



FIGURE 1. Horn's (1966) index of overlap ( $R_o$ ) for foraging height vs. character difference (C. D.) in bill length and bill depth of several species of scansorial birds wintering in deciduous woods. All correlation coefficients ( $r$ ) significant,  $P < 0.01$ . Solid symbols represent intersexual comparisons; open symbols, the interspecific comparisons.

foraging techniques (Willson 1970), which, however, do not seem to be consistently associated with differences in bill size or shape.

## BIRD RECORDS FROM WEST NEW BRITAIN

JARED M. DIAMOND

Physiology Department  
UCLA Medical Center  
Los Angeles, California 90024

The island of New Britain lies in the Bismarck Archipelago 50 mi. E of New Guinea and has the richest avifauna of the Pacific islands except for New

The convergence in bill size and foraging height of these scansorial birds may represent any one of the following situations. It may be a statistical fluke, which seems unlikely because it occurs in two seasons despite some changes in foraging behavior. Secondly, it may be a result of spatial proximity during pair formation of red-bellies and downies, but it occurs during winter also, when red-belly male and female may occupy separate territories, and the correlations hold good even if these points are omitted (see fig. 1). It may be a convergence due to similarity of relevant habitat components (Schoener 1970), but this should produce a strong convergence of bill size and foraging *site*, rather than of *height*. This was not the case, but it is possible that habitat utilization *other than* foraging results in feeding convergence. Finally, it may represent a condition permitted by a great abundance of certain foods and therefore relaxed competition.

There were an unusual number of red-heads in the woods during that winter (more individuals than remained to breed) and almost none the next. The great variability of red-head density suggests that this species may, at least in winter, be foraging rather opportunistically, i.e., settling in large numbers in response to abundant food and departing for other areas if food is scarce. Other species may do so to some extent also. Interspecific aggression was fairly frequent in winter but may have resulted primarily from physical proximity and violation of individual distances more than from competition for food. Possibly during this one-winter study there was an unusually good supply of some kinds of food (such as acorns, corn left standing in nearby fields, etc.) obtained by means other than bark-gleaning which were not quantified.

I am grateful to J. R. Karr for helpful discussions.

## LITERATURE CITED

- HORN, H. S. 1966. Measurement of "overlap" in comparative ecological studies. *Amer. Nat.* 100: 419-424.
- MARTIN, A. C., H. S. ZIM, AND A. L. NELSON. 1951. *American wildlife and plants*. Dover, New York. (1961 reprint of orig. McGraw-Hill ed.)
- SCHOENER, T. W. 1970. Size patterns in West Indian *Anolis* lizards. II. Correlations with the sizes of particular sympatric species—displacement and convergence. *Amer. Nat.* 104:155-174.
- WILLSON, M. F. 1970. Foraging behavior of some winter birds of deciduous woods. *Condor* 72: 169-174.

Accepted for publication 28 December 1970.

Guinea. The lowlands of east and central New Britain have been fairly well explored ornithologically, and there have been two surveys of New Britain mountains, by W. F. Coultas (Whitney South Sea Expedition) and by E. T. Gilliard. In May-July 1969 I collected on Cape Gloucester at the west tip of New Britain, from sea-level to the 5600-ft summit of Mt. Talawe. Pending a full report on the collection, I here report eight records of interest.

Little Pied Cormorant. *Phalacrocorax melanoleucos*. A pair was observed, and one collected, near the coast. This cormorant has a wide but somewhat ir-

regular distribution from Indonesia to the Solomon Islands and had not been previously recorded from the Bismarck Archipelago.

New Britain Grey-headed Goshawk. *Accipiter princeps* (Accipitridae). A male was collected at 3800 ft, and one individual was seen eating a thrush, *Zoothera talasea*, trapped in a mist-net at 4700 ft. The stomach of the specimen contained only insects. This goshawk was previously known from the type series of three specimens collected at 2500 and 3600 ft in the mountains near Wide Bay by Coultas.

White-throated Pigeon. *Columba vitiensis halmaheira* (Columbidae). An immature female was collected at sea-level. The species has a wide range from the Philippines to Fiji, including the Solomon Islands, but had not previously been known from New Britain or the other islands of the Bismarck Archipelago. The related *Columba pallidiceps* is confined to the Bismarck Archipelago and Solomon Islands.

Yellow Wagtail. *Motacilla flava simillima* (Motacillidae). A female was collected on a gravel riverbank at sea-level on July 23. This is the farthest east wintering record of this Siberian breeding form, for which there are seven records from New Guinea.

New Britain Thrush. *Zoothera talasea* (Turdinae). Three specimens were taken in mist-nets at 4700 ft. The species was previously known from the unique type collected by Eichhorn in 1925 near Talasea.

Island Leaf Warbler. *Phylloscopus trivirgatus* (Sylviinae). This warbler was fairly common from 4500 ft up to the summit of Mt. Talawe. The New Britain population was discovered in the Whiteman Range by Gilliard in 1958.

New Britain Honeyeater. *Melidectes* ("Vosea") *whitemanensis* (Meliphagidae). When Gilliard (1960) discovered this large honeyeater in the Whiteman Range at 3700–5700 ft, he erected for it the monotypic genus *Vosea*, noting that it was near the genera *Melidectes* (which consists of nine species in the mountains of New Guinea) and *Melilestes* (monotypic, *M. megarhynchus*, New Guinea lowlands). The New Britain Honeyeater was common on Mt. Talawe from 4300 ft up to the summit. Observations of its voice and behavior, and reevaluation of its morphology, tentatively suggest that it is a *Melidectes* nearest *M. fuscus* and that *Melilestes megarhynchus* is unrelated. The evidence is as follows:

**Voice.** The song of *Vosea* consists of three to eight soft, mellow, whistled pairs of notes delivered at a rate of about one pair per 0.7 sec. The first note of each pair is simple, the second note is trilled or uneven, slightly down-slurred, and at a slightly lower pitch. The song of *Melidectes fuscus* is essentially the same except that the pair of notes is repeated several dozen times instead of three to eight times. Both *Vosea* and *M. fuscus* sing often. *Melilestes* is a quiet bird, usually silent, whose call is a very soft, down-slurred, scolding, somewhat harsh mew or "chur-r-r" unlike either *Vosea* or any *Melidectes*.

**Behavior.** The foraging technique and movements of *Vosea* are similar to those of the five *Melidectes* species with which I am familiar. It moves vigorously like a released coiled spring, with abrupt transitions between rest and motion. It gathers in flowering trees to feed on insects (and probably nectar), hops along branches, and springs off abruptly with rapid flight. It often hangs vertically, head-downwards, to reach a flower, probing with the body nearly horizontal and the head bent down to reach underneath a branch. Also it probes with the body

horizontal and the head rotated nearly 180° around the axis of the body to reach upwards, and flattens and extends the body to peer forward. *Melilestes*, on the other hand, is slow, sluggish, and shy, and has a peculiar foraging technique, working its way up tree trunks and gleaning close to the trunk and main branches.

**Altitudinal range.** It may be relevant, though not a strong indicator, that all nine *Melidectes* species plus *Vosea* are montane and absent below 3000 ft, while *Melilestes* is tropical and common at sea-level.

**Morphology.** The nine New Guinea *Melidectes* species fall into two groups. One includes those species with throat and/or gape wattles, pale edges on the feathers of the back, a large bare patch of facial skin, large size (40–105 g), relatively stout bills, and loud nasal songs often delivered as duets (*M. torquatus*, *M. ochromelas*, *M. rufocrissalis*, *M. leucostephes*, *M. foersteri*, *M. belfordi*). Members of the other group are without throat or gape wattles or pale edges on the back feathers and with a very small bare patch of skin below and behind the eye, of medium size (25–60 g), with relatively slender bills, and have soft songs of two alternating types of notes not involving duetting (*M. fuscus*, *M. princeps*, *M. nouhuysi*). In morphology as well as in voice *Vosea* is nearer the latter group, particularly *M. fuscus*, from which it differs in four respects: *Vosea*'s plumage is olive-brown rather than sooty blackish; its tail is shorter; it has less feathering dorsally and laterally at the base of the bill; and its bill is slightly swollen at the base dorsally. In these four respects *Vosea* resembles *Melilestes megarhynchus*, which differs in having the bill more ridged dorsally, the skin around the eye feathered (although there is said to be a small area of naked skin in *M. m. vagans* of Waigeu), the patterned underwing (axillaries and inner edges of primaries ochraceous contrasting with dull dark primaries, rather than whole underwing dark), and the distinctive immature plumage (yellow eye-ring, ventral streaking). The marked differences in voice and behavior between *Melilestes*, on the one hand, and *Melidectes* and *Vosea*, on the other hand, suggest that *Melilestes* and *Vosea* are not closely related despite their superficially similar appearances. I have no field experience with the Bougainville Honeyeater (*bougainvillei*), which has been variously placed in the genera *Lichmera*, *Meliphaga*, *Melilestes*, or the monotypic genus *Stresemannia*.

Except for "Vosea," no other bird of the Bismarck Archipelago is currently placed in an endemic genus; the rail "*Habropteryx insignis*" has been shown to be a *Rallus* (Mayr 1949) and the babbler-warbler *Ortygocichla rubiginosa* congeneric with *O. rufa* of Fiji and possibly with several other forms (Mayr 1933). In contrast, two other neighboring island groups, the Moluccas and the Solomons, each have several distinct endemic genera (six and four, respectively). The avifauna of New Britain and the other islands of the Bismarck Archipelago is derived mainly from New Guinea, partly from the Solomon Islands. Of the 125 breeding land and freshwater birds of New Britain, only 10 are endemic to New Britain or the Bismarck Archipelago at the level of the species, 18 at the semispecies level, 51 at the subspecies level, and 46 are not even racially distinct. This recency and low degree of endemism of New Britain's avifauna also applies to its frog fauna, which is apparently both poorly differentiated and depauperate compared with the frog faunas of New Guinea and of the Solomon islands (Zweifel 1960).

Blue-faced Parrot-Finch. *Erythrura trichroa sigilifera* (Estrildidae). This finch was observed from 3000 ft to the summit of Mt. Talawe. It is widespread in the southwest Pacific but had been reported only once previously from New Britain (Thompson 1964).

I am deeply indebted to many residents and officials of the Territory of Papua and New Guinea for cooperation in the field work; to the National Geographic Society, Explorers Club, and American Philosophical Society for support; and to Mary LeCroy, Dean Amadon, Ernst Mayr, and Richard Zweifel for suggestions and information.

#### LITERATURE CITED

GILLIARD, E. T. 1960. Results of the 1958-1959 Gilliard New Britain Expedition. 1. A new

genus of honeyeater (Aves). Amer. Mus. Novitates, no. 2001.

MAYR, E. 1933. Birds collected during the Whitney South Sea Expedition. XXII. Three new genera from Polynesia and Melanesia. Amer. Mus. Novitates, no. 590.

MAYR, E. 1949. Notes on the birds of northern Melanesia. 2. Amer. Mus. Novitates, no. 1417.

THOMPSON, M. C. 1964. Two new distributional records of birds from the southwest Pacific. Ardea 52:121.

ZWEIFEL, R. G. 1960. Results of the 1958-1959 Gilliard New Britain Expedition. 3. Notes on the frogs of New Britain. Amer. Mus. Novitates, no. 2023.

Accepted for publication 8 March 1971.

## HIGH NEST DENSITY AND NON-RANDOM NEST PLACEMENT IN THE CEDAR WAXWING

STEPHEN I. ROTHSTEIN<sup>1</sup>

Division of Vertebrate Zoology  
Peabody Museum  
Yale University  
New Haven, Connecticut 06520

The nesting of the Cedar Waxwing (*Bombycilla cedrorum*) has been described as loosely colonial (Lack 1968) although isolated nests are regularly found. In July 1969, I found a group of nests that measurably extends our knowledge of the intensity of nest clumping or coloniality known for this species. Twenty nests were found in a 2.3-acre white pine (*Pinus strobus*) plantation in Cheboygan County, Michigan. Besides its high nest density, the situation was also noteworthy in that the nests showed a non-random distribution.

The plantation was rectangular in shape and measured 194 × 44 m. Nearly all the pines were between 3 and 7 m in height. They were planted in north-south rows and most trees in a row were contiguous. The rows were 2-5 m apart and many pines touched trees in adjacent rows. The plantation was bordered on the east and west by dry grassy fields some 80 m in width. Beyond the east field was a vegetable garden, and then some hayfields. Beyond the west field was a forest of large aspens (*Populus* sp.). This forest directly bordered the south side, but a dirt road ran east-west through the forest about 8 m from the plantation. To the north, the plantation was bordered by a large expanse of dry, sandy fields sparsely covered with grasses.

#### NEST DENSITY AND PLACEMENT

The entire plantation was searched on 5, 18, and 26 July. Intervening visits were made in order to check nests. I suspect that I missed additional nests, since cues such as scolding were not provided by the birds and high nests were difficult to see. Seventeen

nests were located in crotches formed by a main trunk and a branch. Two nests were 0.5 and 1.5 m out from the trunk. The exact placement of the last nest is uncertain since it was found dangling from a branch. Young probably fledged from this nest, as it contained many pieces of feather sheathing. All other nests had eggs and/or young when found. Estimates of nest heights averaged 3.4 m and ranged from 1.7 to 6.1 m.

The total nest density was 8.7 nests per acre. But not all 20 nests were active at the same time. The minimum number of active nests at any one time was between 10 and 17 and probably at least 13. The minimum density of active nests was 4.4-7.4 nests per acre, and was probably at least 5.7. Some nests were quite close to each other. Pairs of nests definitely active at the same time were 9.7, 8.5 and 7.0 m apart. Two nests which may have been from a pair overlapping first and second nestings were 10.0 m apart. Putnam (1949) also noted occasional pairs of close nests, "in three cases not over 25 ft separated two nests." But it is not stated that these were active nests of different pairs.

The plantation described in this paper appears to have had the highest confirmed nesting density of Cedar Waxwings. High nest densities of waxwings in other studies are 27 nests in 28 acres (Messersmith 1963; using Messersmith's diagram, I find the size of his study area to be 38, not 28, acres), 21 nests in about 18 acres (Lea 1942), 14 nests in 5 acres (Young 1949), and 17 nests in about 16 acres (Saunders 1911). Only Young's study clearly stated what the maximum number of active nests was at any one time: eight nests (1.6 nests per acre), probably due to eight pairs. Harrington (in Bent 1950:84) noted a nest density of 11 in a radius of about 25 ft (about 0.16 acres) in a clump of white pines. Only four of the nests had eggs and none held young. A week later all of the nests were deserted. Thus, none was successful. It is possible that the number of pairs nesting in Harrington's pine clump was much below 11, since some pairs may have accounted for more than one nest. Conceivably, some or most of the nests were abandoned or had suffered predation by the time of Harrington's first visit.

Figure 1 shows the placement and status of each nest within the plantation at about the midpoint of this study. The placement of the nests can be analyzed statistically in the following manner. The plantation is split into quarters with east-west lines of

<sup>1</sup>Present address: Chesapeake Bay Center for Environmental Studies, Smithsonian Institution, Route 4, Box 622, Edgewater, Maryland 21037.