

# Dispersal, Mimicry, and Geographic Variation in Northern Melanesian Birds<sup>1</sup>

Jared Diamond<sup>2</sup>

**Abstract:** I present new information about 34 of the 195 resident land and freshwater bird species of Northern Melanesia, an area characterized by a rich avifauna, high endemism, and great geographic variation in morphology. There are many examples of geographic variation in voice, behavior, habitat preference, altitudinal range, vertical stratum, abundance, and nest. Possible vocal convergence or mimicry between sympatric populations of different species is described between the goshawk *Accipiter albogularis* and the kingfisher *Halcyon chloris*, between the cuckoo-shrike *Coracina [tenuirostris]* and other species in its mixed-species foraging flocks, between the white-eyes *Zosterops murphyi* and *Z. rendovae kulambangrae*, and between the starlings *Aplonis grandis* and *Mino dumontii*. Hybridization is reported between the Bismarck and New Guinea races of the cuckoo *Eudynamys scolopacea* on Long Island (described as a new subspecies), between the whistlers *Pachycephala pectoralis* and *P. melanura*, and between the honey-eaters *Myzomela tristrami* and *M. cardinalis*. Cyclones bring Australian species, some of which occasionally remain to breed. Over-water dispersal ability varies greatly, from species that can be seen flying over water any day to species that rarely or never cross water. For instance, a channel 12 km long and only 0.15–1 km wide divides Florida Island into two halves, one of which possesses and the other of which lacks a resident population of the coucal *Centropus milo*.

NORTHERN MELANESIA comprises the hundreds of islands of the Bismarck and Solomon Archipelagoes east of New Guinea. Its rich avifauna, their intensively studied distributions and taxonomy, the marked geographic variation in morphology of conspecific populations among different islands, and the existence of bird species representing many different stages in the speciation process have all combined to make Northern Melanesian birds ideal material for studying speciation (Mayr 1942 and many papers). However, little has been reported about geographic variation in ecology, behavior, and vocalizations. The

Northern Melanesian avifauna includes many little-known endemic populations (five endemic genera, 30 endemic full species or superspecies, 102 endemic allospecies, and 380 endemic subspecies). Rampant ongoing deforestation of Northern Melanesia makes it urgent to study this treasure trove of diversity before much of it disappears.

Between 1969 and 1976 I made four expeditions to Northern Melanesia: 27 June–24 July 1969, West New Britain; 23 June–1 September 1972, Umboi and Long and neighboring islands, and Bougainville; 18 August–31 October 1974 and 5 September–15 October 1976, almost all ornithologically significant Solomon islands (except Buka, Ysabel, Malaita, Ulawa, Ramos, Gower, and the remote outliers), plus 94 small islets in and near Wana Wana Lagoon of the New Georgia group. Previous publications have described the avifaunas of Rennell and Bellona (Diamond 1984), vocalizations of the white-eye superspecies *Zosterops [griseotinctus]* (Diamond 1998), character displacement in

<sup>1</sup> Manuscript accepted 10 May 2001.

<sup>2</sup> Physiology Department, University of California Medical School, Los Angeles, California 90095-1751 (fax: 310-206-5661; E-mail: jdiamond@mednet.ucla.edu).

myzomelid honey-eaters (Diamond et al. 1989), community assembly (Diamond 1975*a*), selected species of Bougainville (Diamond 1975*b*) and West New Britain (Diamond 1971, 1972) and Umboi and nearby islands (Diamond 1974, 1976), species/area/distance relations (Diamond and Mayr 1976, Diamond et al. 1976, Gilpin and Diamond 1976, 1981), the montane avifauna (Mayr and Diamond 1976), and two new taxa (Diamond 1989*a*, 1991).

In this paper I report significant field observations and distributional records—especially ones involving endemic populations and/or concerning geographic variation, vocalizations, overwater dispersal, and hybridization. I also mention two records based on unreported specimens that I found in museums.

Taxonomy and distributions are based on a comprehensive, just-published account of the Northern Melanesian avifauna by Mayr and Diamond (2001), hence information in that book is not repeated in this paper. To facilitate finding such information, I cite each resident species by its number used in Appendix 1 of that book. To facilitate use of the taxonomic literature on Northern Melanesian birds, most of which predates 1960, the island names and spellings used here and in that book are those then in use, differing in nine cases from modern names and spellings (the older Florida, Ganonga, Gatukai, Gizo, Gower, Kulambangra, New Hanover, San Cristobal, and Tetipari rather than the current Nggela, Ranongga, Nggatokae, Ghizo, Ndai, Kolombangara, Lavongai, Makira, and Tetepare, respectively). I frequently cite information provided by island residents (especially Teu Zinghite of Kulambangra and Alisasa Bisili of New Georgia), many of whom proved to be walking encyclopedias of field information. For example, Mr. Zinghite had discovered nests, reared nestlings, and recorded diets, seasonal movements, and overwater dispersal frequencies of most bird species of Kulambangra. On all islands I quizzed older men to obtain local-language species names, according to methods described elsewhere (Diamond 1966, 1989*b,c*; Diamond and Bishop 1999).

#### SPECIES ACCOUNTS

3. Australian Pelican, *Pelecanus conspicillatus*. Two sightings in Wana Wana Lagoon: one soaring high on 16 September 1976, and one resting on a sandbar on the following day. Local people said that one or two pelicans had been present for several weeks, and that cyclones (especially the cyclone of 1952) occasionally brought small numbers, all of which eventually died out or departed. I received such reports from 11 Solomon islands (Ganonga, Gatukai, Honiavasa, Kulambangra, Mono, New Georgia, Pavuvu, Rendova, Roviana, Vella Lavella, Wana Wana), with the earliest remembered arrival being around 1918. There are several previous reports of windblown pelicans reaching Northern Melanesia (e.g., Bradley and Wolff 1956, Cain and Galbraith 1956, Hadden 1981).

4. Little Pied Cormorant, *Phalacrocorax melanoleucos*. Previously known to be resident on six of the larger Northern Melanesian islands. In addition, Teu Zinghite told me that the species had been resident on the Kukundu River of Kulambangra during the 1960s and that he had found a young bird not yet able to fly. Residents of Ganonga, Gatukai, New Georgia, and Wana Wana reported several dozen as having been brought by the cyclone of 1952.

8. Great Egret, *Ardea alba*. Residents of numerous islands of the New Georgia group reported this heron to me as appearing or increasing in numbers after cyclones, and also sometimes resident on exposed reefs, beaches, and mudflats, and along rivers.

12. Sacred Ibis, *Threskiornis moluccus*. Previously known in Northern Melanesia only as an endemic resident race on Rennell and Bellona. Residents of Mono told me in 1974 that a pair of this species arrived around the same time as the cyclone-blown pelicans of 1952 and had been resident since then, but that one of the pair disappeared around 1973, leaving a single survivor. The description was of a slender tall bird similar to the “so” (Mono name for Eastern Reef Egret, *Egretta sacra*) but taller, with a long, curved black bill, black head and tail, and white body.

25. Pied Goshawk, *Accipiter albogularis*.

An interesting range extension for this widespread hawk is Borokua, an isolated, small, steep extinct volcanic island halfway between Guadalcanal and the New Georgia group and 59 km from the next island. A pair was resident and calling frequently during my visit on 7–9 September 1974.

This goshawk is involved in a remarkable vocal convergence or mimicry with the Colared Kingfisher, *Halcyon chloris*. In the New Georgia and Bukida groups the common call of both species is a moderately high-pitched nasal two-note or three-note element with a forced quality, repeated several times at the rate of one per second. Each element consists of an upslur, followed by either one or two notes at lower pitch. Other New Georgia and Bukida calls of *A. albogularis* are a rapid series of 17–50 high-pitched nasal notes delivered at about five per second, rising and then leveling off in pitch, and still with a quality very like the call of *Halcyon chloris*; a slower series, lasting 3 sec, of about five high-pitched upslurs; and a series of 5–10 nasal notes delivered as if the voice were cracking. The San Cristobal races of both *A. albogularis* and *H. chloris* lack the first-named of these calls (the one with the repeated two- or three-note element). San Cristobal *A. albogularis* still gives the rapid rising series and the slower series of upslurs.

*Accipiter albogularis* and its congener Grey Goshawk, *A. novaehollandiae*, coexist on many Solomon islands but differ strikingly in foraging technique. The former hunts by soaring swiftly in circles without flapping, just above or high above the canopy. The latter does not soar, but is a still hunter, searching from a perch within the canopy and then flying slowly with alternate flaps and glides below canopy height to its next perch.

#### 40. Woodford's Rail, *Nesoclopeus woodfordi*?

This endemic rail is known definitely only from the three largest islands carved out by high Holocene sea levels from the expanded Pleistocene island of Greater Bukida: Bougainville, Ysabel, and Guadalcanal. There are also two possible reports for the fourth-largest Bukida-derived island, Choiseul. First, the unpublished diaries of the Whitney South Sea Expedition, preserved in the American

Museum of Natural History, mention on p. 226 of volume V that the Whitney collector Hannibal Hamlin observed one individual of this species in the canebrakes of a mountain creek on Choiseul sometime between September and November 1929. Second, among the 42 bird species that residents of Sasamonga Village on Choiseul described to me or identified with me in the field in 1974 was one named the “ki,” described as follows: similar to, but a different species from, the “peyonga” (= Bush-hen, *Amaurornis olivaceus*); unmarked dark body; bill about 4 cm long; lives on the ground; calls “ki-ki-ki-ki...”; runs very quickly; and either does not fly at all or else flies along the ground if pursued by dogs.

54. Yellow-bibbed Fruit-Dove, *Ptilinopus solomonensis*. This fruit-dove's ecological relations with congeners vary among islands. In the Solomons on high islands of the New Georgia group (Kulambangra, Rendova, Vangunu, Gatukai, Vella Lavella) I found it from 400 m up to the summits, not in the lowlands. At middle elevations it coexisted with Claret-breasted Fruit-Dove, *P. viridis*, and Superb Fruit-Dove, *P. superbus*, but lived alone at higher elevations above the altitudinal ceilings of these other two species. The *P. solomonensis* populations of Bougainville and Guadalcanal are confined to even higher elevations, above 900 m (Diamond 1975b). On low islands of the New Georgia group (New Georgia, Kohinggo, and four lagoon islets) and on Florida, *P. solomonensis*, *P. viridis*, and *P. superbus* coexisted at sea level, *P. solomonensis* being by far the least common. On San Cristobal, where *P. superbus* is absent, *P. solomonensis* is common from coastal lowlands to the mountains, and the distinctive race *P. viridis eugeniae* is confined to inland forest. On Ugi (*P. superbus* also absent) *P. viridis* is joined by Pink-spotted Fruit-Dove, *P. richardsii*; both of these doves are common in open habitats, and *P. solomonensis* is confined to forest.

In the Bismarcks *P. solomonensis* is instead a supertramp species (i.e., confined to species-poor small, remote, or volcanically recently defaunated islands: Diamond 1974), excluded from large, central, species-rich islands by

the very closely related White-bibbed Fruit-Dove, *P. rivoli*, a member of the same super-species. The sole Bismarck island with established populations of both species is Umboi, where I found *P. solomonensis* only in one area on the lower slopes of one mountain (Mt. Birik) up to 500 m. *Ptilinopus rivoli* was on Mt. Birik and other mountains of Umboi, mostly at elevations above *P. solomonensis* but overlapping marginally with it at Mt. Birik's base. On New Hanover and possibly on New Ireland and New Britain, where *P. rivoli* is also resident, *P. solomonensis* has been recorded only as a very rare vagrant. *Ptilinopus solomonensis* was the sole fruit-dove on recently defaunated (A.D. 1888) Ritter near Umboi. On recently defaunated (ca. A.D. 1670) Long, Crown, and Tolokiwa *P. solomonensis* was joined by Red-knobbed Fruit-Dove, *P. insolitus*, and on Tolokiwa by *P. superbus* as well, but *P. solomonensis* was by far the most abundant and ubiquitous fruit-dove from the coastal lowlands up to the summits of these three islands.

Because this dove is far more often heard than seen, ability to distinguish the calls from those of congeners is essential to field identification. There are two calls, a "hoo" series and a two-note call. The hoo series consists of 8–16 (race *vulcanorum* of the New Georgia group) or 12–32 (race *solomonensis* of the San Cristobal group) high-pitched notes. The series accelerates and rises and then usually drops in pitch. Hoo series of *solomonensis* (heard on San Cristobal and Ugi) are much faster and longer than those of *vulcanorum*. In the Solomons confusion is possible only with the hoo series of *P. superbus* (Beehler et al. 1986:106), which differs in being slower, somewhat shorter, and not accelerating nor dropping in pitch at the end. The hoo series of race *meyeri* in the Bismarcks on Umboi and neighboring islands (Long, Crown, Tolokiwa, Sakar) may either accelerate greatly or scarcely at all, and I found it difficult to distinguish from the hoo series of *P. rivoli*.

All three of these races that I encountered also have a two-note, high-pitched, hollow call. The first note is very faint, short, and inaudible at a distance beyond 30 m; the second note is longer and pitched a half-tone

higher. Beyond 30 m one hears only the second note, which would be an utterly nondescript vocalization (a single "hoo") were it not for the distinctive feature that the call is repeated ad nauseam, at regular intervals of 3–8 sec depending on the individual bird, for up to 15 min.

68. Crested Cuckoo-Dove, *Reinwardtoena crassirostris*. The distinctive, far-carrying call of this Solomon endemic is often heard, but the bird is very shy, inconspicuous, and rarely seen. It lives mainly in forest within the shaded midstory and lower canopy at 8–18 m, in the mountains or near lowland rivers. Florida residents said that the population there disappeared after Cyclone Ida destroyed much of the forest in 1971. I heard the call on Kulambangra, Choiseul, San Cristobal, Vangunu, and Gatukai: two notes at medium-high pitch, repeated a few times or else ad nauseam for many minutes. The first note is short, staccato, softer, and at lower pitch by about two whole tones; the second note is longer and downslurred. At a distance the first note becomes inaudible, so one only hears the downslur. The pair of notes is repeated at intervals averaging 5–6 sec, occasionally up to 8 sec. The time interval from the short first note to the longer second note is shorter (2 sec) than the interval from the second note to the next short note (3–6 sec). The quality of the call is so human that Choiseul islanders told me that the bird arose from a child who was left at home by its mother, kept calling for its mother, and was eventually changed into the bird.

68. Pied Cuckoo-Dove, *Reinwardtoena browni*. Calls of this Bismarck endemic that I heard on Umboi were more similar to those of *R. crassirostris* (described above) than to those of *R. reinwardtii* (Beehler et al. 1986:102). Like *R. crassirostris*'s call, *R. browni*'s is human in quality, medium-high-pitched, far carrying, and begins with a short note followed by a longer downslur at a higher pitch. But the *R. browni* call then has a third note, another downslur at a lower pitch. This three-note pattern is repeated at 4-sec intervals for up to several minutes, as in the Solomons.

79. Meek's Lorikeet, *Charmosyna meeki*.

This Solomon endemic is definitely known only from the mountains of Bougainville, Guadalcanal, Kulambangra, Malaita, and Ysabel. However, the species should also be sought in the mountains of Vangunu, where at 650 m I twice glimpsed a single green parrot that appeared to be this species and flew just above the canopy.

85. Solomon Cockatoo, *Cacatua ducorpsi*. It has seemed surprising that this parrot, which can often be seen flying over water between nearby islands and is otherwise distributed throughout the central Solomons, is absent from the San Cristobal group at the southeastern end of the Solomon island chain. In addition, there are no records for Ganonga and Simbo at the southwestern end of the New Georgia group. Although I observed this very conspicuous and noisy species on every other island of at least modest size in the New Georgia group, I failed to observe it on Ganonga or Simbo, and residents of these two islands insisted that not even a single individual had ever been recorded there. Although Ganonga is only 9 km from Vella Lavella, and Simbo is only 7 km from Ganonga, these water gaps are evidently a potent barrier to the cockatoo. Diamond et al. (1976) identified 31 other Solomon bird species that they termed "superior short-distance colonists," frequently crossing narrow but not wide water gaps.

Oriental Cuckoo, *Cuculus saturatus*. There are few records of this palaeartic species from the Solomons, which lie at the eastern limit of its winter range. I observed one individual in a tree on a riverbank in forest on Choiseul on 14 October 1974.

91. Common Koel, *Eudynamis scolopacea*. The populations of Long, Tolokiwa, and Crown provide an interesting example of a distinctive population of hybrid origins that developed and stabilized in less than three centuries. Around A.D. 1670, Long was defaunated by one of the largest volcanic eruptions of recent millennia, covering the island with layers of volcanic ash at least 100 m thick and creating a caldera now filled by a lake of 86 km<sup>2</sup> (Pain et al. 1981, Ball and Hughes 1982, Blong 1982). Matching ash layers imply heavy ashfall on Crown and probably also

on Tolokiwa, the two islands nearest Long. Since then, a forest dominated by rapidly growing softwoods has regenerated. The avifaunas of Long, Crown, and Tolokiwa are largely shared and consist entirely of species known to be good over-water colonists and dominated by eight vagile supertramp species specializing in small, remote, or recently defaunated islands (Diamond 1974, Diamond et al. 1989: table 1). Some populations are derived from New Britain or other Bismarck islands, and others are derived from New Guinea.

Collections of birds on Long were made by W. F. Coultas of the Whitney Expedition in 1933 and by me in 1972. Previous taxonomic studies had identified three species with distinctive populations on Long and its neighbors: Pacific Swallow, *Hirundo tabitica*, whose population is intermediate in color and size between the New Britain and New Guinea populations (Mayr 1955); and the large and small honey-eaters Bismarck Black Myzomela, *Myzomela pammelaena*, and Red-bibbed Myzomela, *M. sclateri*, whose populations are respectively even larger and even smaller than conspecific source populations elsewhere in the Bismarcks (Diamond et al. 1989). These distinctions presumably arose in the last three centuries, by hybridization in the case of the swallow and by character displacement in the case of the honey-eaters.

The *Eudynamis scolopacea* populations of Long and its neighbors also prove to be of recent hybrid origin, between the Bismarck race *salvadorii* and the New Guinea race *rufiventer*. Males of both races are uniformly black, but females and immatures of both sexes have a complexly patterned ochraceous/rufous, black, and white plumage. These two source races differ in two respects: *salvadorii*'s larger size in both sexes, as reflected in wing length and weight (Table 1); and, in the female/immature plumage, *salvadorii*'s paler, more whitish, less ochraceous ground color of the underparts and its broader black tail bands.

In size the Long/Tolokiwa/Crown population agrees with the small New Guinea race *rufiventer*; it apparently weighs even less than *rufiventer* (Table 1). In breadth of black bands

TABLE 1  
Wing Length and Weight in the Cuckoo *Eudynamys scolopacea*

Character	<i>rufiventer</i>	<i>hybrida</i>	<i>salvadorii</i>
♂ wing	194 (176–206) [32]	191 (183–201) [22]	210 (203–220) [17]
♀ wing	188 (182–193) [15]	191 (194–199) [4]	207 (204–214) [7]
♂ weight	219 (188–254) [13]	173 (152–198) [8]	275 (205–330) [5]
♀ weight	219 (202–234) [5]	—	—

Note: Specimens of *rufiventer* are from New Guinea (10 specimens) and adjacent islands (37); of *hybrida*, from Long (22), Tolokiwa (2), and Crown (6); and of *salvadorii*, from New Britain (20), Umboi (4), and Sakar (2). Only fully adult specimens were used. Wing lengths are in millimeters, weights in grams. Values given are the average, followed by the range in parentheses, followed by the number of specimens in brackets. All specimens are in the American Museum of Natural History. See text for discussion.

in the female's tail it agrees with *salvadorii*. In ventral coloration of the female it is intermediate, being paler and less ochraceous than *rufiventer*, though not as white as *salvadorii*. There is no overlap in wing length or weight between the 31 available individuals of the Long/Tolokiwa/Crown population and the 26 available adults of *salvadorii*. All four available females of the Long/Tolokiwa/Crown population can be distinguished from *rufiventer* in plumage. Hence this population is subspecifically distinct, and I propose the name *Eudynamys scolopacea hybrida* (type specimen AMNH no. 422566, collector's field no. 44762, adult female, collected 28 November 1933 by W. F. Coultas on Long Island).

If one divides the available series of adult male *hybrida* into four subspecies by island and year of collection, the resulting small subspecies appear not to differ in wing length: Long, 1933, 14 ♂, average 190 mm; Long, 1972, 3 ♂, average 192 mm; Tolokiwa, 1972, 2 ♂, average 195 mm; Crown, 1972, 3 ♂, average 190 mm. This type of comparison is not possible for adult females, because the four available were all taken on Long in 1933.

This stabilized hybrid population must have formed by the year 1933, because the 1933 Long series is already distinct in both size and female plumage, and because the 1972 Long/Crown/Tolokiwa specimens (all of them adult males) do not differ in size from the 1933 Long males. Formation of the population must have begun sometime after 1670, because *Eudynamys scolopacea* is confined to forest, and some time must have elapsed before forest regenerated after the eruption. Recolonization of forest by *E. scolopacea*

may have required further time. Hence subspeciation must have been achieved in some unknown time less than 263 years (1933 minus 1670).

Because *hybrida* has the size of the New Guinea population, the female tail pattern of the New Britain population, and a female ventral color intermediate between these two populations, it seems likely that colonist individuals of *E. scolopacea* arrived both from New Guinea and from New Britain and hybridized to form an intermediate population now distinct from both ancestral populations, as also seems likely for the Long population of *Hirundo tabitica*. One hint that colonists may still be arriving from the ancestral populations is provided by a subadult male that I collected on Crown in 1972 (now in the American Museum of Natural History awaiting cataloging; my field number 1637). Its small size is compatible with either *hybrida* or *rufiventer*, and its plumage is largely the black adult male plumage, which fails to distinguish *hybrida* from *rufiventer*. However, female-plumaged areas of the tail and underparts both agree with New Guinea *rufiventer*, rather than with *hybrida* or *salvadorii*.

92. Channel-billed Cuckoo, *Scythrops novaehollandiae*. I saw one individual twice on Savo on 24 August 1974 and saw and heard one three times on Simbo on 11 October 1974. The sole other Solomon record is for Rennell. Thus, all three Solomon islands of record are species-poor and isolated. Most records of this species outside Australia are of wintering visitors from Australia; there are three unproven reports of breeding in the Bismarcks, but none in the Solomons.

93. Buff-headed Coucal, *Centropus milo*. Striking reflections of the poor over-water colonizing ability of this Solomon endemic coucal are two examples of its absence on moderate-sized islands very close to islands populated by the species.

This coucal is a weak flier that I never saw in long, flapping flight. Instead, its usual mode of covering horizontal distances up to about 30 m is to climb a tall tree by a series of short hops and jumps, then glide from the top of that tree to another tree while losing altitude and occasionally flapping its wings. Like many other weak-flying species, the coucal is largely confined to larger islands, and the fraction of islands in a given size class that it occupies decreased with decreasing island area. This distributional pattern arises because risk of population extinction increases steeply with decreasing population size and hence with decreasing island area (Pimm et al. 1988). Occasional reimmigrations are required to offset those extinctions, but populations on smaller islands experience more frequent extinctions and receive fewer immigrants, so that smaller islands lack populations an increasing fraction of the time (Diamond and Marshall 1977, Gilpin and Diamond 1981).

The first example is in the New Georgia group, where the coucal is present on the nine largest islands (areas 95–2044 km<sup>2</sup>), absent on the tenth largest island (Wana Wana, 69 km<sup>2</sup>), present on the eleventh, twelfth, and thirteenth largest islands (13–35 km<sup>2</sup>), and then absent on all smaller islands except for three (0.15–1.6 km<sup>2</sup>) lying very close (20–150 m) to large coucal-occupied islands. Coucals are easy to detect because of their loud calls like a lion roaring, and they are well known to residents of the New Georgia group (name “nao” for adults, “sengege” for juveniles, in the Roviana language). I failed to find coucals on Wana Wana Island in two visits there (30 September 1974 and 18 September 1976), and Wana Wana residents insisted that it never occurred there. The nearest island to Wana Wana supporting coucals is Kohinggo, from which Wana Wana is separated by a strait 12 km long and only 2 km wide.

The second, even more striking, example

is in the Florida group, where I found coucals on the largest island (Big Nggela) but not on the second largest island (Small Nggela). The two “islands” are virtually halves of a single larger island divided by a narrow channel 12 km long, only 150 m wide at its narrowest and 1 km at its widest, and about 300 m wide for half of its length. Small Nggela is only slightly smaller than Big Nggela (174 versus 194 km<sup>2</sup>), nearly as high (1250 versus 1312 m), and ecologically similar, and supports most of the same bird species; the sole flagrant discrepancy is the coucal. Florida residents are of course thoroughly familiar with this conspicuous and distinctive bird, for which the local name is “vuleváu.” They told me that cyclones occasionally bring coucals from Big Nggela to Small Nggela, but that the birds then disappear or attempt to fly back to Big Nggela across the channel, into which most of them fall down.

The Solomon coucal’s closest relative is Pied Coucal, *Centropus ateralbus* of the Bismarcks, related in turn to other coucals of the Moluccas and New Guinea. Because Northern Melanesian islands arose from the ocean and have never had a land connection to continental land sources, coucals must have reached the Solomons over water. Presumably, as true of so many island bird populations, the ancestor of the Solomon coucal must have been a better over-water disperser and then undergone evolutionary loss of dispersal ability on reaching the Solomons. This evolutionary loss has involved actual flightlessness in a few Northern Melanesian species (perhaps *Nesoclopeus woodfordi*), weak flying ability in others (such as the coucal), and strong flying ability but behavioral aversion to flying over water in many species.

95. Barn Owl, *Tyto alba*. Although barn owls have been observed or collected by Western ornithologists on 13 Solomon and two Bismarck islands outside the New Georgia group, only two New Georgia islands (Vella Lavella and New Georgia itself) have such records. However, residents of eight other major islands (Ganonga, Gatokai, Gizo, Kohinggo, Kulambangra, Rendova, Vangunu, Wana Wana) and five islets in the group described to me a night bird, with the Roviana

name of “dunduru,” that is evidently this species. Residents of New Georgia and Wana Wana also described a second, smaller, brown species of “dunduru,” but no other owl species has been recorded from the New Georgia group. A possible candidate is a boobook owl: the Solomon Boobook, *Ninox jacquinoti* (see next treatment) is known from 12 Solomon islands outside the New Georgia group.

97. Solomon Boobook, *Ninox jacquinoti*. The Mono race *N. j. mono* is known only from the type series of five specimens collected by the Whitney South Sea Expedition. This was presumably the author of a call that I heard at 5 A.M. on Mono, a series of seven high notes somewhat similar to calls of the races on other Solomon islands (Diamond 1975*b*). Mono residents attributed the call to a hole-nesting nocturnal bird named the “kuru,” the same as the name for *N. jacquinoti* on Choiseul and similar to the name for *N. jacquinoti* (“nduru”) on Florida and for owls (see previous treatment: “dunduru”) in the New Georgia group. Residents of Shortland, an island near Mono and Choiseul from which *N. jacquinoti* had not yet been recorded, described to me as present but not common a small, brown, nocturnal, hole-dwelling bird with a catlike face and with the same name (“kuru”) applied to *N. jacquinoti* on Mono and Choiseul.

100. White-throated Nightjar, *Eurostopodus mystacalis*. In Northern Melanesia this nightjar is confined to the New Georgia group (nine of the larger islands plus at least four lagoon islets) and the northern Bukida group (Bougainville, Shortland group, and Ysabel). My field experience confirms what I was repeatedly told by Solomon residents: the bird lives mainly on small islets, and on the sea side but not the lagoon side of the coast of larger islands. The call is a series of 13–25 staccato notes at a rate of four to five notes per second. The series initially rises in pitch and then levels out to constant pitch. The quality is slightly musical, as of a log being struck with a blunt object.

112. Sacred Kingfisher, *Halcyon sancta*. Recorded from almost all Northern Melanesian islands, where the vast majority of records falls in the austral winter from April

to September and undoubtedly represents nonbreeding winter visitors from Australia. However, in the Solomons a few have been reported to remain throughout the year (Stevens and Tedder 1973), and there are breeding records from Guadalcanal (Cain and Galbraith 1956) and Three Sisters (French 1957).

I observed Sacred Kingfishers on most Solomon islands that I visited and throughout dates of field observations on both of my visits (22 August–28 October 1974 and 7–30 September 1976). Numbers declined markedly toward October, and at late dates most of the individuals that I saw were on small islets in Roviana and Wana Wana Lagoons and on larger outlying islands (Rennell: Diamond 1984) rather than on large central islands such as Guadalcanal, Choiseul, and New Georgia. Preferred habitats are villages, gardens, the coast, and mangroves of large islands, and coconut plantations and forest of small islands, whereas its somewhat larger close relative Collared Kingfisher, *Halcyon chloris*, prefers forest edge and open forest. The two species also differ in preferred perch heights: *H. sancta* usually is found below 4 m and *H. chloris* up to the tops of tall trees.

At my campsite on Lola Island in Wana Wana Lagoon in the period 2–23 September 1976 I repeatedly observed a pair trying to excavate a nest hole in a termite nest 1.5 m high on the side of a tree trunk. After abandoning that site as too small, they excavated in the top of a coconut stump 1 m high, until they abandoned that site as well.

My most detailed information about nesting and habits came from Teu Zinghite of Kulambangra. According to him, *H. sancta* can be found on Kulambangra in any month of the year, and he has found numerous nests, close to the ground on predator-free small islands (as I observed on Lola), at heights of 3–6 m on large islands but still lower than the preferred nest height for *H. chloris*. Nests are excavated in rotten trees or in termites' nests on the sides of trees, in sunnier, more exposed, less concealed locations than those used by *H. chloris*. The clutch size on Kulambangra is two to three for *H. sancta*, two to four for *H. chloris*. Eggs of the two species are similar except that those of *H. chloris* are slightly larger.

119. Blyth's Hornbill, *Rhyticeros plicatus*. The hornbill underwent a major range expansion in the Solomons several decades ago. When the Whitney Expedition was collecting in the Solomons (1927–1930), the hornbill was largely confined to the Bukida chain of islands (Buka to Guadalcanal) plus Malaita. Whitney collectors observed it in the Russell group only on the small island of Leru, and in the New Georgia group only on Kicha, Gatukai, and Vangunu at the southeastern end of the group (sight records in volume S of the expedition diaries). When I was in the Solomons in 1974 and 1976, I saw hornbills on Borokua halfway between the Russells and the New Georgia group, and on 11 islands of the New Georgia group (Gatukai, Vangunu, New Georgia, Rendova, Tetipari, Kohinggo, Wana Wana, Kulambangra, and three smaller islands in Wana Wana Lagoon). Islanders in the New Georgia group told me that the hornbill seasonally visits, but is not resident on, Vella Lavella and Gizo, that its status on Wana Wana is only as a seasonal visitor, and that it never occurs on Simbo or Ganonga.

Many people told me that this range expansion in the New Georgia group took place after World War II. The year can be pinpointed more closely as falling between 1945, when Sibley (1951) lived in the New Georgia group without encountering hornbills, and 1949–1954, when Alisasa Bisili lived on Vella Lavella and used to hunt them there. I did not observe hornbills on the Florida Islands (one of the smaller island groups in the Bukida chain) nor on Savo between Florida and Guadalcanal, but residents of both Florida and Savo said that hornbills were brought by Cyclone Ida in 1952 but did not remain.

127. Superspecies *Coracina [tenuirostris]*: Cicadabird, *C. [t] tenuirostris*, and San Cristobal Cicadabird, *C. [t.] salamonis*. Cicadabird populations of Northern Melanesia are notable for their habitat preference and extreme geographic variability in vocalizations (plate 7 of Mayr and Diamond 2001).

The ancestral New Guinea population is strictly a nonforest species replaced in forest by five congeners. In contrast, Northern Melanesian populations live mainly in groups of two to three in the forest canopy above 6 m,

and they are replaced outside forest by Yellow-eyed Cuckoo-Shrike, *C. lineata*, and White-bellied Cuckoo-Shrike, *C. papuensis*. On high islands (Kulambangra, New Britain, Umboi) I found *C. tenuirostris* up to about 1000 m.

Vocalizations show greater geographic variation than do vocalizations of any other Northern Melanesian species except Golden Whistler, *Pachycephala pectoralis*. I found the vocalizations recognizably distinct on every island without exception, and distinct between different sites on Umboi. There are three types of vocalizations. First, all populations share a flight call and contact call, which is a low-pitched, unmusical, spitted, and staccato “whk” repeated rapidly up to five times. Second, the populations of at least four Bukida islands (Fauro, Choiseul, Florida, Guadalcanal) give a series of several slow nasal whistled slurs. Related to these Bukida slurs are the calls of the morphologically very distinct San Cristobal population, *C. salamonis*, considered a distinct allospecies: a slightly decelerating series of 7–14 upslurred or downslurred nasal whistles at the rate of 0.7 sec per slur.

The third and most widespread call is a long crescendoing series of clear, ringing, musical notes at or near the same pitch. (This is the song replaced in South New Guinea and Australia by the series of unmusical buzzes familiar to Australian ornithologists and responsible for the vernacular name “Cicadabird”). I heard this song from *C. [tenuirostris]* populations on islands of the Papuan Region (e.g., Karkar) and on all occupied islands of Northern Melanesia except Florida, the Russell group, and San Cristobal. Geographic variation in this song involves five features summarized in Table 2. The number of notes varies from the shortest series of 10–16 on Shortland and Mono, to the longest Northern Melanesian series of 41–46 on Vella Lavella, to as many as 72 notes on Karkar (Diamond and LeCroy 1979). The speed or initial speed varies from the slow songs of Mono, New Britain, Gatukai, Shortland, and Vangunu (one to two notes per second) to the fast songs of Guadalcanal, Rendova, and Vella Lavella (five to six notes per second). The series is

TABLE 2  
Geographic Variation in the Third Song of the Cuckoo-shrike *Coracina tenuirostris*

1. Island	2. Subspecies group	3. Subspecies	4. Number of notes	5. Initial speed (notes/sec)	6. Change of speed	7. Change of series pitch	8. Change of note pitch
Karkar	<i>muellerii</i>	<i>muellerii</i>	30–72	3			D
Long	<i>muellerii</i>	<i>muellerii</i>			A start	No	D
Umboi: Arot	<i>muellerii</i>	<i>rooki</i>			No	No	U
Umboi: Lablab	<i>muellerii</i>	<i>rooki</i>	30		D	D	U
New Britain	<i>muellerii</i>	<i>heinrothi</i>		1.5	D		U
Shortland	<i>remota</i>	<i>saturatior</i>	10–16	2	D++ start		U
Mono	<i>remota</i>	<i>saturatior</i>	10–12	1	No		D
Fauro	<i>remota</i>	<i>saturatior</i>	13–27		D++	No	U
Choiseul	<i>remota</i>	<i>saturatior</i>	12–30		No	A	D
Vella Lavella	<i>remota</i>	<i>saturatior</i>	41–46	6	D++ end	D	
Gizo	<i>remota</i>	<i>saturatior</i>					D
Kulambangra	<i>remota</i>	<i>saturatior</i>	24–35	3	D	No	
Wana Wana	<i>remota</i>	<i>saturatior</i>	23–27	3	D++	A	
W.W. lagoon	<i>remota</i>	<i>saturatior</i>	18–35		No	A, D	
Vangunu	<i>remota</i>	<i>saturatior</i>		2	D		D end
Gatukai	<i>remota</i>	<i>saturatior</i>	10–30	1.8			D
Rendova	<i>remota</i>	<i>saturatior</i>		5			No
Guadalcanal	<i>remota</i>	<i>erythrogygia</i>	31–33	5	D++	D	U end
Savo	<i>remota</i>	<i>erythrogygia</i>		4		A	U

Note: Column 1: Island (W.W. lagoon = Wana Wana Lagoon; songs of the Arot and Lablab Districts of Umboi Island differ and are characterized separately). Column 2: Subspecies group (megasubspecies). Column 3: Subspecies (from Appendix 1 of Mayr and Diamond 2001). Column 4: Number of notes in the whole song. Column 5: Speed of the song, in notes per second (speed of the whole song if its speed is constant, or initial speed if the speed changes). Column 6: “No,” speed of song remains constant from start to end; “A, D, D++,” accelerates, decelerates, decelerates greatly; “start” or “end,” accelerates or decelerates especially at start or end of song. Column 7: “No, A, D,” or “A, D,” pitch remains constant, ascends, descends, or ascends then descends from start to end. Column 8: “No, U,” or “D,” each note remains at one pitch, is an upslur, or is a downslur (“end,” each note is at one pitch for most of the song but becomes an upslur or downslur toward the end of the song). Blank entries, I did not establish that characteristic on that island. See text for discussion.

delivered at a constant rate on some islands (Choiseul, Mono, Umboi’s Arot District, Wana Wana Lagoon), but on other islands it decelerates slightly (e.g., Kulambangra) or greatly near the start (e.g., Shortland) or greatly near the end (e.g., Vella Lavella), or else it accelerates (Long). The series remains at constant pitch (Fauro, Kulambangra, Long, Umboi’s Arot District), descends in pitch (Umboi’s Lablab District, Guadalcanal, Vella Lavella), ascends in pitch (Choiseul, Savo, Wana Wana), or ascends and then descends (Wana Wana Lagoon). Finally, the individual notes are either at constant pitch (Rendova), downslurred (e.g., Gizo, Gatukai), upslurred (e.g., Fauro, Shortland), initially at constant pitch but becoming downslurred at the end of the series (Vangunu), or initially at constant pitch but becoming upslurred at the end of the series (Guadalcanal).

This geographic variability in song correlates imperfectly with geographic variation in plumage. On the one hand, the morphologically very distinctive populations of San Cristobal (*C. salamonis*) and of the Russell group (*C. t. nisoria*) are vocally distinctive in lacking the otherwise widespread third song. On the other hand, the distinctive second song is given on Bukida islands but not by birds on islands of the New Georgia group, all of which belong to the race *C. t. saturatior*; and there is much quantitative variation in the third song between populations belonging to the same subspecies.

Finally, there appear to be some parallel geographic variation and convergence in the Solomons between songs of *C. [tenuirostris]* and of the satin flycatcher superspecies *Myiagra [rubecula]*, some of whose vocalizations on Bukida islands, the New Georgia group, and

San Cristobal are surprisingly difficult to distinguish from the local versions of the second and third songs of *C. [tenuirostris]* on that island.

128. Solomon Cuckoo-shrike, *Coracina holopolia*. This endemic, unobtrusive, little-known, taxonomically isolated species had previously been recorded from nine of the larger Solomon islands. On 24 September 1976 I observed it twice at sites several kilometers apart on New Georgia, whence records had been lacking. The species is confined to the crowns of tall trees, mainly at perch heights above 7 m but once down to 4 m, and mainly in forests on hilly terrain, occasionally in isolated trees and on flat terrain. Most of my observations were of individuals or pairs (once a trio) in small mixed flocks with its congeners *C. lineata*, *C. papuensis*, and *C. tenuirostris*, and once with Solomon Satin Flycatcher, *Myiagra ferrocyanea*. I saw one glean and capture an insect 3 cm long, hold it with one leg, and tear it apart.

The vocalizations of this species have not been previously described. I found that the subspecies *C. h. holopolia* of the Bukida group and *C. h. pygmaea* of the New Georgia group, which are very distinct morphologically, are also distinct vocally. On Guadalcanal (*C. h. holopolia*) the song is a regularly spaced series of 4–15 identical upslurs delivered at a rate of 1 slur/1.5–1.7 sec. Each slur begins slightly hoarsely and becomes more nasal. The series initially increases in volume. This song is at first easy to confuse with the upslur series of the Common Koel, *Eudynamis scolopacea*, but differs in being delivered faster and comprising more notes, with the notes spaced at equal rather than irregular time intervals, and with the series composed of more notes. On Kulambangra and New Georgia (*C. h. pygmaea*) the song differs in consisting of downslurs rather than upslurs, decelerating slightly in speed through the series, and dropping slightly in pitch at the end of the series, like a long-playing record played on a turntable that is slowing down. The frequently heard call of *C. h. pygmaea* is a single faint nasal note.

131. Pied Chat, *Saxicola caprata*. Previously known in Northern Melanesia only from New

Britain and two of its satellite islands (Long and Vuatom). The Los Angeles County Museum of Natural History contains a specimen collected by James Smith on 19 July 1979 at Hilalom on New Ireland, where there is also one sight record (Finch 1985).

142. Kulambangra Leaf-warbler, *Phylloscopus amoenus*. Nothing has been recorded of this warbler, endemic to Kulambangra, since the collection of the type and one other specimen without field notes by the Whitney Expedition in 1927 (Hartert 1929). In 7 days that I spent on Kulambangra, including 5 days camped at high elevation, I observed it only twice (5 and 6 October 1974): single individuals gleaning at 3–5 m in forest 12 m tall near the summit (1595 and 1620 m). The birds appeared dull-colored above, dull yellow with a slight olive tinge below, and with a suggestion of an indistinctly pale superciliary. The song is a fast, high-pitched, formless warble. The widespread Island Leaf-Warbler, *P. poliocephala pallescens*, which I observed nearby at the same elevation and in the same habitat, differed in its pale gray breast and whitish belly without a trace of yellow and in the much more distinct pale superciliary. These two warbler species differed ecologically in that all my observations of *P. poliocephala* were at heights of 6–12 m above the ground, considerably above the midstory heights of *P. amoenus*, and that I observed *P. amoenus* only at the summit (1595–1620 m) but *P. poliocephala* from the summit down to 1020 m. The population of *P. amoenus*, evidently uncommon and confined to the summit of one island, must be small.

144. Solomon Pied Fantail, *Rhipidura cockerelli*. This Solomon endemic belongs to the same superspecies as, and represents, Northern Fantail, *R. rufiventris*, of the Bismarcks, New Guinea, Australia, and the Lesser Sunda. It is virtually confined to Solomon islands of area  $\geq 95$  km<sup>2</sup>. It lives mainly in the shaded open middle story at 3–20 m under the canopy of tall forest, never inside dense vegetation. Most of my observations were of solitary individuals separate from the mixed-species insectivorous foraging flocks of other flycatcher species.

As for its foraging technique, it is the only

Solomon bird species that specializes exclusively in sallying. Unlike Rufous Fantail, *Rhipidura rufifrons*, and other typical fantails but like *R. rufiventris*, *R. cockerelli* perches with its body held upright rather than horizontally, and it never fans its tail, droops its wings, or crashes into foliage to beat out insects. Holding a perch for up to 10 min, but more typically 10–30 sec (depending on insect abundance), it turns its head but keeps its body stationary. From that solitary perch it sallies out to catch an insect in midair with a loud snap of the bill, or less often sallies to pluck an insect from vegetation while flying past without stopping to hover. Sallying and sallying/plucking were the sole foraging modes that I observed for it; I never saw it glean, hover-glean, probe, or hop along a branch. After a sally, it either returns to the same perch or else goes to a new perch up to 10 m away. However, most sallies consist of a large arc or a sweep toward the ground, so that the distance flown in a sally is several times the straight-line distance between successive perches.

The song is faint and consists of various three-note or four-note patterns within a small pitch range, delivered in an unpredictably varying tempo as in a Chopin waltz played rubato. The notes variously consist of voiced, short, slightly hoarse, whistled monosyllables at a single pitch or else unvoiced disyllables. Each note begins with a sharp attack like the notes of a keyboard instrument, especially like a flute stop of a baroque organ. Songs that I heard from the races *septentrionalis* (heard on Shortland), *interposita* (Choiseul), *cockerelli* (Guadalcanal), *lavellae* (Ganonga, Vella Lavella), and *albina* (Kulambangra, New Georgia, Vangunu, Tetipari, Rendova) were all quite similar. The song pattern is repeated ad nauseam every 2–4 sec for up to several minutes. I found it very easy to call up individuals of *R. cockerelli* by imitating the song.

145. San Cristobal Fantail, *Rhipidura tenebrosa*. I encountered this little-known species endemic to San Cristobal only once, in the shaded middle story and lower crown of 18-m-tall forest at an elevation of 600 m and at 6–12 m above the ground. It was in a mixed

flock with *Rhipidura rufifrons* and *Pachycephala pectoralis*. Unlike *R. cockerelli*, *R. tenebrosa* is a typical fantail in its behavior, though not as extreme as *R. rufifrons*: it often hops and turns, droops its wings, flares its tail, thereby presenting a maximum cross-sectional area in its line of advance, and moves thus through dense vegetation while using its large profile to stir up insects.

151. Superspecies *Monarcha [melanopsis]*: Spot-eyed Monarch, *M. erythrostrictus*; Chestnut-bellied Monarch, *M. castaneiventris*; White-capped Monarch, *M. richardsii*. Throughout the Solomons this is the most common lowland flycatcher, a core member of mixed-species insectivorous foraging flocks, specializing in capturing prey while hovering, but ranging from the understory to the canopy. Other flock members are (usually) pied monarchs *Monarcha [manadensis]*; Rufous Fantail, *Rhipidura rufifrons*; and satin flycatchers *Myiagra [rubecula]*; often, Solomon Pied Fantail, *Rhipidura cockerelli*; cicadabirds *Coracina [tenuirostris]*; white-eyes New Georgia White-eye, *Zosterops rendovae*; or Bukida White-eye, *Z. metcalfeii*; and Golden Whistler, *Pachycephala pectoralis*; and occasionally, honey-eaters *Myzomela [pammelaena]*. Only on San Cristobal were the flocks joined by Long-tailed Triller, *Lalage leucopyga*, and San Cristobal Starling, *Aplonis dichroa*, as well as by San Cristobal Cicadabird, *Coracina salamonis*, and San Cristobal Satin Flycatcher, *Myiagra cervinicauda*; the association of these four species with each other and with *M. castaneiventris* in mixed flocks may be a biological factor driving the surprising vocal convergence among these five species on San Cristobal (see discussion at the end of the section on Species Accounts).

Solomon populations of the superspecies (plate 5 of Mayr and Diamond 2001) use at least four types of vocalizations, all of which vary geographically. The first, which is given long before dawn as well as during the day and which I take to be the song, is a weak, tremulous, eerie, high-pitched, whistled note repeated two to five times at intervals of 2–3 sec. The pied monarchs *Monarcha [manadensis]* *manadensis* and *M. guttula* of New Guinea give a very similar song, but (strangely) the North-

ern Melanesian representatives of *M. [manadensis]* do not. As for geographic variation, *M. erythrostickta*'s version of this song (heard on Bougainville, Fauro, Shortland, and nearby islets) is either not tremulous or else tremulous just at the end of each note, and is either at constant pitch or downslurred. This song of *M. richardsii* (New Georgia group) is at constant pitch or slightly upslurred, and crescendoes on most islands, but crescendoes very little on Vangunu and Gatukai and not at all on Rendova. In *M. castaneiventris* this song is tremulous and downslurred on most islands, but varies considerably among islands: the Choiseul song is very high pitched, not tremulous, and with long notes; the Florida song is often given as a simultaneous duet; notes of the Pavuvu song are short and louder and sound like a police whistle; and the San Cristobal population does not give this song at all.

The second vocalization is a nontremulous, louder, downslurred, repeated, whistled note at a medium pitch considerably lower than the first song. I heard this song from *M. erythrostickta* (islets near Fauro) and *M. castaneiventris* (Choiseul, San Cristobal), but not from *M. richardsii*.

The third vocalization is a rapid, energetic series of somewhat musical scolding notes, reminiscent of the chatter of a squirrel, with the sense of a wound-up toy discharging, and very similar to calls of the closely related Island Monarch, *M. cinerascens*. I heard this call from all populations except *M. erythrostickta*.

The last type of vocalization, heard from all populations, consists of rasps: either a single, big, dry rasp like that of Shining Flycatcher, *Myiagra alecto*, or else several extremely harsh rasped notes like New Guinea's Black Monarch, *M. axillaris*.

Unique to the San Cristobal population is a medium-high-pitched, cheerful, fairly loud, slightly hoarse upslur, downslur, or note slurred up and then down, repeated three to six times, suggestive of calls of *M. cinerascens*, and convergent on calls of Long-tailed Triller, *Lalage leucopyga*, and other San Cristobal species that join the monarch in mixed flocks (see earlier under *Coracina salamonis*). It is curious that the San Cristobal population, *M. castaneiventris megarhynchus*, which morphologi-

cally is only a weakly differentiated subspecies, is vocally the most distinct Solomon population of the *M. [melanopsis]* superspecies in possessing this unique call and in lacking the otherwise ubiquitous first vocalization (weak tremulous repeated note). It is also distinct in its foraging mode of hopping rather than hovering.

152. Superspecies *Monarcha [manadensis]*: Bukida Pied Monarch, *Monarcha barbatus*; New Georgia Pied Monarch, *M. browni*; San Cristobal Pied Monarch, *M. viduus*. It was well known previously that the Solomon allospecies differ strikingly in plumage and size (see plate 3 of Mayr and Diamond 2001). For example, *M. viduus* is a much smaller bird, weighing 20% less than the other two allospecies. I noted equally striking behavioral differences in the field: *M. viduus* is much more nervous and *Rhipidura*-like in its quick movements. On San Cristobal *M. [manadensis] viduus* is more common and forages on the average higher than its congener *M. [melanopsis] castaneiventris*, but the relations are reversed in the Bukida and New Georgia groups, where *M. [manadensis] barbatus* and *M. [manadensis] browni*, respectively, are less common and forage on the average lower than *M. [melanopsis] castaneiventris* and *M. [melanopsis] richardsii*, respectively.

159. Golden Whistler, *Pachycephala pectoralis*. In 1962 the Noona Dan Expedition added Dyaul to the Northern Melanesian islands inhabited by this hypervariable species, but the Dyaul specimens were not studied taxonomically. I examined five adult males and seven adult females from Dyaul in the Zoological Museum of the University of Copenhagen. Compared with specimens of the race *P. p. citreogaster* that the Noona Dan Expedition collected on the nearest Bismarck islands (New Ireland, New Hanover, New Britain), Dyaul specimens agree well, differing only in the yellower, less olive, back of males. Males of the closely related Mangrove Golden Whistler, *P. melanura*, differ in the same respect from male *P. p. citreogaster*, making one wonder whether the Dyaul population is of hybrid origin (see discussion of hybrid populations below). However, I cannot detect other *P. melanura*-like traits in the Dyaul

population: for example, Dyaul males have the olive primary edges and narrow breast band of *P. pectoralis*.

This is the most geographically variable bird species in the world, with 66 recognized subspecies (Galbraith 1956, Mayr 1967), many of them very distinctive in plumage and sometimes considered separate allospecies. Sixteen of these subspecies live in Northern Melanesia, and speciation has proceeded to the point of two sister-species living sympatrically beside *P. pectoralis* (*P. melanura* and Solomon Mountain Whistler, *P. implicata*). (See plate 2 of Mayr and Diamond 2001 for paintings of seven *P. pectoralis* races and both sister-species.) Although this geographic variation in plumage is famous and regularly cited in textbooks of biology (e.g., Mayr 1942), little has been reported about variation in behavior and life history. My observations indicate equally marked variation in at least three characteristics: altitudinal range, vertical stratum preferences, and song.

As for altitudinal distribution, of the 34 Northern Melanesian island populations for which I have information, 26 occur at sea level and extend up to various elevations, and eight are confined to mountains and absent from sea level: those on New Britain, New Ireland, Bougainville, Ganonga, Kulambangra, Rendova, Vangunu, and Gatokai. For example, the populations of Kulambangra, Vangunu, and Gatokai are confined to elevations above about 150 m; the populations of Rendova and New Britain's Mt. Talawe, to above about 300 m; and the populations of Bougainville's Kieta area, to above about 600 m. Altitudinal distribution varies within subspecies: there are both montane and lowland populations of the subspecies *citreogaster* (New Britain and New Ireland versus Umboi and other islands, respectively), *bougainvillei* (Bougainville versus Buka and Shortland), *centralis* (Kulambangra, Vangunu, and Gatokai versus New Georgia and Kohinggo), and *melanoptera* (Rendova versus Tetipari). Furthermore, there is also variation within the same island: on Bougainville *P. pectoralis* reaches sea level at Cape Torokina but not at Kieta or Mt. Balbi, and on New Britain at Ralum but not on Mt. Talawe.

As for vertical stratum preference, most populations that I observed prefer the middle story and lower crown, but the Tetipari and New Georgia populations live mostly high in the crown, and the Rennell population remains mostly below 5 m, never gets above 12 m, and is unique in often feeding thrushlike on the ground. In addition, males forage markedly higher than females on some islands: I observed heights for males and females, respectively, of 8–18 and 0.6–9 m on Kulambangra and 6–24 and 0.6–16 m on Pavuvu, and Cain and Galbraith (1956) observed even more extreme vertical segregation of the sexes on Guadalcanal. However, there is much less vertical segregation on San Cristobal, where I found both sexes at 5–15 m, in agreement with the observations there of Cain and Galbraith (1956), who noted that interisland variation in vertical segregation may relate to interisland variation in sexual dimorphism of cryptic plumage.

I shall describe interisland variation in song, proceeding from the islands with the simplest songs to those with the most complex songs. Within each population, each individual has a repertoire of multiple songs, and individuals differ in their songs. The simplest and weakest songs are on Tolokiwa (race *citreogaster*) and Bougainville (*bougainvillei*) and consist of only three to seven notes, of which the first one to four are high pitched and constant pitched (not slurred) and tinkling, the next one to two notes lower pitched and fuller and still constant pitched, and the last note a single upslur or downslur. Umboi songs (also *citreogaster*) are almost as simple, differing only in that the first note is sometimes disyllabic. All of these songs are similar to those of New Guinea's Rusty Whistler, *Pachycephala hyperythra*.

Still weak, and only slightly more complex, is the song on Choiseul (*orioloides*): a rapid series of 3–10 notes, most of them upslurs or downslurs, and few or none of them at constant pitch. The Florida song (also *orioloides*) also consists of a rapid series of upslurs and downslurs, is louder than on Choiseul, and stands out by being very long, often lasting more than 3 sec. Guadalcanal songs (*cinnamonea*) are similar to those on Florida but shorter.

Pavuvu songs (*pavuvu*) are the loudest songs that I have heard from any *Pachycephala* species, rivaling the related Grey Shrike-Thrush, *Colluricincla harmonica*, in volume. The song is long (up to 18 notes), consists mostly of slurs rather than constant-pitched notes, includes diverse qualities of notes (slurs, smacking notes, whiplike notes), and crescendoes. Noteworthy on Pavuvu is song structuring: the song begins with an introductory note or slur repeated up to eight times. The song of the distinctive sexually monomorphic Rennell race (*feminina*) is also loud and diverse, thereby reminding one of an *Acrocephalus* warbler or New World mockingbird (*Mimus*) (Diamond 1984). Elements on Rennell include many constant-pitched notes, plus squeaks, mellow notes, impure tones, rapid doublets and triplets (a very rapid pair or trio of notes), and some slurs. Characteristic on Rennell is the repetition of a note two to eight times on one pitch, then on another pitch, and again for a total of up to four pitches, with each successive pitch set being louder, faster, and less pure toned. The diverse call notes include extremely harsh notes, a staccato froglike note, and a rattled high-pitched note, and they are convergent on Rennell calls of the Island Thrush, *Turdus poliocephalus*, on which the Rennell whistler population also converges in its ground-feeding habits.

The Rendova song (*melanoptera*) is loud and diverse in its sounds, which include unvoiced staccato notes (lacking on the previously named islands), bell-like notes, squeaky notes, and many slurs.

When I first heard the song on Vangunu (*centralis*), I considered it the wildest, most spectacular *Pachycephala* song known to me—but I had not yet been to Kulambangra (next paragraph). Elements include fast runs; repeated slurs that become louder, higher pitched, and more excited with each repetition; explosive sounds; ringing notes at high consistent pitch; and notes variously resembling in quality those of the Singing Parrot, *Geoffroyus heteroclitus*; Collared Kingfisher, *Halcyon chloris*; and thrush alarm calls.

The most brilliant *P. pectoralis* song that I heard was on Kulambangra (also *centralis*). A notable, almost unique feature (present much

less often in Vangunu songs) is fast, accelerating runs of many notes in a series either ascending in pitch, descending in pitch, or ascending and then descending several times at breakneck speed. As on Vangunu, Rendova, and Pavuvu, the elements are diverse and include high soft squeaks, explosive notes, constant-pitched notes, and slurs. Dawn songs, but not those later in the day, are antiphonal, with the male giving most of the song and the female ending the song with one or several explosive and especially loud notes. On Kulambangra and Vangunu the whistler songs completely dominate the dawn chorus, overwhelm the songs of other bird species, and the loud volume of individual singers multiplied by the species' abundance makes the overall volume deafening.

160. Mangrove Golden Whistler, *Pachycephala melanura*. *Pachycephala melanura* and its very close relative *P. pectoralis* occur together in a fine-grained checkerboard over most of *P. melanura*'s range from coastal northern Australia through coastal eastern New Guinea and the Bismarcks to the northwestern Solomons (Galbraith 1967, Diamond 1976). On the whole, they segregate as a result of *P. melanura* occupying smaller or more remote or volcanically recently defaunated islands, and *P. pectoralis* occupying larger and more central islands. There is no known case of overlap of breeding territories, but *P. melanura* vagrants have been found on islands with resident *P. pectoralis* populations. The eastern limit of *P. melanura*'s range is reached in the Shortland group of the Solomons, just south of Bougainville. On three small islands there (Akiki at 155° 38' E, 7° 00' S, Momalufu at 155° 30' E, 6° 57' S, and Whitney somewhere nearby) the Whitney Expedition in 1927 collected a population that Hartert (1929) described as a *P. pectoralis* race *P. p. whitneyi*, but that Mayr (1932b) showed to constitute a very variable hybrid population between *P. melanura dabli* (the *P. melanura* race occupying the Bismarcks and islets in the Northwest Solomons) and *P. pectoralis bougainvillei* (the *P. pectoralis* race of Bougainville, Buka, and Shortland, the three largest islands in the Northwest Solomons).

In October 1974 I visited the three largest

islands (Shortland, Fauro, Mono) and 10 small islands in the Shortland group. Shortland itself supports *P. pectoralis bougainvillei*. I found no whistlers on Fauro, Mono, and seven of the 10 small islands (from east to north to west going counterclockwise around Fauro: Bagora, Samarai, Piru, New, Kanasata, Kukuvulu, and Nusave). On the remaining three islets (Tapanu and Nameless at 156° 08' E, 6° 50' S, and Elo at 155° 53' E, 6° 53' S) I saw and heard, and collected four males and one female specimen of, evidently hybrid populations. Sizes were intermediate between the larger *P. p. bougainvillei* and smaller *P. m. dabli*: weights ♂ 25, 31, 32, 32, ♀ 33 g; wings ♂ 93, 95, 95, 96, ♀ 90 mm; tail ♂ 67, 69, 69, 70 mm, ♀—. The male's throat was either pure white as in *P. m. dabli* or else had inconspicuous lemon tips on white, but was never the pure yellow of *P. p. bougainvillei*. Male axillaries were white with variably lemon edges, intermediate between the two parent taxa. Male primary edges were gray as in *P. m. dabli* or else olive-gray, but never the olive of *P. p. bougainvillei*. The female specimen was closest to *P. m. dabli* in its dark gray to gray-brown (not brown) crown, dark gray primaries with dull olive-gray edges (not brown), dull olive rather than olive-brown back, and gray-tipped whitish throat grading posteriorly through pale gray and dirty lemon to pale lemon on the belly.

The Elo population consisted of at least seven individuals, of which at least three were singing simultaneously. Songs that I heard on all three islets were relatively weak and short and consisted of three to five introductory repeated notes, upslurs, or pairs of slurs, ending in a final upslur. These songs are similar to *P. m. dabli* songs of the Bismarcks and *P. p. bougainvillei* songs of Bougainville, which are in turn fairly similar to each other. They differ from *P. p. orioloides* songs of Choiseul and songs of other Solomon *P. pectoralis* populations (see preceding treatment).

Evidently, small islands of the Shortland group still supported hybrid populations in 1974, as they did in 1927. The populations are evidently maintained by dispersing vagrants from *P. p. bougainvillei* populations established on Bougainville and Shortland, and

from *P. m. dabli* populations established on small islets fringing Bougainville. This is a typical example of hybridization between two species that maintain reproductive isolation in the geographic core of the range, but that hybridize at the periphery of the range of one species (*P. melanura*), where potential conspecific mates are hard to find.

168. Kulambangra Mountain White-eye, *Zosterops murphyi*. This white-eye, endemic to Kulambangra, was previously known only from the type series of five specimens with no field notes. It proved to be the most abundant bird in the mountains of Kulambangra, living in large flocks of up to 100 or more individuals that move downhill in the morning and back uphill in the midafternoon. I found it from the summit (1620 m) down to 950 m, once even at 660 m, so there is some altitudinal overlap with its famous lowland congener New Georgia White-eye, *Zosterops [griseotinctus] rendovae*, which I found up to 1130 m. However, the two species overlap commonly only at 950–1070 m, with higher and lower elevations occupied mainly just by *Z. murphyi* and *Z. rendovae*, respectively. In the field *Z. murphyi* and *Z. rendovae kulambangrae* are most quickly distinguished by the former's very broad white eye-ring and gray legs, the latter's very thin white eye-ring and orange legs (see plate 1 of Mayr and Diamond 2001).

*Zosterops murphyi* is a canopy species, remaining in tall forest mainly above 5 m, but descending to 1 m in the low (< 9 m) vegetation on Kulambangra's summit. Its diet and foraging modes are diverse: I saw it take insects, pick at fruit 3 mm in diameter, and probe at flowers in *Eugenia* trees shared with Meek's Lorikeet, *Charmosyna meeki*, and New Georgia Myzomela, *Myzomela eichborni*.

A nest found on 5 October 1974 at a height of 1.5 m in a 1.8-m-high bush on Kulambangra's summit was a woven cup 5 cm deep and 5 cm in diameter, made of tiny dry twigs and containing two naked chicks.

The song is a high-pitched warble distinct among *Zosterops* songs by being very long (up to 5 sec) and not distinctly broken into syllables as is the "telegraph" song of *Z. rendovae* (Diamond 1998). The quality is very sweet and sometimes penetrating. Many notes have

a sharp attack, like the sound of a coin dropped on a hard surface. The overall effect resembles a small version of the song of Europe's Common Blackbird, *Turdus merula*, as also true for the race *Z. rendovae kulambangrae*, so there may be vocal convergence between the two Kulambangra white-eye populations. The call is either a constantly given peeping note with a sharp attack, faint from each individual bird but cumulatively loud from the whole flock, or else a descending whinny.

175. Cardinal Myzomela, *Myzomela cardinalis*, and 177. San Cristobal Myzomela, *Myzomela tristrami*. The San Cristobal group of islands at the southeastern end of the Solomon chain consists of the large island of San Cristobal, plus four nearby (8–20 km) smaller islands (Santa Anna, Santa Catalina, Ugi, Three Sisters). The current distributions of these two honey-eaters in the group are seemingly straightforward: both species occur on San Cristobal, *M. tristrami* alone on Santa Anna and Santa Catalina, and *M. cardinalis* alone on Ugi and Three Sisters. However, new information and reexamination of specimens suggest a more complex and interesting story of a recent invasion, ongoing dispersal, and hybridization (see plate 4 of Mayr and Diamond 2001).

The facts are as follows. On the most remote of the four smaller islands, Three Sisters (20 km from San Cristobal), *M. cardinalis* is resident, and *M. tristrami* has never been recorded (French 1957). On Ugi (8 km from San Cristobal) as well, *M. cardinalis* is resident, but Ugi islanders told me that *M. tristrami* occasionally visits from San Cristobal, and Dutson (2001) saw two individuals. Ugi names are “kikito” for *M. cardinalis* and “kikito-ni-hanuato” (meaning “kikito from the big land [San Cristobal]”) for *M. tristrami*. On Santa Anna and Santa Catalina (also 8–9 km from San Cristobal) *M. tristrami* is the resident species, but G. Dennis and G. Kuper of Santa Anna and W. Ma-onga of Santa Catalina told me that *M. cardinalis* arrives infrequently in small numbers at both islands (e.g., after a December 1971 cyclone) and remains for some time near the coast. The name given to *M. tristrami* on Santa Anna is “kikite,” but *M. cardinalis* is called

“kikite-marao,” meaning “the kikite from Marao [local name for Three Sisters]” because these *M. cardinalis* vagrants are believed to originate from Three Sisters, as may indeed be true. The sole bird collections obtained on Santa Anna, by the Whitney Expedition in 1927 and 1930, included 17 specimens of “pure” *M. tristrami*, no “pure” *M. cardinalis*, and two evident hybrids closest to *M. tristrami* (black except for a few red-edged feathers on the rump: Mayr 1932a).

As for San Cristobal itself, I found (as did Cain and Galbraith [1956] in 1953) *M. tristrami* abundant everywhere from the coast inland to the highest elevation that I reached at 635 m. *Myzomela cardinalis* was abundant in the Kira Kira area on the coast and in coastal coconut plantations, but the farthest from the coast that I saw even a single individual was only a few hundred meters inland along the Magoha River. Both species fed in the same flowering trees at the government station at Kira Kira, where *M. cardinalis* chased *M. tristrami*, as expected from the former's somewhat larger size.

According to San Cristobal residents, *M. cardinalis* was formerly absent, arrived recently, is still spreading over the island, and hybridizes with *M. tristrami* at the front of its expanding range where the two species have just come into contact, but hybridization ceases in areas of longer contact. This account is supported by my examination of specimens and of the literature (Figure 1). Nineteenth-century collectors on San Cristobal obtained only *M. tristrami*, neither *M. cardinalis* nor hybrids. A. S. Meek in 1908 obtained *M. tristrami* and hybrids, but no pure *M. cardinalis*; the Whitney Expedition in 1927–1930 found *M. cardinalis* nearly as abundant as *M. tristrami* and also took hybrids; and Cain and Galbraith (1956) found *M. cardinalis* more abundant than *M. tristrami* and took no hybrids. In many other cases of range expansions as well, hybridization occurs in early stages or at the geographic front, where the expanding species is greatly outnumbered by the resident species and has difficulty finding conspecific mates (Mayr 1963; cf. my discussion of *Pachycephala melanura* × *P. pectoralis* earlier).

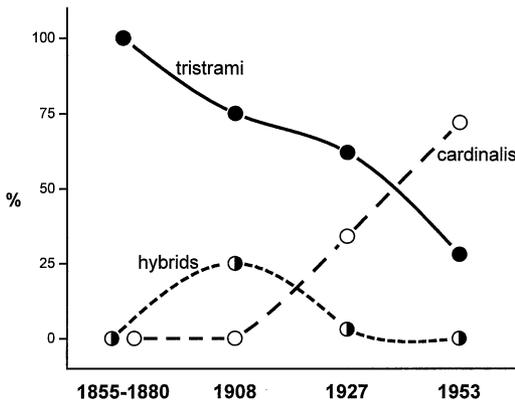


FIGURE 1. Relative frequencies (as percentages) of *Myzomela tristrami*, *M. cardinalis*, and hybrids between them, in collections from coastal areas of San Cristobal at four different periods. 1855-1880, various collectors; 1908, A. S. Meek; 1927, Whitney Expedition; 1953, Cain and Galbraith. Note that the first collectors found only *M. tristrami*, later collectors found hybrids and rising numbers of *M. cardinalis*, and the latest collectors found *M. cardinalis* outnumbering *M. tristrami* and did not find hybrids. This appearance and subsequent disappearance of hybridization is a frequent phenomenon when one species invades the range of a close relative. See text for discussion.

The invasion of San Cristobal by *M. cardinalis* must have originated from the resident populations of the same subspecies (*M. c. pulcherrima*) on Three Sisters and Ugi. In accord with this interpretation, the first known established *M. cardinalis* population on San Cristobal was that encountered by the Whitney Expedition in 1927 at Kira Kira and Wainoni Bay on the north coast opposite Three Sisters and Ugi. The Whitney collectors did not find the species during their stay at Star Harbor at San Cristobal's east end opposite Santa Anna and Santa Catalina Islands, where *M. cardinalis* is still not established (volumes D, P, and V of the Whitney Expedition diaries). It would be of great interest today to survey the coasts of San Cristobal to determine how far along the coastline *M. cardinalis* has spread, and where hybridization is still occurring.

183. Blue-faced Parrot-Finch, *Erythrura trichroa*. Previously known in the Solomons only from Bougainville and Guadalcanal. I heard an individual twice and saw it twice

in forest understory near the summit of Kulambangra.

188. Superspecies *Aplonis* [*grandis*]: Brown-winged Starling, *Aplonis* [*grandis*] *grandis*, and San Cristobal Starling, *A. [grandis] dichroa*. This superspecies, endemic to the Solomons, is represented on the Bukida and New Georgia groups by the large *A. g. grandis*, and on Guadalcanal by the very similar *A. g. macrura*; on Malaita, by the intermediate-sized *A. g. malaitae*; and on San Cristobal, by the small *A. dichroa*. My field observations comparing *A. grandis* and *A. dichroa* supplement previous notes by Cain and Galbraith (1956) and by Finch (1986). My comments about *A. grandis* apply equally to the races *grandis* and *macrura*, between which I did not note differences; I did not visit Malaita.

*Aplonis grandis* is widely distributed. I observed it on every island of the New Georgia group exceeding 35 km<sup>2</sup> in area, and on 14 small islands in lagoons. It has also been recorded on every moderate-sized island of the Bukida group. Hence it must colonize across water frequently. Although I never saw it fly over water, Teu Zinghite has seen it cross between islands up to 2 km apart. In contrast, *A. dichroa* is known only from San Cristobal, has never been reported on any of the smaller islands of the San Cristobal group, and evidently does not cross water now.

*Aplonis grandis* occurs mainly outside forest or in very open forest, much less often in deep forest, mainly in the lowlands (including on the coast), and only uncommonly in the mountains. I recorded it a few times in montane forest of Kulambangra up to 1000 m, never in the mountains of Vangunu or Rendova. In contrast, *A. dichroa* occurs regularly in forest as well as in more open habitats; I found it inland but not immediately on the coast; and Cain and Galbraith (1956) observed it most often in the mountains. Both allospecies prefer the canopy, but *A. grandis* is more extreme in its preference for the top of the tallest trees.

*Aplonis grandis* occurs mainly in pairs. Out of 49 cases in which I tallied the number seen, there was one quartet, three trios, 44 pairs, and one individual. However, *A. dichroa* occurs mainly in groups of three to eight.

*Aplonis dichroa* appears to be considerably more abundant than *A. grandis*.

*Aplonis grandis*, but never *A. dichroa*, has the distinctive habit of sitting for a long time at midday with its black plumage fully exposed to the hot sun, like a cold-blooded reptile trying to warm itself. Why doesn't *A. grandis* overheat?

I observed both allospecies to eat mainly fruit, mostly tiny fruits of diameter 1–2 mm, but occasionally up to 5 mm in the case of the larger *A. grandis*.

The nest of *A. grandis* is a conspicuous large mass of sticks, vines, moss, and lichens 20–60 cm in diameter in the crown of a tall tree, often an isolated dead tree. According to Teu Zinghite, on Kulambangra one clutch per year of two (less often, three) eggs is laid in the period September to November, and the usual stick nest is much less often replaced by a hole in a branch. On San Cristobal neither I nor anyone else has noted the conspicuous stick nests, and one resident told me that *A. dichroa* instead nests in a hole in a tree.

The "song" of *A. grandis* is a medley of high-pitched soft notes of diverse, unmusical, peculiar, unbirdlike qualities, delivered at a rate of about 0.7 sec per note. Common elements are staccato, very short, slightly sucked-in, unvoiced clicks at various pitches; staccato, short, snapping notes; gurgles; short bell-like notes; downslurred mellow whistles; short crescendoing whistles at constant pitch; and a very high-pitched creaking upslur that seems to strain the bird's throat and to rise in pitch beyond the human auditory range. The "song" of *A. dichroa* is also soft and varied but otherwise entirely different: a whistled upslur repeated every few seconds; a mewling upslur at medium-high pitch; a high-pitched nasal note; a high-pitched piercing downslur; and a medium-high-pitched musical complex slur (downslurred then upslurred, or else vice versa) repeated 8–10 times at about 0.6 sec per slur.

Both allospecies appear to be involved in vocal mimicry or convergence. The vocalizations of *A. grandis* are confusingly similar to those of the slightly larger starling *Mino dumontii* (absent on *A. dichroa*'s island of San

Cristobal), whose song is louder and includes many fewer clicks. *Aplonis grandis* and *M. dumontii* are also similar in their typically loud wing beats (not true of *A. dichroa*). The vocalizations of *A. dichroa* are instead similar to those of three San Cristobal endemics: San Cristobal Cicadabird, *Coracina salomonis*; Long-tailed Triller, *Lalage leucopyga*; and the San Cristobal race *megarhynchus* of Chestnut-bellied Monarch, *Monarcha castaneiventris*. These vocal similarities may have some biological significance, because the vocally similar species in each case except for the insectivorous monarch overlap in frugivorous diet.

#### DISCUSSION

Northern Melanesia's rich avifauna, its hundreds of endemic bird taxa, and its geographic fragmentation into hundreds of ornithologically significant islands combine to make it a premier study area for the field biologist. This paper can only begin to indicate some of the innumerable problems awaiting further study.

It is clear that the geographic variation in morphology for which Northern Melanesian birds are famous is paralleled by geographic variation in other biological attributes. These attributes include voice (e.g., *Accipiter albogularis*, *Ptilinopus solomonensis*, *Reinwardtoena [reinwardtii]*, *Ninox [novaeseelandiae]*, *Halcyon chloris*, *Coracina [tenuirostris]*, *C. holopolia*, *Monarcha [melanopsis]*, *M. [manadensis]*, *Pachycephala pectoralis*, and *Aplonis [grandis]*), behavior (*Monarcha [melanopsis]*, *M. [manadensis]*, *Aplonis [grandis]*), habitat preference (*Coracina [tenuirostris]*, *Aplonis [grandis]*), altitudinal range (*Ptilinopus solomonensis*, *Pachycephala pectoralis*), vertical stratum (*Monarcha [manadensis]*, *Pachycephala pectoralis*, *Aplonis [grandis]*), abundance (*Ptilinopus solomonensis*), and nest (*Aplonis [grandis]*).

There are many cases of sympatric populations whose vocalizations are much more similar to each other than are the vocalizations of populations of the same species from different islands (e.g., *Accipiter albogularis* and *Halcyon chloris*, *Coracina [tenuirostris]* and other species in its mixed-species foraging flocks, and *Zosterops murphyi* and *Z. rendovae*

*kulambangrae*). These cases pose the questions of whether the resemblance involves vocal mimicry, vocal convergence, or just chance, and—if the explanation is not chance—what might be the selective forces underlying the mimicry or convergence.

I have reported three cases of hybridization: between two colonist populations arriving at the same unoccupied island (*Eudynamis scolopacea*), between an established species and an invading relative (*Myzomela tristami* and *M. cardinalis*), and between a species in the center and another species at the periphery of its geographic range (*Pachycephala pectoralis* and *P. melamura*). Careful study is likely to detect many more cases in which vagrants dispersing over water become incorporated by hybridization into a related resident population on an island that they reach.

This paper illustrates the enormous range of over-water dispersal ability among Northern Melanesian bird populations. Some are maintained by Australian winter visitors (e.g., *Scythrops novaehollandiae*, *Halcyon sancta*) or Australian wind-blown vagrants (*Pelecanus conspicillatus*, *Phalacrocorax melanoleucos*, *Ardea alba*, possibly *Tbreskiornis moluccus*) that only occasionally remain to breed. Northern Melanesian resident species themselves include species that can be seen daily flying over water (*Haliaeetus sanfordi*, *Accipiter albogularis*), species that readily colonize defaunated volcanic islands (*Ptilinopus solomonensis*, *Eudynamis scolopacea*), species that fly short but not long distances over water (*Cacatua ducorpsi*), strong fliers that refuse to fly over water, weak fliers (*Centropus milo*), and flightless species (*Nesoclopeus woodfordi*).

Even within the 32 years since I first visited Northern Melanesia, deforestation has reduced opportunities to study these biological phenomena. The greatly accelerated rate of deforestation today lends urgency to further studies.

#### ACKNOWLEDGMENTS

I thank Ernst Mayr for 47 years of friendship and inspiration about Northern Melanesian birds; Teu Zinghite, Alisasa Bisili, and many other residents of Northern Melanesia for

help with fieldwork and for sharing their knowledge; the staff of the Bird Department of the American Museum of Natural History for allowing me to study their collections for the past 37 years; Jon Fjeldså and Kimball Garrett for allowing me to study bird collections in the Zoological Museum of the University of Copenhagen and the Los Angeles County Museum of Natural History, respectively; and the National Geographic Society for support.

#### Literature Cited

- Ball, E. E., and I. M. Hughes. 1982. Long Island, Papua New Guinea: People, resources, and culture. *Rec. Aust. Mus.* 34:463–525.
- Beehler, B., T. Pratt, D. Zimmerman, H. Bell, B. Finch, J. M. Diamond, and J. Coe. 1986. *Birds of New Guinea*. Princeton University Press, Princeton, New Jersey.
- Blong, R. J. 1982. *The time of darkness*. Australian National University Press, Canberra.
- Bradley, D., and T. Wolff. 1956. The birds of Rennell Island. *Nat. Hist. Rennell Isl., Br. Solomon Isl.* 1:85–120.
- Cain, A. J., and I. C. J. Galbraith. 1956. Field notes on birds of eastern Solomon Islands. *Ibis* 98:100–134, 262–295.
- Diamond, J. M. 1966. Zoological classification system of a primitive people. *Science* (Washington, D.C.) 151:1102–1104.
- . 1971. Bird records for western New Britain. *Condor* 73:481–483.
- . 1972. Further examples of dual singing by Southwest Pacific birds. *Auk* 89:180–183.
- . 1974. Colonization of exploded volcanic islands by birds: The supertramp strategy. *Science* (Washington, D.C.) 183:803–806.
- . 1975a. Assembly of species communities. Pages 342–444 in M. L. Cody and J. M. Diamond, eds. *Ecology and evolution of communities*. Harvard University Press, Cambridge, Massachusetts.
- . 1975b. Distributional ecology and habits of some Bougainville birds (Solomon Islands). *Condor* 77:14–23.

- . 1976. Preliminary results of an ornithological exploration of the islands of Vitiaz and Dampier Straits, Papua New Guinea. *Emu* 76:1–7.
- . 1984. The avifaunas of Rennell and Bellona Islands. *Nat. Hist. Rennell Isl., Br. Solomon Isl.* 8:127–168.
- . 1989*a*. A new subspecies of the Island Thrush *Turdus poliocephalus* from Tolokiwa Island in the Bismarch Archipelago. *Emu* 89:58–60.
- . 1989*b*. This-fellow frog, name belong-him dakwo. *Nat. Hist.* 98 (4): 16–23.
- . 1989*c*. The ethnobiologist's dilemma. *Nat. Hist.* 98 (6): 26–30.
- . 1991. A new species of rail from the Solomon Islands and convergent evolution of insular flightlessness. *Auk* 108:461–470.
- . 1998. Geographic variation in vocalizations of the white-eye superspecies *Zosterops [griseotinctus]* in the New Georgia group. *Emu* 98:70–74.
- Diamond, J. M., and K. D. Bishop. 1999. Ethno-ornithology of the Ketengban people, Indonesia New Guinea. Pages 17–45 in S. Atran and D. Medin, eds. *Folk biology*. MIT Press, Cambridge, Massachusetts.
- Diamond, J. M., and M. LeCroy. 1979. Birds of Karkar and Bagabag Islands, New Guinea. *Bull. Am. Mus. Nat. Hist.* 164:469–531.
- Diamond, J. M., and A. G. Marshall. 1977. Distributional ecology of New Hebridean birds: A species kaleidoscope. *J. Anim. Ecol.* 46:703–727.
- Diamond, J. M., and E. Mayr. 1976. Species-area relation for birds of the Solomon Archipelago. *Proc. Natl. Acad. Sci. U.S.A.* 73:262–266.
- Diamond, J. M., M. E. Gilpin, and E. Mayr. 1976. The species-distance relation for birds of the Solomon Archipelago, and the paradox of the great speciators. *Proc. Natl. Acad. Sci. U.S.A.* 73:2160–2164.
- Diamond, J. M., S. L. Pimm, M. Gilpin, and M. LeCroy. 1989. Rapid evolution of character displacement in myzomelid honeyeaters. *Am. Nat.* 134:675–708.
- Dutson, G. 2001. New distributional ranges for Melanesian birds. *Emu* (in press).
- Finch, B. W. 1985. Noteworthy observations in Papua New Guinea and Solomons. *Papua New Guinea Bird Soc. Newsl.* 215:6–12.
- . 1986. The *Aplonis* starlings of the Solomon Islands. *Muruk* 1:3–16.
- French, W. 1957. Birds of the Solomon Islands. *Ibis* 99:126–127.
- Galbraith, I. C. J. 1956. Variation, relationships, and evolution in the *Pachycephala pectoralis* superspecies (Aves, Muscicapidae). *Bull. Br. Mus. (Nat. Hist.) Zool.* 4:133–222.
- . 1967. The Black-tailed and Robust Whistlers *Pachycephala melanura* as a species distinct from the Golden Whistler *P. pectoralis*. *Emu* 66:289–294.
- Gilpin, M. E., and J. M. Diamond. 1976. Calculation of immigration and extinction curves from the species-distance relation. *Proc. Natl. Acad. Sci. U.S.A.* 73:4130–4134.
- . 1981. Immigration and extinction probabilities for individual species: Relation to incidence functions and species colonization curves. *Proc. Natl. Acad. Sci. U.S.A.* 78:392–396.
- Hadden, D. 1981. Birds of the North Solomons. Wau Ecology Institute, Wau, Papua New Guinea.
- Hartert, E. 1929. Birds collected during the Whitney South Sea Expedition. 8. Notes on birds from the Solomon Islands. *Am. Mus. Novit.* 364.
- Mayr, E. 1932*a*. Birds collected during the Whitney South Sea Expedition. 18. Notes on Meliphagidae from Polynesia and the Solomon Islands. *Am. Mus. Novit.* 516.
- . 1932*b*. Birds collected during the Whitney South Sea Expedition. 20. Notes on thickheads (*Pachycephala*) from the Solomon Islands. *Am. Mus. Novit.* 522.
- . 1942. Systematics and the origin of species. Columbia University Press, New York.
- . 1955. Notes on the birds of Northern Melanesia. 3. Passeres. *Am. Mus. Novit.* 1707.
- . 1963. Animal species and evolution. Harvard University Press, Cambridge, Massachusetts.

- . 1967. Subfamily Pachycephalinae, Whistlers or Thickheads. Pages 3–51 in R. A. Paynter, ed. Check-list of birds of the world. Vol. 12. Museum of Comparative Zoology, Cambridge, Massachusetts.
- Mayr, E., and J. M. Diamond. 1976. Birds on islands in the sky: Origin of the montane avifauna of Northern Melanesia. *Proc. Natl. Acad. Sci. U.S.A.* 73:1765–1769.
- . 2001. *The birds of Northern Melanesia: Speciation, ecology, and biogeography*. Oxford University Press, New York.
- Pain, C. F., R. J. Blong, and C. O. McKee. 1981. Pyroclastic deposits and eruptive sequences on Long Island, Papua New Guinea. *Papua New Guinea Geol. Surv. Men.* 10:101–113.
- Pimm, S. L., H. L. Jones, and J. M. Diamond. 1988. On the risk of extinction. *Am. Nat.* 132:757–785.
- Sibley, C. G. 1951. Notes on the birds of New Georgia, central Solomon Islands. *Condor* 53:81–92.
- Stevens, G. W., and J. L. O. Tedder. 1973. *A Honiara bird guide*. British Solomon Islands Scout Association, Honiara.