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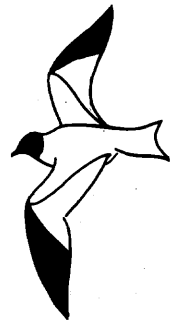

DO BIRDS FLOCK IN HAWAII, A LAND WITHOUT PREDATORS?

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Birds of a feather sometimes flock together, as anyone knows who has ever seen blackbirds or sandpipers in fall. More surprisingly, in many parts of the world birds of different feathers flock together. H. W. Bates (1863), in his classic "Naturalist on the River Amazons," reports how the empty forest seemed to come alive with dozens of kinds of birds whenever one of the diverse Amazonian "mixed flocks" passed by. Less spectacular but similar mixed flocks of Plain Titmice, Hutton's Vireos, and other birds can be seen in California oak woodland. Those who watch for mixed flocks will be surprised how common they are, from migrant warblers among Common Bushtits in chaparral to Cactus Wrens among Black-throated Sparrows on the desert.

Some mixed flocks gather for obvious reasons, such as the gulls one sees at garbage dumps or the flocks of birds that follow army ants for flushed insects in tropical America. The birds in most complex flocks, however, seem to congregate and follow each other without obvious reasons. Probably no biologist can say what a warbler gains by following Bushtits about, although many biologists nowadays are studying mixed flocks. Reasons suggested for mixed flocks mostly fall in two categories. Perhaps the birds lead each other to food, or avoid competing for food, by watching each other. Perhaps the birds avoid predation by associating with each other.

One bird I studied in Panama, the small Spotted Antbird *(Hylophylax naevioides),* definitely spent less time calling or fleeing nervously when it associated with birds of other species (Willis, in press). This gave it the opportunity to stare at the ground to forage.

Presumably, if there were no predators there would be no reason for such birds as Spotted Antbirds to join other species; they could forage as they pleased without keeping near other alert birds. Mixed flocks bound together by wariness would be absent; flocks would be associated with feeding opportunities only.

Birds in an area without predators could form a natural experiment. If flocks like those of the Vireo and the Titmouse existed in such an area, it would be likely that these mixed flocks do form for food reasons alone. Birds and other organisms in places without predators lose their defensive mechanisms rapidly. Island birds are notably fearless, and plants on Hawaii seldom have spines or poisons (Carlquist, 1970). Warner (1968) found Hawaiian honeycreepers do not sleep with their heads in their back feathers, and are therefore easy prey for introduced mosquitoes.

The problem is, it is rare to find a place without predators. It is especially difficult to find such a place with many species of birds, so that one can get mixed flocks. The natural experiment, however, has been performed on certain oceanic archipelagos that have few or no predators. As Darwin found during the voyage of the Beagle, the isolated archipelago of the Galapagos has many species of finches but hardly any native predators. However, there are many somewhat predatory lizards on the Galapagos.

Evolution on the Hawaiian Islands has produced a group of land birds as diverse as the Darwin's Finches, in a land almost without predators. There are open-country Hawaiian Hawks *(Buteo solitarius)* on the island of Hawaii and Short-eared Owls *(Asio flammeus)* on all islands, but no predatory native mammals or reptiles. Unless the hawk and owl fed on insects and nestlings, they may have come to Hawaii as new immigrants after the Polynesians introduced rats; they seldom eat adult birds. If there were mixed flocks of the diverse native Hawaiian birds, they surely could not be caused by predation except perhaps on the island of Hawaii itself.

The Drepanididae, or Hawaiian honeycreepers, are a fascinatingly diverse group of birds. Having evolved from one or two original kinds of birds, so far back that nobody now knows whether they were tropical honeycreepers or Northern finches, the many types of drepanidids now possess the widest variety of types of bills in any bird family. There are small warblerlike ones with straight bills (the Anianiau, *Loxops parva)* or slightly decurved ones (the Amakihi, *Loxops virens),* others with vireolike bills (the Creeper, *Loxops maculata,* of the forest undergrowth, and the Akepa, *Loxops*

coccinea, of the leafy tree crowns) and finally strange rare creatures with downcurved bills over 2 inches in length (the Akaialoa, *Hemignathus procerus).* One, the Akiapolaau *(Hemignathus wilsoni),* has a short, straight lower mandible that it uses to flake bark off trunks with woodpeckerlike hammering, while its long downcurved upper mandible probes for insects in crevices. The related Nukupuu *(Hemignathus lucidus)* differs mainly in having the short lower mandible downcurved. Related birds, mostly the size of large sparrows, had thick finchlike bills or even parrotlike ones to crack seeds or tear open twigs. Regrettably, most finchlike birds except the Palila *(Psittirostra bailleui)* are now rare or extinct.

Another line, mostly extinct now with the exception of the common red Apapane *(Himatione sanguinea)* with its short, slightly decured bill and the fairly common red and black Iiwi *(Vestiaria coccinea)* with its long downcurved bill, adds to the diversity of the native Hawaiian avifauna. In addition, there are a little native flycatcher, the Elepaio *(Chasiempsis sandwichensis),* two native thrushes (including the Omao, *Phaeornis obscura),* and numerous introduced birds. The avifauna is certainly diverse enough that mixed flocks could form, although the native birds have suffered greatly and many are now rare or extinct. Introduced mosquitoes brought them introduced diseases (Warner, 1968), introduced ants killed insects they fed on (Zimmerman, 1970), and the original forests were reduced to a quarter their original extent (Carlquist, 1970).

G. C. Munro, one of the collectors at the turn of the century, saw the native Hawaiian birds during their horrible decline. In 1944, he recorded his memories and field notes of half a century on the islands. On Kauai, he reports, the Creeper formed small flocks with Akepas. The constant chipping of the Creeper attracted other birds. To find certain rare species, such as the Nukupuu, he followed the chipping of the Creeper. Since there were no native predators on Kauai other than Short-eared Owls, Munro's report interested me greatly. Richardson and Bowles (1964:29) reported Anianiau often forage together with Amakihi. It seemed that there might indeed be mixed flocks on Hawaii in the absence of predators.

However, one must be cautious of reports of mixed flocks. Even birds that ignore each other occasionally come in contact, and an observer who comes up at that moment will think the birds are associating. Sometimes birds mobbing an observer will attract other species. One needs to watch critically to see if birds actually follow each other.

Thus, when my wife Yoshika and I went to Hawaii, I looked for mixed flocks. I quickly found that some of the other things I looked for, such as rare or reportedly extinct birds, were very hard to find. As Berger (1970) reports, bird study on Hawaii is very difficult for a variety of reasons. Many of the native birds are so rare or restricted to undisturbed forests that a major expedition is needed to hunt them down. I tried hiking in to some such places, such as a 10-mile mountain climb to the upper Kipahulu Valley on the east side of the extinct volcano Haleakala on the island of Maui; but I found that I had only three or four hours of birding before I had to start hiking back. Naturally, I missed the rare species.

However, if one gets to relatively undisturbed forests above 1000 meters elevation, he finds that the remaining native birds of Hawaii are often remarkably common and far outnumber the introduced birds in some areas. On our first day on Hawaii, in the forests of ohia trees and tree-ferns along Kilauea Crater, it seemed that every other treetop had its Apapane or two, every fifth tree a tail-flicking little Amakihi. These are the two commonest surviving honeycreepers, common on all the larger Hawaiian islands from the last scrubby ohias in the crater of Haleakala down to the slopes above Honolulu.

From Kilauea, we went to cabins at Pohakuloa State Recreation Area in the dry saddle between the massive volcanoes of Mauna Kea and Mauna Loa. In the dry scrub and eucalyptus, House Finches, House Sparrows and California Quail outnumbered native birds. The pretty little Red-billed Leiothrix *(Leiothrix lutea)* were in flocks of up to 10 birds, and I watched small groups of introduced White-eyes *(Zosterops palpebrosus)* and a few Amakihi follow one such flock. There were many White-eyes and Amakihis away from this mixed flock, however.

From Pohakuloa, I drove up on the slopes of Mauna Kea to what proved the best birding area on the "Big Island" of Hawaii. This was the scrubby, low grassy woodland of mamane and naio trees at Andrew Berger's study area above Puu Ulaau cabin. Here, Elepaio flitted from bush to bush, Amakihi were more common than Elepaio, crimson Apapane and Iiwi paraded from treetop to flowering treetop, and Palila whistled from a few of the mamane trees. The scolding of a few Leiothrix, almost the only introduced birds besides the common White-eyes and grass-dwelling Skylarks, brought in the most exciting bird--a bright yellow Akiapolaau with its absurdly shaped bill, to tap on branches inside a mamane near me and then to perch near me as I squeaked and drew in curious Amakihi from all

directions. One feels sad that this forest is gradually dying, mainly from overgrazing by feral sheep and goats that are protected for Hawaiian hunters. There are still many native birds, but I still had not seen a mixed flock. The Iiwi and Apapane concentrated in flowering trees, but that was all.

Akipuka, an island of tall ohia and other trees amid the lava flows at Mile 22 from Hilo, was another exciting area near Pohakuloa. On a foggy afternoon, it was bursting with the strange songs of Omao and Iiwi. The weird chirps of Apapane came from the treetops, and Amakihi and Elepaio flitted lower. The birds still crisscrossed without forming mixed flocks, however. Even though there is a hawk on the Big Island, we left with the impression that only introduced birds--ones whose ancestors recently fled hawks and other predators--formed mixed flocks.

On Maui, I hiked up over the rim of Haleakala Crater from the few ohia trees at Paliku Cabin, then down through grassland on the north side of the volcano before dropping down into the cloud forest of the rugged upper Kipahulu Valley. Here I finally found Creepers, or rather families of them found and chipped busily at me. There were Amakihi, Apapane, and Iiwi all over the place, but no mixed flocks, in the cluttered tree-ferns and lichens and gnarled ohia trees. On the way back down Kaupo Gap, I saw a few birds but no flocks in the dry scrub and streamside koa forests.

We birded little on Oahu, except for introduced birds in the lower Makiki Valley at Honolulu. We saved three days for the highlands of Kauai, a forested plateau which everybody agreed is the best place for native birds on the islands. At our cabins at Kokee State Park there were many introduced trees among the native koas, but native birds still outnumbered introduced White-eyes, Hwa-Meis *(Garrulax canorus),* and Cardinals *(Richmondena cardinalis).* To the usual Elepaio, Amakihi, Apapane and Iiwi the little yellow Anianiau added variety. There were plenty of birds, but no definite flocks. Yoshika saw one group in which Apapane and Amakihi seemed to associate with Elepaio, however.

To see other native birds we went up past the Kaumahina Lookouts, where the rain-drenched forests of the Alakai Swamp spill over into the huge canyons and wrinkled cliffs of the western wall of Kauai. On the rainy first day we found Akepa as well as the four commoner drepanidids along the divide, and were interested that the Akepa seemed to be in family groups. The next day the weather cleared beautifully, for one of the few days each year in which rainy

Mt. Waialeale, off across the ohia woodlands of the Alakai Swamp, could be seen all day. I hiked through the boggy meadows and patchy woodlands of the Swamp, adding Creepers to the five other honeycreepers. The Creepers did chip a little, as Munro reported, but only at me. I began to wonder if the other birds Munro had seen with them had just come to the chipping at him.

The first two Creepers I saw were in a bird flock with an Anianiau and two Amakihi plus an Elepaio, but the flock seemed to dissipate like clouds over Kaumahina as I watched. The rest of the Creepers were paired, but were wandering apart from other species. At no time did the fairly numerous Akepa of the canopy join them, and I wondered how they could do so when the Creepers seemed to stay so low and Akepa so high. Alas, I saw none of the rare Nukupuu and Akaialoa that Munro thought joined such flocks.

At places like Volcano House, Puu Ulaau, Kipahulu, Kokee, and the Alakai we saw hundreds of Hawaiian honeycreepers of eight species. The general impression we had is that they are abundant compared to tropical birds in Panama, that they scatter all over the place, and that they wander singly, in pairs, or in small groups. Practically none were in definite mixed flocks, except in a few flowering trees. The few mixed flocks we saw could almost be explained by random movement or by temporary attraction to outside things like my squeaking. The honeycreepers mostly seemed to lack alarm calls, although the chipping of Creepers was a definite antipredator noise connected mainly with danger to young birds.

So, our preliminary study suggests that lack of predators leads to lack of alarm calls and to few or no mixed flocks on Hawaii; do mixed flocks elsewhere form to watch out for predators? Before we can conclude this we need to look for other possibilities. My wife and I were only able to spend ten days (14-23 September 1971) looking for mixed flocks on Hawaii. Perhaps there are bird flocks at some other season, even though we went in a nonbreeding month, when mixed flocks are usually best in other parts of the world. Perhaps we did not get far enough into the forests to see mixed flocks in which rare Nukupuu and Akaialoa might play a part.

Even if mixed flocks are rare on Hawaii, it might be that they are rare for some reason other than lack of predators. Island birds are typically few in numbers of species but high in numbers of individuals compared to mainland areas, and Hawaii is no exception. Island trees and insects are similarly low in numbers of species and high in numbers of individuals compared to mainland trees and

Table 1. a-e – a, 10 percent, b, 20 percent, up to e, 50 percent with mixed flocks. f-14 to 23 September 1971. Nonpasserines and birds of open country not included. Some birds of open country, such as Black-headed Mannikins and Strawberry Finches, do form mixed flocks.

Number of Birds Seen and Percent in Mixed Flocks, by locality (f)

Birds	*Hawaii* Volcano House	Thurston Tube	Pohakuloa	Puu Ulaau	Mile 22	Mile 31	*Maui* Paliku	Kipahulu	Kaupo Gap	*Oahu* Makiki	*Kauai* Kokee	Kaumahina	Alakai	Total	% Mixed
Native Species															
Turdidae															
Omao		3			6									9	0
Muscicapidae															
Elepaio				50	2					1	5		6[b]	64	2
Drepanididae															
Amakihi	10	15	10[d]	75	10	3	15	30	15	2	16	8	5[b]	214	2
Anianiau											18	5	15[a]	38	3
Creeper								15					10[b]	25	8
Akepa												3	10	13	0
Akiapolaau				1										1	0
Palila				4										4	0
Apapane	75	100		15	15		1	40			27	50	40	363	0
Iiwi		1		8	15			10			8	1	5	48	0
Introduced Species															
Zosteropidae															
White-eye	15	5	10[e]	5	3		10	8	5	15	5		15	86	6
Timaliidae															
Hwa-mei											7		3	10	0
Leiothrix			20[e]	10		3		4						37	27
Turdidae															
Shama										6				6	0
Pycnonotidae															
Bulbul, Red-vented										2				2	0
Fringillidae															
Cardinal											4		2	6	0
Finch, House			40	20			10	10	10	8				38	0
Ploceidae															
Sparrow, House			30											30	0
Estrildidae															
Waxbill (sp.)										2				2	0

insects. The lack of similarly foraging bird species on islands could lead to lack of flocking. The high numbers of individual birds and of food sources of a few types could remove any necessity for a bird to join others to search for rare food. Perhaps we should look at other islands, ones with predators, to see if there are mixed flocks on those islands.

Moreover, the Hawaiian honeycreepers are peculiar birds, not very diverse despite their diversity. Many of them, both birds with straight and long curved beaks, feed on nectar from the common ohia flowers. Most of them are treetop birds, except the Creepers and a few rare species. It might be that they come from nonflocking ancestors, or that their nectar and fruit-eating habits force them not to be sociable. This is not true of other fruit-eating birds, for Moynihan (1962) found fruit-eating honeycreepers do form mixed flocks in Panama; and I have repeatedly seen such flocks in the Amazon. However, more study is needed, both on Hawaii and in other areas, to see if absence of predation causes a lack of mixed flocks.

SUMMARY

Mixed flocks seemed rare among native land birds on Hawaii. The absence of native predators may have allowed birds to wander separately.

LITERATURE CITED

Bates, H. W. 1863. The naturalist on the river Amazons. Murray, London.

Berger, A. J. 1970. The present status of the birds of Hawaii. Pacific Science 24: 29-42.

Carlquist, S. 1970. Hawaii: A natural history. Natural History Press, Garden City, N. Y.

Moynihan, M. 1962. The organization and probable evolution of some mixed species flocks of neotropical birds. Smithsonian Misc. Collns., 143 (7): 1-140.

Munro, G. C. 1944. Birds of Hawaii. Tongg Publishing Co., Honolulu.

Richardson, F. and J. Bowles. 1964. A survey of the birds of Kauai, Hawaii. Bull. Bernice P. Bishop Museum 227.

Warner, R. E. 1968. The role of introduced diseases in the extinction of the endemic Hawaiian avifauna. Condor 70: 101-120.

Willis, E. O. in press. The behavior of Spotted Antbirds. A.O.U. Monographs.

Zimmerman, E. C. 1970. Adaptive radiation in Hawaii with special reference to insects. Biotropica 2: 32-38.

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