in the central Amazonian Basin. Revista Brasileira de Biologia 48:169–178.

Binford, L. C. 1965. Two new subspecies of birds from Oaxaca, Mexico. Occasional Papers of the Museum of Zoology, Louisiana State University 30:1–6.

Blackwelder, R. E. 1954. The open season on taxonomists. Systematic Zoology 3:177–181.

Blake, E. R. 1977. Manual of Neotropical Birds, vol. 1. University of Chicago Press, Chicago, Illinois.

Bock, W. J. 1966. An approach to the functional analysis of bill shape. Auk 83:10–51.

Bokma, F. 2003. Testing for differences in rates of speciation between higher taxa. Evolution 57:2469–2474.

Boles, W. E. 2006. Family Rhipiduridae (fantails). *In* Handbook of the Birds of the World, vol. 11: Old World Flycatchers to Old World Warblers (J. del Hoyo, A. Elliott, and D. A. Christie, Eds.). Lynx Edicions, Barcelona, Spain.

Borgmeier, T. 1957. Basic questions of systematics. Systematic Zoology 6:53–69.

Bortolotti, G. R. 2006. Natural selection and coloration: Protection, concealment, advertisement, or deception? Pages 3–35 *in* Bird Coloration, vol. 2: Function and Evolution (G. E. Hill and K. J. McGraw, Eds.). Harvard University Press, Cambridge, Massachusetts.

Bowcock, A. M., A. Ruiz-Linares, J. Tomfohrde, E. Minch, J. R. Kidd, and L. L. Cavalli-Sforza. 1994. High resolution of human evolutionary trees with polymorphic microsatellites. Nature 368:455–457.

Brennan, L. A. 1999. Northern Bobwhite (*Colinus virginianus*). *In* The Birds of North America, no. 397 (A. Poole and F. Gill, Eds.). Academy of Natural Sciences, Philadelphia, and American Ornithologists' Union, Washington, D.C.

Brent, R. 1973. Algorithms for Minimization without Derivatives. Prentice-Hall, Englewood Cliffs, New Jersey.

Brooke, M. de L., S. H. M. Butchart, S. T. Garnett, G. M. Crowley, N. B. Mantilla-Beniers, and A. J. Stattersfield. 2008. Rates of movement of threatened bird species between IUCN Red List categories and toward extinction. Conservation Biology 22:417–427.

Brookfield, J. 2002. Review of *Genes, Categories, and Species* by Jody Hey. Genetic Research 79:107–108.

Browning, M. R. 1990. Taxa of North American birds described from 1957 to 1987. Proceedings of the Biological Society of Washington 103:432–451.

Browning, M. R. 1994. A taxonomic review of *Dendroica petechia* (Yellow Warbler) (Aves: Parulinae). Proceedings of the Biological Society of Washington 107:27–51.

Brumfield, R. T. 2005. Mitochondrial variation in Bolivian populations of the Variable Antshrike (*Thamnophilus caerulescens*). Auk 122:414–432.

Buchanan, K. L., M. R. Evans, A. R. Goldsmith, D. M. Bryant, and L. V. Rowe. 2001. Testosterone influences basal metabolic rate in male House Sparrows: A new cost of dominance signaling? Proceedings of the Royal Society of London, Series B 268:1337–1344.

Buerkle, C. A. 2000. Morphological variation among migratory and non-migratory populations of Prairie Warblers. Wilson Bulletin 112:99–107.

Bulgarella, M., R. E. Wilson, C. Kopuchian, T. H. Valqui, and K. G. McCracken. 2007. Elevational variation in body size of Crested Ducks (*Lophonetta specularioides*) from the central high Andes, Mendoza, and Patagonia. Ornitología Neotropical 18:587–602.

Bulgin, N. L., H. L. Gibbs, P. Vickery, and A. J. Baker. 2003. Ancestral polymorphisms in genetic markers obscure detection of evolutionarily distinct populations in the endangered Florida Grasshopper Sparrow (*Ammodramus savannarum floridanus*). Molecular Ecology 12:831–844.

Bullock, T. H. 1985. Comparative neuroethology of startle, rapid escape, and giant fiber-mediated responses. Pages 2–12 *in* Neural Mechanisms of Startle Behavior (R. C. Eaton, Ed.). Plenum Press, London.

Burbrink, F. T., R. Lawson, and J. B. Slowinski. 2000. Mitochondrial DNA phylogeography of the polytypic North American rat snake (*Elaphe obsoleta*): A critique of the subspecies concept. Evolution 54:2107–2118.

Burn, H. 2006. [Color plates 24 MONARCHIDAE (*Arses*, *Myiagra*) and 25 MONARCHIDAE (*Myiagra*, *Lamprolia*); pp. 314–315, 318–331]. *In* Handbook of Birds of the World, vol. 11: Old World Flycatchers to Old World Warblers (J. del Hoyo, A. Elliott, and D. A. Christie, Eds.). Lynx Edicions, Barcelona, Spain.

Burney, C. W., and R. T. Brumfield. 2009. Ecology predicts levels of genetic differentiation in Neotropical birds. American Naturalist 174:358–368.

Burney, D. A., H. F. James, L. Pigott Burney, S. L. Olson, W. Kikuchi, W. L. Wagner, M. Burney, D. McCloskey, D. Kikuchi, F. V. Grady, and others. 2001. Fossil evidence for a diverse biota from Kauai and its transformation since human arrival. Ecological Monographs 71:615–641.

Burtt, E. H., Jr. 1981. The adaptiveness of animal colors. BioScience 31:723–729.

Burtt, E. H., Jr., and J. M. Ichida. 2004. Gloger's rule, feather-degrading bacteria, and color variation among Song Sparrows. Condor 106:681–686.

Bush, M. B., D. R. Piperno, P. A. Colinvaux, L. Krissek, P. E. De Oliveira, L. A. Krissek, M. C. Miller, and W. E. Rowe. 1992. A 14300-yr paleoecological profile of a lowland tropical lake in Panama. Ecological Monographs 62:251–275.

Cabe, P. R., and D. N. Alstad. 1994. Interpreting population differentiation in terms of drift and selection. Evolutionary Ecology 8:489–492.

Cabot, J., and C. Urdiales. 2005. The subspecific status of Sardinian Warblers *Sylvia melanocephala* in the Canary Islands with the description of a new subspecies from Western Sahara. Bulletin of the British Ornithologists' Club 125:230–240.

Cadena, C. D., J. Klicka, and R. E. Ricklefs. 2007. Evolutionary differentiation in the Neotropical montane region: Molecular phylogenetics and phylogeography of *Buarremon* brush-finches (Aves, Emberizidae). Molecular Phylogenetics and Evolution 44:993–1016.

Calder, W. A., III. 1974. Consequences of body size for avian energetics. Pages 86–151 *in* Avian Energetics (R. A. Paynter, Jr., Ed.). Nuttall Ornithological Club, Cambridge, Massachusetts.

Calder, W. A., III. 1984. Size, Function and Life History. Harvard University Press, Cambridge, Massachusetts.

Canty and Associates. 2005. Weatherbase. [Online.] Available at www.weatherbase.com.

Carling, M. D., and R. T. Brumfield. 2008. Integrating phylogenetic and population genetic analyses of multiple loci to test species divergence hypotheses in *Passerina* buntings. Genetics 178:363–377.

Carlquist, S. 1974. Island Biology. Columbia University Press, New York.

Carroll, S. B. 2008. Evo-devo and an expanding evolutionary synthesis: A genetic theory of morphological evolution. Cell 134:25–36.

Carstensen, D. W., and J. M. Olesen. 2009. Wallacea and its nectarivorous birds: Nestedness and modules. Journal of Biogeography 36:1540–1550.

Cassin, J. 1856. Illustrations of the Birds of California, Texas, Oregon, British and Russian America. J.B. Lippincott, Philadelphia.

Chikara, O. 2002. Little-known and neglected distinctive (sub)species of southern Japan. Oriental Bird Club Bulletin 35:26–31.

Chui, C. K. S., and S. M. Doucet. 2009. A test of ecological and sexual selection hypotheses for geographical variation in coloration and morphology of Golden-crowned Kinglets (*Regulus satrapa*). Journal of Biogeography 36:1945–1957.

Cibois, A., J.-C. Thibault, and E. Pasquet. 2004. Biogeography of eastern Polynesian monarchs (*Pomarea*): An endemic genus close to extinction. Condor 106:837–851.

Cibois, A., J.-C. Thibault, and E. Pasquet. 2007. Uniform phenotype conceals double colonization by reed-warblers of a remote Pacific archipelago. Journal of Biogeography 34:1150–1166.

Cicero, C. 1996. Sibling species of Titmice in the *Parus inornatus* complex (Aves: Paridae). University of California Publications in Zoology, no. 128.

Cicero, C., and N. K. Johnson. 2006. Diagnosability of subspecies: Lessons from Sage Sparrows (*Amphispiza belli*) for analysis of geographic variation in birds. Auk 123:266–274.

Cicero, C., and N. K. Johnson. 2007. Narrow contact of desert Sage Sparrows (*Amphispiza belli nevadensis* and *A. b. canescens*) in Owens Valley, eastern California: Evidence from mitochondrial DNA, morphology, and GIS-based niche models. Pages 78–95 *in* Festschrift for Ned K. Johnson: Geographic Variation and Evolution in Birds (C. Cicero and J. V. Remsen, Jr., Eds.). Ornithological Monographs, no. 63.

Clare, E. L., B. K. Lim, M. D. Engstrom, J. L. Eger, and P. D. N. Hebert. 2007. DNA barcoding of Neotropical bats: Species identification and discovery within Guyana. Molecular Ecology Notes 7:184–190.

Clayton, N. S. 1990. Assortative mating in Zebra Finch subspecies, *Taeniopygia guttata guttata* and *T. g. castanotis*. Philosophical Transactions of the Royal Society of London, Series B: Biological Sciences 330:351–370.

Clegg, S. M., F. D. Frentiu, J. Kikkawa, G. Tavecchia, and I. P. F. Owens. 2008. 4000 years of phenotypic change in an island bird: Heterogeneity of selection over three microevolutionary timescales. Evolution 62:2393–2410.

Clement, M., D. Posada, and K. A. Crandall. 2000. TCS: A computer program to estimate gene genealogies. Molecular Ecology 9:1657–1659.

Clements, J. F. 2000. Birds of the World: A Checklist, 5th ed. Ibis Publishing Company, Vista, California.

Clements, J. F. 2007. The Clements Checklist of Birds of the World, 6th ed. Cornell Lab of Ornithology, Ithaca, New York.

Cohen, J. 1988. Statistical Power Analysis for the Behavioral Sciences, 2nd ed. Erlbaum, Hillsdale, New Jersey.

Cokinos, C. 2000. Hope Is the Thing with Feathers. J.P. Tarcher/Putnam, New York.

Collar, N. J. 1996. Species concepts and conservation: A response to Hazevoet. Bird Conservation International 6:197–200.

Collar, N. J. 1997. Taxonomy and conservation: Chicken and egg. Bulletin of the British Ornithologists' Club 117:122–136.

Collar, N. J. 2005. How many bird species are there in Asia? Oriental Bird Club Bulletin 38:20–30.

Collar, N. J. 2006a. A partial revision of the Asian Babblers (Timaliidae). Forktail 22:85–112.

Collar, N. J. 2006b. A taxonomic reappraisal of the Black-browed Barbet *Megalaima oorti*. Forktail 22:170–173.

Collar, N. J. 2007a. Philippine bird taxonomy and conservation: A commentary on Peterson (2006). Bird Conservation International 17:103–113.

Collar, N. J. 2007b. Taxonomic notes on some insular *Loriculus* hanging-parrots. Bulletin of the British Ornithologists' Club 127:97–107.

Collar, N. J. 2008. Subjectivity and space in evaluating species limits: A response to Peterson and Moyle. Forktail 24:112–113.

Collar, N. J., M. J. Crosby, and A. J. Stattersfield. 1994. Birds to Watch 2: The World List of Threatened Birds. BirdLife International, Cambridge, United Kingdom.

Collins-Schramm, H. E., B. Chima, T. Morii, K. Wah, Y. Figueroa, L. A. Criswell, R. L. Hanson, W. C. Knowler, G. Silva, J. W. Belmont, and M. F. Seldin. 2004. Mexican American ancestry-informative markers: Examination of population structure and marker characteristics in European Americans, Mexican Americans, Amerindians and Asians. Human Genetics 114:263–271.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2005. Guidelines for recognizing Designatable Units below the species level (Appendix F5 in the COSEWIC O&P Manual). Committee on the Status of Endangered Wildlife in Canada, Ottawa. [Online.] Available at www.dfo-mpo.gc.ca/csas/Csas/Schedule-Horraire/Details/2005/11_Nov/COSEWIC_DU_guidelines_EN.pdf.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2008. Guidelines for recognizing Designatable Units below the species level (Appendix F5 in the COSEWIC O&P Manual). Committee on the Status of Endangered Wildlife in Canada, Ottawa.

Connelly, J. W., J. W. Gratson, and K. P. Reese. 1998. Sharp-tailed Grouse (*Tympanuchus phasianellus*). *In* The Birds of North America, no. 354 (A. Poole and F. Gill, Eds.). Academy of Natural Sciences, Philadelphia, and American Ornithologists' Union, Washington, D.C.

Cooper, A., J. Rhymer, H. F. James, S. L. Olson, C. E. McIntosh, M. D. Sorenson, and R. C. Fleischer. 1996. Ancient DNA and island endemics. Nature 381:484.

Cornuet, J. M., S. Piry, G. Luikart, A. Estoup, and M. Solignac. 1999. New methods employing multilocus genotypes to select or exclude populations as origins of individuals. Genetics 153:1989–2000.

Cory, C. B., and C. E. Hellmayr. 1925. Catalogue of the Birds of the Americas and the Adjacent Islands, vol. 13, part 4. Field Museum of Natural History, Chicago.

Coues, E. 1866. List of the birds of Fort Whipple, Arizona: With which are incorporated all other species ascertained to inhabit the Territory; with brief critical and field notes, descriptions of new species, etc. Proceedings of the Academy of Natural Sciences of Philadelphia 18:38–100.

Coues, E. 1871. Progress of American ornithology. American Naturalist 5:364–373.

Coues, E. 1872. Key to North American Birds. Estes and Lauriat, Boston.

Coues, E. 1884. On the application of trinomial nomenclature to zoology. Zoologist 8:241–247.

Coyne, J. A., and H. A. Orr. 2004. Speciation. Sinauer Associates, Sunderland, Massachusetts.

Cracraft, J. 1983. Species concepts and speciation analysis. Pages 159–187 *in* Current Ornithology, vol. 1 (R. F. Johnston, Ed.). Plenum Press, New York.

Cracraft, J. 1985. Historical biogeography and patterns of differentiation within the South American avifauna: Areas of endemism. Pages 49–84 *in* Neotropical Ornithology (P. A. Buckley, M. S. Foster, E. S. Morton, R. S. Ridgely, and F. G. Buckley, Eds.). Ornithological Monographs, no. 36.

Cracraft, J. 1992. The species of the birds-of-paradise (Paradisaeidae): Applying the phylogenetic species concept to a complex pattern of diversification. Cladistics 8:1–43.

Cracraft, J. 1997. Species concepts in systematics and conservation biology—An ornithological viewpoint. Pages 325–339 *in* Species: The Units of Biodiversity (M. F. Claridge, H. A. Dawah, and M. R. Wilson, Eds.). Chapman & Hall, New York.

Cracraft, J. 2000. Species concepts in theoretical and applied biology: A systematic debate with consequences. Pages 3–14 *in* Species Concepts and Phylogenetic Theory: A Debate (Q. D. Wheeler and R. Meier, Eds.). Columbia University Press, New York.

Craig, R. J., and E. Taisacan. 1994. Notes on the ecology and population decline of the Rota Bridled White-eye. Wilson Bulletin 106:165–169.

Cramp, S., K. E. L. Simmons, and C. M. Perrins, Eds. 1977–1994. Handbook of the Birds of Europe, the Middle East and Africa, vols. 1–4. Oxford University Press, Oxford, United Kingdom.

Crandall, K. A., O. R. P. Bininda-Emonds, G. M. Mace, and R. K. Wayne. 2000. Considering evolutionary processes in conservation biology. Trends in Ecology and Evolution 15:290–295.

Cunningham, C. W. 1997. Is congruence between data partitions a reliable predictor of phylogenetic accuracy? Empirically testing an iterative procedure for choosing among phylogenetic methods. Systematic Biology 46:464–478.

Curson, J., D. Quinn, and D. Beadle. 1994. Warblers of the Americas: An Identification Guide. Houghton Mifflin, Boston.

Cutright, P. R., and M. J. Brodhead. 1981. Elliott Coues: Naturalist and Frontier Historian. University of Illinois Press, Urbana.

Dale, J. 2006. Intraspecific variation in coloration. Pages 36–86 *in* Bird Coloration, vol. 2: Function and Evolution (G. E. Hill and K. J. McGraw, Eds.). Harvard University Press, Cambridge, Massachusetts.

Daniels, S. R., N. J. L. Heideman, M. G. J. Hendricks, M. E. Mokone, and K. A. Crandall. 2005. Unraveling evolutionary lineages in the limbless fossorial skink genus *Acontias* (Sauria: Scincidae): Are subspecies equivalent systematic units? Molecular Phylogenetics and Evolution 34:645–654.

Darwin, C. 1859. On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life. John Murray, London.

Darwin, C. 1895. On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life, 6th ed. John Murray, London.

Davis, J. I., and K. C. Nixon. 1992. Populations, genetic variation, and the delimitation of phylogenetic species. Systematic Biology 41:421–435.

Dayrat, B., P. D. Cantino, J. A. Clarke, and K. de Queiroz. 2008. Species names in the PhyloCode: The approach adopted by the International Society for Phylogenetic Nomenclature. Systematic Biology 57:507–514.

Degnan, J. H., and N. A. Rosenberg. 2009. Gene tree discordance, phylogenetic inference and the multispecies coalescent. Trends in Ecology and Evolution 24:332–340.

Delacour, J. 1956. The Waterfowl of the World, vol. 2. Country Life Limited, London.

del Hoyo, J., A. Elliott, J. Sargatal, and D. A. Christie, Eds. 1992–2008. Handbook of the Birds of the World, vols. 1–13. Lynx Edicions, Barcelona, Spain.

D'Elia, J., M. Zwartjes, and S. McCarthy. 2008. Considering legal viability and societal values when deciding what to conserve under the U.S. Endangered Species Act. Conservation Biology 22:1072–1074.

de Queiroz, K. 1998. The general lineage concept of species, species criteria, and the process of speciation: A conceptual unification and terminological recommendations. Pages 57–75 *in* Endless Forms: Species and Speciation (D. J. Howard and S. H. Berlocher, Eds.). Oxford University Press, Oxford, United Kingdom.

de Queiroz, K. 2005a. Different species problems and their resolution. BioEssays 27:1263–1269.

de Queiroz, K. 2005b. Ernst Mayr and the modern concept of species. Proceedings of the National Academy of Sciences USA 102:6600–6607.

de Queiroz, K., and M. J. Donoghue. 1988. Phylogenetic systematics and the species problem. Cladistics 4:317–338.

de Queiroz, K., and M. J. Donoghue. 1990. Phylogenetic systematics revisited. Cladistics 6:83–90.

de Queiroz, K., and J. Gauthier. 1992. Phylogenetic taxonomy. Annual Review of Ecology and Systematics 23:449–480.

DeSalle, R., M. G. Egan, and M. Siddall. 2005. The unholy trinity: Taxonomy, species delimitation and DNA barcoding. Philosophical Transactions of the Royal Society of London, Series B 360:1905–1916.

D'Horta, F. M., J. M. Cardoso da Silva, and C. C. Ribas. 2008. Species limits and hybridization zones in *Icterus cayanensis-chrysocephalus* group (Aves: Icteridae). Biological Journal of the Linnean Society 95:583–597.

Diamond, J. M., M. E. Gilpin, and E. Mayr. 1976. Species-distance relation for birds of the Solomon Archipelago, and the paradox of the great speciators. Proceedings of the National Academy of Sciences USA 73:2160–2164.

Dickerman, R. W., and J. Gustafson. 1996. The Prince of Wales Spruce Grouse: A new subspecies from southeastern Alaska. Western Birds 27:41–47.

Dickinson, E. C., Ed. 2003. The Howard and Moore Complete Checklist of the Birds of the World, 3rd ed. Princeton University Press, Princeton, New Jersey.

Di Giacomo, A. G. 1995. Two new species for Argentine avifauna. Hornero 14:77–78.

Dijkstra, L. H., and D. J. Jellyman. 1999. Is the subspecies classification of freshwater eels *Anguilla australis australis* Richardson and *A. a. schmidtii* Phillips still valid? Marine and Freshwater Research 50:261–263.

Dillon, S., and J. Fjeldså. 2005. The implications of different species concepts for describing biodiversity patterns and assessing conservation needs for African birds. Ecography 28:682–692.

Dimcheff, D. E., S. V. Drovetski, and D. P. Mindell. 2002. Phylogeny of Tetraoninae and other galliform birds using mitochondrial 12S and ND2 genes. Molecular Phylogenetics and Evolution 24:203–215.

Dingle, C., W. Halfwerk, and H. Slabbekoorn. 2008. Habitat-dependent song divergence at subspecies level in the Grey-breasted Wood-wren. Journal of Evolutionary Biology 21:1079–1089.

Dizon, A. E., C. Lockyer, W. F. Perrin, D. P. Demaster, and J. Sisson. 1992. Rethinking the stock concept: A phylogeographic approach. Conservation Biology 6:24–36.

Donoghue, M. J. 1985. A critique of the biological species concept and recommendations for a phylogenetic alternative. Bryologist 88:172–181.

Drovetski, S. V. 2002. Molecular phylogeny of grouse: Individual and combined performance of W-linked, autosomal, and mitochondrial loci. Systematic Biology 51:930–945.

Drovetski, S. V., R. M. Zink, and N. A. Mode. 2009. Patchy distributions belie morphological and genetic homogeneity in rosy-finches. Molecular Phylogenetics and Evolution 50:437–445.

Drovetski, S. V., R. M. Zink, S. Rohwer, I. V. Fadeev, E. V. Nesterov, I. Karagodin, E. A. Koblik, and Y. A. Red'kin. 2004. Complex biogeographic history of a Holarctic passerine. Proceedings of the Royal Society of London, Series B 271:545–551.

Drummond, A. J., S. Y. W. Ho, M. J. Phillips, and A. Rambaut. 2006. Relaxed phylogenetics and dating with confidence. PLoS Biology 4:e88.

Drummond, A. J., and A. Rambaut. 2007. BEAST: Bayesian evolutionary analysis by sampling trees. BMC Evolutionary Biology 7:214.

Drummond, A. J., A. Rambaut, B. Shapiro, and O. G. Pybus. 2005. Bayesian coalescent inference of past population dynamics from molecular sequences. Molecular Biology and Evolution 22:1185–1192.

Dubois, A. 1871. Conspectus systematicus et geographicus Avium Europæarum. C. Muquardt, H. Merzbach, Brussels.

Dumbacher, J. P., and R. C. Fleischer 2001. Phylogenetic evidence for color pattern convergence in toxic pitohuis: Müllerian mimicry in birds? Proceedings of the Royal Society of London, Series B 268:1971–1976.

Dunning, J. B. 2008. CRC Handbook of Avian Body Masses. CRC Press, Boca Raton, Florida.

Eckert, A. J., and B. C. Carstens. 2008. Does gene flow destroy phylogenetic signal? The performance of three methods for estimating species phylogenies in the presence of gene flow. Molecular Phylogenetics and Evolution 49:832–842.

Edelaar, P. 2008. Assortative mating also indicates that Common Crossbill *Loxia curvirostra* vocal types are species. Journal of Avian Biology 39:9–12.

Edwards, S. V. 2009. Is a new and general theory of molecular systematics emerging? Evolution 63:1–19.

Edwards, S. V., and P. Beerli. 2000. Perspective: Gene divergence, population divergence, and the variance in coalescence time in phylogeographic studies. Evolution 54:1839–1854.

Edwards, S. V., and S. Bensch. 2009. Looking forwards or looking backwards in avian phylogeography? A comment on Zink and Barrowclough 2008. Molecular Ecology 18:2930–2933.

Edwards, S. V., S. B. Kingan, J. D. Calkins, C. N. Balakrishnan, W. B. Jennings, W. J. Swanson, and M. D. Sorensen. 2005. Speciation in birds: Genes, geography, and sexual selection. Proceedings of the National Academy of Sciences USA 102:6550–6557.

Edwards, S. V., L. Liu, and D. K. Pearl. 2007. High-resolution species trees without concatenation. Proceedings of the National Academy of Sciences USA 104:5936–5941.

Eggert, L. S. 1996. A phylogenetic approach to management of coastal California Cactus Wrens (*Campylorhynchus brunneicapillus*). M.S. thesis, San Diego State University, San Diego, California.

Elliott, D. G. 1914. In memoriam: Philip Lutley Sclater. Auk 31:1–13.

Ellsworth, D. L., R. L. Honeycutt, N. J. Silvy, K. D. Rittenhouse, and M. H. Smith. 1994. Mitochondrial-DNA and nuclear-gene differentiation in North American prairie grouse (Genus *Tympanuchus*). Auk 111:661–671.

Endler, J. A. 1977. Geographic variation, speciation and clines. Princeton University Press, Princeton, New Jersey.

Endler, J. A., and P. W. Mielke, Jr. 2005. Comparing entire colour patterns as birds see them. Biological Journal of the Linnean Society 86:405–431.

Engelmoer, M., and C. S. Roselaar. 1998. Geographical Variation in Waders. Kluwer, Dordrecht, The Netherlands.

Evarts, S. 2005. Cinnamon Teal *Anas cyanoptera*. Pages 549–553 *in* Ducks, Geese, and Swans (J. Kear, Ed.). Oxford University Press, Oxford, United Kingdom.

Fallon, S. M. 2007. Genetic data and the listing of species under the U.S. Endangered Species Act. Conservation Biology 21:1186–1195.

Falush, D., M. Stephens, and J. K. Pritchard. 2003. Inference of population structure using multilocus genotype data: Linked loci and correlated allele frequencies. Genetics 164:1567–1587.

Fancy, S. G., and T. J. Snetsinger. 2001. What caused the population decline of the Bridled White-eye on Rota, Mariana Islands? Pages 274–280 *in* Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna (J. M. Scott, S. Conant, and C. Van Riper III, Eds.). Studies in Avian Biology, no. 22.

Farris, J. S., M. Kallersio, A. G. Kluge, and C. Bult. 1995. Constructing a significance test for incongruence. Systematic Biology 44:570–572.

Felsenstein, J. 1985. Confidence limits on phylogenies: An approach using the bootstrap. Evolution 39:783–791.

Felsenstein, J. 1993. PHYLIP (phylogeny inference package), version 3.5. [Online.] Available at evolution.gs.washington.edu/phylip.html.

Filardi, C. E., and R. G. Moyle. 2005. Single origin of a pan-Pacific bird group and upstream colonization of Australasia. Nature 438:216–219.

Filardi, C. E., and C. E. Smith. 2005. Molecular phylogenetics of monarch flycatchers (genus *Monarcha*) with emphasis on Solomon Island endemics. Molecular Phylogenetics and Evolution 37:776–788.

Fisher, A. K. 1898. Rank of the Sage Sparrow. Auk 15:190.

Fisher, R. A. 1930. The Genetical Theory of Natural Selection. Clarendon Press, Oxford, United Kingdom.

Fitzpatrick, J. W. 1980. Foraging behavior of Neotropical tyrant flycatchers. Condor 82:43–57.

Fitzpatrick, J. W. 1985. Form, foraging behavior, and adaptive radiation in the Tyrannidae. Pages 447–470 *in* Neotropical Ornithology (P. A. Buckley, M. S. Foster, E. S. Morton, R. S. Ridgely, and F. G. Buckley, Eds.). Ornithological Monographs, no. 36.

Fitzpatrick, J. W. 2004. Ochre-bellied Flycatcher, *Mionectes oleagineus*. Page 309 *in* Handbook of Birds of the World, vol. 9: Cotingas to Pipits and Wagtails (J. del Hoyo, A. Elliott, and D. A. Christie, Eds.). Lynx Edicions, Barcelona, Spain.

Fjeldså, J., and N. Krabbe. 1990. Birds of the High Andes. Apollo Books, Svendborg.

Fleischer, R. C., G. Fuller, and D. B. Ledig. 1995. Genetic structure of endangered Clapper Rail (*Rallus longirostris*) populations in southern California. Conservation Biology 9:1234–1243.

Fleischer, R. C., H. F. James, and S. L. Olson. 2008. Convergent evolution of Hawaiian and Australo-Pacific Honeyeaters from distant songbird ancestors. Current Biology 18:1927–1931.

Fleischer, R. C., J. J. Kirchman, J. P. Dumbacher, L. Bevier, C. Dove, N. C. Rotzel, S. V. Edwards, M. Lammertink, K. J. Miglia, and W. S. Moore. 2006. Mid-Pleistocene divergence of Cuban and North American Ivory-billed Woodpeckers. Biology Letters 2:466–469.

Fleischer, R. C., and C. E. McIntosh. 2001. Molecular systematics and biogeography of the Hawaiian avifauna. Pages 51–60 *in* Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna (J. M. Scott, S. Conant, and C. Van Riper III, Eds.). Studies in Avian Biology, no. 22.

Fleischer, R. C., C. E. McIntosh, and C. L. Tarr. 1998. Evolution on a volcanic conveyor belt: Using phylogeographic reconstructions and K-Ar-based ages of the Hawaiian Islands to estimate molecular evolutionary rates. Molecular Ecology 7:533–545.

Fleischer, R. C., B. Slikas, J. Beadell, C. Atkins, C. E. McIntosh, and S. Conant. 2007. Genetic variability and taxonomic status of the Nihoa and Laysan Millerbirds. Condor 109:954–962.

Fleischer, R. C., C. L. Tarr, H. F. James, B. Slikas, and C. E. McIntosh. 2001. Phylogenetic placement of the Poouli, *Melamprosops phaeosoma*, based on mitochondrial DNA sequence and osteological characters. Pages 98–104 *in* Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna (J. M. Scott, S. Conant, and C. Van Riper III, Eds.). Studies in Avian Biology, no. 22.

Francis, R. I. C. C., and R. H. Mattlin. 1986. A possible pitfall in the morphometric application of discriminant function analysis: Measurement bias. Marine Biology 93:311–313.

Fraser, D. J., and L. Bernatchez. 2001. Adaptive evolutionary conservation: Towards a unified concept for defining conservation units. Molecular Ecology 10:2741–2752.

Freeland, J. R., and P. T. Boag. 1999. Phylogenetics of Darwin's finches: Paraphyly in the tree-finches and two divergent lineages in the Warbler Finch. Auk 116:577–588.

Freeman, S., and J. C. Herron. 2007. Evolutionary Analysis, 4th ed. Pearson Prentice Hall, Upper Saddle River, New Jersey.

Fry, A. J., and R. M. Zink. 1998. Geographic analysis of nucleotide diversity and Song Sparrow (Aves: Emberizidae) population history. Molecular Ecology 7:1303–1313.

Fu, Y. X. 1997. Statistical tests of neutrality of mutations against population growth, hitchhiking and background selection. Genetics 147:915–925.

Funk, D. J., and K. Omland. 2003. Species-level paraphyly and polyphyly: Frequency, causes, and consequences, with insights from animal mitochondrial DNA. Annual Review of Ecology, Evolution, and Systematics 34:397–423.

Funk, W. C., E. D. Forsman, T. D. Mullins, and S. M. Haig. 2008. Introgression and dispersal among Spotted Owl (*Strix occidentalis*) subspecies. Ecological Applications 1:161–171.

Funk, W. C., T. D. Mullins, and S. M. Haig. 2007. Conservation genetics of Snowy Plovers (*Charadrius alexandrinus*) in the Western Hemisphere: Population genetic structure and delineation of subspecies. Conservation Genetics 8:1287–1309.

Futuyma, D. J. 1979. Evolutionary Biology. Sinauer Associates, Sunderland, Massachusetts.

Futuyma, D. J. 1998. Evolutionary Biology, 3rd ed. Sinauer Associates, Sunderland, Massachusetts.

Futuyma, D. J. 2005. Evolution. Sinauer Associates, Sunderland, Massachusetts.

Gabbiani, F., H. G. Krapp, and G. Laurent. 1999. Computation of object approach by a wide-field, motion-sensitive neuron. Journal of Neuroscience 19:1122–1141.

Gabrielson, I. N., and F. C. Lincoln. 1951. The races of Song Sparrows in Alaska. Condor 53:250–255.

Galatowitsch, M. L., and R. L. Mumme. 2004. Escape behavior of Neotropical homopterans in response to a flush-pursuit predator. Biotropica 36:586–595.

Gamauf, A., J.-O. Gjershaug, N. Røv, K. Kvaløy, and E. Haring. 2005. Species or subspecies? The dilemma of taxonomic ranking of some south-east Asian hawk-eagles (genus *Spizaetus*). Bird Conservation International 15:99–117.

Gammonley, J. H. 1996. Cinnamon Teal (*Anas cyanoptera*). *In* The Birds of North America, no. 217 (A. Poole and F. Gill, Eds.). Academy of Natural Sciences, Philadelphia, and American Ornithologists' Union, Washington, D.C.

García-Moreno, J., N. Cortés, G. M. García-Deras, and B. E. Hernández-Baños. 2006. Local origin and diversification among *Lampornis* hummingbirds: A Mesoamerican taxon. Molecular Phylogenetics and Evolution 38:488–498.

García-Moreno, J., A. G. Navarro-Sigüenza, A. T. Peterson, and L. A. Sánchez-González. 2004. Genetic variation coincides with geographic structure in the Common Bush-tanager (*Chlorospingus ophthalmicus*) complex from Mexico. Molecular Phylogenetics and Evolution 33:186–196.

Garnett, S. T., and L. Christidis. 2007. Implications of changing species definitions for conservation purposes. Bird Conservation International 17:187–195.

Garreaud, R., M. Vuille, and A. C. Clement. 2003. The climate of the Altiplano: Observed current conditions and mechanisms of past changes. Palaeogeography, Palaeoclimatology, Palaeoecology 194:5–22.

Gath, I., and A. B. Geva. 1989. Unsupervised optimal fuzzy clustering. IEEE Transactions on Pattern Analysis and Machine Intelligence 11:773–781.

Genner, M. J., and G. F. Turner. 2005. The mbuna cichlids of Lake Malawi: A model for rapid speciation and adaptive radiation. Fish and Fisheries 6:1–34.

Gentry, A. H. 2001. Patrones de diversidad y composición florística en los bosques de las montañas neotropicales. Pages 85–123 *in* Bosques Nublados del Neotrópico (M. Kappelle and A. D. Brown, Eds.). Instituto Nacional de Biodiversidad, InBio, Santo Domingo de Heredia, Costa Rica.

Gill, F. B. 1982. Might there be a resurrection of the subspecies? Auk 99:598–599.

Gill, F. B. 2007. Ornithology, 3rd ed. W.H. Freeman, New York.

Gill, F. B., and M. Wright. 2006. Birds of the World: Recommended English Names. Princeton University Press, Princeton, New Jersey.

Gippoliti, S., and G. Amori. 2007. The problem of subspecies and biased taxonomy in conservation lists: The case of mammals. Folia Zoologica 56:113–117.

Glenn, T. 1997. Genetic bottlenecks in long-lived vertebrates: Mitochondrial and microsatellite DNA variation in American alligators and whooping cranes. Ph.D. dissertation, University of Maryland, College Park.

Goetzmann, W. H. 1986. New Lands, New Men: America and the Second Great Age of Discovery. Viking, New York.

Goldstein, D. B., and C. Schlötterer. 1999. Microsatellites: Evolution and Applications. Oxford University Press, Oxford, United Kingdom.

Goldstein, P. Z., R. DeSalle, G. Amato, and A. P. Vogler. 2000. Conservation genetics at the species boundary. Conservation Biology 14:120–131.

Gonzalez, G., G. Sorci, A. P. Møller, P. Ninni, C. Haussy, and F. De Lope. 1999. Immunocompetence and condition-dependent sexual advertisement in male House Sparrows (*Passer domesticus*). Journal of Animal Ecology 73:1225–1234.

González-Forero, M. 2009. Removing ambiguity from the biological species concept. Journal of Theoretical Biology 256:76–80.

González-José, R., I. Escapa, W. A. Neves, R. Cúneo, and H. M. Pucciarelli. 2008. Cladistic analysis of continuous modularized traits provides phylogenetic signals in *Homo* evolution. Nature 453:775–778.

Gould, S. J., and R. C. Lewontin. 1979. The spandrels of San Marco and the Panglossian paradigm: A critique of the adaptationist programme. Proceedings of the Royal Society of London, Series B 205:581–598.

Grange, W. 1940. A comparison of the displays and vocal performances of the Greater Prairie-Chicken, Lesser Prairie-Chicken, Sharp-tailed Grouse and Sooty Grouse. Passenger Pigeon 2:127–133.

Grant, P. R., and B. R. Grant. 2006. Species before speciation is complete. Annals of the Missouri Botanical Garden 93:94–102.

Grant, P. R., and B. R. Grant. 2008. How and Why Species Multiply: The Radiation of Darwin's Finches. Princeton University Press, Princeton, New Jersey.

Greenberg, R., P. J. Cordero, S. Droege, and R. C. Fleischer. 1998. Morphological adaptation with no mitochondrial DNA differentiation in the coastal plain Swamp Sparrow. Auk 115:706–712.

Greenlaw, J. S. 1996. Eastern Towhee (*Pipilo erythrophthalmus*). *In* The Birds of North America, no. 262 (A. Poole and F. Gill, Eds.). Academy of Natural Sciences, Philadelphia, and American Ornithologists' Union, Washington, D.C.

Greenlaw, J. S., and G. E. Woolfenden. 2007. Wintering distributions and migration of Saltmarsh and Nelson's sharp-tailed sparrows. Wilson Journal of Ornithology 119:361–377.

Gregorius, H. R. 1980. The probability of losing an allele when diploid genotypes are sampled. Biometrics 36:643–652.

Gregory, P. A. 2006. Species accounts for *Arses, Myiagra, Lamprolia,* and *Machaerirhynchus*. Pages 315–325 *in* Handbook of Birds of the World, vol. 11: Old World Flycatchers to Old World Warblers (J. del Hoyo, A. Elliott, and D. A. Christie, Eds.). Lynx Edicions, Barcelona, Spain.

Grinnell, J. 1898a. Birds of the Pacific Slope of Los Angeles County. G.A. Swerdfiger, Pasadena, California.

Grinnell, J. 1898b. Rank of the Sage Sparrow. Auk 15:58–59.

Grinnell, J. 1905. The California Sage Sparrow. Condor 7:18–19.

Grinnell, J., and A. H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna, no. 27.

Groves, C. P. 1986. Systematics of the great apes. Page 187–217 *in* Comparative Primate Biology, I: Systematics, Evolution, and Anatomy (D. R. Swindler and J. Erwin, Eds.). Alan R. Liss, New York.

Guimerà, R., and L. A. N. Amaral. 2005. Functional cartography of complex metabolic networks. Nature 433:895–900.

Gutiérrez, R. J., G. F. Barrowclough, and J. G. Groth. 2000. A classification of the grouse (Aves: Tetraoninae) based on mitochondrial DNA sequences. Wildlife Biology 6:205–211.

Guyot, I., and J.-C. Thibault. 1987. Les oiseaux terrestres des Iles Wallis-et-Futuna (Pacifique sud-ouest). L'Oiseau et R. F. O. 57:226–250.

Hackett, S. J. 1996. Molecular phylogenetics and biogeography of Tanagers in the genus Ramphocelus (Aves). Molecular Phylogenetics and Evolution 5:368–382.

Haffer, J. 1985. Avian zoogeography of the Neotropical lowlands. Pages 113–146 *in* Neotropical Ornithology (P. A. Buckley, M. S. Foster, E. S. Morton, R. S. Ridgely, and F. G. Buckley, Eds.). Ornithological Monographs, no. 36.

Haffer, J. 2001. Ornithological research traditions in central Europe during the 19th and 20th centuries. Journal für Ornithologie 142:27–93.

Haffer, J. 2007. Ornithology, Evolution, and Philosophy: The Life and Science of Ernst Mayr 1904–2005. Springer, Berlin.

Haffer, J., and J. W. Fitzpatrick. 1985. Geographic variation in some Amazonian forest birds. Pages 147–168 *in* Neotropical Ornithology (P. A. Buckley, M. S. Foster, E. S. Morton, R. S. Ridgely, and F. G. Buckley, Eds.). Ornithological Monographs, no. 36.

Haig, S. M., E. A. Beever, S. M. Chambers, H. M. Draheim, B. D. Dugger, S. Dunham, E. Elliott-Smith, J. B. Fontaine, D. C. Kesler, B. J. Knaus, and others. 2006. Taxonomic considerations in listing subspecies under the U.S. Endangered Species Act. Conservation Biology 20:1584–1594.

Haig, S. M., and J. D'Elia. This volume. Avian subspecies and the U.S. endangered species act. Pages 24–34 *in* Avian Subspecies (K. Winker and S. M. Haig, Eds.). Ornithological Monographs, no. 67.

Haig, S. M., T. D. Mullins, and E. D. Forsman. 2004. Subspecific relationships and genetic structure in the Spotted Owl. Conservation Genetics 5:683–705.

Hall, E. R., and K. R. Kelson. 1959. The Mammals of North America, vol. 1. Roland Press, New York.

Hamilton, T. H. 1961. The adaptive significances of intraspecific trends of variation in wing length and body size among bird species. Evolution 15:180–195.

Hanson, H. C. 2006. The White-cheeked Geese: Taxonomy, Ecophysiographic Relationships, Biogeography, and Evolutionary Considerations, vol. 1: Eastern Taxa. Avvar Books, Blythe, California.

Harding, R. M. 1996. New phylogenies: An introductory look at the coalescent. Pages 15–22 *in* New Uses for New Phylogenies (P. H. Harvey, A. J. L. Brown, J. M. Smith, and S. Nee, Eds.). Oxford University Press, Oxford, United Kingdom.

Hare, M. P., and G. F. Shields. 1992. Mitochondrial-DNA variation in the polytypic Alaskan Song Sparrow. Auk 109:126–132.

Harmon, L. J., J. T. Weir, C. Brock, R. E. Glor, and W. Challenger. 2008. GEIGER: Investigating evolutionary radiations. Bioinformatics 24:129–131.

Harris, J. D., and E. Froufe. 2004. Taxonomic inflation: Species concept or historical geopolitical bias? Trends in Ecology and Evolution 20:6–7.

Harrison, R. G. 1993. Hybrids and hybrid zones: Historical perspective. Pages 3–12 *in* Hybrid Zones and the Evolutionary Process (R. G. Harrison, Ed.). Oxford University Press, New York.

Harshman, J. 1996. Phylogeny, evolutionary rates, and ducks. Ph.D. dissertation, University of Chicago, Chicago, Illinois.

Harvey, P. H., R. M. May, and S. Nee. 1994. Phylogenies without fossils. Evolution 48:523–529.

Hasegawa, M., H. Kishino, and T. Yano. 1985. Dating of the human-ape splitting by a molecular clock of mitochondrial DNA. Journal of Molecular Evolution 22:160–174.

Haskell, D. G., and A. Adhikari. 2009. Darwin's manufactory hypothesis is confirmed and predicts the extinction risk of extant birds. PLoS One 4:e5460.

Hatsopoulos, N., F. Gabbiani, and G. Laurent. 1995. Elementary computation of object approach by a wide-field visual neuron. Science 270:1000–1003.

Hazevoet, C. J. 1995. The Birds of the Cape Verde Islands. British Ornithologists' Union, Tring, United Kingdom.

Hazevoet, C. J. 1996. Conservation and species lists: Taxonomic neglect promotes the extinction of endemic birds, as exemplified by taxa from eastern Atlantic islands. Bird Conservation International 6:181–196.

Hebert, P. D. N., S. Ratnasingham, and J. R. deWaard. 2003. Barcoding animal life: Cytochrome *c* oxidase subunit 1 divergences among closely related species. Proceedings of the Royal Society of London, Series B 270 (Supplement 1):S96–-S99.

Hebert, P. D. N., M. Y. Stoeckle, T. S. Zemlak, and C. M. Francis. 2004. Identification of birds through DNA barcodes. PLoS Biology 2:1657–1663.

Helbig, A. J., A. G. Knox, D. T. Parkin, G. Sangster, and M. Collinson. 2002. Guidelines for assigning species rank. Ibis 144:518–525.

Hennig, W. 1966. Phylogenetic Systematics. University of Illinois Press, Urbana.

Hewitt, G. 2000. The genetic legacy of the Quaternary ice ages. Nature 405:907–913.

Hey, J. 2001. The mind of the species problem. Trends in Ecology and Evolution 16:326–329.

Hey, J., R. S. Waples, M. L. Arnold, R. K. Butlin, and R.G. Harrison. 2003. Understanding and confronting species uncertainty in biology and conservation. Trends in Ecology and Evolution 18:597–603.

Hill, G. E. 1993. Geographic variation in the carotenoid plumage pigmentation of male House Finches (*Carpodacus mexicanus*). Biological Journal of the Linnean Society 49:63–86.

Hill, G. E. 2006. Environmental regulation of ornamental coloration. Pages 507–560 *in* Bird Coloration, vol. l: Mechanisms and Measurements (G. E. Hill and K. J. McGraw, Eds.). Harvard University Press, Cambridge, Massachusetts.

Hirschfeld, E., Ed. 2008. Rare Birds Yearbook 2009. MagDig Media, Shrewsbury, United Kingdom.

Hoekstra, H., R. J. Hirschmann, R. A. Bundy, P. A. Insel, and J. P. Crossland. 2006. A single amino acid mutation contributes to adaptive beach mouse color pattern. Science 313:101–104.

Hoekstra, H. E., J. G. Krenz, and M. W. Nachman. 2005. Local adaptation in the rock pocket mouse (*Chaetodipus intermedius*): Natural selection and phylogenetic history of populations. Heredity 94:217–228.

Holderegger, R., and H. H. Wagner. 2006. A brief guide to landscape genetics. Landscape Ecology 21:793–796.

Holmqvist, M. H., and M. V. Srinivasan. 1991. A visually evoked escape response of the housefly. Journal of Comparative Physiology A 169:451–459.

Hopkins, S. R., and F. L. Powell. 2001. Common themes of adaptation to hypoxia. Advances in Experimental Medicine and Biology 502:153–167.

Hostert, E. E. 1997. Reinforcement: A new perspective on an old controversy. Evolution 51:697–702.

Hudson, R. R., and J. A. Coyne. 2002. Mathematical consequences of the genealogical species concept. Evolution 56:1557–1565.

Huelsenbeck, J. P., and F. Ronquist. 2001. MRBAYES: Bayesian inference of phylogenetic trees. Bioinformatics 17:754–755.

Huler, S. 2004. Defining the Wind: The Beaufort Scale, and How a Nineteenth-Century Admiral Turned Science into Poetry. Crown, New York.

Hull, J. M., W. K. Savage, J. L. Bollmer, R. T. Kimball, P. G. Parker, N. K. Whiteman, and H. B. Ernest. 2008. On the origin of the Galápagos Hawk: An examination of phenotypic differentiation and mitochondrial paraphyly. Biological Journal of the Linnean Society 95:779–789.

Hupp, J. W., and C. E. Braun. 1991. Geographic variation among Sage Grouse in Colorado. Wilson Bulletin 103:255–261.

Huxley, J. S. 1942. Evolution, the Modern Synthesis. Allen & Unwin, London.

Inger, R. F. 1961. Problems in the application of the subspecies concept in vertebrate taxonomy. Pages 262–285 *in* Vertebrate Speciation (W. F. Blair, Ed.). University of Texas Press, Austin.

International Code of Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. International Trust for Zoological Nomenclature, London.

Irestedt, M., J. Fjeldså, U. S. Johansson, and P. G. P. Ericson. 2002. Systematic relationships and biogeography of the tracheophone suboscines (Aves: Passeriformes). Molecular Phylogenetics and Evolution 23:499–512.

Irwin, D. E. 2009. Incipient ring speciation revealed by a migratory divide. Molecular Ecology 18:2923–2925.

Irwin, D. E., S. Bensch, J. H. Irwin, and T. D. Price. 2005. Speciation by distance in a ring species. Science 307:414–416.

Irwin, D. E., S. Bensch, and T. Price. 2001. Speciation in a ring. Nature 409:333–337.

Isaac, N. J. B., J. Mallet, and G. M. Mace. 2004. Taxonomic inflation: Its influence on macroecology and conservation. Trends in Ecology and Evolution 19:464–469.

Isler, M. L., P. R. Isler, and B. M. Whitney. 1998. Use of vocalizations to establish species limits in antbirds (Passeriformes: Thamnophilidae). Auk 115:577–590.

IUCN Standards and Petitions Working Group. 2008. Guidelines for Using the IUCN Red List Categories and Criteria. Version 7.0. Prepared by the Standards and Petitions Working Group of the IUCN SSC Biodiversity Assessments Sub-Committee in August 2008.

Jabłonski, P. G. 1999. A rare predator exploits prey escape behavior: The role of tail-fanning and plumage contrast in foraging of the Painted Redstart (*Myioborus pictus*). Behavioral Ecology 10:7–14.

Jabłonski, P. G. 2001. Sensory exploitation of prey: Manipulation of the initial direction of prey escapes by a conspicuous 'rare enemy.' Proceedings of the Royal Society of London, Series B 268:1017–1022.

Jabłonski, P. G., K. Laseter, R. L. Mumme, M. Borowiecz, J. P. Cygan, J. Pereira, and E. Sergiej. 2006a. Habitat-specific sensory-exploitative signals in birds: Propensity of dipteran prey to cause evolution of plumage variation in flush-pursuit insectivores. Evolution 60:2633–2642.

Jabłonski, P. G, S. D. Lee, and L. Jerzak. 2006b. Innate plasticity of a predatory behavior: Nonlearned context dependence of avian flush-displays. Behavioral Ecology 17:925–932.

Jabłonski, P. G., and C. McInerney. 2005. Prey escape direction is influenced by the pivoting displays of flush-pursuing birds. Ethology 111:381–396.

Jabłonski, P. G., and N. J. Strausfeld. 2000. Exploitation of an ancient escape circuit by an avian predator: Prey sensitivity to model predator display in the field. Brain, Behavior and Evolution 56:94–106.

Jabłonski, P. G., and N. J. Strausfeld. 2001. Exploitation of an ancient escape circuit by an avian predator: Relationships between taxon-specific prey escape circuits and the sensitivity to visual cues from the predator. Brain, Behavior and Evolution 58:218–240.

James, F. C. 1968. A more precise definition of Bergmann's rule. American Zoologist 8:815–816.

James, F. C. 1970. Geographic size variation in birds and its relationship to climate. Ecology 51:365–390.

James, F. C. 1983. The environmental component of geographic variation in the size and shape of birds: Transplant experiments with blackbirds. Science 221:184–186.

James, F. C. 1991. Complementary descriptive and experimental studies of clinal variation in birds. American Zoologist 31:694–706.

James, H. F. 2004. The osteology and phylogeny of the Hawaiian finch radiation (Fringillidae: Drepanidini), including extinct taxa. Zoological Journal of the Linnean Society 141:207–255.

James, H. F., and S. L. Olson. 1991. Descriptions of thirty-two new species of birds from the Hawaiian Islands: Part II. Passeriformes. Ornithological Monographs, no. 46.

James, H. F., and S. L. Olson. 2003. A giant new species of Nukupu'u (Fringillidae: Drepanidini: *Hemignathus*) from the island of Hawaii. Auk 120:970–981.

James, H. F., and S. L. Olson. 2005. The diversity and biogeography of koa-finches (Drepanidini: Rhodacanthis), with descriptions of two new species. Zoological Journal of the Linnean Society 144:527–541.

James, H. F., and S. L. Olson. 2006. A new species of Hawaiian finch (Drepanidini: *Loxioides*) from Makauwahi Cave, Kaua'i. Auk 123:335–344.

Jewett, S. G., W. P. Taylor, W. T. Shaw, and J. W. Aldrich. 1953. Birds of Washington State. University of Washington Press, Seattle.
Jiguet, F. 2002. Taxonomy of the Kelp Gull *Larus dominicanus* Lichtenstein inferred from biometrics and wing plumage pattern, including two previously undescribed subspecies. Bulletin of the British Ornithologists' Club 122:50–71.
Johnsgard, P. A. 1978. Ducks, Geese, and Swans of the World. University of Nebraska Press, Lincoln.
Johnsgard, P. A. 1983. The Grouse of the World. University of Nebraska Press, Lincoln.
Johnsgard, P. A. 2002. Grassland Grouse and their Conservation. Smithsonian Institution Press, Washington, D.C.
Johnson, J. A. 2008. Recent range expansion and divergence among North American Prairie Grouse. Journal of Heredity 99:165–173.
Johnson, J. A., J. E. Toepfer, and P. O. Dunn. 2003. Contrasting patterns of mitochondrial and microsatellite population structure in fragmented populations of Greater Prairie-Chickens. Molecular Ecology 12: 3335–3347.
Johnson, N. K. 1980. Character variation and evolution of sibling species in the *Empidonax difficilis-flavescens* complex (Aves: Tyrannidae). University California Publications Zoology, no. 112.
Johnson, N. K. 1982. Retain subspecies—At least for the time being. Auk 99:605–606.
Johnson, N. K., and J. A. Marten. 1992. Macrogeographic patterns of morphometric and genetic variation in the Sage Sparrow complex. Condor 94:1–19.
Johnson, N. K., J. V. Remsen, Jr., and C. Cicero. 1999. Resolution of the debate over species concepts in ornithology: A new comprehensive biologic species concept. Pages 1470–1482 *in* Proceedings of the 22nd International Ornithological Congress, Durban (N. J. Adams and R. H. Slotow, Eds.). BirdLife South Africa, Johannesburg.
Johnson, N. K., and R. M. Zink. 1985. Genetic evidence for relationships among the Red-eyed, Yellow-green, and Chivi Vireos. Wilson Bulletin 97:421–435.
Johnson, R. E. 2002. Black Rosy-Finch (*Leucosticte atrata*). *In* The Birds of North America, no. 678 (A. Poole and F. Gill, Eds.). Birds of North America, Philadelphia.
Johnson, R. E., P. Hendricks, D. L. Pattie, and K. B. Hunter. 2002. Brown-capped Rosy-Finch (*Leucosticte australis*). *In* The Birds of North America, no. 536 (A. Poole and F. Gill, Eds.). Birds of North America, Philadelphia.
Johnston, R. F., and R. K. Selander. 1964. House Sparrows: Rapid evolution of races in North America. Science 144:548–550.
Jones, R. E. 1964. The specific distinctness of the Greater and Lesser prairie-chickens. Auk 81:65–73.
Kahn, N. W., C. E. Braun, J. R. Young, S. Wood, D. R. Mata, and T. W. Quinn. 1999. Molecular analysis of genetic variation among large and small-bodied Sage Grouse using mitochondrial control-region sequences. Auk 116:819–824.
Karl, S. A., R. M. Zink, and J. R. Jehl, Jr. 1987. Allozyme analysis of the California Gull (*Larus californicus*). Auk 104:767–769.
Karr, J. R., and F. C. James. 1975. Eco-morphological configurations and convergent evolution in species and communities. Pages 258–291 *in* Ecology and Evolution of Communities (M. L. Cody and J. M. Diamond, Eds.). Belknap Press, Cambridge, Massachusetts.
Kendall, D. G. 1948. On the generalized "birth-and-death" process. Annals of Mathematical Statistics 19:1–15.
Kenesei, T., B. Balasko, and J. Abonyi. 2006. A MATLAB toolbox and its web based variant for fuzzy cluster analysis. [Online.] Available at bmf.hu/conferences/huci2006/56_Kenesei.pdf.
Kerr, K. C. R., M. Y. Stoeckle, C. J. Dove, L. A. Weigt, C. M. Francis, and P. D. N. Hebert. 2007. Comprehensive DNA barcode coverage of North American birds. Molecular Ecology Notes 7:535–543.
Keyserling, A., and J. H. Blasius. 1840. Die Wirbelthiere Europas. F. Vieweg und Sohn, Braunschweig, Germany.
Kimura, M. 1983. The Neutral Theory of Molecular Evolution. Cambridge University Press, Cambridge, United Kingdom.
Klicka, J. T., and R. M. Zink. 1997. The importance of recent ice ages in speciation: A failed paradigm. Science 277:1666–1669.
Knox, A. G. 2007. Order or chaos? Taxonomy and the British list over the last 100 years. British Birds 100:609–623.
Kornegay, J. R., T. D. Kocher, L. A. Williams, and A. C. Wilson. 1993. Pathways of lysozyme evolution inferred from the sequences of cytochrome *b* in birds. Journal of Molecular Evolution 37:367–379.
Krüger, O., M. D. Sorenson, and N. B. Davies. 2009. Does coevolution promote species richness in parasitic cuckoos? Proceedings of the Royal Society of London, Series B 276:3871–3879.
Lanyon, W. E. 1967. Revision and probable evolution of the *Myiarchus* flycatchers of the West Indies. Bulletin of the American Museum of Natural History 136:331–370.
Larsson, K., and P. Forslund 1992. Genetic and social inheritance of body and egg size in the Barnacle Goose (*Branta leucopsis*). Evolution 46:235–244.
Lawrence, G. N. 1864. Catalogue of birds collected at the island of Sombrero, W. I., with observations by A. A. Julien. Annals of the Lyceum of Natural History, New York 8:92–106.
Leafloor, J. O., C. D. Ankney, and D. H. Rusch. 1998. Environmental effects on body size of Canada Geese. Auk 115:26–33.
Legge, J. T., R. Roush, R. DeSalle, A. P. Vogler, and B. May. 1996. Genetic criteria for establishing evolutionarily significant units in Cryan's Buckmoth. Conservation Biology 10:85–98.

Leinonen, T., R. B. O'Hara, J. M. Cano, and J. Merilä. 2008. Comparative studies of quantitative trait and neutral marker divergence: A meta-analysis. Journal of Evolutionary Biology 21:1–17.

Leisler, B., and H. Winkler. 1985. Ecomorphology. Pages 155–186 *in* Current Ornithology, vol. 2 (R. F. Johnston, Ed.). Plenum Press, New York.

Lemon, W. C., and R. H. Barth, Jr. 1992. The effects of feeding rate on reproductive success in the Zebra Finch, *Taeniopygia guttata*. Animal Behaviour 44:851–857.

Lentino, M., E. Bonaccorso, M. A. García, C. Portas, E. A. Fernández, and R. Rivero. 2003. Longevity records of wild birds in the Henri Pittier National Park, Venezuela. Ornitología Neotropical 14:545–548.

Lewis, P. O., and D. Zaykin. 2001. Genetic Data Analysis: Computer program for the analysis of allelic data. Version 1.0 (d16c). [Online.] Available at lewis.eeb.uconn.edu/lewishome/software.html.

Li, J. Z., D. M. Absher, H. Tang, A. M. Southwick, A. M. Casto, S. Ramachandran, H. M. Cann, G. S. Barsh, M. Feldman, L. L. Cavalli-Sforza, and R. M. Myers. 2008. Worldwide human relationships inferred from genome-wide patterns of variation. Science 319:1100–1104.

Liu, Z., and R. George. 2005. Mining weather data using fuzzy cluster analysis. Pages 105–119 *in* Fuzzy Modeling with Spatial Information for Geographic Problems (F. E. Petry, V. B. Robinson, and M. A. Cobb, Eds.). Springer, Berlin.

Lougheed, S. C., T. W. Arnold, and R. C. Bailey. 1991. Measurement error of external and skeletal variables in birds and its effect on principal components. Auk 108:432–436.

Lucchini, V., J. Höglund, S. Klaus, J. Swenson, and E. Randi. 2001. Historical biogeography and a mitochondrial DNA phylogeny of grouse and ptarmigan. Molecular Phylogenetics and Evolution 20:149–162.

MacDougall-Shackleton, S. A., R. E. Johnson, and T. P. Hahn. 2000. Gray-crowned Rosy-Finch (*Leucosticte tephrocotis*). *In* The Birds of North America, no. 559 (A. Poole and F. Gill, Eds.). Birds of North America, Philadelphia.

Mace, G. M. 2004. The role of taxonomy in species conservation. Philosophical Transactions of the Royal Society of London, Series B 359:711–719.

Madge, S., and H. Burn. 1988. Waterfowl: An Identification Guide to the Ducks, Geese, and Swans of the World. Houghton Mifflin, Boston.

Magallón, S., and M. J. Sanderson. 2001. Absolute diversification rates in angiosperm clades. Evolution 55:1762–1780.

Malhi, R. S., H. M. Mortensen, J. A. Eshleman, B. M. Kemp, J. G. Lorenz, F. A. Kaestle, J. R. Johnson, C. Gorodezky, and D. G. Smith. 2003. Native American mtDNA prehistory in the American Southwest. American Journal of Physical Anthropology 120:108–124.

Mallet, J. 1995. A species definition for the modern synthesis. Trends in Ecology and Evolution 10:294–299.

Mallet, J. 2007. Subspecies, semispecies, superspecies. Pages 1–5 *in* Encyclopedia of Biodiversity (S. A. Levin, Ed.). Elsevier, Oxford, United Kingdom.

Manel, S., M. K. Schwartz, G. Luikart, and P. Taberlet. 2003. Landscape genetics: Combining landscape ecology and population genetics. Trends in Ecology and Evolution 18:189–197.

Manly, B. F. J. 2000. Multivariate Statistical Methods: A Primer, 2nd ed. Chapman & Hall/CRC, Boca Raton, Florida.

Manni, F., and E. Guérard. 2004. Barrier version 2.2 User's Manual. Population genetics team, Musée de l'Homme, Paris.

Manni, F., E. Guérard, and E. Heyer. 2004. Geographic patterns of (genetic, morphologic, linguistic) variation: How barriers can be detected by using Monmonier's algorithm. Human Biology 76:173–190.

Mao, X., A. W. Bigham, R. Mei, G. Gutierrez, K. M Weiss, T. D. Brutsaert, F. Leon-Velarde, L. G. Moore, E. Vargas, P. M. McKeigue, and others. 2007. A genomewide admixture mapping panel for Hispanic/Latino populations. American Journal of Human Genetics 80:1171–1178.

Marantz, C. A. 1992. Evolutionary implications of vocal and morphological variation in the woodcreeper genus *Dendrocolaptes* (Aves: Dendrocolaptidae). M.S. thesis, Louisiana State University, Baton Rouge.

Marantz, C. A. 1997. Geographic variation in plumage patterns in the woodcreeper genus *Dendrocolaptes* (Dendrocolaptidae). Pages 399–429 *in* Studies in Neotropical Ornithology Honoring Ted Parker (J. V. Remsen, Jr., Ed.). Ornithological Monographs, no. 48.

Marantz, C. A., A. Aleixo, L. R. Bevier, and M. A. Patten. 2003. Family Dendrocolaptidae (Woodcreepers). Pages 358–447 *in* Handbook of the Birds of the World, vol. 8: Broadbills to Tapaculos (J. del Hoyo, A. Elliott, and D. A. Christie, Eds.). Lynx Edicions, Barcelona, Spain.

Marantz, C. A., and M. A. Patten. This volume. Quantifying subspecies analysis: A case study of morphometric variation and subspecies in the woodcreeper genus *Dendrocolaptes*. Pages 123–138 *in* Avian Subspecies (K. Winker and S. M. Haig, Eds.). Ornithological Monographs, no. 67.

Marchant, S., P. J. Higgins, S. J. J. F. Davies, J. M. Peter, W. K. Steele, and S. J. Cowling, Eds. 1990–2006. Handbook of Australian, New Zealand and Antarctic Birds, vols. 1–7. Oxford University Press, Melbourne, Australia.

Margot, J.-L. 2006. What makes a planet? [Online.] Available at www.astro.cornell.edu/~jlm/planet.html.

Marshall, J. T., Jr. 1967. Parallel variation in North and Middle American screech-owls. Monographs of the Western Foundation of Vertebrate Zoology, no. 1.

Marthinsen, G., L. Wennerberg, and J. T. Lifjeld. 2007. Phylogeography and subspecies taxonomy of Dunlins (*Calidris alpina*) in western Palearctic analysed by DNA microsatellites and amplified fragment length polymorphism markers. Biological Journal of the Linnean Society 92:713–726.

Martin, J. W., and B. A. Carlson. 1998. Sage Sparrow (*Amphispiza belli*). The Birds of North America Online (A. Poole, Ed.). Cornell Lab of Ornithology, Ithaca, New York. [Online.] Available at bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/326.

Martin, P. R., and J. J. Tewksbury. 2008. Latitudinal variation in subspecific diversification of birds. Evolution 62:2775–2788.

Maurer, B. A. 1994. Geographical Population Analysis: Tools for the Analysis of Biodiversity. Blackwell Science, Oxford, United Kingdom.

Mayr, E. 1933. Birds collected during the Whitney South Sea Expedition. XXIV. Notes on Polynesian Flycatchers and a revision of the genus *Clytorhynchus* Elliot. American Museum Novitates, no. 628.

Mayr, E. 1940. Speciation phenomena in birds. American Naturalist 74:249–278.

Mayr, E. 1942a. Birds collected during the Whitney South Sea Expedition. XLVIII. Notes on the Polynesian species of *Aplonis*. American Museum Novitates, no. 1166.

Mayr, E. 1942b. Systematics and the Origin of Species from the Viewpoint of a Zoologist. Columbia University Press, New York.

Mayr, E. 1945. Birds of the Southwest Pacific: A Field Guide to the Birds of the Area between Samoa, New Caledonia, and Micronesia. Macmillan, New York.

Mayr, E. 1951. Speciation in birds: Progress report on the years 1938–1950. Pages 91–131 *in* Proceedings of the Xth International Ornithological Congress (S. Hörstadius, Ed.). Almquist & Wiksell, Uppsala, Sweden.

Mayr, E. 1956. Geographical character gradients and climatic adaptation. Evolution 10:105–108.

Mayr, E. 1963. Animal Species and Evolution. Belknap Press of Harvard University Press, Cambridge, Massachusetts.

Mayr, E. 1969. Principles of Systematic Zoology. McGraw-Hill, New York.

Mayr, E. 1982a. Of what use are subspecies? Auk 99:593–595.

Mayr, E. 1982b. The Growth of Biological Thought: Diversity, Evolution, and Inheritance. Belknap Press of Harvard University Press, Cambridge, Massachusetts.

Mayr, E. 1983. How to carry out the adaptationist program? American Naturalist 121:324–334.

Mayr, E. 1993. Fifty years of research on species and speciation. Proceedings of the California Academy of Sciences 48:131–140.

Mayr, E. 1996. What is a species, and what is not? Philosophy of Science 63:262–277.

Mayr, E. 2000a. A critique from the biological species concept perspective: What is a Species, and What is Not? Pages 93–100 *in* Species Concepts and Phylogenetic Theory: A Debate (Q. D. Wheeler and R. Meier, Eds.). Columbia University Press, New York.

Mayr, E. 2000b. The biological species concept. Pages 17–29 *in* Species Concepts and Phylogenetic Theory: A Debate (Q. D. Wheeler and R. Meier, Eds.). Columbia University Press, New York.

Mayr, E., and P. D. Ashlock. 1991. Principles of Systematic Zoology, 2nd ed. McGraw-Hill, New York.

Mayr, E., and J. Diamond. 2001. The Birds of Northern Melanesia: Speciation, Ecology, and Biogeography. Oxford University Press, Oxford, United Kingdom.

Mayr, E., E. G. Linsley, and R. L. Usinger. 1953. Methods and Principles of Systematic Zoology. McGraw-Hill, New York.

Mayr, E., and M. Moynihan. 1946. Birds collected during the Whitney South Sea Expedition. 56. Evolution in the *Rhipidura rufifrons* group. American Museum Novitates, no. 1321.

Mayr, E., and L. L. Short. 1970. Species taxa of North American birds: A contribution to comparative systematics. Publications of the Nuttall Ornithological Club, no. 9.

McCracken, K. G., C. P. Barger, M. Bulgarella, K. P. Johnson, M. K. Kuhner, A. V. Moore, J. L. Peters, J. Trucco, T. H. Valqui, K. Winker, and R. E. Wilson. 2009a. Signatures of high-altitude adaptation in the major hemoglobin of five species of Andean dabbling ducks. American Naturalist 174:631–650.

McCracken, K. G., C. P. Barger, M. Bulgarella, K. P. Johnson, S. A. Sonsthagen, J. Trucco, T. H. Valqui, R. E. Wilson, K. Winker, and M. D. Sorenson. 2009b. Parallel evolution in the major hemoglobin genes of eight Andean waterfowl. Molecular Ecology 18:3992–4005.

McGraw, K. J. 2006a. Mechanics of carotenoid-based coloration. Pages 177–242 *in* Bird Coloration, vol. l: Mechanisms and Measurements (G. E. Hill and K. J. McGraw, Eds.). Harvard University Press, Cambridge, Massachusetts.

McGraw, K. J. 2006b. Mechanics of melanin-based coloration. Pp. 243–294 *in* Bird Coloration, vol. 1: Mechanisms and Measurements (G. E. Hill and K. J. McGraw, Eds.). Harvard University Press, Cambridge, Massachusetts.

McGraw, K. J., E. A. Mackillop, J. Dale, and M. E. Hauber. 2002. Different colors reveal different information: How nutritional stress affects the expression of melanin- and structurally based ornamental plumage. Journal of Experimental Biology 205:3747–3755.

McKay, B. D. 2008. Phenotypic variation is clinal in the Yellow-throated Warbler. Condor 110:569–574.

McKitrick, M. C., and R. M. Zink. 1988. Species concepts in ornithology. Condor 90:1–14.

McNab, B. K. 1971. On the ecological significance of Bergmann's rule. Ecology 52:845–854.

McPeek, M. A. 2008. The ecological dynamics of clade diversification and community assembly. American Naturalist 172:E270–E284.

Meiri, S., and T. Dayan. 2003. On the validity of Bergmann's rule. Journal of Biogeography 30:331–351.

Mennill, D. J. 2001. Song characteristics and singing behavior of the Mangrove Warbler (*Dendroica petechia bryanti*). Journal of Field Ornithology 72:327–337.

Merilä, J., and J. D. Fry. 1998. Genetic variation and causes of genotype–environment interaction in the body size of Blue Tit (*Parus caeruleus*). Genetics 148:1233–1244.

Meyer, A. 1993. Phylogenetic relationships and evolutionary processes in East African cichlid fishes. Trends in Ecology and Evolution 8:279–284.

Meyer de Schauensee, R. M. 1970. A Guide to the Birds of South America. Livingston, Wynnewood, Pennsylvania.

Milá, B., T. B. Smith, and R. K. Wayne. 2007. Speciation and rapid phenotypic differentiation in the Yellow-rumped Warbler *Dendroica coronata* complex. Molecular Ecology 16:159–173.

Miller, A. H. 1955. Concepts and problems of avian systematics in relation to the evolutionary processes. Pages 1–22 *in* Recent Studies in Avian Biology (A. Wolfson, Ed.). University of Illinois Press, Urbana.

Miller, M. J., E. Bermingham, J. Klicka, P. Escalante, F. S. Raposo do Amaral, J. T. Weir, and K. Winker. 2008. Out of Amazonia again and again: Episodic crossing of the Andes promotes diversification in a lowland forest flycatcher. Proceedings of the Royal Society of London, Series B 275:1133–1142.

Miller, M. J., E. Bermingham, and R. E. Ricklefs. 2007. Historical biogeography of the New World solitaires (*Myadestes* spp.). Auk 124:868–885.

Millien, V., S. K. Lyons, L. Olson, F. A. Smith, A. B. Wilson, and Y. Yom-Tov. 2006. Ecotypic variation in the context of global climate change: Revisiting the rules. Ecology Letters 9:853–869.

Minch, E., A. Ruiz-Linares, D. B. Goldstein, M. W. Feldman, and L. L. Cavalli-Sforza. 1995. MICROSAT software. Stanford University Press, Stanford, California.

Mitchell-Olds, T., J. H. Willis, and D. B. Goldstein. 2007. Which evolutionary processes influence natural genetic variation for phenotypic traits? Nature Reviews Genetics 8:845–856.

Mock, K. E., T. C. Theimer, O. E. Rhodes, Jr., D. L. Greenberg, and P. Keim. 2002. Genetic variation across the historical range of the Wild Turkey (*Meleagris gallopavo*). Molecular Ecology 11:643–657.

Møller, A. P., and J. J. Cuervo. 1998. Speciation and feather ornamentation in birds. Evolution 52:859–869.

Monge, C., and F. León-Velarde. 1991. Physiological adaptation to high altitude: Oxygen transport in mammals and birds. Physiological Reviews 71:1135–1172.

Monmonier, M. 1973. Maximum-difference barriers: An alternative numerical regionalization method. Geographical Analysis 3:245–261.

Morales-Pérez, J. E., M. A. A. González-Ortega, and P. G. Domínguez. 2000. Records of the Black-banded Woodcreeper *Dendrocolaptes picumnus* in Chiapas, Mexico. Bulletin of the British Ornithologists' Club 120:133–136.

Moritz, C. 1994. Applications of mitochondrial DNA analysis in conservation: A critical review. Molecular Ecology 3:401–411.

Moritz, C. 1999. Conservation units and translocations: Strategies for conserving evolutionary processes. Hereditas 130:217–228.

Moritz, C. 2002. Strategies to protect biological diversity and the evolutionary processes that sustain it. Systematic Biology 51:238–254.

Moritz, C., and C. Cicero. 2004. DNA barcoding: Promise and pitfalls. PLoS Biology 2:1529–1531.

Morjan, C. L., and L. H. Rieseberg. 2004. How species evolve collectively: Implications of gene flow and selection for the spread of advantageous alleles. Molecular Ecology 13:1341–1356.

Moyle, R. G., C. E. Filardi, C. E. Smith, and J. Diamond. 2009. Explosive Pleistocene diversification and hemispheric expansion of a "great speciator." Proceedings of the National Academy of Sciences USA 106:1863–1868.

Mumme, R. L. 2002. Scare tactics in a Neotropical warbler: White tail feathers enhance flush-pursuit foraging performance in the Slate-throated Redstart (*Myioborus miniatus*). Auk 119:1024–1035.

Mumme, R. L., M. L. Galatowitsch, P. G. Jabłoński, T. M. Stawarczyk, and J. P. Cygan. 2006. Evolutionary significance of geographic variation in a plumage-based foraging adaptation: An experimental test in the Slate-throated Redstart (*Myioborus miniatus*). Evolution 60:1086–1097.

Myers, N., R. A. Mittermeier, C. G. Mittermeier, G. A. B. da Fonseca, and J. Kent. 2000. Biodiversity hotspots for conservation priorities. Nature 403:853–858.

Nagel, L., and D. Schluter. 1998. Body size, natural selection, and speciation in sticklebacks. Evolution 52:209–218.

National Marine Fisheries Service. 1991. Pacific Salmon, *Oncorhynchus* spp., and the definition of "species" under the Endangered Species Act. Federal Register: 56:10542.

Navarro-Sigüenza, A. G., and A. T. Peterson 2004. An alternative species taxonomy of Mexican birds. Biota Neotropica 4(2). [Online.] Available at www.biotaneotropica.org.br/v4n2/pt/.

Navarro-Sigüenza, A. G., A. T. Peterson, A. Nyari, G. M. García-Deras, and J. García-Moreno. 2008. Phylogeography of the *Buarremon* brush-finch complex (Aves, Emberizidae) in Mesoamerica. Molecular Phylogenetics and Evolution 47:21–35.

Nee, S., E. C. Holmes, R. M. May, and P. H. Harvey. 1994. Extinction rates can be estimated from molecular phylogenies. Philosophical Transactions of the Royal Society of London, Series B 344:77–82.

Negro, J. J., G. R. Bortolotti, J. L. Tella, K. J. Fernie, and D. M. Bird. 1998. Regulation of integumentary colour and plasma carotenoids in American Kestrels consistent with sexual selection theory. Functional Ecology 12:307–312.

Nei, M. 1987. Molecular Evolutionary Genetics. Columbia University Press, New York.

Neigel, J. E., and J. C. Avise. 1986. Phylogenetic relationships of mitochondrial DNA under various demographic models of speciation. Pages 515–534 *in* Evolutionary Processes and Theory (S. Karlin and E. Nevo, Eds.). Academic Press, New York.

Nelson, M. P., J. A. Vucetich, and M. K. Phillips. 2007. Normativity and the meaning of *endangered*: Response to Waples et al. 2007. Conservation Biology 21:1646–1648.

Newton, A., Ed. 1862. A List of the Birds of Europe: By Professor J. H. Blasius. Reprinted from the German, with the author's corrections. Matchett and Stevenson, Norwich, England.

Newton, I. 2003. Speciation and Biogeography of Birds. Academic Press, London.

Nicholls, J. A., J. J. Austin, C. Mortiz, and A. W. Goldizen. 2006. Genetic population structure and call variation in a passerine bird, the Satin Bowerbird, *Ptilonorhynchus violaceus*. Evolution 60:1279–1290.

Nixon, K. C., and Q. D. Wheeler. 1990. An amplification of the phylogenetic species concept. Cladistics 6:211–223.

Nosil, P. 2008. Speciation with gene flow could be common. Molecular Ecology 17:2103–2106.

Oberholser, H. C. 1906. A description of a new *Querquedula*. Proceedings of the Biological Society of Washington 19:93–94.

O'Brien, S. J., and E. Mayr. 1991. Bureaucratic mischief: Recognizing endangered species and subspecies. Science 251:1187–1188.

Office of the Solicitor. 2007. The meaning of "in danger of extinction throughout all or a significant portion of its range." Memorandum M-37013 from the Solicitor to the Director of the U.S. Fish and Wildlife Service (16 March). U.S. Department of the Interior, Office of the Solicitor, Washington, D.C. [Online.] Available at www.doi.gov/solicitor/M37013.pdf.

Ohta, T. 2002. Near-neutrality in evolution of genes and gene regulation. Proceedings of the National Academy of Sciences USA 99:16134–16137.

Olesen, J. M., J. Bascompte, Y. L. Dupont, and P. Jordano. 2007. The modularity of pollination networks. Proceedings of the National Academy of Sciences USA 104:19891–19896.

Olmstead, R. G. 1995. Species concepts and plesiomorphic species. Systematic Botany 20:623–630.

Olson, S. L., and H. F. James. 1982. Prodromus of the fossil avifauna of the Hawaiian Islands. Smithsonian Contributions to Zoology 365:1–59.

Olson, S. L., and H. F. James. 1991. Descriptions of thirty-two new species of birds from the Hawaiian Islands: Part I. Non-Passeriformes (S. L. Olson and H. F. James, Eds.). Ornithological Monographs, no. 45.

Olson, S. L., and H. F. James. 1995. Nomenclature of the Hawaiian Akialoas and Nukupuus (Aves: Drepanidini). Proceedings of the Biological Society of Washington 108:373–387.

Orme, C. D. L., R. G. Davies, M. Burgess, F. Eigenbrod, N. Pickup, V. A. Olson, A. J. Webster, T.-S. Ding, P. C. Rasmussen, R. S. Ridgely, and others. 2005. Global hotspots of species richness are not congruent with endemism or threat. Nature 436:1016–1019.

Orme, C. D. L., R. G. Davies, V. A. Olson, G. H. Thomas, T.-S. Ding, P. C. Rasmussen, R. S. Ridgely, A. J. Stattersfield, P. M. Bennett, I. P. F. Owens, and others. 2006. Global patterns of geographic range size in birds. PLoS Biology 4:1276–1283.

Oyler-McCance, S. J., N. W. Kahn, K. P. Burnham, C. E. Braun, and T. W. Quinn. 1999. A population genetic comparison of large- and small-bodied sage grouse in Colorado using microsatellite and mitochondrial DNA markers. Molecular Ecology 8:1457–1465.

Oyler-McCance, S. J., F. A. Ranlser, L. K. Berkman, and T. W. Quinn. 2007. A rangewide population genetic study of Trumpeter Swans. Conservation Genetics 8:1339–1353.

Oyler-McCance, S. J., J. St. John, and T. W. Quinn. This volume. Rapid evolution in lekking grouse: Implications for taxonomic definitions. Pages 114–122 *in* Avian Subspecies (K. Winker and S. M. Haig, Eds.). Ornithological Monographs, no. 67.

Päckert, M., C. Dietzen, J. Martens, M. Wink, and L. Kvist. 2006. Radiation of Atlantic goldcrests *Regulus regulus* spp.: Evidence of a new taxon from the Canary Islands. Journal of Avian Biology 37:364–380.

Padial, J. M., and I. De la Riva. 2006. Taxonomic inflation and the stability of species lists: The perils of the Ostrich's behavior. Systematic Biology 55: 859–867.

Paetkau, D., R. Slade, M. Burden, and A. Estoup. 2004. Genetic assignment methods for the direct, real-time estimation of migration rate: A simulation-based exploration of accuracy and power. Molecular Ecology 13:55–65.

Page, R. D. M. 1996. TREEVIEW: An application to display phylogenetic trees on personal computers. Computer Applications in the Biosciences 12:357–358.

Pamilo, P., and M. Nei. 1988. Relationships between gene trees and species trees. Molecular Biology and Evolution 5:568–583.

Panhuis, T. M., R. Butlin, M. Zuk, and T. Tregenza. 2001. Sexual selection and speciation. Trends in Ecology and Evolution 16:364–371.

Paradis, E. 2004. Can extinction rates be estimated without fossils? Journal of Theoretical Biology 229:19–30.

Parchman, T. L., and C. W. Benkman. 2002. Diversifying coevolution between crossbills and black spruce on Newfoundland. Evolution 56:1663–1672.

Parkes, K. C. 1982. Subspecific taxonomy: Unfashionable does not mean irrelevant. Auk 99:596–598.

Parzudaki, É. 1856. Catalogue de Oiseaux d'Europe offerts, en 1856, aux Ornithologistes. Régidé d'aprés les dernières classifications de le Prince Bonaparte. Paris.

Patten, M. A. 2009. 'Subspecies' and 'race' should not be used as synonyms. Nature 457:147.

Patten, M. A. This volume. Null expectations in subspecies diagnosis. Pages 35–41 *in* Avian Subspecies (K. Winker and S. M. Haig, Eds.). Ornithological Monographs, no. 67.

Patten, M. A., G. McCaskie, and P. Unitt. 2003. Birds of the Salton Sea: Status, Biogeography, and Ecology. University of California Press, Berkeley.

Patten, M. A., and C. L. Pruett. 2009. The Song Sparrow, *Melospiza melodia*, as a ring species: Patterns of geographic variation, a revision of subspecies, and implications for speciation. Systematics and Biodiversity 7:33–62.

Patten, M. A., J. T. Rotenberry, and M. Zuk. 2004. Habitat selection, acoustic adaptation, and the evolution of reproductive isolation. Evolution 58:2144–2155.

Patten, M. A., and B. D. Smith-Patten. 2008. Biogeographical boundaries and Monmonier's algorithm: A case study in the northern Neotropics. Journal of Biogeography 35:407–416.

Patten, M. A., and P. Unitt. 2002. Diagnosability versus mean differences of Sage Sparrow subspecies. Auk 119:26–35.

Pavlova, A., R. M. Zink, S. V. Drovetski, Y. Red'kin, and S. Rohwer. 2003. Phylogeographic patterns in *Motacilla flava* and *Motacilla citreola*: Species limits and population history. Auk 120:744–758.

Paxinos, E. E., H. F. James, S. L. Olson, M. D. Sorenson, J. Jackson, and R. C. Fleischer. 2002. MtDNA from fossils reveals a radiation of Hawaiian geese recently derived from the Canada Goose. Proceedings of the National Academy of Sciences USA 99:1399–1404.

Paynter, R. J., Jr., Ed. 1968. Check-list of Birds of the World, vol. 14. Museum of Comparative Zoology, Cambridge, Massachusetts.

Pearson, D. L., and M. A. Plenge. 1974. Puna bird species on the coast of Peru. Auk 91:626–631.

Pennock, D. S., and W. W. Dimmick. 1997. Critique of the evolutionarily significant unit as a definition for "distinct population segment" under the U.S. Endangered Species Act. Conservation Biology 11:611–619.

Pérez-Emán, J. L. 2005. Molecular phylogenetics and biogeography of the Neotropical redstarts (*Myioborus*; Aves, Parulinae). Molecular Phylogenetics and Evolution 37:511–528.

Peters, J. L., et al. 1934–1987. Check-list of the Birds of the World, vols. I–XVI. Museum of Comparative Zoology, Cambridge, Massachusetts.

Peterson, A. T. 2006. Taxonomy is important in conservation: A preliminary reassessment of Philippine species-level bird taxonomy. Bird Conservation International 16:155–173.

Peterson, A. T., and R. G. Moyle. 2008. An appraisal of recent taxonomic reappraisals based on character scoring systems. Forktail 24:110–112.

Peterson, A. T., and A. G. Navarro-Sigüenza. 1999. Alternate species concepts as bases for determining priority conservation areas. Conservation Biology 13:427–431.

Peterson, A. T., A. G. Navarro-Sigüenza, and K. P. Johnson. 2006. Consistency of taxonomic treatments: A response to Remsen (2005). Auk 123:885–887.

Petit, R. J., and L. Excoffier. 2009. Gene flow and species delimitation. Trends in Ecology and Evolution 24:386–393.

Phillimore, A. B., C. D. L. Orme, R. G. Davies, J. D. Hadfield, W. J. Reed, K. J. Gaston, R. P. Freckleton, and I. P. F. Owens. 2007. Biogeographical basis of recent phenotypic divergence among birds: A global study of subspecies richness. Evolution 61:942–957.

Phillimore, A. B., and I. P. F. Owens. 2006. Are subspecies useful in evolutionary and conservation biology? Proceedings of the Royal Society of London, Series B 273:1049–1053.

Phillimore, A. B., I. P. F. Owens, R. A. Black, J. Chittock, T. Burke, and S. M. Clegg. 2008. Complex patterns of genetic and phenotypic divergence in an island bird and the consequences for delimiting conservation units. Molecular Ecology 17:2839–2853.

Phillimore, A. B., and T. D. Price. 2008. Density-dependent cladogenesis in birds. PLoS Biology 6:e71.

Phillimore, A. B., and T. D. Price. 2009. Ecological influences on the temporal pattern of speciation. Pages 240–256 *in* Speciation and Patterns of Diversity (R. Butlin, J. Bridle, and D. Schluter, Eds.). Cambridge University Press, Cambridge, United Kingdom.

Phillips, J. C. 1923. A Natural History of the Ducks, vol. 2. Houghton Mifflin, Boston.

Pielou, E. C. 1991. After the Ice Age: The Return of Life to Glaciated North America. University of Chicago Press, Chicago, Illinois.

Piry, S., A. Alapetite, J.-M. Cornuet, D. Paetkau, L. Baudouin, and A. Estoup. 2004. GENECLASS2: A software for genetic assignment and first-generation migrant detection. Journal of Heredity 95:536–539.

Pollard, D. A., V. N. Iyer, A. M. Moses, and M. B. Eisen. 2006. Widespread discordance of gene trees with species tree in *Drosophila*: Evidence for incomplete lineage sorting. PLoS Genetics 2: 1634–1647.

Poole, A., and F. Gill, Eds. 1992–2002. The Birds of North America. Academy of Natural Sciences, Philadelphia, and American Ornithologists' Union, Washington, D.C.

Posada, D., and K. A. Crandall. 1998. MODELTEST: Testing the model of DNA substitution. Bioinformatics 14:817–818.

Postma, E., and A. J. van Noordwijk. 2005. Gene flow maintains a large genetic difference in clutch size at a small spatial scale. Nature 433:65–68.

Power, D. M. 1969. Evolutionary implications of wing and size variation in the Red-winged Blackbird in relation to geographic and climatic factors: A multiple regression analysis. Systematic Zoology 18:363–373.

Pratt, H. D. 1980. Intra-island variation in the 'Elepaio on the Island of Hawaii. Condor 82:449–458.

Pratt, H. D. 1982. Relationships and speciation of the Hawaiian thrushes. Living Bird 19:73–90.

Pratt, H. D. 1989. Species limits in Akepas (Drepanidinae: *Loxops*). Condor 91:933–940.

Pratt, H. D. 1990. Bird the world's islands now. Birding 22:10–15.

Pratt, H. D. 1992. Systematics of the Hawaiian "creepers" *Oreomystis* and *Paroreomyza*. Condor 94:836–846.

Pratt, H. D. 2005. The Hawaiian Honeycreepers: Drepanidinae. Oxford University Press, Oxford, United Kingdom.

Pratt, H. D. 2006. Old World Flycatchers to Old World Warblers [Plate 14]. *In* Handbook of Birds of the World, vol. 11 (J. del Hoyo, A. Elliott, and D. A. Christie, Eds.). Lynx Edicions, Barcelona, Spain.

Pratt, H. D. 2008. Penduline-tits to Shrikes [Plates 31–35]. *In* Handbook of Birds of the World, vol. 13 (J. del Hoyo, A. Elliott, and D. A. Christie, Eds.). Lynx Edicions, Barcelona, Spain.

Pratt, H. D. This volume. Revisiting species and subspecies of island birds for a better assessment of biodiversity. Pages 79–89 *in* Avian Subspecies (K. Winker and S. M. Haig, Eds.). Ornithological Monographs, no. 67.

Pratt, H. D., P. L. Bruner, and D. G. Berrett. 1979. America's unknown avifauna: The birds of the Mariana Islands. American Birds 33:227–235.

Pratt, H. D., P. L. Bruner, and D. G. Berrett. 1987. A Field Guide to the Birds of Hawaii and the Tropical Pacific. Princeton University Press, Princeton, New Jersey.

Pratt, H. D., and T. K. Pratt. 2001. The interplay of species concepts, taxonomy, and conservation: Lessons from the Hawaiian avifauna. Pages 68–80 *in* Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna (J. M. Scott, S. Conant, and C. Van Riper III, Eds.). Studies in Avian Biology, no. 22.

Price, T. 2008. Speciation in Birds. Roberts, Greenwood, Colorado.

Price, T. D., and M. M. Bouvier. 2002. The evolution of F_1 postzygotic incompatibilities in birds. Evolution 56:2083–2089.

Price, T. D., A. Qvarnström, and D. E. Irwin. 2003. The role of phenotypic plasticity in driving genetic evolution. Proceedings of the Royal Society of London, Series B 270:1433–1440.

Pritchard, J. K., M. Stephens, and P. Donnelly. 2000. Inference of population structure using multilocus genotype data. Genetics 155:945–959.

Pruett, C. L. 2002. Phylogeography and population genetic structure of Beringian landbirds. Ph.D. dissertation, University of Alaska, Fairbanks.

Pruett, C. L., P. Arcese, Y. Chan, A. Wilson, M. A. Patten, L. F. Keller, and K. Winker. 2008a. Concordant and discordant signals between genetic data and described subspecies of Pacific coast Song Sparrows. Condor 110:359–364.

Pruett, C. L., P. Arcese, Y. Chan, A. Wilson, M. A. Patten, L. F. Keller, and K. Winker. 2008b. The effects of contemporary processes in maintaining the genetic structure of western Song Sparrows (*Melospiza melodia*). Heredity 101:67–74.

Pruett, C. L., D. D. Gibson, and K. Winker. 2004. Amak Island Song Sparrows (*Melospiza melodia amaka*) are not evolutionarily significant. Ornithological Science 3:133–138.

Pruett, C. L., and K. Winker. 2005. Northwestern song sparrow populations show genetic effects of sequential colonization. Molecular Ecology 14:1421–1434.

Pruett, C. L., and K. Winker. This volume. Alaska Song Sparrows (*Melospiza melodia*) demonstrate that genetic marker and method of analysis matter in subspecies assessments. Pages 160–169 *in* Avian Subspecies (K. Winker and S. M. Haig, Eds.). Ornithological Monographs, no. 67.

Prum, R. O. 1997. Phylogenetic tests of alternative intersexual selection mechanisms: Trait macroevolution in a polygynous clade (Aves: Pipridae). American Naturalist 149:668–692.

Prum, R. O. 2006. Anatomy, physics, and evolution of structural colors. Pages 245–353 *in* Bird Coloration, vol. 1: Mechanisms and Measurements (G. E. Hill and K. J. McGraw, Eds.). Harvard University Press, Cambridge, Massachusetts.

Pryke, S. R., and S. C. Griffith. 2009. Postzygotic genetic incompatibility between sympatric color morphs. Evolution 63:793–798.

Pyle, P., and J. Engbring. 1985. Checklist of the birds of Micronesia. 'Elepaio 46:57–68.

Quinn, T. W. 1992. The genetic legacy of Mother Goose—Phylogeographic patterns of Lesser Snow Goose *Chen caerulescens caerulescens* maternal lineages. Molecular Ecology 1:105–117.

Quinn, T. W., and A. C. Wilson. 1993. Sequence evolution in and around the mitochondrial control region in birds. Journal of Molecular Evolution 37: 417–425.

Rabosky, D. L. 2009a. Ecological limits and diversification rate: Alternative paradigms to explain the variation in species richness among clades and regions. Ecology Letters 12:735–743.

Rabosky, D. L. 2009b. Ecological limits on clade diversification in higher taxa. American Naturalist 173:662–674.

Rabosky, D. L. 2010. Extinction rates should not be estimated from molecular phylogenies. Evolution 64: in press.

Rabosky, D. L., and I. J. Lovette. 2008. Density-dependent diversification in North American Wood Warblers. Proceedings of the Royal Society of London, Series B 275:2363–2371.

Raikow, R. J. 1994. A phylogeny of the woodcreepers (Dendrocolaptinae). Auk 111:104–114.

Ramey, R. R., II, H.-P. Liu, C. W. Epps, L. M. Carpenter, and J. D. Wehausen. 2005. Genetic relatedness of the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) to nearby subspecies of *Z. hudsonius* as inferred from variation in cranial morphology, mitochondrial DNA and microsatellite DNA: Implications for taxonomy and conservation. Animal Conservation 8:329–346.

Ramos-Onsins, S. E., and J. Rozas. 2002. Statistical properties of new neutrality tests against population growth. Molecular Biology and Evolution 19:2092–2100.

Rand, A. L., and M. A. Traylor. 1950. The amount of overlap allowable for subspecies. Auk 67:169–183.

Rand, D. M. 1996. Neutrality tests of molecular markers and the connection between DNA polymorphism, demography, and conservation biology. Conservation Biology 10:665–671.

Rapoport, E. H. 1982. Areography: Geographical Strategies of Species. Pergamon Press, Oxford, United Kingdom.

Rea, A. M., and K. L. Weaver. 1990. The taxonomy, distribution, and status of Coastal California Cactus Wrens. Western Birds 21:81–126.

R Development Core Team. 2008. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna. [Online.] Available at www.R-project.org.

Reddy, S. 2008. Systematics and biogeography of the shrike-babblers (*Pteruthius*): Species limits, molecular phylogenetics, and diversification patterns across southern Asia. Molecular Phylogenetics and Evolution 47:54–72.

Reding, D. M., J. T. Foster, H. F. James, H. D. Pratt, and R. C. Fleischer. 2008. Convergent evolution of "creepers" in the Hawaiian honeycreeper radiation. Biology Letters 5:221–224.

Remsen, J. V., Jr. 1984. High incidence of "leapfrog" pattern of geographic variation in Andean birds: Implications for the speciation process. Science 224:171–173.

Remsen, J. V., Jr. 2005. Pattern, process, and rigor meet classification. Auk 122:403–413.

Remsen, J. V., Jr. This volume. Subspecies as a meaningful taxonomic rank in avian classification. Pages 62–78 *in* Avian Subspecies (K. Winker and S. M. Haig, Eds.). Ornithological Monographs, no. 67.

Remsen, J. V., Jr., C. D. Cadena, A. Jaramillo, M. Nores, J. F. Pacheco, M. B. Robbins, T. S. Schulenberg, F. G. Stiles, D. F. Stotz, and K. J. Zimmer. 2009. A classification of the bird species of South America. [Online.] American Ornithologists' Union, Washington, D.C. Available at www.museum.lsu.edu/~Remsen/SACCBaseline.html.

Remsen, J. V., Jr., and S. K. Robinson. 1990. A classification scheme for foraging behavior of birds in terrestrial habitats. Pages 144–160 *in* Avian Foraging: Theory, Methodology, and Applications (M. L. Morrison, C. J. Ralph, J. Verner, and J. R. Jehl, Jr., Eds.). Studies in Avian Biology, no. 13.

Rensch, B. 1960. Evolution above the Species Level. Columbia University Press, New York.

Reznick, D., D. H. Rodd, and L. Nunney. 2004. Empirical evidence for rapid evolution. Pages 244–264 *in* Evolutionary Conservation Biology (R. Ferrière, U. Dieckmann, and D. Couvet, Eds.). Cambridge University Press, Cambridge, United Kingdom.

Rheindt, F. E., and R. O. Hutchinson. 2007. A photoshot odyssey through the confused avian taxonomy of Seram and Buru (southern Moluccas). BirdingASIA 7:18–38.

Rice, W. R., and E. E. Hostert. 1993. Laboratory experiments on speciation: What have we learned in 40 years? Evolution 47:1637–1653.

Ricklefs, R. E. 2006. Global variation in the diversification rate of passerine birds. Ecology 87:2468–2478.

Ricklefs, R. E. 2007. Estimating diversification rates from phylogenetic information. Trends in Ecology and Evolution 22:601–610.

Ricklefs, R. E. 2009. Speciation, extinction and diversity. Pages 257–277 *in* Speciation and Patterns of Diversity (R. Butlin, J. Bridle, and D. Schluter, Eds.). Cambridge University Press, Cambridge, United Kingdom.

Ride, W. D. L. 1999. International Code of Zoological Nomenclature, 4th ed. International Trust for Zoological Nomenclature, London.

Ridgely, R. S., T. F. Allnutt, T. Brooks, D. K. McNicol, D. W. Mehlman, B. E. Young, and J. R. Zook. 2003.

Digital distribution maps of the birds of the Western Hemisphere, version 1.0. NatureServe, Arlington, Virginia.

Ridgely, R. S., and G. Tudor. 1994. The Birds of South America, vol. 2: The Suboscine Passerines. University of Texas Press, Austin.

Ridgway, R. 1881. Nomenclature of North American birds, chiefly contained in the U.S. National Museum. Bulletin of the U.S. National Museum 21:3–94.

Ridgway, R. 1901. The birds of North and Middle America: Family Fringillidae. Bulletin of the U.S. National Museum, no. 50, part 1.

Ridgway, R. 1902. The birds of North and Middle America. Bulletin of the U.S. National Museum, no. 50, part 2.

Ridgway, R., and H. Friedmann. 1901–1950. The Birds of North and Middle America: A descriptive catalogue of the higher groups, genera, species, and subspecies of birds known to occur in North America, from the Arctic lands to the Isthmus of Panama, the West Indies and other islands of the Caribbean Sea, and the Galapagos Archipelago. Government Printing Office, Washington, D.C.

Ridley, M. 2004. Evolution, 3rd ed. Blackwell, Malden, Massachusetts.

Riesing, M. J., L. Kruckenhauser, A. Gamauf, and E. Haring. 2003. Molecular phylogeny of the genus *Buteo* (Aves: Accipitridae) based on mitochondrial marker sequence. Molecular Phylogenetics and Evolution 27:328–342.

Rind, F. C., and P. J. Simmons. 1992. Orthopteran DCMD neuron: A reevaluation of responses to moving objects. I. Selective responses to approaching objects. Journal of Neurophysiology 68:1654–1666.

Rising, J. D. 1996. A Guide to the Identification and Natural History of the Sparrows of the United States and Canada. Academic Press, San Diego.

Rising, J. D. 2007. Named subspecies and their significance in contemporary ornithology. Pages 45–54 *in* Festschrift for Ned K. Johnson: Geographic Variation and Evolution in Birds (C. Cicero and J. V. Remsen, Jr., Eds.). Ornithological Monographs, no. 63.

Rising, J. D., D. A. Jackson, and H. B. Fokidis. 2001. Geographic variation in size and shape of Savannah Sparrows. Wilson Journal of Ornithology 121:253–264.

Rising, J. D., D. A. Jackson, and H. B. Fokidis. 2009. Geographic variation in plumage pattern and coloration of Savannah Sparrows. Wilson Journal of Ornithology 121:253–264.

Rising, J. D., and K. M. Somers. 1989. The measurement of overall body size in birds. Auk 106:666–674.

Roberts, D. W. 2008. Statistical analysis of multidimensional fuzzy set ordinations. Ecology 89:1246–1260.

Rogers, A. R. 1995. Genetic evidence for a Pleistocene population explosion. Evolution 49:608–615.

Rogers, A. R., and H. Harpending. 1992. Population growth makes waves in the distribution of pairwise genetic differences. Molecular Biology and Evolution 9:552–569.

Rogers, J. S. 1972. Measures of genetic similarity and genetic distance. University of Texas Studies in Genetics 7:145–153.

Rohwer, S., L. K. Butler, and D. R. Froehlich. 2005. Ecology and demography of East–West differences in molt-scheduling of Neotropical migrant passerines. Pages 87–105 *in* Birds of Two Worlds: The Ecology and Evolution of Migration (R. Greenberg and P. P. Marra, Eds.). Johns Hopkins University Press, Baltimore, Maryland.

Rohwer, S., and P. W. Ewald. 1981. The cost of dominance and advantage of subordination in a badge signaling system. Evolution 35:441–454.

Rohwer, V. G., S. Rohwer, and J. H. Barry. 2008. Molt scheduling of western Neotropical migrants and up-slope movement of Cassin's Vireo. Condor 110:365–370.

Ronquist, F., and J. P. Huelsenbeck. 2003. MRBAYES 3: Bayesian phylogenetic inference under mixed models. Bioinformatics 19:1572–1574.

Ronquist, F., J. P. Huelsenbeck, and P. V. D. Mark. 2005. MRBAYES 3.1 Manual. School of Computational Science, Florida State University, and Division of Biological Sciences, University of California at San Diego.

Rosenberg, N. A. 2002. The probability of topological concordance of gene trees and species trees. Theoretical Population Biology 61:225–247.

Rosenberg, N. A. 2007. Statistical tests for taxonomic distinctiveness from observations of monophyly. Evolution 61:317–323.

Rosenberg, N. A., and R. Tao. 2008. Discordance of species trees with their most likely gene trees: The case of five taxa. Systematic Biology 57:131–140.

Rosenzweig, M. L. 1978. Geographical speciation: On range size and the probability of isolate formation. Pages 172–194 *in* Proceedings of the Washington State University Conference on Biomathematics and Biostatistics (D. Wollkind, Ed.). Washington State University, Pullman.

Rothschild, M. 1983. Dear Lord Rothschild: Birds, Butterflies and History. Balaban Publishers, Glenside, Pennsylvania.

Rozas, J., J. C. Sánchez-DelBarrio, X. Messeguer, and R. Rozas. 2003. DnaSP, DNA polymorphism analyses by the coalescent and other methods. Bioinformatics 19:2496–2497.

Rubin, D. B. 1987. Multiple Imputation for Nonresponse in Surveys. Wiley, New York.

Ruegg, K. 2007. Divergence between subspecies groups of Swainson's Thrush (*Catharus ustulatus ustulatus* and *C. u. swainsoni*). Pages 67–77 *in* Festschrift for Ned K. Johnson: Geographic Variation and Evolution in Birds (C. Cicero and J. V. Remsen, Jr., Eds.). Ornithological Monographs, no. 63.

Ruegg, K. C., and T. B. Smith. 2002. Not as the crow flies: A historical explanation for circuitous migration in Swainson's Thrush (*Catharus ustulatus*). Proceedings of the Royal Society of London, Series B 269:1375–1381.

Rundle, H. D., and P. Nosil. 2005. Ecological speciation. Ecology Letters 8:336–352.

Sabrosky, C. W. 1955. Postscript to a survey of infraspecific categories. Systematic Zoology 4:141–142.

Sangster, G. 2000. Taxonomic stability and avian extinctions. Conservation Biology 14:579–581.

Santer, R. D., F. C. Rind, R. Stafford, and P. J. Simmons. 2006. Role of an identified looming-sensitive neuron in triggering a flying locust's escape. Journal of Neurophysiology 95:3391–3400.

Savidge, J. A. 1987. Extinction of an island forest avifauna by an introduced snake. Ecology 68:660–668.

Schafer, J. L. 1999. NORM: Multiple imputation of incomplete multivariate data under a normal model, version 2. Software for Windows 95/98/NT. [Online.] Available at www.stat.psu.edu/~jls/misoftwa.html.

Schemske, D. W., and P. Bierzychudek. 2007. Spatial differentiation for flower color in the desert annual *Linanthus parryae*: Was Wright right? Evolution 61:2528–2543.

Schlegel, H. 1844. Kritische Übersicht der europäischen Vögel. Arnz und Comp, Leiden.

Schmidt-Nielsen, K., and J. L. Larimer. 1958. Oxygen dissociation curves of mammalian blood in relation to body size. American Journal of Physiology 195:424–428.

Schodde, R., and I. J. Mason. 1999. The Directory of Australian Birds: Passerines. CSIRO Publishing, Collingwood, Australia.

Seddon, N., R. M. Merrill, and J. A. Tobias. 2008. Sexually selected traits predict patterns of species richness in a diverse clade of suboscine birds. American Naturalist 171:620–631.

Seebohm, H. 1881. Catalogue of the Birds of the British Museum, vol. 5. British Museum, London.

Selander, R. K. 1971. Systematics and speciation in birds. Pages 57–147 *in* Avian Biology, vol. 1 (D. S. Farner and J. R. King, Eds.). Academic Press, New York

Sélys Longchamps, E. 1842. Faune belge. Première partie. Indication méthodique des mammifères, oiseaux, reptiles et poissons, observés jusqu'ici en Belgique. Pages i–xii, 1–310 *in* Faune Belge, Liège, Belgium.

Sharpe, R. B. 1909. A Hand-list of the Genera and Species of Birds, vol. 5. British Museum (Natural History), London.

Sharpe, R. S. 1968. The evolutionary relationships and comparative behavior of prairie chickens. Ph.D. dissertation, University of Nebraska, Lincoln.

Shin, H. S., and P. G. Jabłoński. 2008. Integration of optimality, neural networks, and physiology for field studies of the evolution of visually-elicited escape behaviors of Orthoptera: A minireview and prospects. Journal of Ecology and Field Biology 31:89–95.

Short, L. L. 1967. A review of the genera of grouse (Aves, Tetraoninae). American Museum Novitates, no. 2289:1–39.

Shriver, M. D., E. J. Parra, S. Dios, C. Bonilla, H. Norton, C. Jovel, C. Pfaff, C. Jones, A. Massac, N. Cameron, and others. 2003. Skin pigmentation, biogeographical ancestry and admixture mapping. Human Genetics 112:387–399.

Sibley, C. G. 1954. The contribution of avian taxonomy. Systematic Zoology 3:105–110.

Sibley, C. G., and B. L. Monroe, Jr. 1990. Distribution and Taxonomy of Birds of the World. Yale University Press, New Haven, Connecticut.

Sibley, C. G., and B. L. Monroe, Jr. 1993. A supplement to *Distribution and Taxonomy of Birds of the World*. Yale University Press, New Haven, Connecticut.

Simpson, G. G. 1961. Principles of Animal Taxonomy. Columbia University Press, New York.

Sites, J. W., Jr., and K. A. Crandall. 1997. Testing species boundaries in biodiversity studies. Conservation Biology 11:1289–1297.

Skalski, J. R., R. L. Townsend, L. L. McDonald, J. W. Kern, and J. J. Millspaugh. 2008. Type I errors linked to faulty statistical analyses of endangered subspecies classifications. Journal of Agricultural, Biological, and Environmental Statistics 13:199–220.

Slabbekoorn, H., and T. B. Smith. 2002. Bird song, ecology and speciation. Philosophical Transactions of the Royal Society of London, Series B 357:493–503.

Slikas, B., I. B. Jones, S. R. Derrickson, and R. C. Fleischer. 2000. Phylogenetic relationships of Micronesian white-eyes based on mitochondrial sequence data. Auk 117:355–365

Slud, P. 1964. The birds of Costa Rica: Distribution and ecology. Bulletin of the American Museum of Natural History, no. 128.

Smith, H. M., and F. N. White. 1956. A case for the trinomen. Systematic Zoology 5:183–190.

Smith, J. W., and C. W. Benkman. 2007. A coevolutionary arms race causes ecological speciation in crossbills. American Naturalist 169:455–465.

Smith, J. W., C. W. Benkman, and K. Coffey. 1999. The use and misuse of public information by foraging Red Crossbills. Behavioral Ecology 10:54–62.

Snow, D. W. 1954. Trends in geographical variation in the Palearctic members of the genus *Parus*. Evolution 8:19–28.

Snow, D. W. 1997. Should the biological be superseded by the phylogenetic species concept? Bulletin British Ornithologists' Club 117:110–120.

Snowberg, L. K., and C. W. Benkman. 2007. The role of marker traits in the assortative mating within

Red Crossbills, *Loxia curvirostra* complex. Journal of Evolutionary Biology 20:1924–1932.

Snyder, L. L., and H. G. Lumsden. 1951. Variation in *Anas cyanoptera*. Occasional Papers of the Royal Ontario Museum of Zoology 10:1–18.

Sokal, R. R., and F. J. Rohlf. 1995. Biometry: The Principles and Practice of Statistics in Biological Research, 3rd ed. W.H. Freeman, New York.

Sol, D., D. G. Stirling, and L. Lefebvre. 2005. Behavioral drive or behavioral inhibition in evolution: Subspecific diversification in Holarctic passerines. Evolution 59:2669–2677.

Solek, C. W., and L. J. Szijj. 2004. Coastal Cactus Wren (*Campylorhynchus brunneicapillus*). *In* The Coastal Scrub and Chaparral Bird Conservation Plan: A Strategy for Protecting and Managing Coastal Scrub and Chaparral Habitats and Associated Birds in California. California Partners in Flight and PRBO Conservation Science, Stinson Beach, California.

Sorenson, M. D., A. Cooper, E. E. Paxinos, T. W. Quinn, H. F. James, S. L. Olson, and R. C. Fleischer. 1999. Relationships of the extinct moa-nalos, flightless Hawaiian waterfowl, based on ancient DNA. Proceedings of the Royal Society of London, Series B 266:2187–2193.

Spaulding, A. 2007. Rapid courtship evolution in grouse (Tetraonidae): Contrasting patterns of acceleration between the Eurasian and North American polygynous clades. Proceedings of the Royal Society of London, Series B 274:1079–1086.

Stanford, C. B. 2001. The subspecies concept in primatology: The case of Mountain Gorillas. Primates 42:309–318.

Starrett, A. 1958. What *is* the subspecies problem? Systematic Zoology 7:111–115.

Stattersfield, A. J., and D. R. Capper, Eds. 2000. Threatened Birds of the World: The Official Source for Birds on the IUCN Red List. Lynx Edicions, Barcelona, Spain.

Steadman, D. W. 2006. Extinction and Biogeography of Tropical Pacific Birds. University of Chicago Press, Chicago, Illinois.

Stejneger, L. 1884. On the use of trinomials in American ornithology. Proceedings of the U.S. National Museum 7:70–81.

Stern, D. L., and V. Orgogozo. 2008. The loci of evolution: How predictable is genetic evolution? Evolution 62:2155–2177.

Steullet, A., and E. Deautier. 1950. Una nueva subespecie de *Dendrocolaptes pallescens* Pelzeln. Hornero 9:175–177.

Stoeckle, M., and K. Winker. 2009. A global snapshot of avian tissue collections: State of the enterprise. Auk 126:684–687.

Storer, R. W. 1982. Subspecies and the study of geographic variation. Auk 99:599–601.

Stresemann, E. 1921. Die Spechte der Insel Sumatra. Archiv für Naturgeschichte 87 (Abteilung A):64-–120.

Stresemann, E. 1931. Die Zosteropiden der indo-australischen Region. Mittheilungen aus dem Zoologischen Museum zu Berlin 17:201–238.

Stresemann, E. 1936. The Formenkreis-theory. Auk 53:150–158.

Stresemann, E. 1975. Ornithology from Aristotle to the Present. Harvard University Press, Cambridge, Massachusetts.

Strickberger, M. W. 2000. Evolution, 3rd ed. Jones and Bartlett, Boston.

Student [Gosset, W. S.]. 1908. The probable error of a mean. Biometrika 6:1–25.

Sun, J. X., J. C. Mullikin, N. Patterson, and D. E. Reich. 2009. Microsatellites are molecular clocks that support accurate inferences about history. Molecular Biology and Evolution 26:1017–1027.

Suzuki, Y., and N. F. Nijhout. 2007. Genetic basis of adaptive evolution of a polyphenism by genetic accommodation. Journal of Evolutionary Biology 21:57–66.

Swei, A., P. V. Brylski, W. D. Spencer, S. C. Dodd, and J. L. Patton. 2003. Hierarchical genetic structure in fragmented populations of the Little Pocket Mouse (*Perognathus longimembris*) in southern California. Conservation Genetics 4:501–514.

Swofford, D. L. 2003. PAUP*: Phylogenetic Analysis Using Parsimony (*And Other Methods), version 4. Sinauer Associates, Sunderland, Massachusetts.

Tacha, T. C., P. A. Vohs, and W. D. Warde. 1985. Morphometric variation of Sandhill Cranes from mid-continental North America. Journal of Wildlife Management 49:246–250.

Takahata, N., and M. Slatkin. 1990. Genealogy of neutral genes in two partially isolated populations. Theoretical Population Biology 38:331–350.

Tarr, C. L., and R. C. Fleischer. 1994. Mitochondrial DNA variation and evolutionary relationships in the Amakihi complex. Auk 110:825–831.

Tarr, C. L., and R. C. Fleischer. 1995. Evolutionary relationships of the Hawaiian Honeycreepers (Aves: Drepanidinae). Pages 147–159 *in* Hawaiian Biogeography: Evolution on a Hot Spot Archipelago (W. L. Wagner and V. A. Funk, Eds.). Smithsonian Institution Press, Washington, D.C.

Tateno, Y., M. Nei, and F. Tajima. 1982. Accuracy of estimated phylogenetic trees from molecular data. I. Distantly related species. Journal of Molecular Evolution 18:387–404.

Tian, C., R. Kosoy, A. Lee, M. Ransom, J. W. Belmont, P. K. Gregersen, and M. F. Seldin. 2008a. Analysis of East Asia genetic substructure using genome-wide SNP arrays. PLoS ONE 3(12):e3862.

Tian, C., R. M. Plenge, M. Ransom, A. Lee, P. Villoslada, C. Selmi, L. Klareskog, A. E. Pulver, L. QI, P. K. Gregersen, and M. F. Seldin. 2008b. Analysis and application of European genetic substructure using 300 K SNP information. PLoS Genetics 4(1):e4.

Tickell, W. L. N. 2003. White plumage. Waterbirds 26:1–12.

Todd, W. E. C. 1950. The northern races of *Dendrocolaptes certhia*. Journal of the Washington Academy of Sciences 40:236–238.

Topp, C. M., and K. Winker. 2008. Genetic patterns of differentiation among five landbird species from the Queen Charlotte Islands, British Columbia. Auk 125:461–472.

Traylor, M. A., Jr., Ed. 1979. Check-list of Birds of the World, vol. 8. Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

Underwood, J. N., L. D. Smith, M. J. H. Van Oppen, and J. P. Gilmour. 2007. Multiple scales of genetic connectivity in a brooding coral on isolated reefs following catastrophic bleaching. Molecular Ecology 16:771–784.

Unitt, P. 2004. San Diego County Bird Atlas. Proceedings of the San Diego Society of Natural History, no. 39.

Unitt, P. 2008. San Diego Cactus Wren, *Campylorhynchus brunneicapillus sandiegensis*. Pages 300–305 *in* California Species of Special Concern (W. D. Shuford and T. Gardali, Eds.). Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

U.S. Department of the Interior and U.S. Department of Commerce. 1996. Policy regarding the recognition of distinct vertebrate population segments under the Endangered Species Act. Federal Register 61:4722–4725.

U.S. Fish and Wildlife Service. 1983. Listing and Recovery Priority Guidelines. Federal Register 48:43098–43105.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1980. Rules for listing endangered and threatened species, designating critical habitat, and maintaining the lists. Federal Register 45:13010–13026.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1996. Policy regarding the recognition of distinct vertebrate population segments under the Endangered Species Act. Federal Register 61:4722–4725.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 2000. Controlled propagation of species listed under the Endangered Species Act. Federal Register 65:56916–56922.

Uy, J. A. C., and G. Borgia. 2000. Sexual selection drives rapid divergence in bowerbird display traits. Evolution 54:273–278.

Uy, J. A. C., R. G. Moyle, and C. E. Filardi. 2009. Plumage and song differnces mediate species recognition between incipient flycatcher species of the Solomon Islands. Evolution 63:153–164.

Valkiūnas, G., and T. A. Iezhova. 2001. A comparison of the blood parasites in three subspecies of the Yellow Wagtail *Motacilla flava*. Journal of Parasitology 87:930–934.

van Balen, S. 2008. Family Zosteropidae (White-eyes). Pages 402–485 *in* Handbook of Birds of the World, vol. 13: Penduline-tits to Shrikes (J. del Hoyo, A. Elliott, and D. A. Christie, Eds.). Lynx Edicions, Barcelona, Spain.

VanderWerf, E. A. 1998. 'Elepaio (*Chasiempis sandwichensis*). *In* The Birds of North America, no. 344 (A. Poole and F. Gill, Eds.). Academy of Natural Sciences, Philadelphia, and American Ornithologists' Union, Washington, D.C.

VanderWerf, E. A., A. Cowell, and J. L. Rohrer. 1997. Distribution, abundance, and conservation of O'ahu 'Elepaio in the southern leeward Ko'olau Range. 'Elepaio 57:99–105.

van Oosterhout, C., B. Hutchinson, D. Wills, and P. Shipley. 2004. MICROCHECKER: Software for identifying and correcting genotyping errors in microsatellite data. Molecular Ecology Notes 4:535–538.

van Rossem, A. J. 1936. The Orange-bellied Redstart of western Central America. Condor 38:117–118.

Vogler, A. P., and R. DeSalle. 1994. Diagnosing units of conservation management. Conservation Biology 8:354–363.

Vucetich, J. A., M. P. Nelson, and M. K. Phillips. 2006. The normative dimension and legal meaning of *endangered* and *recovery* in the U.S. Endangered Species Act. Conservation Biology 20:1383–1390.

Wakeley, J. 2006. Coalescent Theory: An Introduction. Roberts, Greenwood Village, Colorado.

Waples, R. S., P. B. Adams, J. Bohnsack, and B. L. Taylor. 2007a. A biological framework for evaluating whether a species is threatened or endangered in a significant portion of its range. Conservation Biology 21:964–974.

Waples, R. S., P. B. Adams, J. Bohnsack, and B. L. Taylor. 2007b. Normativity redux. Conservation Biology 21:1649–165.

Waples, R. S., and O. Gaggiotti. 2006. What is a population? An empirical evaluation of some genetic methods for identifying the number of gene pools and their degree of connectivity. Molecular Ecology 15:1419–1439.

Watling, D. 2001. A Guide to the Birds of Fiji and Western Polynesia. Environmental Consultants, Suva, Fiji.

Wayne, R. K., and P. A. Morin. 2004. Conservation genetics in the new molecular age. Frontiers in Ecology and the Environment 2:89–97.

Weir, J. T. 2006. Divergent timing and patterns of species accumulation in lowland and highland Neotropical birds. Evolution 60:842–855.

Weir, J. T., E. Bermingham, M. J. Miller, J. Klicka, and M. A. González. 2008. Phylogeography of a morphologically diverse Neotropical montane species, the Common Bush-Tanager (*Chlorospingus ophthalmicus*). Molecular Phylogenetics and Evolution 47:650–664.

Weir, J. T., and D. Schluter. 2008. Calibrating the avian molecular clock. Molecular Ecology 17:2321–2328.

West-Eberhard, M. J. 2003. Developmental Plasticity and Evolution. Oxford University Press, New York.

Wetmore, A. 1944. A collection of birds from northern Guanacaste Costa Rica. Proceedings of the U.S. National Museum 95:25–80.

Wheeler, Q. D., and R. Meier, Eds. 2000. Species Concepts and Phylogenetic Theory: A Debate. Columbia University Press, New York.

Wheeler, Q. D., and K. C. Nixon. 1990. Another way of looking at the species problem: A reply to de Queiroz and Donoghue. Cladistics 6:77–81.

Wheeler, Q. D., and N. I. Platnick. 2000. The phylogenetic species concept. Pages 55–69 *in* Species Concepts and Phylogenetic Theory: A Debate (Q. D. Wheeler and R. Meier, Eds.). Columbia University Press, New York.

Wiens, J. A. 1982. Forum: Avian subspecies in the 1980's. Auk 99:593.

Wiles, G. J. 2005. A checklist of the birds and mammals of Micronesia. Micronesica 38:141–189.

Wiley, E. O. 1978. The evolutionary species concept reconsidered. Systematic Biology 27:17–26.

Wiley, E. O. 1981. Phylogenetics: The Theory and Practice of Phylogenetic Systematics. Wiley-Interscience, New York.

Wilgenbusch, J. C., D. L. Warren, and D. L. Swofford. 2004. AWTY: A system for graphical exploration of MCMC convergence in Bayesian phylogenetic inference. [Online.] Available at ceb.csit.fsu.edu/awty.

Williams, M. 1991. Introductory remarks: Ecological and behavioural adaptations of Southern Hemisphere waterfowl. Pages 841–842 *in* Acta XX Congressus Internationalis Ornithologici (M. N. Clout and D. C. Paton, Eds.). New Zealand Ornithological Congress Trust Board, Wellington.

Willis, E. O. 1972. The behavior of Plain-brown Woodcreepers, *Dendrocincla fuliginosa*. Wilson Bulletin 84:377–420.

Willis, E. O. 1979. Behavior and ecology of two forms of White-chinned Woodcreepers (*Dendrocincla merula*, Dendrocolaptidae) in Amazonia. Papéis Avulsos de Zoologia, São Paulo 33:27–66.

Willis, E. O. 1982. The behavior of Black-banded Woodcreepers (*Dendrocolaptes picumnus*). Condor 84:272–285.

Willis, E. O. 1992. Comportamento e ecologia do arapaçu-barrado *Dendrocolaptes certhia* (Aves, Dendrocolaptidae). Boletim do Museu Paraense Emílio Goeldi, série Zoologia 8:151–215.

Willis, E. O., and Y. Oniki. 1978. Birds and army ants. Annual Review of Ecology and Systematics 9:243–263.

Willis, E. O., and Y. Oniki. 2001. On a nest of the Planalto Woodcreeper, *Dendrocolaptes platyrostris*, with taxonomic and conservation notes. Wilson Bulletin 113:231–233.

Willmann, R., and R. Meier. 2000. A critique from the Hennigian species concept perspective. Pages 101–118 *in* Species Concepts and Phylogenetic Theory (Q. D. Wheeler and R. Meier, Eds.). Columbia University Press, New York.

Wilson, A., P. Arcese, L. F. Keller, C. L. Pruett, K. Winker, M. A. Patten, and Y. Chan. 2009. The contribution of island populations to in situ genetic conservation. Conservation Genetics 10:419–430.

Wilson, E. O. 1994. Naturalist. Island Press, Washington, D.C.

Wilson, E. O., and W. L. Brown, Jr. 1953. The subspecies concept and its taxonomic application. Systematic Zoology 2:97–111.

Wilson, R. E., M. Eaton, and K. G. McCracken. 2008. Color divergence among Cinnamon Teal (*Anas cyanoptera*) subspecies from North America and South America. Ornitología Neotropical 19:307–314.

Wilson, R. E., and K. G. McCracken. 2008. Specimen shrinkage in Cinnamon Teal. Wilson Journal of Ornithology 120:390–392.

Winker, K. 1996. The crumbling infrastructure of biodiversity: The avian example. Conservation Biology 10:703–707.

Winker, K. 1998. Suggestions for measuring external characters of birds. Ornitología Neotropical 9:23–30.

Winker, K. 2009. Reuniting genotype and phenotype in biodiversity research. BioScience 59:657–665.

Winker, K. This volume. Subspecies represent geographically partitioned variation, a gold mine of evolutionary biology, and a challenge for conservation. Pages 5–23 *in* Avian Subspecies (K. Winker and S. M. Haig, Eds.). Ornithological Monographs, no. 67.

Winker, K., D. A. Rocque, T. M. Braile, and C. L. Pruett. 2007. Vainly beating the air: Species-concept debates need not impede progress in science or conservation. Pages 30–44 *in* Festschrift for Ned K. Johnson: Geographic Variation and Evolution in Birds (C. Cicero and J. V. Remsen, Jr., Eds.). Ornithological Monographs, no. 63.

Wittenberger, J. F. 1978. The evolution of mating systems in grouse. Condor 80:126–137.

Woods, D. S. 1992. Color and size variation in eastern White-breasted Nuthatches. Wilson Bulletin 104:599–611.

Woods, T., and S. Morey. 2008. Uncertainty and the Endangered Species Act. Indiana Law Journal 83:529–536.

Wright, S. 1943. Isolation by distance. Genetics 28:114–138.

Young, J. R. 1994. The influence of sexual selection on phenotypic and genetic divergence of Sage Grouse. Ph.D. dissertation, Purdue University, West Lafayette, Indiana.

Young, J. R., C. E. Braun, S. J. Oyler-McCance, J. W. Hupp, and T. W. Quinn. 2000. A new species of sage-grouse (Phasianidae: *Centrocercus*) from southwestern Colorado. Wilson Bulletin 112:445–453.

Young, J. R., J. W. Hupp, J. W. Bradbury, and C. E. Braun. 1994. Phenotypic divergence of secondary sexual traits among Sage Grouse populations. Animal Behaviour 47:1353–1362.

Zimmer, K. J., and M. L. Isler. 2003. Family Thamnophilidae (typical antbirds). Pages 448–681 *in* Handbook of the Birds of the World, vol. 8: Broadbills to Tapaculos (J. del Hoyo, A. Elliott, and D. A. Christie, Eds.). Lynx Edicions, Barcelona, Spain.

Zink, R. M. 1988. Evolution of Brown Towhees: Allozymes, morphometrics and species limits. Condor 90:72–82.

Zink, R. M. 1989. The study of geographic variation. Auk 106:157–160.

Zink, R. M. 1994. The geography of mitochondrial DNA variation, population structure, hybridization, and species limits in the Fox Sparrow (*Passerella iliaca*). Evolution 48:96–111.

Zink, R. M. 1997. Phylogeographic studies of North American birds. Pages 301–324 *in* Avian Molecular Evolution and Systematics (D. P. Mindell, Ed.). Academic Press, London.

Zink, R. M. 2002. A new perspective on the evolutionary history of Darwin's finches. Auk 119:864–871.

Zink, R. M. 2004. The role of subspecies in obscuring avian biological diversity and misleading conservation policy. Proceedings of the Royal Society of London, Series B 271:561–564.

Zink, R. M. 2005. Natural selection on mitochondrial DNA in *Parus* and its relevance for phylogeographic studies. Proceedings of the Royal Society of London, Series B 272:71–78.

Zink, R. M. 2006. Rigor and species concepts. Auk 123:887–891.

Zink, R. M., and G. F. Barrowclough. 2008. Mitochondrial DNA under siege in avian phylogeography. Molecular Ecology 17:2107–2121.

Zink, R. M., G. F. Barrowclough, J. L. Atwood, and R. C. Blackwell-Rago. 2000. Genetics, taxonomy, and conservation of the threatened California Gnatcatcher. Conservation Biology 14:1394–1405.

Zink, R. M., and R. C. Blackwell-Rago. 2000. Species limits and recent population history in the Curve-billed Thrasher. Condor 102:881–886.

Zink, R. M., and D. L. Dittmann. 1992. Review of *The Known Birds of North and Middle America*, Part II, by A. R. Phillips. Wilson Bulletin 104:764–767.

Zink, R. M., and D. L. Dittmann. 1993a. Gene flow, refugia, and evolution of geographic variation in the Song Sparrow (*Melospiza melodia*). Evolution 47:717–729.

Zink, R. M., and D. L. Dittmann. 1993b. Population structure and gene flow in the Chipping Sparrow and a hypothesis for evolution in the genus *Spizella*. Wilson Bulletin 105:399–413.

Zink, R. M., S. V. Drovetski, S. Questiau, I. V. Fadeev, E. V. Nesterov, M. C. Westberg, and S. Rohwer. 2003. Recent evolutionary history of the Bluethroat (*Luscinia svecica*) across Eurasia. Molecular Ecology 12:3069–3075.

Zink, R. M., S. V. Drovetski, and S. Rohwer. 2002a. Phylogeographic patterns in the Great Spotted Woodpecker *Dendrocopos major* across Eurasia. Journal of Avian Biology 33:175–178.

Zink, R. M., A. E. Kessen, T. V. Line, and R. C. Blackwell-Rago. 2001. Comparative phylogeography of some aridland bird species. Condor 103:1–10.

Zink, R. M., and J. T. Klicka. 1990. Genetic variation in the Common Yellowthroat and some allies. Wilson Bulletin 102:514–520.

Zink, R. M., D. F. Lott, and D. W. Anderson. 1987. Genetic variation, population structure, and evolution of California Quail. Condor 89:395–405.

Zink, R. M., and M. C. McKitrick. 1995. The debate over species concepts and its implications for ornithology. Auk 112:701–719.

Zink, R. M., and J. V. Remsen, Jr. 1986. Evolutionary processes and patterns of geographic variation in birds. Pages 1–69 *in* Current Ornithology, vol. 4 (R. F. Johnston, Ed.). Plenum Press, New York.

Zink, R. M., J. D. Rising, S. Mockford, A. G. Horn, J. M. Wright, M. Leonard, and M. C. Westberg. 2005. Mitochondrial DNA variation, species limits, and rapid evolution of plumage coloration and size in the Savannah Sparrow. Condor 107:21–28.

Zink, R. M., S. Rohwer, S. Drovetski, R. C. Blackwell-Rago, and S. L. Farrell. 2002b. Holarctic phylogeography and species limits of Three-toed Woodpeckers. Condor 104:167–170.

Zink, R. M., W. L. Rootes, and D. L. Dittmann. 1991. Mitochondrial DNA variation, population structure, and evolution of the Common Grackle (*Quiscalus quiscula*). Condor 93:318–329.