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INTRODUCTION

COCOS ISLAND IS SITUATED at latitude 5° 32′ N., longitude 87° 04′ W., about 325 miles southwest of Costa Rica and 450 miles northeast of the Galapagos Archipelago, in the the tropical eastern Pacific Ocean. Roughly rectangular, it averages a little less than 5 miles in length and more than 2 miles in width (fig. 1). Although the island is uninhabited and flies no flag, its Costa Rican sovereignty has not been challenged by other governments. The present paper serves in part to complement my recent report on the birds of the republic of Costa Rica (Slud, 1964). Biogeographically, however, the island has little in common with the mainland, apart from the predominantly American character of the flora and fauna.

A convenient summary of the geology of the island, the biota, and the climate, appended with an exhaustive bibliography, has been compiled by Hertlein (1963). A supplemental source of general information is a set of old separates reproduced under one cover by the Instituto Geográfico de Costa Rica (1963). The physiography and vegetational physiognomy were evocatively described in the botanical report of Stewart (1912, pp. 376–383).

In brief, this volcanic island is seated upon a submarine ridge that extends most of the distance between Costa Rica and the Galapagos Archipelago. Rising abruptly and fronting the sea with tall cliffs along most of its circumference (pl. 49), it tapers to a height of some 2000 feet in its western part. The extreme topography, uncertain footing, and dense bushy undergrowth make it extremely difficult for a person to move about the slopes. Indeed, my own activities were largely limited to lower Wafer Valley and the neighboring hillsides and ridges (pl. 46). I lacked a boat to facilitate travel around the island or to visit the rocky offshore islets.

Normally the island lies in the path of the eastward-flowing equatorial countercurrent, but an occasional southward shift of the currents brings a flow from the opposite direction. Air temperatures range between 68° F. (20° C.) and 94° F. (34.5° C.). The rains appear to be heavy through most of the year, and the valleys are supplied with running fresh water. Every rainstorm creates a number of temporary waterfalls that beribbon the precipitous reaches of the island (pls. 48, 49). The only pluviometric record is the following short-term one, obtained by me:

	MILLIMETERS
February 27-March 4, 1963	7.5
March 5–11	35.0
March 12–18	55.0
March 19–26	136.0
March 27–April 2	168.0
April 3–9	369.0
April 10–16	86.5
April 17–23	99.5
April 24–28	96.5

The valleys and majority of the slopes are densely wooded. The bigger trees have their crowns at least 75 feet from the ground. "There are trees on the island so large that timbers 3×3×60 could be cut from them" (Stewart, 1912, p. 380). Even sheer walls of rock are coated with greenery, including *Cecropia* trees that here and there manage to hold themselves fast (pl. 46).

The four native land birds of Cocos were made known to science in the nineteenth century. The first was the Cocos cuckoo, a specimen of which was obtained about 1840 during the voyage of H.M.S. "Sulphur" (Gould, 1843). Fifty years later, in 1891, the resident flycatcher, wood warbler, and finch were brought to light by Townsend (1895). Around the turn of the century the birds of Cocos were being reported upon by Alfaro (1898), who visited the island in 1898, by Snodgrass and Heller (1902) in 1899, Beck (1907) in 1902, and Gifford (1913, 1919), accompanied by Beck, in 1905.

Ornithological attention was directed to the island again in the 1920's and 1930's by Beebe (1926) in 1925, Fisher in 1929 (Fisher and Wetmore, 1931), Chapin (MS) and Townsend (1930) in 1930, Percy Howe in 1932 (I. C. J. Galbraith, personal letter; Wetmore, 1958), Charles H. Lankester in December, 1932, to January, 1933 (Plumpton, 1935), Karl L. Koch in 1938 (Kenton C. Lint, personal letter), and Arthur C. Twomey in 1939 (Trimble, 1943). Recent visitors include Murphy (1958) in 1956, Witold L.

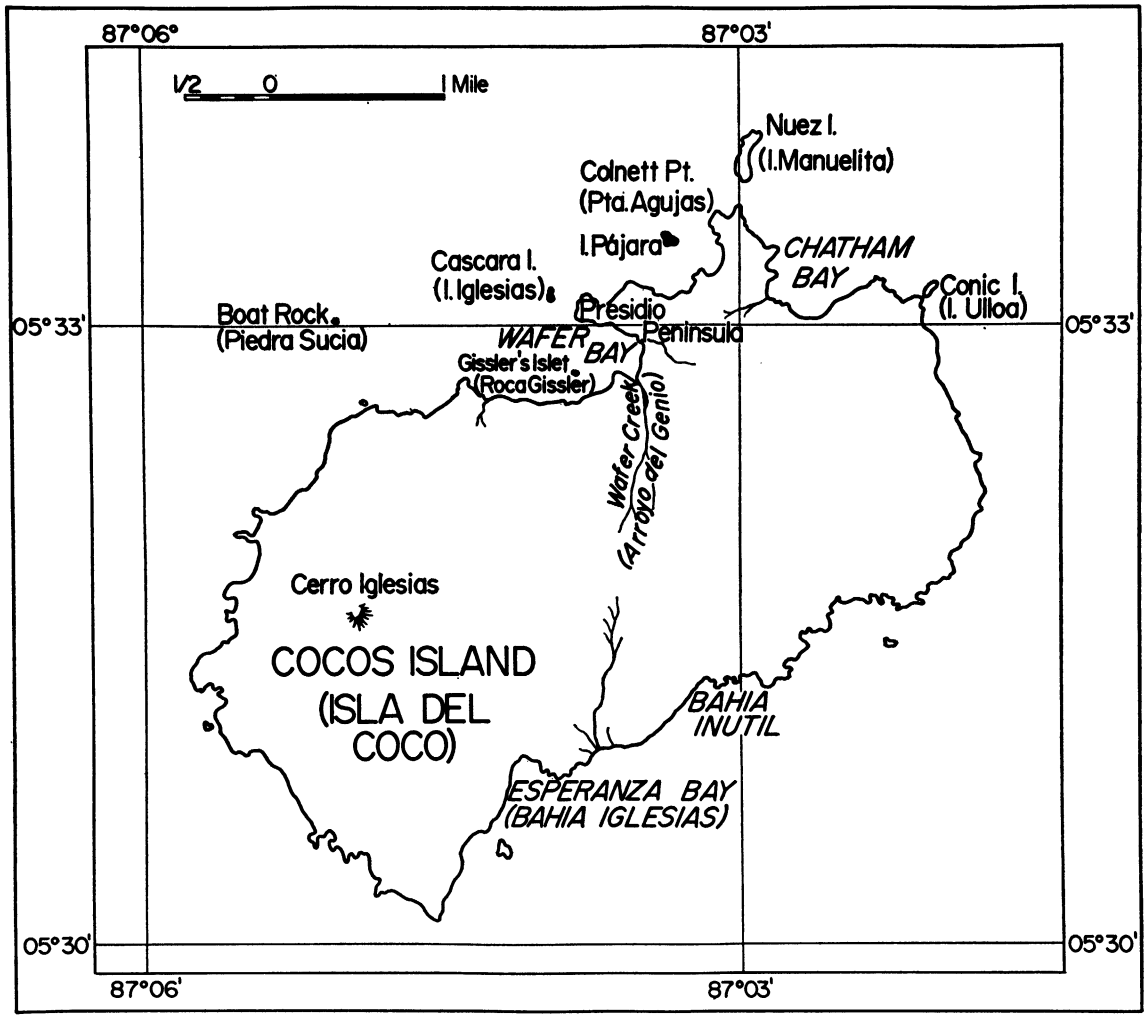

FIG. 1. Map of Cocos Island. Redrawn and simplified from Hydrographic Chart No. 1685, ninth edition, Washington, D. C. (1945).

Klawe (personal letters) in 1959, Hundley (1962) in 1962, Stephen Billeb, Robert I. Bowman, and Paul DeBenedictis (DeBenedictis, personal letters) in 1964, and Keith A. Arnold and Norm Scott (Arnold, personal communication) in 1965.

This report is, first, a check list of the birds of Cocos Island and its surrounding waters; second, an annotated list based principally on personal observations between February 21 and April 28, 1963.

The known avifauna now amounts to 77 species. Some 65 of these are non-breeding species, a figure that slightly exceeds the 63 compiled by Lévêque, Bowman, and Billeb (1966) for their island-strewn circular "Galápagos area" measuring 700 miles in diameter.

In the list that follows, the species preceded by two asterisks had not been recorded at Cocos prior to my visit. Species preceded by one asterisk are previously recorded ones that I also found. Species without an asterisk are those that I did not encounter. Species followed by S or P are represented by a specimen or by a photograph, respectively. Species without an S or P are sight records. Species in brackets in my opinion require substantiation; each is discussed in the text. The sequence of species is based on Eisenmann (1955).

***Podilymbus podiceps* (P)
Puffinus creatopus
Puffinus lherminieri
[*Pterodroma phaeopygia*]

Pelagodroma marina (S)
Oceanodroma tethys (S)
Oceanodroma castro (S)
Oceanodroma leucorhoa
Oceanodroma markhami (S)
Oceanodroma melania (S)
[*Pelecanus occidentalis*]
[*Sula variegata*]
**Sula dactylatra* (S)
**Sula sula* (S)
**Sula leucogaster* (S)
[*Sula* sp.]
**Fregata magnificens*
**Fregata minor* (S)
***Ardea herodias*
**Butorides virescens* (S)
**Butorides striatus* (S)
**Casmerodius albus*
***Egretta thula* (S)
***Hydranassa tricolor* (S)
Nyctanassa violacea (S)
**Anas* sp. (S)
**Pandion haliaetus* (S)
**Falco peregrinus* (S)
***Squatarola squatarola*
Pluvialis dominica (S)
**Charadrius semipalmatus* (S)
Charadrius wilsonia (S)
**Numenius phaeopus* (S)
***Totanus flavipes*
**Totanus melanoleucus*
***Tringa solitaria* (S)
**Actitis macularia* (S)
**Heteroscelus incanus* (S)
Arenaria interpres (S)
[*Ereunetes pusillus*]
**Ereunetes mauri* (S)
**Erolia minutilla* (S)
Erolia fuscicollis (S)
**Erolia bairdii* (S)
***Erolia melanotos*
***Micropalama himantopus*
Stercorarius pomarinus
Stercorarius parasiticus
Larus modestus (S)
***Larus atricilla*
***Larus pipixcan*
***Xema sabini* (S)
Sterna fuscata (S)
**Anous stolidus* (S)
**Anous tenuirostris* (S)
**Gygis alba* (S)
**Coccyzus ferrugineus* (S)
[*Tapera naevia*]
***Chordeiles acutipennis* (S)
***Chordeiles minor* (S)
**Chaetura* sp.
***Megaceryle alcyon*
Tyrannus tyrannus (S)
***Myiarchus crinitus*
**Nesotriccus ridgwayi* (S)
**Hirundo rustica* (S)
***Riparia riparia*
[*Mimus* sp.]
***Hylocichla mustelina*
***Vireo olivaceus*
***Mniotilta varia*
***Protonotaria citrea*
***Vermivora peregrina* (S)
**Dendroica petechia* (S)
***Dendroica coronata* (S)
***Dendroica castanea* (S)
***Dendroica discolor* (S)
***Dendroica palmarum* (S)
***Seiurus noveboracensis* (S)
***Setophaga ruticilla*
***Icterus galbula*
**Dolichonyx oryzivorus*
**Pinaroloxias inornata* (S)
***Passerculus sandwichensis*

The References include the citations in the text as well as other pertinent literature, especially that which makes some mention of the birds.

Specimen locations are abbreviated as follows: A.M.N.H. (the American Museum of Natural History); B.M. (British Museum); C.A.S. (the California Academy of Sciences); C.M. (Carnegie Museum); L.S.U.M.Z. (Louisiana State University Museum of Zoology); U.S.N.M. (United States National Museum). The specimens collected by me are in the American Museum of Natural History.

I thank the following persons for their various kindnesses, whether in making specimens available to me or providing information: Messrs. Dean Amadon, Keith A. Arnold, John L. Bull, James P. Chapin, William C. Conway, Eugene Eisenmann, Ian J. C. Galbraith, Miss Mary A. Heimerdinger, Messrs. Thomas R. Howell, Alfonso Jiménez, Witold L. Klawe, Charles H. Lankester, Raymond Lévêque, Kenton C. Lint, George H. Lowery, James D. Macdonald, Robert C. Murphy, George S. Myers, Charles E. O'Brien, Ralph S. Palmer, George E. Watson, and Alexander Wetmore.

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ANNOTATED LIST

Podilymbus podiceps

PIED-BILLED GREBE

An individual in winter plumage occurred at Cocos Island on March 6, 1963. I first saw it early in the morning on the lower course of Wafer Creek, beside my camp. The bird was alternately preening itself and resting afloat in a shallow pool of calm water. It disappeared when the creek rose with the incoming tide. I found it again the following day a bit upstream as it was pushing itself through a sand-bottomed riffle. This individual, dully plumaged and with a weakly ringed beak, was most likely a long-distance migrant on its way north rather than a vagrant from a resident population on the tropical mainland.

Puffinus creatopus

PINK-FOOTED SHEARWATER

The only report of this species seems to be that of Murphy (1958, p. 103), by whom it was "observed, always singly, on six days during the cruise between the coastal waters of southern Baja California and the vicinity of Cocos Island. A casual representative of this southern-hemisphere breeder north of the equator during the normal nesting season is to be expected."

Puffinus lherminieri

AUDUBON'S SHEARWATER

Beebe (1926, pp. 328–329) observed a "dusky shearwater" almost every day between May 25 and June 3, 1925, while stationed 60 miles south of the island. Murphy (1958, p. 104) was referring to the Galapagos race, *subalaris*, when he wrote: "We last saw this species near Cocos Island, and in waters toward the NW, Dec. 1–6. The northernmost records were in the neighborhood of 11° N. Although the Galapagos Islands are still the only known breeding grounds, it is quite possible that this shearwater may prove to be also a resident of Cocos Island."

[Pterodroma phaeopygia

DARK-RUMPED PETREL

Probably it was this species that Beebe (1926, p. 328) reported from Cocos waters as follows: "Shearwaters were in sight almost every day, the dusky, and the larger, white-fronted species." The locality, latitude 4° 50′ N., longitude 87° W., was the open sea some 60 miles south of the island, where the "Arcturus" served as a floating platform from May 25 to June 3, 1925.]

Pelagodroma marina

WHITE-FACED STORM PETREL

This species probably visits the vicinity of Cocos Island occasionally. Sixty miles south of the island, Beebe (1926, p. 329) reported, between May 25 and June 3, 1925: ". . . but when a white-faced petrel (*Pelagodroma marina*) flew on board late one evening, I knew I had a prize." Murphy (1936) cited the record (p. 770) and referred to the specimen (p. 771), the stomach of which "contained remains of insects, the marine water-strider (Halobates)." I have not found this specimen.

Beebe (*op. cit.*, p. 417) reported the species again a few weeks later, on June 16, 1925, and from another position, at the Galapagos Archipelago: "In the evening a white-faced petrel, *Pelagodroma marina*, flew on board, and others called plaintively in the distant darkness." Apparently it was the latter example that became No. 222 of the Beebe Collection, now in the American Museum of Natural History; the stomach contents are not noted on the label.

Birds straying into the tropical eastern Pacific would appear to belong to the New Zealand race, *maoriana*, which "in measurements and pattern . . . seems to be a near counterpart of *P. m. marina*" (Murphy and Irving, 1951, pp. 9–10). According to Bourne (1953), *maoriana* is indistinguishable from nominate *marina*.

Oceanodroma tethys

WEDGE-RUMPED STORM PETREL

The species was observed by Snodgrass and Heller (1904, p. 243) on an unspecified date (probably between June 30 and July 3, 1899) "north of the Galapagos Islands in the latitude of Cocos Island."

A male specimen (A.M.N.H. No. 196375)

of nominate *tethys*, mentioned by Murphy (1936, p. 730), was collected September 2, 1905, 30 miles southwest of Cocos Island, by R. H. Beck. Recently, a male and a female of this race were collected by Keith A. Arnold, and a female by Norm Scott, on April 11, 1965, one-half mile north of Chatham Bay. None was in breeding condition. These latter specimens are in the collection of the Museum of Zoology at Louisiana State University.

The race *kelsalli* was met "outside the Gulf of Panama, in the waters around Cocos Island, and for a thousand miles toward the NW" in early December, by Murphy (1958, p. 105).

Oceanodroma castro

BAND-RUMPED STORM PETREL

A specimen in the American Museum of Natural History (No. 70299) bears on its label the information that it had been collected by Anastasio Alfaro on June 18, 1898, at Cocos Island. The bird was almost surely taken at sea, because Alfaro did not mention it on the island in his report (1898). Nichols (1914) assigned it to *bangsi*, a race he was describing for the tropical eastern Pacific. *Bangsi*, according to Murphy (1936, p. 734), "breeds at the Galápagos, and probably at Cocos Island, and has been taken in the waters adjacent to each." Austin (1952, p. 396) was unable to find significant morphological differences among the populations of the species, which must therefore be deemed monotypic.

Oceanodroma leucorhoa

LEACH'S STORM PETREL

Beebe (1926, p. 329) observed this storm petrel between May 25 and June 3, 1925, while his ship lay afloat 60 miles south of Cocos Island. Murphy (1958, p. 105), "Dec. 2–4, . . . found it at 04° 09′ N, 83°34′ W, in waters around Cocos Island, and for about 200 miles northwestward."

Oceanodroma markhami

MARKHAM'S STORM PETREL

The only record (C.A.S. No. 658) seems to be the one published by Loomis (1918, p. 174): "Mr. R. H. Beck . . . [shot] a male on September 1, 1905, thirty miles south of Cocos Island—about latitude 5° N., longitude 87° W."

Oceanodroma melania

BLACK STORM PETREL

The species was recorded by Murphy (1958, p. 105), who "found it at our southernmost station (04° 09′ N, 83° 34′ W), around Cocos Island, and N toward the continent to the latitude of Cape San Lazaro . . . ." The specimens are in the American Museum of Natural History.

[Pelecanus occidentalis

BROWN PELICAN

Brown Pelicans were reported as being common about Cocos Island by Fisher (Fisher and Wetmore, 1931, p. 30) during his visit aboard the "Mary Pinchot," June 4–10, 1929. Fisher took no specimens, and his is the only report.

In view of the circumstance that Fisher on the one hand found it common at Cocos, while on the other hand he recorded no Brown Pelican during the entire Caribbean portion of his cruise (*ibid.*, pp. 2–23); that the species "seldom ranges far from shore (either seaward or inland) but islands bordering the Caribbean [are] spaced closely enough so that it has colonized this chain" and the "only remote islands on which it is established are the Galapagos" (Palmer, 1962, p. 274); and that Murphy, notwithstanding his inclusion of the Fisher and Wetmore report in his bibliography, stated (1936, p. 818) that "pelicans have not been recorded from Cocos Island, in the tropical Pacific," it would seem that Fisher's observation, if not an outright error, is in need of verification.]

[Sula variegata

PERUVIAN, OR VARIEGATED, BOOBY

Rothschild (1903), Wetmore (1932), Murphy (1936, p. 848), and Stager (1964, p. 361) have pointed out that young individuals of *Sula dactylatra* in the tropical eastern Pacific Ocean have been misidentified as *Sula variegata* of the coastal waters of Peru and Chile. The mistake evidently applies to two individuals observed at Cocos Island and identified as *Sula variegata* by Beck (1907), and subsequently cited as such by Gifford (1913, p. 90).]

Sula dactylatra

MASKED, OR BLUE-FACED, BOOBY

The Masked Booby, represented by the eastern Pacific *granti*, may occur as a wanderer at Cocos Island. "The species avoids forested islands and continental coasts. It was not present at Cocos Island, for example, although common enough over the surrounding ocean within a distance of a few hours' sail" (Murphy, 1958, p. 106).

The only previous report for Cocos Island seems to be the inadvertent one of Beck (1907), provided it was this species he had identified as *S. variegata*. I recorded the Masked Booby only on March 28, 1963, when twice during the day an adult bird flew across Wafer Bay to disappear over the crest of the ridge that forms the eastern rampart of the bay.

Sula sula

RED-FOOTED BOOBY

The Red-footed Booby nests abundantly over much of forested Cocos Island, where it has been recorded by all visitors with some knowledge of birds. Murphy (1958, pp. 106–107) has pointed out that "throughout the tropical oceans this species has several plumage phases, the taxonomic significance of which is not yet well understood. The Cocos Island population, however, comprises only uniformly grayish-brown birds. . . ." The tropical eastern Pacific population, from the Galapagos to the Revilla Gigedos, is presumably assignable to *websteri* (Murphy, 1936, p. 863).

When I arrived at Cocos on February 21, 1963, the crowns of the trees covering the island were strikingly patched with cottony "blossoms." These, of course, were the downy white young of this tree-nesting booby. At Chatham Bay in March I noted only one large tree, rooted at beach level, in "flower" with white immatures. I saw none so low at Wafer Bay. This decorative aspect also impressed Collenette (1926, p. 220), but apparently no one else.

By the end of April, when I left the island, the downy young had gradually so diminished in number that they could be found only by carefully sweeping the slopes with binoculars. Nevertheless adults carrying nesting material were regularly seen in flight. Fisher found them breeding the first week in June, 1929 (Fisher and Wetmore, 1931, p. 31). Gifford (1913, p. 87) reported birds in breeding condition and breaking off twigs for nests in September, 1905. Perhaps the species breeds throughout the year on Cocos. Possibly, as on Canton Island, "the peak does not necessarily run during the same months for two successive seasons" (Murphy, Niedrach, and Bailey, 1954, p. 45).

My observations were made in great part at Wafer Bay. Here this arboreal species occupied the steep slopes and the tops of the ridges and soared and flapped about, upward from a hundred feet or so to many hundreds of feet in the air. Wafer Bay as a fishing ground for boobies was reserved largely to the Brown Booby (*S. leucogaster*). It was not used by the Red-footed, which descended low over the water only when harassed by a frigatebird. Apparently the Red-footed forages well offshore. Murphy (1958, p. 106) met it at sea, chiefly in a northwesterly direction from the island. Beebe (1926, p. 328) reported the Red-footed, also the Brown, as being attracted in numbers to the lights of his ship 60 miles south of the island.

This booby was the favorite victim of the resident frigatebird (*Fregata minor*), which seemed somehow to know when one was freshly stuffed with fish. A strangling raucous cry, to be heard at any hour of the day, was wrenched from the bird, as in terror, when viciously pursued by one or usually two or more of the pestiferous pirates in tandem. This cry, an agitated prolonged "quaaak" or parrot-like squawk or heron-like croak, could rise to a high-pitched protest, usually coated with phlegm, or distort not unmusically with distance to suggest the strains of a trumpet. The harried booby might attempt to return a nip at the pursuer by twisting its neck rearward while disadvantaged in the lead position. It could foil the enemy by swerving to a sudden stop in a leafy tree, but this maneuver it executed clumsily and seldom successfully.

Usually during the headlong chase a twisting escape from one *Fregata* placed the booby in the oncoming path of another. The worried booby seeking salvation sooner or later expelled its catch. The robber would be rushing so close that the suspended vomit passed

smoothly from the booby's mouth into its own. Or else the spew was swooped at and gobbled while it dropped as debris. Booby and frigatebird replay this scene timelessly against the green backdrop of headland and cliff. "The terrorization of boobies, and the recovery of the ejected prize, was described by Columbus in the log of his first voyage of discovery" (Murphy, 1936, p. 933).

An especially rebellious booby resisted the inevitable until bullied to the water. There it suffered the passes of the frigatebirds now joined by those of the Brown Boobies, whose hunting domain was being trespassed, and the foundering bird soon capitulated. Sometimes the roles were seemingly reversed, when the booby gave chase to the frigatebird. The booby, whose misfortune it had now been to be robbed of nesting material in flight, would scream, as it were in angry frustration, and engage in outraged hopeless pursuit.

Other cries given by this booby included ducklike long quacks and, when at rest in a tree, chucking sounds that could have been caused by a slowly chiseling woodpecker.

Sula leucogaster

BROWN BOOBY

The resident population belongs to the race *etesiaca*, which is distributed primarily along the Pacific coast from southern Central America to Ecuador, "while Cocos Island is the outpost farthest from the mainland shore" (Murphy, 1936, p. 860).

Gifford (1913, p. 98) reported the birds as nesting abundantly in September, 1905, when he found naked and downy young as well as eggs. Their headquarters were a small island offshore; only two or three individuals were observed on Cocos itself. Murphy (1958, p. 107) recorded nests with eggs and young in all stages, principally on the outlying islets, early in December, 1956. Keith A. Arnold (personal letter) found the bird "in breeding condition (largest ovum 10 mm.)" in mid-April, 1965.

The Brown Booby was common to abundant over the ocean and on the islets in view during my visit. The species was also present at the main island, Cocos, where it kept to the shores. Daily at Wafer Bay I observed individuals totaling several dozen in number. The birds were stationed alone or in two's or three's on boulders, ledges, and limbs of trees, also wheeling and diving for fish. These were all adults apparently in residence. Only once was there a sign of possible nesting activity, when on April 5 I saw a single bird with a twig in its beak. This individual was probably foreign to the population at Wafer; it flew across the bay and out of sight around Presidio Point.

Not until March 22, a month after my arrival, but with increasing frequency thereafter at Wafer Bay, did I happen to note an immature bird or two, together with several adults and many Brown Noddies, on Gissler's Islet. Later, I saw four immatures on this rock. They kept on amicable terms with the adults; at times they sparred with their bills among themselves. Occasionally a visiting immature bird was to be seen hunting with the adults over the bay. The young birds were far more abundant seaward and in the vicinity of the offshore islets.

Just as the congeneric Red-footed never fished in the waters of Wafer Bay and seldom flew low over its surface, so the Brown Booby rarely rose high in the air as did the Red-footed normally. Murphy (1958, p. 107), who found both species breeding on some of the islets, noted that the nests of the Brown Booby were placed underneath the tall shrubs upon which the Red-footed was nesting. Murphy observed also that "although confined to the ground for nidification, the [Brown] boobies perch freely on good-sized branches of trees, but perhaps never on twigs." The arboreal Red-footed, by contrast, I saw regularly perched on branchlets in the canopy.

The Brown Boobies at Wafer Bay were virtually free of the scourge which the Great Frigatebird (*Fregata minor*) personified to the Red-footed Booby. On the other hand, a source of annoyance was a female Magnificent Frigatebird (*Fregata magnificens*), either the same wandering individual or, more likely, one of several such visitors to the island, that plied its piratic trade at the expense of an occasional Brown Booby. Only once did I see a Brown Booby persecuted by the resident *Fregata minor*. This was after the hapless booby had been forced to the water and made to disgorge by *Fregata magnificens*.

[**Sula** sp.

BOOBY

Onward from April 2 my attention was drawn to a booby I could not identify at Wafer Bay then or, to my chagrin, among museum specimens later. Usually I detected single birds, sometimes two and once three individuals together, most often in flight. I could with the naked eye pick one out daily by its mannerisms and silhouette from a company of Brown Boobies fishing in the bay. An 8× binocular was used to confirm the sightings. Perched birds were observed through a 20–60× spotting scope.

This booby appeared to be entirely a dusky dull brownish, including the under wing, toned a bit grayish at close range. Thus it differed from the young of the Brown Booby, which have the under parts paler than, and abruptly demarked from, the solid breast. This patterned appearance of the young Brown, foreshadowing that of the adult, is apparent both in the field and in a collection of skins. Also, one of the nameless boobies showed a white spot or two on the upper side of one wing when in flight. Viewed in the telescope, the perched bird had a heavy conical black beak, a hazel iris, bluish skin behind the eye, and the legs drab like the under parts. The webs joining the toes appeared a translucent yellowish or ocher against the sky.

This booby impressed me as being larger and longer-tailed than the Brown Booby. Its more frequently flapping, heavier-bodied flight caused it to appear considerably slower on the wing, yet it could outfly the Brown at will. Sporadically it worried the Brown, not only overtaking the latter but also engaging at times in "half-hearted" pursuit; once I saw it rob a Red-footed Booby (*Sula sula*). In contrast to the plunging Brown, it had the shearwater-like habit of flapping and coursing very close to the surface and entering the water for fish with its body barely downslanted from the horizontal. A bird or two could be noted almost daily either heading inland up Wafer Valley or flying out of the interior to the bay, which I never saw the Brown Booby do, though the Red-footed did so all the time.

When occasionally I saw this booby come to rest it was, as is often the case with the Brown, on the limbs of trees. One day, however, a bird attempted to perch in a manner foreign to the Brown Booby at Wafer. Maneuvering and lighting awkwardly on a thin low branch, which immediately snapped, bird and branch tumbled several yards to the ground. The booby struggled to gain its feet and stood looking "stupidly" about. Its attitude could have been that of a person attempting to feign a face-saving indifference. Early that same morning, incidentally, I had noticed an individual, perhaps the same one, standing alone and exposed on an open sand flat in what struck me at the time as an idiotic manner. The Brown Booby in my experience at Cocos never behaved in such a way.

This booby was generally separable, too, by its heavy, bullfrog-like croak, deeper than the quacks of the Brown Booby and different in quality. It also made a croaking growl, when bothered by noddies, that brought to mind the cry of a Red-footed Booby being pursued by *Fregata*.]

Fregata magnificens

MAGNIFICENT FRIGATEBIRD

The first definite report of the present species in contradistinction to the specimen-documented *Fregata minor* at Cocos Island is dated May 22, 1962, less than a year prior to my own visit, when Hundley (1962, p. 112) watched a dozen female Magnificent Frigatebirds keeping pace with the ship as it neared the island. Later, on April 16, 1965, Keith A. Arnold (personal letter) was convinced "that both *F. minor* and *F. magnificens* frequent the island."

Whereas Hundley (*ibid.*, p. 113) had estimated that one out of 10 of the frigatebirds observed in the vicinity of Chatham Bay was *F. magnificens*, I would guess the ratio at Wafer Bay was one *magnificens* to 100 *minor* of the birds seen by me. An individual or two of *magnificens* was to be found occasionally or, if patiently watched for, almost daily during my stay at Cocos. My observations were restricted to females, of which I could view no more than one at a time at sufficiently close quarters for identification, whether positively through field marks or through a visual judgment of size in relation

to the smaller *minor*, by which it was so greatly outnumbered.

The female *F. magnificens* was parasitizing the Brown Booby exclusively. Having forced the booby to the water, it proceeded as though by rote with its tacking sweeps and velocitous swoops at the victim. Sometimes a booby struggled repeatedly to rise from the surface into active defense, until in exhaustion it finally surrendered its prey. Compared to the booby, *magnificens* loomed monstrously large.

Fregata minor

GREAT FRIGATEBIRD

This is the resident frigatebird met so abundantly by ships approaching the island many miles away. Represented on Cocos by *ridgwayi* of the tropical eastern Pacific, the species patrols the island and surrounding waters at all heights in the air. It perches on the trees covering the slopes and ridges, as does the Red-footed Booby, at times virtually side-by-side with the latter bird.

Gifford (1913, p. 103) observed "many males in fine glistening black plumage . . . flying about with their bright red pouches distended; so, evidently, September was the opening of the breeding season, and undoubtedly the nests were placed in the tops of the tall trees, where so many of the birds could be seen and heard." Murphy (1958, p. 108) shot a breeding adult male early in December. Occasionally in the latter part of March and in April, 1963, I noted black males with the brilliant red throat sac ballooned and sometimes the beak holding a branchlet, perhaps stolen in flight from a booby. The testes of a male (L.S.U.M.Z. No. 35459) collected in mid-April, 1965, were slightly enlarged (Keith A. Arnold, personal letter).

Reference is made above to the intimidating tactics of *Fregata minor* applied specifically to the Red-footed Booby. In addition, this frigatebird at times pursued a noddy, certainly the Black as reported by Gifford (1913, p. 103), perhaps also the larger Brown, close to the water until the tern coughed up its catch. One day I even saw this frigatebird making passes at a Peregrine Falcon high in flight.

Vocally the adult *Fregata minor* produced a nasal "kack" of one or two syllables. From the immature I heard a hoarse, rooster-like cry.

Ardea herodias

GREAT BLUE HERON

I observed a solitary individual of this migrant species at approximately two-week intervals from February 22 to April 22, 1963, only at Wafer Bay. Secretively frequenting the rock-piled shores extending seaward at tidemark, the bird usually hove into view when flying from one arm of the bay to the other. On one such occasion in the open it was given chase by a frigatebird.

Evidently this stray heron had been surviving on creatures in tidal pools, perhaps also those attached to rocks or scuttling among boulders. It did not ever reconnoiter the mangrove-like, fresh-water portions of Wafer Valley, nor did it approach the brackish outflow of the creek at the head of the bay.

Butorides virescens

GREEN HERON

Green Herons in adult, subadult, and immature plumage have been collected on Cocos Island. In color and relative shortness of wing I find the majority inseparable from *maculatus* of Middle America. A few with longer wings fit within the size range of nominate *virescens*. A list of specimens follows: B.M. Reg. No. 1935.3.8.3; C.A.S. Nos. 2170, 2171, 2173, 2174; L.S.U.M.Z. No. 35460; U.S.N.M. No. 316840.

The British Museum specimen, a subadult that could belong with either *virescens* or *maculatus*, was taken October 2, 1932, at Wafer Bay. Percy Howe, the collector, noted on the label: "Sex not determined. Contents of crop, slime, almost empty. Observations: Bird shot sitting on small mangrove tree in swamp. These birds later bred and I saw the young in quill feathers." This is the only mention of *virescens* breeding on the island. Unfortunately, *virescens* and the following species, *striatus*, on Cocos have been confused with one another in the literature and on the labels of specimens in museums. Hence the name of the species that breeds there cannot be stated with certainty, especially since Howe did not know the birds.

At least two adult-plumaged Green Herons

were present during my visit at Wafer Bay. Both individuals were wary if not wild, yet they did not normally conceal themselves in dense cover. For the most part they kept to the shaded overgrown parts of the lower valley. Generally they skulked about the channeled muddy floor, inundated daily by the tide, also the borders of the creek. Flushed, they often lit on branches in the trees.

Not until mid-April did I notice this heron in more open situations. Sometimes it occurred at the gravel lining the exit of the stream through the beach, walk-running with "nervously" flicking tail. Twice I saw one approached and made to retreat by a curious or perhaps hostile *Hydranassa*. Also, a Green Heron was apt to visit the boulders exposed on the lower beach at ebb tide.

Butorides striatus

STRIATED HERON

The presence of this heron on Cocos was brought to light by Trimble (1943, p. 418). Previous examples from the island had been misidentified as *B. virescens* in museums and in the literature. Specimens are distributed as follows: A.M.N.H. No. 789449; B.M. Reg. No. 1949.58.27; C.A.S. Nos. 2169, 2172; C.M. Nos. 123826, 123827.

The bird in the British Museum, an adult male, was collected January 2, 1933, by Charles H. Lankester. It has the face and neck olive-tinged brownish as in some populations of nominate *striatus* scattered from central Panama through northern South America. The label bears the notation "resident and breeding" but wrongly identifies the bird as *B. virescens*. Hence one cannot confidently apply the information to one species ahead of the other. The possibility that either heron breeds or is resident on the island remains open.

The bird in the American Museum of Natural History, an adult male, somewhat fat, its testes not enlarged, was collected by me on March 1, 1963, at Wafer Bay. The fact that it is clearly referable to gray-necked *striatus* of South America points to alternative conclusions. If this particular individual originated on the mainland, it cannot of course be considered native to Cocos, and its personal contribution to the gene pool of *Butorides* herons on the island is negligible at best. If, on the other hand, it be a representative of a resident population on Cocos, then it embodies no visible sign of hybridization with *virescens*, provided *virescens* is indeed apt to breed on the island.

The above bird was the only individual of *striatus* that I saw. Whether wary or shy, it kept tightly concealed in the tangled mangrove-like thickets and trees of a fresh-water swamp behind the beach. Vocally it struck me as being quite different from *virescens*. It gave a scratchy long note, followed by scratchy "tik" 's. Not dissimilarly, it uttered a double scratchy snarl, arresting as a cat's, that ended with two spitting "tik" 's.

Casmerodius albus

GREAT, OR COMMON, EGRET

There seems to be but one other observation of this migrant heron, that of a single individual along the rocky shore of Wafer Bay on May 22, 1962, by Hundley (1962, p. 114). I saw the species only once, on April 5, 1963, when a bird in measured flight appeared over Wafer Bay and circled higher in the air. A sudden attack by an overlording Peregrine Falcon in winter residence destroyed the calm progress of the heron, which now flew willy-nilly with outstretched neck and disorganized beat in search of safety in a treetop on the nearest slope facing the bay.

Egretta thula

SNOWY EGRET

I saw as many as four of these herons at a time for the duration of my visit at Wafer Bay in the spring of 1963. Two years later the species was encountered in mid-April at Chatham Bay by Keith Arnold (personal letter). I find no other report from the island, unless "the white egret-like birds" seen December 5, 1959 (Witold L. Klawe, personal letter), were of this species. The wildness of the egrets seen by me was suggestive of their recent arrival.

A single bird or two or more together could generally be seen from afar at the edge of the stony shores fronting the steep slopes. Sometimes at low tide they flew to the exposed rocks at the head of the bay. With their necks outstretched more often than not and their heads raised gracefully, the birds flew good

distances up to the width of the bay, as a rule keeping close to the surface.

On a number of days, generally before sunrise, an egret or two entered the shaded lower course of Wafer Creek to a little beyond the reach of the tide. Avoiding pools in favor of shallows, the bird sought the places that permitted a free path for flight. Even when accustomed to my presence, the species remained wary and hid behind foliage or retired around a bend. At sunset a bird, perhaps trailed by another, would fly along the creek seaward, then veer toward the southern arm of the bay.

Whether feeding at the open exit of the creek where it furrows the beach, or frequenting the boulders and overhanging boughs at fresh water upstream, this egret, judged by its scurries and tries, did not spear active prey very capably. The bird seemed to stab more successfully when shuffling a foot extended forward like a yellow-gloved hand below the surface.

I first noted two egrets with nuptial plumes in the second half of April. Thus gorgeously attired one of the birds displayed, as though hostile, at a *Hydranassa* foraging nearby. Toward the end of the month the daily pattern of movements became confused, and *Egretta* and *Hydranassa* each appeared untroubled by the other's presence. I saw the two together crossing the bay to the rocks at the far end of the beach and returning soon after to the shelter of the creek.

Hydranassa tricolor

LOUISIANA HERON

I recorded only one member of this species at Cocos Island. This individual, which I saw almost daily, had taken up residence along the intertidal lower portion of Wafer Creek. Timid and given to flight at my arrival, the bird lost its wildness with time. In April it was present most days at dawn and, like the Snowy Egret, left the creek for the night. Wading, running, and darting at prey, it was marvelously agile at spearing minnows. The bird also caught fish too broad to be swallowed, which it juggled from all angles and futilely squeezed in its beak.

This heron began to change its routine the last week in April, about the same time as *Egretta*. No longer did it restrict its daytime activities to the creek, where its appearances were becoming irregular. Instead the bird at times was favoring the rocks uncovered on the beach at low tide and given to making flights over the bay and along its open shores.

Nyctanassa violacea

YELLOW-CROWNED NIGHT HERON

Three specimens in the collection of the California Academy of Sciences are the only ones known from Cocos Island. They were taken within a few days of one another, on September 4 and 8, 1905, two of them, an adult male and an immature male, by E. W. Gifford, the third, an unsexed subadult, by R. H. Beck.

Gifford (1913, pp. 60–62) called attention to the darkness of the birds and the large beak of the males. Alexander Wetmore, who had analyzed this night heron racially (1946, pp. 15–21), graciously identified these specimens for me as *caliginis*, a form he had himself described, which ranges coastally along the Pacific mainland from Panama, including the Pearl Islands, to Colombia and Ecuador.

According to Gifford (*loc. cit.*), "during the first half of September . . . they were not infrequent, being seen in the trees and along the fresh-water streams." Previous to the specimen he collected in 1905, Beck (1907, p. 110) had observed two of these night herons on January 26, 1902. There has been no further report from the island over the past 60 years.

Anas sp.

TEAL

The only definite mention of a teal on Cocos is the terse "*Querquedula discors* (Blue-wing Teal), one shot, two more seen" by Beck (1907, p. 110). One does not know whether Beck saw an adult-plumaged male, but the specimen (A.M.N.H. No. 731975), taken January 28, 1902, is a female. In view of the fact that the females of *A. discors* and *A. cyanoptera* seem to be indistinguishable (Ralph S. Palmer, personal letter), and that either species is apt to range to the tropical eastern Pacific in migration, the bird in question is specifically unidentifiable. The specimen, incidentally, is heavily stained with rust below. This discoloration could have been acquired at the island, owing to the in-

fusion of reddish mud so frequently carried to sea by the rains and washed ashore by the tide. At any rate, areas of beach were so tinged.

Two female-plumaged teal, of which species I do not know, were present February 21, 1963, the day of my arrival. The birds were keeping together as a twosome under the mangrove-like conditions of lower Wafer Valley, frequenting the mud-bottomed brackish pools, alternately drained and refilled by the tide. Occasionally they swam in the bay close to the beach during periods of intertidal calm. The birds became frightened easily, but, cramped as they were for suitable surroundings, flew neither high nor far.

By February 24, only one of the teal remained to be seen. Probably it was this individual I did not observe again until March 27, when it also disappeared.

Pandion haliaetus

OSPREY

The species represented by *carolinensis* is undoubtedly a regular migrant to Cocos Island, though it has not been mentioned by all visitors. Gifford (1919, p. 193) reported an osprey a few miles offshore on September 3, 1905, and on the island in the days that followed. Beebe (1926, p. 229) noted in mid-May, 1925, that "high overhead a hawk circled, the only one ever recorded for this island." Chapin (MS) recorded it this way: "Will Beebe says he saw a hawk on Cocos. I noticed none save fishhawk." The species was observed most recently in April, 1965, by K. A. Arnold (personal communication). That an individual may remain through the summer is suggested by the presence of one between June 4 and June 10, 1929 (Fisher and Wetmore, 1931, p. 38).

As many as three ospreys were inhabiting Wafer Bay during my visit. Two of these had apparently taken up temporary residence. They could often be seen or heard together. Only one, however, rested regularly on a favorite tree within my view. Watching the water from its high perch, this latter individual had the alert habit of looking downward by jerking its head from side to side in two movements. Once I saw it being mobbed, gently, in the air by noddy terns (probably the Brown). Another time afoot among rocks it was harassed by a Peregrine Falcon.

Falco peregrinus

PEREGRINE FALCON

This falcon was first reported from Cocos Island by Beck (1907, p. 110), who saw one there in January, 1902. It was not definitely recorded again until the spring of 1963, when I found two individuals. Most recently it was met on April 11, 1965, at Chatham Bay by Keith A. Arnold (personal communication). Despite the few observations, I believe the island annually provides a landfall for the species, represented in migration by the wide-ranging *anatum*.

A Peregrine was already present when I landed at Wafer Bay, having appropriated the shores and facing slopes for its depredations. Its preferential seat was the trees on the slope overlooking the left horn of the beach, and it was from this corner of the bight that the bird was terrorizing the environs. Obviously in fine fettle, it bullied and crippled the smaller weak birds and pestered even the big strong ones. It directed its attentions mainly to birds of the open, and I never saw it enter a situation from which it could not withdraw without endangering its superb physical equipment.

Frequently it pursued either species of noddy well out in the bay. Noddies probably constituted the bulk of the prey, though I seldom saw one caught. The tern could dodge the attacks for a while by flying close to the water, as if aware that the Peregrine would not risk a wetting. Once when the falcon did carry one off, the tern broke loose. The Peregrine resumed its beleaguering rises and swoops until it hooked the victim securely and bore it landward.

Another time the Peregrine shot out purposively in rapid direct flight. It was headed, I soon discovered, straight for a Brown Noddy on a far rock at the opposite shore of the bay. The Peregrine struck unsuccessfully, having perhaps overcalculated its margin of safety. Rising smoothly from the miss, the falcon soared above the promontory. There it made pestering passes at Red-footed Boobies and frigatebirds, retaliated by a booby or two, maybe in protection of nearby young.

Next the Peregrine swept down at a noddy low over the bay, but, again missing its mark, whipped onward to shore where it routed out an osprey amid the rocks. The falcon presently departed empty-handed from whatever had been the osprey's concern on the ground.

The bird was disregarding my presence by the first week of April. It had added a station inside the valley from which to strike out, usually without success, at the Black Noddies streaming down from the interior. Also, in my prejudiced view, it was brazenly continuing the pitiless, ruthless pursuit of defenseless shore birds, driving away some and miserably maiming others, as they put in one by one at this island haven. Since the visitors included several unreported species, I put an end, unwillingly, to this rivalry for first records by shooting the falcon on April 12. A male changing into adult plumage (A.M.N.H. No. 789450), it was in very fat condition.

The presence of a second Peregrine on the island was proved when one appeared later the same day I had collected the first. This individual was making the feathers fly from an osprey in an aerial show of pugnacity at the ridge that bounds the bay on the east. I did not see this Peregrine again, therefore assumed it was based at another embayment.

Squatarola squatorola

BLACK-BELLIED PLOVER

One winter-plumaged individual of this species was present at Wafer Bay when I arrived the latter part of February, 1963. I saw it again, probably the same bird, nearly two weeks later. Thereafter it was present almost daily in unchanging plumage until April 14. I find no other report for the island.

This lone plover was wary throughout the period that it was observed. It kept to itself, for the most part moving slowly or standing about. It preferred the tide-influenced portions of lower Wafer Valley, where tree growth was sufficiently dense to discourage the Peregrine from making attacks. Occasionally, as at dusk, it visited the edge of the beach when the sea was calm. The bird ventured out of the valley entrance more frequently as April was advancing. Apparently it subsisted on animal matter left in wet mud and damp sand by the tide.

Pluvialis dominica

AMERICAN GOLDEN PLOVER

One of the few records of this species in the eastern tropical Pacific and the only one for Cocos Island is that of a specimen of nominate *dominica* (L.S.U.M.Z. No. 35463) collected April 12, 1965, at Chatham Bay by Keith A. Arnold. A male, apparently adult, with little fat and unenlarged gonads, it had already started to change into summer dress.

Charadrius semipalmatus

SEMIPALMATED PLOVER

This migrant plover probably occurs more or less regularly at Cocos Island, though it has received scant mention in the literature. Beck (1907, p. 110) saw four wintering individuals in January, 1902. Gifford (1913, p. 53) reported a few fall birds early in September, 1905, at Wafer Bay, where three males were collected. In 1929, a female at Wafer Bay was taken June 5, in the spring (Fisher and Wetmore, 1931, p. 39).

I noticed a lone bird at the head of Wafer Bay on March 20, and on the days that followed until March 25, 1963. It kept to the beach, freezing in position at my approach and flying as a last resort. Usually this little plover was hard to distinguish amid the litter. Perhaps its shyness helped preserve the bird from a predatory Peregrine there in winter residence.

Charadrius wilsonia

WILSON'S PLOVER

"Two Wilson's Plovers . . . were taken on Cocos Island, Costa Rica; a male on September 4 [by R. H. Beck] and a female on September 11, 1905 [by E. W. Gifford]"(Gifford, 1913, p. 53). Both are in the collection of the California Academy of Sciences. I know of no other report.

The birds were assigned to *beldingi* on geographic grounds by Ridgway [1919 (1901–1950), pt. 8, p. 113, footnote], who did not examine them personally. They were also catalogued as such by Hellmayr and Conover [1948 (Cory *et al.*, 1918–1949), pt. 1, no. 3, p. 72]. The specimens to my eye suggest *beldingi* in relative width of the dusky malar patch and limited extent of white on the forehead and above the eyes. In these very respects,

however, they are indistinguishable from a number of nominate *wilsonia* in the American Museum of Natural History. The upper parts are paler than the average for *beldingi* but similar in tone to those of *wilsonia*. Both appear to be first-year birds.

Numenius phaeopus

WHIMBREL

The migrant North American race *hudsonicus* occurs most likely as an irregular visitant. Gifford (1913, p. 54) recorded one bird, "a female in worn plumage, shot on the beach at Wafer Bay on September 12, 1905." Witold L. Klawe, a participant in the Costa Rica Dome Cruise of the Inter-American Tropical Tuna Commission, preserved on December 5, 1959, a specimen which is now in the anatomical collection of the American Museum of Natural History. Hundley (1962, p. 114) reported seeing several whimbrels along the shore of Wafer Bay on May 22, 1962. The single individual that I found was present only on February 22, 1963, at the wedge-shaped entrance to Wafer Creek. This bird became frightened easily and left the area. Perhaps it tarried elsewhere on the shores of the island.

Totanus flavipes

LESSER YELLOWLEGS

On April 21, 1963, I watched a yellowlegs seeking food along the edge of an exposed gravelly flat at Wafer Bay. Seen on and off during the day, the bird was nodding its head and jerking its rear, also holding its wings raised on alighting. Its relatively small size and slender straight bill left no doubt in my mind that it was this species.

Totanus melanoleucus

GREATER YELLOWLEGS

I know of only two reports for Cocos Island. Beebe (1926, p. 229) "frightened up a quartet of yellow-legs" on May 15, 1925, at Chatham Bay, which are identified as this species in the appendix (*op. cit.*, p. 435). Keith A. Arnold (personal communication) met it April 12, 1965, on the beach at Chatham Bay. I did not find it.

Tringa solitaria

SOLITARY SANDPIPER

A single example of this migrant species appeared at the entrance to Wafer Creek on April 13, 1963. This was a very wild individual which I watched from about 35 yards off. Even at that distance the bird's frequent noddings and teeterings seemed to indicate I was too close for its comfort. It disappeared the same day.

Two years later, on April 14, 1965, a bird was collected by Norm Scott on the beach at Chatham Bay (Keith A. Arnold, personal letter). It was very fat and had the testes unenlarged. The specimen (L.S.U.M.Z. No. 35465) lacks the freckling on the inner vane of the outermost primary that characterizes so many examples of the race *cinnamomea*. Yet the large size—wing (chord), 130 mm.; tail, 57 mm.; exposed culmen, 31 mm.; tarsus, 30 mm.—the relatively broad dark bars on the rectrices, and the cinnamon-buff back spotting place it with *cinnamomea* rather than nominate *solitaria*.

Actitis macularia

SPOTTED SANDPIPER

The species was reported from Cocos by Gifford (1913, p. 56), who observed several examples daily at Chatham and Wafer bays in early September, 1905, and by Chapin (MS), who saw a spring-plumaged individual at Wafer Creek on April 19, 1930.

I noted the species on April 1, 1963, when a lately arrived lone bird was driven off by a Wandering Tattler. The spotting on this individual was beginning to appear. Not until April 19 did I see a bird again. This one was well spotted below and had its bill reddish orange in color. Judged by its repeated exaggerated bobs, it was in a highly nervous state.

It may have been the same individual I continued to see every day until my departure at the end of April. Though on occasion chased away repeatedly by a tattler, it returned persistently to the wintering tattler's territory. Only once, on April 22, did I see two Spotted Sandpipers at the same time, at Wafer Bay.

Heteroscelus incanus

WANDERING TATTLER

Cocos Island no doubt forms part of the wintering range of the species. Gifford (1913, p. 55) reported a few birds along the rocky shores during the first half of September; according to Swarth (1931, p. 61), one was collected. Beebe (1926, pp. 226, 229) met a bird at Chatham Bay on May 15. Chapin (MS) noted two individuals along Wafer Creek on April 19. Charles H. Lankester collected a specimen, the British Museum has informed me, on "2.1.33." That the island harbors non-breeding individuals in summer is to be inferred from Snodgrass and Heller (1902, p. 512), who saw a bird at Chatham Bay at the beginning of July, and from Fisher and Wetmore (1931, p. 40), who reported a winter-plumaged male taken early in June, "when its companions in Alaska are beginning to nest. . . ."

Two birds in plumage of winter type were inhabiting the entranceway of Wafer Creek when I encamped on February 21, 1963. A month later one of the birds had advanced into rather well-barred spring plumage; the other was still unpatterned but with the breast now grayish. A third individual, plain-colored, was to be seen from time to time through the first three weeks of April, if not longer.

During the first part of April, two birds regularly visited the gravelly shore at nightfall. Moving like shadows in head-down runs that came to sudden stops, they fed on small crabs and probably other prey. Sometimes they headed to the rocks at the far end of the beach, flying low. They called frequently, as if in response to each other. On April 23, three birds out on the flats in the dimming light were giving their similarly patterned cries. Those of one individual were pitched differently from those of each of the others, producing in concert an interacting double-stop effect.

On April 22, I saw a barred tattler and an unbarred tattler in combat. The latter individual was standing on the head and neck of the former and pecking its head. Though it seemed to be winning the battle, it was soon driven off by the other. Either bird was apt to assume a head-down tail-up stance or rest its under parts on the ground. The incident recalled to me another, unpatterned, dull-colored tattler I had seen the preceding day, which was wounded and bloody on the side of its neck, probably as a result of maltreatment by one of its kind. Another time I noted one plain-colored individual being chased by a second plain-colored individual.

The latter part of April was a period of increase in the number of tattlers. At least five birds, two of them barred, the other three plain, were occasionally in view at once. Now that the time for departure was at hand, the tattlers were moving about more freely and flying openly across narrow necks of land. Two birds of a group of three were seen heading westward to the open sea after sunset on April 23, as though in response to a migratory urge no longer put off. This turned out to be a trial flight. At any rate, what I took to be the same three birds were back the next day. On April 27, I saw five tattlers bunched at the entrance to flooded Wafer Creek. The heavy rains and high seas were, between them, virtually eliminating the tideline habitat. The twilight feeding habits probably helped round out the diminished gleanings of the birds.

The two tattlers residing at the creek were *Actitis*-like in appearance and actions. Rather short-necked and hunched, they walked steadily yet teetering irregularly, sometimes continually for spells, and making sudden darts for food. As the birds explored the sloping sides of boulders, their ungainly stalking tread again brought *Actitis* to mind, as did also the probing around stones and heavy gravel. The yellow legs, however, and the habit of wading suggested a gallinule-like bird, whereas the manner of pecking downward into the water could have been that of an unusually circumstanced chicken. Also, the tattlers threw trash from side to side, alighted with the wings raised for a moment, and flew with shallow whipping beats distinct from the short-arc flutters of *Actitis*.

They kept at peace with such shore birds as the Pectoral and Solitary, though not at first with the Stilt, sandpipers, as each made its bow at the Wafer Valley wedge. But they reacted in a hostile manner toward *Actitis*,

often chasing it away as in territorial defense.

The tattlers were noisy, and one of the calls could have belonged to a Spotted Sandpiper. Also, uncontrolled individual whistles, meaningless as those by a mischievous boy, were given in haphazard sequence.

Arenaria interpres

RUDDY TURNSTONE

I find few references to the migrant Ruddy Turnstone on Cocos Island. Probably it appears irregularly and in small numbers at this way station. Beck (1907, p. 110) saw six birds on January 26, 1902. Gifford (1913, p. 47) reported a few at Wafer Bay on September 4 and 13, 1905. Keith A. Arnold (personal letter) found it at Chatham Bay on April 11, 1965.

Two specimens, a male and a female (C.A.S. Nos. 1858, 1876), were taken by Beck during Gifford's visit to Cocos (Swarth, 1931, p. 59). These two examples, plus a series of 29 skins from the Galapagos Islands, were lent to me by the California Academy of Sciences. Compared with the specimens in the American Museum of Natural History, they correspond in general appearance to more individuals of *morinella* than of nominate *interpres*. The crown streaking of the summer-plumaged individuals among the lot is matched in degree of reduction by some Canadian birds; elsewhere the species perhaps tends to broader, heavier streaking on the crown.

[Ereunetes pusillus

SEMIPALMATED SANDPIPER

Gifford (1913, p. 56) reported a female of this species as having been collected September 13, 1905, on the beach at Wafer Bay. This specimen (C.A.S. No. 1993) was re-examined by Robert T. Orr, who informed me by letter that it is *E. mauri*.

Probably *pusillus* does wander to the island occasionally. Indeed, I thought I saw one there on March 29, 1963. Yet a bird I shot the next day turned out to be *mauri*.]

Ereunetes mauri

WESTERN SANDPIPER

The one previous record of this migrant species on Cocos is the misidentified specimen of the preceding account.

I saw two *Ereunetes* sandpipers, one on March 30 and the other on April 19, 1963, on the beach at Wafer Bay, each of which I promptly collected. Both were females, and neither one was fat. The ovary was very slightly enlarged in the earlier bird, somewhat larger in the later bird.

Erolia minutilla

LEAST SANDPIPER

Gifford (1913, p. 56) mentioned a few birds seen and collected at Wafer Bay in early September, 1905. I noted a single individual at the same bay from March 7 to March 20, 1963. The bird frequented the littered lonely beach, except when retreating at flood tide to the tree-lined upper margin. I met it at almost every patrol, pattering ahead of me with an occasional momentary pause to hitch up its hindquarters, so to speak.

Erolia fuscicollis

WHITE-RUMPED SANDPIPER

"A female [U.S.N.M. No. 316846] taken at Wafer Bay, Cocos Island, June 5, 1929, is in breeding plumage. The date is late for occurrence of this migrant" (Fisher and Wetmore, 1931, p. 40). This is the only report.

Erolia bairdii

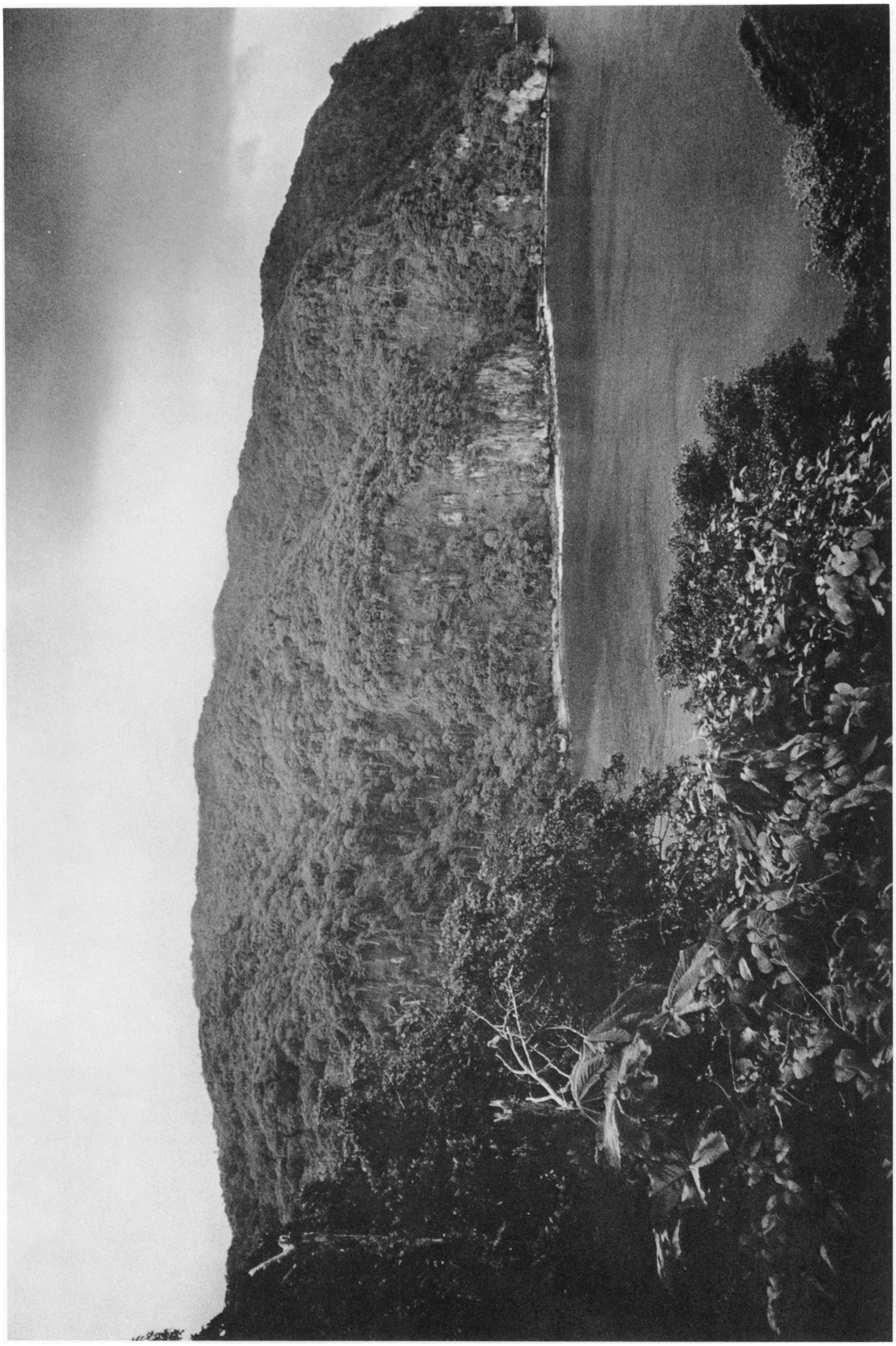
BAIRD'S SANDPIPER

A male taken at Wafer Bay on September 4, 1905, was reported by Gifford (1913, p. 57). At the opposite time of year, April 3, 1963, I collected a bird on the beach at Wafer Bay. A male, it was not fat and its testes were not enlarged.

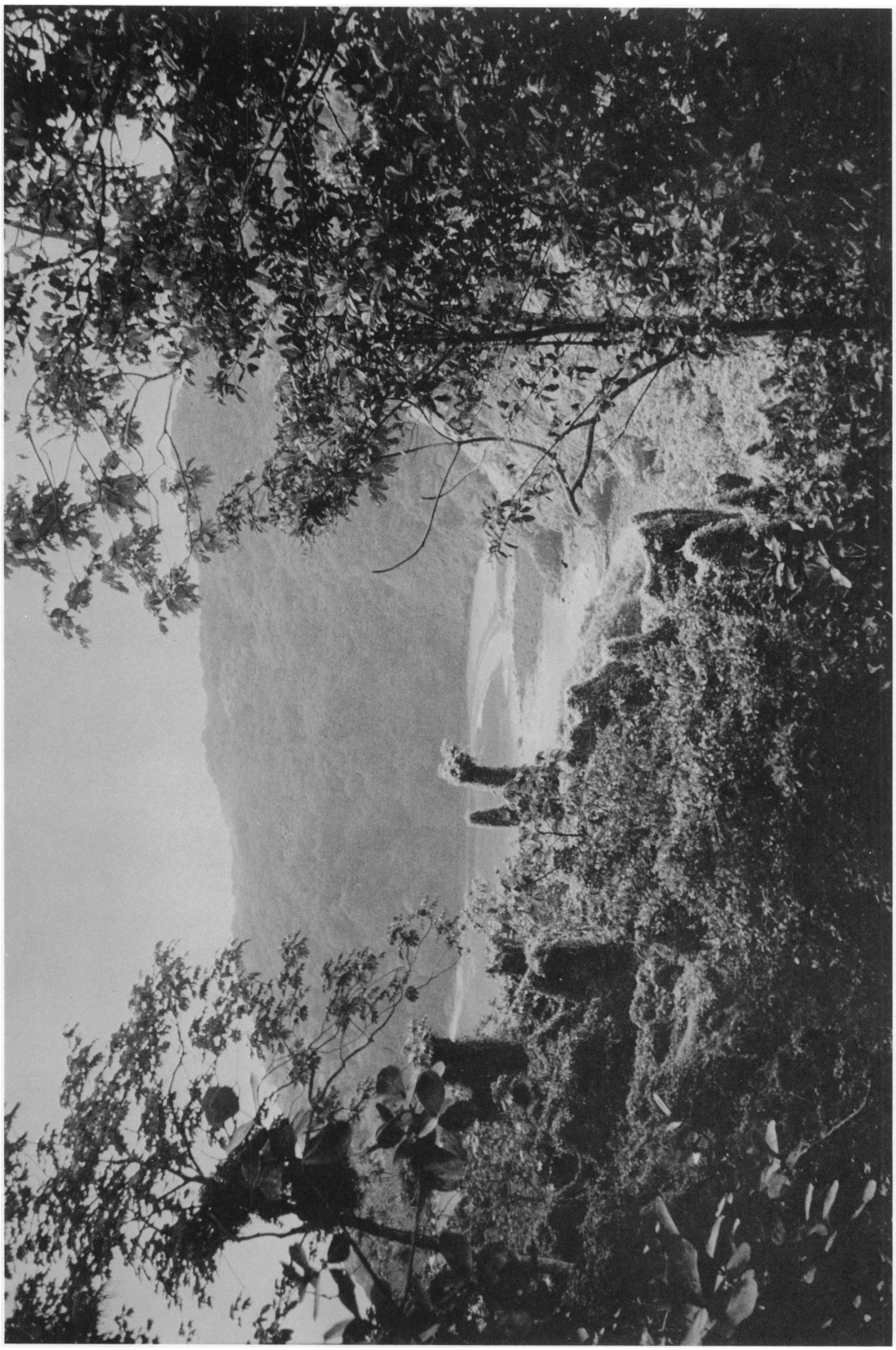
Erolia melanotos

PECTORAL SANDPIPER

A single individual was virtually confined to the outlet of Wafer Creek from April 7 to 13, 1963. I first saw it at the grassy bank of a tiny islet at tidemark in the stream. The bird was dragging a wing slightly and limping noticeably. It seemed loath to fly despite the "nervous" trembling of the damaged wing when I approached. Whether or not this sandpiper had reached the island that very day, its injuries were surely inflicted subsequent to arrival, most likely by the Peregrine Falcon there ruling the roost. Though not recovered three days later, as its wing still drooped, the bird was walking and running

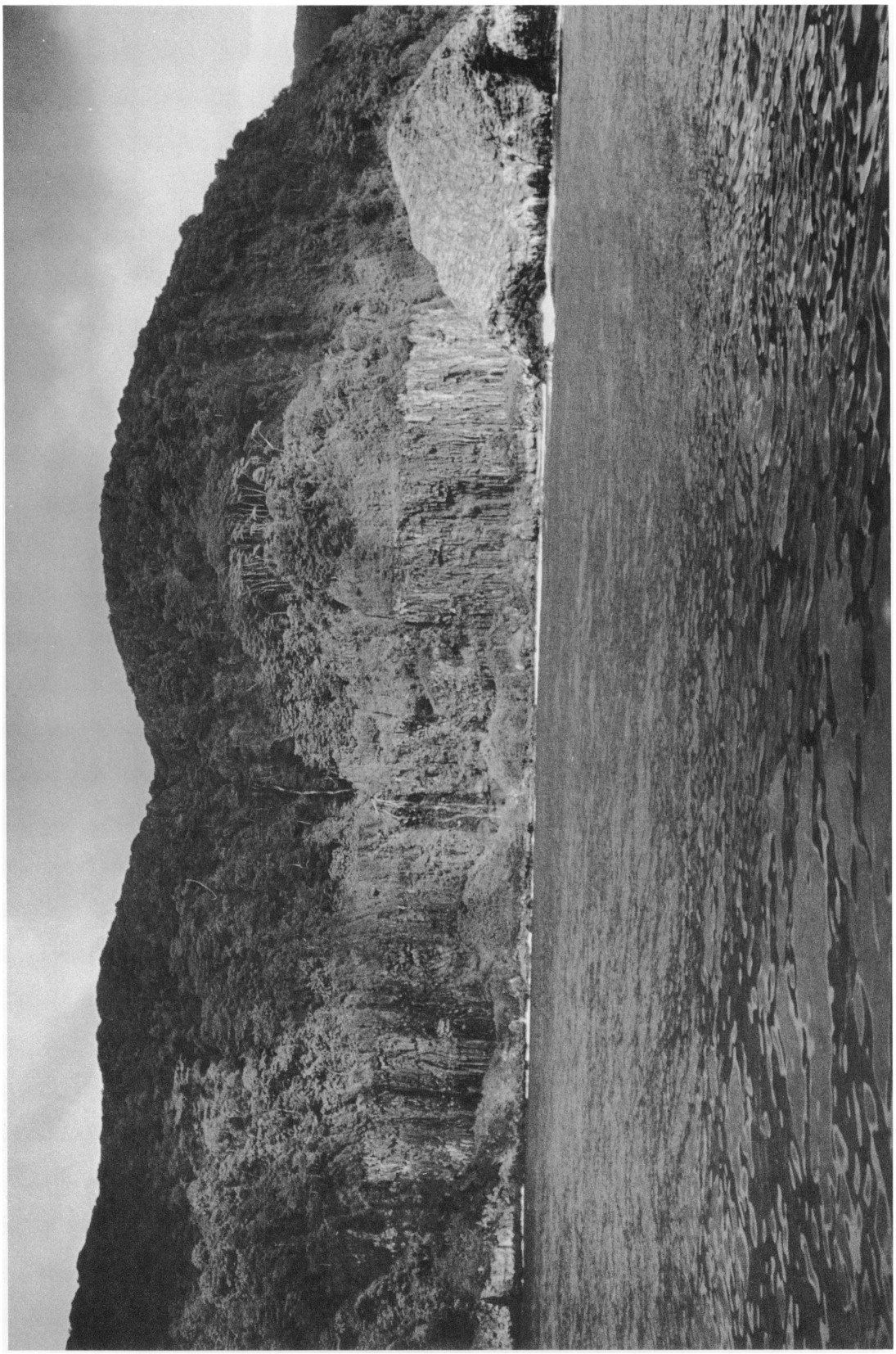


Wafer Bay



Chatham Bay

Esperanza Bay



Typical view of shore line

normally. The seventh and last day on which I saw this sandpiper, it had improved to the point at which it could raise the wing temporarily into place.

Micropalama himantopus

STILT SANDPIPER

A single example was present April 9 and 10, 1963, just inside the entrance to Wafer Creek. The bird showed a cinnamon-buff patch behind the eye, its neck and breast were streaky gray, with something of a brownish wash, and its rump flashed white in flight. Hence its plumage, though transitional, looked bright and fresh. Alighting, it kept its wings raised. This sandpiper had a rather steady searching walk, in contrast to the rushes of the nearby tattlers. Wading shallowly, also more deeply, it preferred to forage in partly flooded gravel.

Stercorarius pomarinus

POMARINE JAEGER

Specific reference to this jaeger at the area in question seems to have been made only by Murphy (1958, p. 108): "Seen everywhere, and almost daily [November-December], between San Diego and Panama, and in the water NW of Cocos Island."

Stercorarius parasiticus

PARASITIC JAEGER

The sighting of "a second year bird believed to be Parasitic on the basis of short pointed central tail feathers and a conspicuous white patch in the primaries" was made by Paul DeBenedictis (personal letters). The bird flew almost directly over the T. S. "Golden Bear" as it was pulling into Cocos Island the morning of March 8, 1964.

Larus modestus

GRAY GULL

The only record of this completely unexpected gull at Cocos is that of Beebe, who mistook it for another species (1926, p. 226): "Then a black spot on the sand exposed by the ebbing tide [at Chatham Bay] turned out to be a grey Galápagos gull, so interesting a straggler that I later secured it. It was pecking at an old fish. . ." The juvenal-plumaged specimen, No. 203 of the Department of Tropical Research of the New York Zoological Society, is now in the American Museum of Natural History. According to the label, on which it is misidentified as *Larus fuliginosus*, it was collected May 22, 1925.

[Positioned some 60 miles south of the island, Beebe (*op. cit.*, p. 330) again encountered a gull, probably storm driven: "The stray [Lava] gull was peculiar to the Galápagos, and it flew around the ship wing-wearily one morning, like the one I had seen the week before at Cocos." Perhaps this one was indeed a Dusky Gull (*Larus fuliginosus*).]

Larus atricilla

LAUGHING GULL

On February 21, 1963, about a mile offshore, two winter-plumaged adults accompanied for a short while the boat that was bringing me to Cocos. I did not see the species again during the remainder of my land-based stay on the island. In 1964, Paul DeBenedictis (personal letter) observed an apparently first-year bird at Chatham Bay during most of March 8 and the evening of March 9.

Larus pipixcan

FRANKLIN'S GULL

A brightly patterned Franklin's Gull flew over Wafer Bay on April 23, 1963. One of its legs was hanging as if injured. Next day I met presumably the same individual stranded at the edge of the beach. A summer-plumaged adult, it had a pinkish bloom on the under parts, and its beak was dark blood-red, with a black patch near the tip. Its leg seemed all right, but the bird was now dragging its right wing. Instead of flying it tried to walk away, but I overtook it so closely as to notice how fouled was its vent. Its poor condition was probably due to the attack of a predator, perhaps a Peregrine Falcon. Several times it sipped sea water.

I did not see the bird again. A few days later, however, a visiting scientific party aboard the M/V "Red Rooster" described a moribund Franklin's Gull that had been seen at Chatham Bay on April 27.

Xema sabini

SABINE'S GULL

A spring-plumaged adult appeared over the island and followed Wafer cleft seaward on March 24, 1963. Later the same morning I

saw it on the low-tide flats, grounded by the onslaughts of a Peregrine Falcon. The Peregrine desisted at my approach.

The right wing of the gull was dragging, and its scapulars were fluffed. It staggered when attempting to walk and experienced difficulty keeping on its feet. It preferred simply to lie on the sand. The bird could rise into the air when pressed, but it flew slowly, low, and not far. Tiring soon, it came to rest and stood defenseless on the open beach when I drew near. The likelihood that this disabled gull could eke out a living, let alone recoup its strength, seemed small.

The rising tide forced the bird to retreat to the embankment bordering the beach. Flushed from the low cover into barely sustained flight, the bird limped through the air a short distance. The next morning I found it awash in the sandy outflow of Wafer Creek. The dead bird, fully hooded, had the eye ring dark red, the beak yellow-tipped blackish, and legs gray-black. A male with gonadial measurements of 4.5 mm. by 3 mm., it had a good supply of fat, colored orange-red.

Sterna fuscata

SOOTY TERN

The form known from Cocos waters is *crissalis* of the tropical eastern Pacific, mostly north of the equator. Snodgrass and Heller (1904, p. 239) included Cocos Island in the range, presumably on the basis of a record, which I have not been able to trace, dated earlier than their own visit in 1899. Gifford (1913, p. 21) reported an immature male taken 40 miles south of the island on September 2, 1905. An adult male, No. 217 of the Department of Tropical Research of the New York Zoological Society, was obtained 60 miles south of Cocos on June 1, 1925, by the Arcturus Expedition. The specimen is in the American Museum of Natural History.

Hundley (1962, p. 114) met the species at Cocos on May 22, 1962: "On the way [to Wafer Bay] we passed Isla Manuelita, a rugged, nearly vertical mass of rock. Brown Boobies were perched along its sides. In one sheltered nook that sloped downward toward the sea, thirty Sooty Terns sat on nests. Former writers have mentioned Cocos as being too humid for the nesting of this species. Perhaps this small colony may be relatively new."

Anous stolidus

BROWN NODDY

The reproductive schedule of *ridgwayi*, the form of Brown Noddy in the northern tropical eastern Pacific, appears to be seasonal on Cocos. Nesting is evidently well under way by May (Hundley, 1962, p. 114), possibly earlier in some years or later in others. Only Hundley (*loc. cit.*) found the species nesting on the main island, as opposed to the islets, also flying around the approaching boat and screaming and diving at the persons aboard. Eggs, presumably of this noddy, have been taken in quantity at least as late as August (Plumpton, 1935, p. 92). Nearly fledged young are known from early September, when the adults are generally in postnuptial molt (Gifford, 1913, pp. 26–27). A refractory period that at Cocos may continue into December is manifested by a bird with slightly enlarged ovaries, recorded by Murphy (1958, p. 109).

Seasonally the numerical status is uncertain. Townsend (1895, p. 125) found the species abundant at the end of February in 1891. Chapin (MS) doubted the presence of more than eight or 10 individuals in mid-April, 1930, the smaller Black Noddy being much more numerous. Hundley (*loc. cit.*) reported fewer than 100 birds from the main island on May 22, 1962. Snodgrass and Heller (1902, p. 508), in July, did not comment on frequency. Gifford (*loc. cit.*) found the species common in September.

Late in February, some days after my arrival, I came to expect the sight of a noddy or two dashing madly to sea at daybreak. The swift twisting flight precluded precise identification until the third week in March, when both species of noddy were visible daily in increasing numbers, often together, and close at hand. Previously, whether alone or in tight flocks, the birds had been keeping far out in the bay.

By the latter part of March the noddies in growing quantities were spending each night in the interior and funneling down Wafer cleft at dawn. In early April the sequence of small groups audibly winging seaward had become an exodus lasting half the

morning. The birds reappeared at dusk, their silhouettes straggling over the beach and disappearing up the valley. By the middle of April, individual Brown Noddies were returning inland in the bright light of morning as well. Only 10 days later the stream of noddies flowing up and down the valley had dried to a trickle.

It struck my notice after the middle of March that Brown Noddies were favoring Gissler's Rock in flock-sized groups, somewhat separated from a few Brown Boobies up higher. Some birds were holding straw-colored sticks perhaps 12 inches long in their beaks. Others, fluttering, were plucking a stalk from the islet's low crest. Again, I saw two individuals pulling from opposite sides at a small clump of grassy stems, even rising with it between them in short flight. Two others were sparring with their bills. Nest material, in which the bird bringing it was apt to lose interest, was carried off promptly by another. On March 23, I first saw a bird hovering above a second as if to copulate. However, it was repulsed by the one below lifting its head, bending its back, and pecking upward.

Every noddy I could see on the rock demonstrated, in virtually all situations where afoot, a periodic lowering of the head and bending of the neck that brought the bill past the perpendicular to point like the proboscis of a mosquito a bit breastward. This mannerism could not help but direct the white crown at a facing individual for an appreciable pause. Except during the hot part of the day, the terns kept moving about awkwardly, as though jockeying positions, their wings somewhat raised and outstretched, fluttering, as in immatures. The "idly" pussyfooting birds also practiced the nod that ends in the hypnotized pose described above.

Generally these noddies arrived at the rock and departed in integrated flocks. Often for no apparent reason, unless in "panic-flight" reaction (see Cullen and Ashmole, 1963, p. 424), a cloud of terns would set out "impulsively" over the bay. Soon returning, they by-passed the rock, as a rule to loop back around it, as might a flock of exercising pigeons. The noddies either alighted or swerved out to sea, then returned to repeat the maneuver. At other times scores of milling birds were spotted fairly high in the air, then lower above the bay, before descending to fly to and fro, as though Gissler's Rock were home base in a game of tag. Yet this tiny islet lost most of its attraction by the last week in April. On the other hand, great crowds of noddies, probably of both species, continued to swirl like smoke in the direction of Boat Rock at sunset.

A small scouting party first ventured in broad daylight to the head of the bay and the open approach to Wafer Creek on March 24. The birds made many passes over the area before finally alighting. The very next day a trio on the wing kept patrolling the exposed pebbly beach. Thereafter small groups flew back and forth along the shore, seldom sweeping downward to dip their beaks for a morsel, to settle at last on the ground. Joined at times afoot by a Black Noddy or two, the terns waddled about rather tamely with short-paced goose steps, and both kinds habitually bowed their heads and held their bills in the same attitudinized manner. At close range I could see the downpointed beaks being kept slightly open, as if ready to pick something up, which the birds sometimes did. Occasionally at nightfall a foraging noddy was discerned hovering above calm water close in.

Each species of noddy during my visit was very uncommon, if not rare, from the latter part of February into the first half of March. In March both species were adding to their numbers stepwise, as do migrants arriving in waves. The waxing and waning of the Brown Noddy's nesting activities, which came to naught at Wafer Bay, apparently kept pace there with the cyclical changes in abundance.

Anous tenuirostris

Black Noddy

The race of Black Noddy on Cocos Island is the eastern Pacific *diamesus*. As with the Brown Noddy, scattered observations suggest a seasonal alteration in numbers. That the two species do not always fluctuate synchronously can perhaps be inferred from Chapin (MS), who found the Black Noddy numerous and the Brown Noddy scarce in mid-April. Townsend (1895) listed the Brown Noddy and not the Black at the end of February, but his was only a one-day visit. Both species may have been unobtrusively present

when I reached the island on February 21, though I did not definitely identify them until later. The Black Noddy is unquestionably common in March, April, May, July, and September. Murphy (1958) simply reported its presence in early December, not its abundance.

Before sunrise in late February and early March I watched for a lone noddy racing seaward in snipelike, veering, low flight. From the third week of March well into April, Black Noddies in groups of as many as 20 individuals, also singly, were flying to sea every morning. Their erratic paths crisscrossed close to the surface in a happy-go-lucky manner distinguishable from the steadier-beating flight of the Brown. Chapin (MS) wrote: " . . . the small noddies . . . fly about over the bay in flocks of 30–100, and now and then a few, or even most of the flock, fly up a ravine, where they evidently perch in the trees. They come shooting down again singly or in twos and threes, to resume their coursing over the water." In April, when the noddies were streaming back to the island at nightfall, I observed a few individuals heading out of sight in the opposite direction. Particularly during this period of abundance did I see the Black Noddy being persecuted by the native frigatebirds (*Fregata minor*) and sought as prey by a visiting Peregrine Falcon.

On April 13, I noticed for the first time a Black Noddy, in company with several Brown Noddies, scouting the gravelly shore. Thereafter the mixed occurrence of Black and Brown noddies afoot at the edge of the beach was a usual sight. By April 18, Black Noddies were flying about severally at slow steady speed, paced by fairly rapid shallow beats, in contrast to the usual wayward flight. On this date I noted a bird with a dry leaf in its bill flying in and out of the trees, perching on a limb, then pressing the gift upon a not fully responsive companion, the leaf falling to the ground. It was becoming astonishingly plain that scattered birds were perching socially in the trees on the hillside flanking the head of the bay on the east. Many were seated in two's, and both members were apt to make roundabout sallying excursions. The interest of the birds in nesting material was growing by the day, and some were playing with it in the air.

Nests in every stage of construction seemed suddenly to have taken shape by April 20. Disposed colonially upon the hillside trees, they were being built in part of moss that the hovering birds stripped from the bark of trees outside the social complex. Billsful were carried off and passed to the companion at the nesting site by the returning birds, which set out again to fetch more. Other materials abundantly at hand and commonly employed included the soaked remains of plants carried to sea by the heavy rains and now awash at the shore. A year earlier Hundley (1962, p. 113) had noted on May 22: "Black Noddies . . . were collecting this material. Although there was an abundance of these leaves, that secured by an individual bird always seemed the most desirable. The laden one would be pursued by other terns which dipped to the side and below it in an attempt to capture a bit of the prize. If the tern managed to retain its load beyond the beach, it continued in peace on a direct line . . . ." Hundley next discovered these birds nesting in foot-tall shrubs on a high, inaccessible, offshore rock. In contrast, the junky flattish nests of blackened leaves, limp stems, and absorbent moss seen by me were placed at a juncture or crotch up in the open-branched trees overlooking the shore on the main island.

April 22 was the date I first saw the birds copulating. The activity was being engaged in by birds on the beach, by birds on the rocks, and by birds on the branches. The impulse seemed to have spread infectiously that very day. Also, the birds had suddenly acquired the habit of taking off seaward as a flock and soon returning. Perhaps these were not the "panic flights," an explanation for the absence of which in the Black Noddies of Ascension Island was aired by Cullen and Ashmole (1963, p. 424). Again, a bird on a limb, whether alone or with others, gave a quick shrug, similar to that of *Gygis*, at irregular intervals.

I did not hear the voice of this noddy before April 18. But on that day, in time with the acceleration in reproductive tempo, the birds had become noisy. One of the cries was variously a hoarse or harsh titter or rattle, short, not strong, and rather froglike. Another, similar to the last, was an excited

chattering. A third was a squeaky scratch, neither rattling nor churring. Incidentally, I had in no instance detected a sound from the Brown Noddy.

Snodgrass and Heller (1902, p. 510) found nesting still in progress "in the tops of tall trees a short distance inland at Chatham Bay" early in July. In September, according to Gifford (1913, p. 30), "young, a-wing, appeared to be more numerous than adults, evidencing that the breeding season had passed."

Gygis alba

Fairy Tern

The Fairy Tern has been found on Cocos, and its aerial grace has been noted, by most visitors, including the yachtsman and treasure hunter, even to having "been christened Holy Ghost birds" (Plumpton, 1935, p. 87) by a group of the latter. Published notices of occurrence now span the period from late February to mid-September. Other than the erroneous allocation of twig-built nests to this species by Snodgrass and Heller (1902, p. 511), the only mention of breeding is the following: "Two adult males and a nestling with wing quills just starting were taken . . . June 10, 1929, by A. K. Fisher. Mr. Cleaves took a number of photographs of them at the nesting place on Nuez Islet. They were common also at Wafer Bay" (Fisher and Wetmore, 1931, pp. 46–47).

The five-month "winter" hiatus at Cocos corresponds to a slack season for visiting naturalists, yet expert observers have not been altogether wanting. Charles H. Lankester arrived December 23, 1932, and remained on the island a month (Plumpton, 1935, pp. 131–133, 141), but saw no Fairy Terns, to his regret (personal letter). Nor, apparently, did Murphy (1958) see any during his brief stopover early in December, 1956. Hence it may be less implausible to regard this striking species as a breeding visitant than as a resident fortuitously overlooked the rest of the year.

Sequentially, it was my second day on the island, February 22, 1963, that I saw two birds, slightly separated but possibly paired, in the woods at an elevation of some 600 feet. I found them still close to the original tree two days later. Not until March 1, but regularly thereafter, did I spot the species in the open, flying out of the interior high and very fast, erratically altering its beat and changing direction. The number of birds and their goings and comings at cliff height were increasing by the day.

On March 15, I found the species for the first time in the trees on the flat of lower Wafer Valley, which was to remain a favorite site. Two terns were stationed at different levels, just sitting about. A somewhat rattling dry chatter was produced, not loud, rather froglike, quite at odds with the exquisite appearance. A bit later I noticed the two birds together. One was preening the wing of the other, which, with head and bill directed downward from the perch, seemed to be soliciting and enjoying the attention. Many a night a tern or two roosting in the trees beside my camp periodically advertised its presence. The cry, a sort of nasal gibbering cackle, disturbed me no end until I identified the perpetrator.

From this time onward the birds steadily increased in number and appeared to be readying themselves for breeding. As early as March 17, the species was usually to be seen in small groups, also in aggregations of as many as 50, well out over the bay, some of them low, others high, sweeping toward the surface but never diving. Again, a twosome winged over the bay, "playing" and twinkling prettily like white butterflies, rising higher and higher, their antics joined temporarily by a third individual, until the original pair became lost from sight. A few birds were now also chasing about the trees in lower Wafer Valley.

The agility and speed were of the rapturous order. So adept was the bird in the air that sometimes, as if in proof, it "buzzed" the Peregrine Falcon of Wafer Bay. Another time a half dozen terns were mildly mobbing an osprey with a fish on its perch. Flight was not always erratic, hence probably under perfect control, and the bird could hover almost stationary at a spot which had aroused its curiosity.

Species-wide nesting dated perhaps from the first of April. More birds had been coming to the head of the bay and the entrance to the valley to explore the branches, settling upon them as in trial. On April 2, I noted many

individuals spread about, for the most part singly but also in two's. The dainty creatures emitted their patterned, gutturally froglike, incongruous "laugh" and a variant I later transcribed as a cronish cackle.

I did not discover until April 12 that incubation was already in progress. The first bird I spied at a thin bare crotch some 40 feet up, sitting tight indefinitely, it seemed, with an egg-shaped bulge to its belly feathers. If not for the white plumage, I would have had trouble finding it again. I found other patiently perched birds scattered about during the next two weeks. As their numbers increased, I noted here and there two or even three birds at rest on different limbs of the same tree. Many other individuals seemed still to be seeking a site at the end of the third week in April. Later, on April 27, I saw for the first time a pair copulating, on a crotch.

Every bird a-perch that I watched, from the first to the last, whether covering an egg or companionably at rest, gave a quick shake of its head at irregularly frequent intervals. Neither a nod nor a shrug but rather a spasmodic flick sideways, it was a habitual movement which I likened to a tic.

Fairy Terns in the tropical eastern Pacific, according to Baker (1951, pp. 174–181), are assignable to *pacifica* of the tropical western and south-central Pacific.

Coccyzus ferrugineus

Cocos Island Cuckoo

The indigenous form, *ferrugineus*, is the least common of the land birds on Cocos Island. According to the literature, it has been found occasionally at best, even when sought by the collector: five or six by Townsend (1895, p. 124), one by Snodgrass and Heller (1902, p. 517), six by Gifford (1919, p. 195) and party, one each by Fisher and two shipmates (Fisher and Wetmore, 1931, p. 49), three by Chapin (MS), apparently none by Hundley and companions (1962). Yet Charles H. Lankester writes me that "of the resident birds only the little flycatcher was at all rare."

During my stay in the spring, three or four cuckoos were inhabiting lower Wafer Valley. No doubt these were sedentary residents that I kept seeing on and off; I met another few individuals singly on the slopes. The freely used voice established the regular presence of a bird or two in the vicinity of camp. The usual call was a succession of guttural, froglike barks, beginning with a roll and continuing as an iterated note. The bird also gave a resonant guttural "kkkkrúhoo."

The notation by Chapin (MS), "attitudes etc. like our yellow-bill," summarizes my impressions of *Coccyzus* cuckoos. The apparent shyness of this one was due to its relative scarcity and to its arboreally concealed, lethargic behavior. Generally it hopped a few inches to a few feet among the branches, then stopped to look about deliberately. A spurt of activity consisted of a quick hopping or running up or along a limb. The ingrained cuckoo style of hunting, in which periods of quiet inspection alternate with sudden mobility, as a rule resulted in failure while I was watching, thus perhaps proving an adage such as "patience in lieu of plenty."

The diet of the bird seems to lack variety. "An examination of the stomach of one showed the remains of what appeared to be crickets" (Gifford, 1919, p. 195). "The cuckoos used to come down to the almond trees (introduced) in Wafer Bay, to feed on the raucous cicadas there" (Charles H. Lankester, personal letter). The once or twice when I saw this cuckoo with food in its mouth, it had a large cicada-like insect, tan in color. When occasionally a bird descended below eye level into shrubs, or when I saw one drop from a tree to the ground for a moment at the upper edge of the beach, it may have been stalking such good-sized prey.

The adults of *C. ferrugineus* differ at a glance from those of every population of Mangrove Cuckoo (*C. minor*), both continental and insular, in having the upper parts rufescent, a hue that tinges the wings of the young of all races of *minor* to a slight degree. As the Cocos Island Cuckoo habitually crosses an opening in a dashing glide, it transforms to a bird that is all reddish or rusty, in contrast to its appearance when perched. "A flash of rufous and a throaty note revealed the . . . cuckoo" to Beebe (1926, p. 227), who must have been similarly impressed. Moreover, the Cocos bird lacks the grayish wash at the sides of the neck, so pronounced among island populations of *minor*. The quality, if not the pattern, of its cries did not remind me

of Mangrove Cuckoos I had heard on the mainland.

[Tapera naevia

STRIPED CUCKOO

An uncatalogued specimen of this continental species in the Museo Nacional de Costa Rica bears on its label the information that it was collected June, 1899, by Anastasio Alfaro on Isla del Coco. This highly improbable record loses all credence when one realizes that Alfaro visited the island in 1898, and that his report, dated June 24, 1898, makes no mention of the species.]

Chordeiles acutipennis

LESSER NIGHTHAWK

A lone migrating individual of this species appeared at dawn on April 22, 1963, over the gravelly sand flats of Wafer Bay. Presumably it was the same individual that I collected when it reappeared that day at dusk. A female (A.M.N.H. No. 789456), its ovary measuring 5 mm. by 4 mm., the bird had no subcutaneous fat. It belongs with the race *inferior*.

Chordeiles minor

COMMON NIGHTHAWK

In the late afternoon of March 15, 1963, I observed a nighthawk which I identified tentatively as this species in migration. It was flying westward low over Wafer Bay, then, circling higher and higher, constantly flapping in a hawklike manner, it headed eastward high over the island and out of sight.

I assumed that it was the same individual that had returned to the island and that I was seeing irregularly during the next three weeks. The bird often appeared on schedule after sunset, when the light was failing rapidly, over the palm trees at a certain section of beach. Its aerial flitting maneuvers were those of a hunting bird. I spied it intermittently for a quarter of an hour or so until dark.

I had stopped seeing it early in April, but on April 6 I flushed a nighthawk in daytime from the overgrown edge of the beach above tide line and again from the muddy, treed interior of lower Wafer Valley. The bird flew in a labored manner, and I collected it. A female (A.M.N.H. No. 789455), its ovary measuring 8 mm. by 5 mm., it was in emaciated condition. Its racial allocation is with *chapmani*.

Chaetura sp.

SWIFT

Chaetura swifts that I took to be Chimney Swifts (*C. pelagica*) on migration appeared at Cocos Island on two successive days late in April. About sundown on the overcast afternoon of April 25 I noted two individuals far overhead. They rose higher and higher until they were out of sight, but they soon returned and stayed in view for 15 minutes. The next day I saw one bird flying about in the morning and one bird late in the afternoon.

The following notation by Fisher (Fisher and Wetmore, 1931, p. 51) is of interest because of the date, between June 4 and June 10: "On one of the trips which Mr. Cleaves made to the upper reaches of Cocos Island, he saw swallows and swifts flying over a broad, grassy open stretch of country."

Megaceryle alcyon

BELTED KINGFISHER

Two individuals of this migratory kingfisher were already present at Wafer Bay on February 21, 1963. They were frequenting the fresh-water course of lower Wafer Creek, also the area of tide-filled channels in low portions of the valley. The birds were extremely wary and tried to keep a screen of foliage between themselves and the observer. Clattering or rattling in travel up and down the tree-lined arcaded creek, they darted and twisted through the streamside vegetation with astonishing speed and dexterity and came suddenly to finely calculated stops. They perched apart to the degree that I could not view them at once. Both birds remained well through March. My last notation, dated April 11, was to the effect that only one of them was still present.

A year later, along the stream emptying into Chatham Bay, a Belted Kingfisher was seen on March 8 by Robert I. Bowman and Stephen Billeb and again on the following day by Paul DeBenedictis (DeBenedictis, personal letter).

Tyrannus tyrannus

EASTERN KINGBIRD

Wetmore (1958) has brought to our attention the occurrence of this migrant flycatcher on Cocos Island, "the first to be reported from that distant point. A note attached to the specimen reads in part 'Collected by Percy Howe at Wafer Bay, Cocos Island on 15th November, 1932. The bird . . . was exhausted and taking cover just behind the camp in cleared ground. It is the only one seen of its kind during a year's residence on the Island.' " Mr. I. C. J. Galbraith (personal letter) has kindly supplied the information that, between September and November, 1932, Howe had collected three specimens at Wafer Bay, *Tyrannus tyrannus*, *Coccyzus ferrugineus*, and *Butorides virescens*, all in the British Museum (B.M. Reg. Nos. 1935.3.8.1–1935.3.8.3).

Myiarchus crinitus

GREAT CRESTED FLYCATCHER

A bird of this species in migration occurred at the head of Wafer Bay from April 14 until my last observation on April 19, 1963. The bird hardly strayed from the parklike wedge of flat terrain filling the valley entrance. So lethargic was this individual that its attitudes brought to mind a native neighbor, the Cocos cuckoo. For the most part it sat about inactively, except when looking around as if to spy prey. After a while it moved to another branch or to a different tree, again in the manner of the cuckoo. Only by changing sites was the silent bird apt to disclose its presence.

Nesotriccus ridgwayi

COCOS ISLAND FLYCATCHER

Several authors have commented on the infrequency with which one meets this endemic flycatcher, even judging it the least common of the native land birds. In my experience it ranked next to the ubiquitous Cocos finch, whether in total numbers or on the basis of island-wide occurrence.

I found it singly or in two's wherever I went, from the tide-mark scrub to the mangrove-like tangles behind the beach, up the forested slopes, and along the wooded ridges and ravines. It frequented all vegetational levels, from shrub height to the treetops, and temporarily descended almost to the ground. Its distinctive voice underscored the presence of many more unseen individuals. The only cry that I heard was a snorting downscale twitter, sometimes trilling, other times rattling, with which the tail vibrated in rhythm. It was unlike that of any flycatcher I knew.

This plain-colored little bird, with its straight, relatively long slender beak and longish narrow tail, suggested on the one hand a long-billed, long-tailed, slim *Empidonax*, if one such were to exist; on the other hand a gnatwren, such as the mainland *Ramphocaenus*. Its unhurried searching behavior approximated that of its neighbors, the Cocos finch and the even slower-acting Cocos cuckoo. Perhaps it was solely the slender proportions that suggested a similitude to a creeping explorer rather than a buoyant flitter.

Actually it moved about the foliage and twigs in finchlike hops and spurts, pausing to look around, and it hovered at or under leaves. The bird did of course engage in flickering short sallies, when it proved itself adept at aerial fly-catching. Its flight was of the fluttery type, usually in straight trajectory for a short distance.

That the bird reacts to squeaking was noted previously by Chapin (MS). That it is generally rather tame, Beebe (1926, p. 227) put this way: ". . . and then there came to my ears the sharp snap of a bird's beak and on the tip of the barrels of my gun which I had left propped against a rock, perched the Cocos flycatcher. . . ."

Hirundo rustica

BARN SWALLOW

The North American *erythrogaster* in its wide-ranging migration has been recorded a few times from Cocos Island and vicinity. Gifford (1919, p. 205) "saw some 20 of them flying about the top of a hill above Chatham Bay" on September 5, 1905. A few days earlier, Gifford and his associates had captured two immature males at sea, one 40 miles, the other 25 miles, south of the island (Swarth, 1931, p. 104). In mid-April 1930, Chapin (MS) noted a flock of about 20 Barn Swallows feeding above the top of a grass-grown hill, probably the same one as had

Gifford, at Chatham Bay. I observed a lone bird flying over the beach and inner Wafer Bay at sunset on March 31, 1963. A month later, on April 27, during a heavy rain late in the afternoon, I saw several Barn and Bank swallows flying about at the head of the bay and the entrance to Wafer Valley.

Riparia riparia

BANK SWALLOW

I saw this migrant swallow at Cocos Island three times in all. A bird first appeared at Wafer Bay on April 21, 1963, very late in the day. On April 27, several individuals of this species, together with several Barn Swallows, materialized during a rainstorm very late in the afternoon. The next morning I noted a single Bank Swallow hawking low over the entrance to the creek.

[**Mimus** sp.

MOCKINGBIRD

Beebe wrote (1926, p. 337), ". . . at Cocos, I saw a number of mockingbirds and yellow warblers feeding exclusively along the line of the tide, picking up tiny shrimps and other forms of marine life." This observation is almost certainly the result of a slip of the pen. There is no specimen to support the statement, nor is a mockingbird known to occur on Cocos.]

Hylocichla mustelina

WOOD THRUSH

A Wood Thrush was detected daily along lower Wafer Valley from February 22, the day following my arrival, through February 26, again on March 1, and for the last time on March 5, 1963. The bird was very shy, keeping in the protection of thickety bushy cover on the floor of the stream-shot narrow valley. Concealed, it sang onward from February 26. The breaking into song by this lone individual 5½ degrees north of the equator contrasted with the uniform silence of Wood Thrushes on the Costa Rican mainland at this time of year (Slud, 1964, p. 299).

Vireo olivaceus

RED-EYED VIREO

I first encountered a bird of this migratory species in transience at Cocos on March 29, 1963. It had taken refuge, so to speak, in an open-branched hibiscus tree at one end of the beach at Wafer Bay. I met a bird again on April 22, then almost every day until April 27, the day before I left the island, at lower Wafer Creek and in the trees along the shore. It was generally not active.

Mniotilta varia

BLACK-AND-WHITE WARBLER

I observed an individual of this species on February 22, again on February 25, and once more on March 9, in the shrubs and trees at the head of Wafer Bay. This methodically foraging wood warbler acted no differently on the island from the way it does when wintering on the mainland.

Protonotaria citrea

PROTHONOTARY WARBLER

The two individuals of this migrant species which I noted on February 25, 1963, could well have been wintering on the island. Later I saw a single bird on March 1 and again on March 4. This warbler kept as a rule up in the trees, also lower in the branches and in shrubs, in the mangrove-like low portion of the valley. It was foraging on each occasion, hence attracting attention to its bright flashes of color.

Vermivora peregrina

TENNESSEE WARBLER

Tennessee Warblers were present during the length of my stay, probably as visitants, conceivably as a transient population being continually replaced. This species was easily the most common arboreal migrant, and I could generally expect to meet the active, little, plain-colored, hard-to-count birds flitting singly or severally through the tops of the trees, sometimes lower. Once I saw a trio of birds very low, two of which went to the ground to feed, apparently on grass seeds.

Dendroica petechia

YELLOW, OR GOLDEN, WARBLER

To the race *aureola* belongs the "canary"-like little bird that catches the eye of even the untrained enthusiast once ashore. Thus did Commander Plumpton (1935, p. 87) express himself: "Land birds were confined to the ordinary house sparrow and canaries, and I

do not know whether these are true canaries. Probably not, for they had little song [in August], and in appearance did not seem to have so much yellow as the canary with which we are familiar; but they were jolly little chaps."

Sir Malcolm Campbell (1931, pp. 167–168) refreshingly penned his impressions as follows: "While we were sitting under the palm tree the bird population of Cocos sent its emissaries to inspect us. There were only two sorts. . . . The first visitors were several small yellow birds, friendly in their intentions and about the size of canaries, but with longer beaks. They came to within six feet of us and did not seem to have the slightest fear. These little birds had bright canary yellow bodies with green wings, while what I imagined to be the males had red heads, whereas the heads of the females were green. They were clever little fellows and quite the prettiest birds I had ever seen. I had half a mind to set a brick-trap with some pieces of rock to catch a couple to take home, but it was unlikely that they would have lived, so I gave up the idea."

The casual visitor has been apt to consider this warbler one of the most common birds of the island, because it frequents the entrances to the few accessible valleys, precisely the places chosen by humans to land. At these places the mangrove-like low woods that the bird prefers may extend to the beach, even bordering the sea at high tide. Also, the bird flirts and flashes brightly, it is vocal, rather fearless, inquisitive, even aggressive at times, and it responds to a squeak. But the frequency of its appearances, singly but sometimes in two's, decreases rapidly as one climbs up the overgrown slopes, as though the bird were drawn to a disturbance well outside its home range.

The species was inhabiting foliaged tree, bush, and shrub, from medium heights downward. I found it regularly at the shore, where it hopped about in search of tiny insects in the shade of overhanging branches and leafage. There it repeatedly drove off a Myrtle Warbler (*Dendroica coronata*), visiting afoot and likewise scurrying for prey, from the flat rocks and sand at one end of the beach. That the bird may venture to sea is implicit in the remarks of Beebe (1926, pp. 330–331) concerning a Cocos yellow warbler that settled on the yacht "Arcturus" 58 miles south of the island.

The normal sprightliness of this species contrasted markedly with that of the other resident land birds. Besides flitting and searching it also bent sideways to look under branches. It was hardly proficient at aerial fly-catching. On the other hand, both sexes of a pair taking turns soon learned to favor a twiggy root projecting into a garbage pit. Looking alertly about, stretching the neck and darting the head, they dextrously caught flies with the bill while fixedly perched. Here, too, this warbler was cockily territorial. At any rate, I saw the female maltreating with its beak a young Cocos finch that had invaded the pit, even to holding it in submission in its claws. Incidentally, the bird sighted by Beebe (*loc. cit.*) at sea, "flew down to the deck where, with the skill of a professional flycatcher far transcending that of an ordinary warbler, it caught two flies which were humming about a dead fish."

The species was up at dawn on Cocos, singing and looking for food. Both Chapin (MS) and Hundley (1962, p. 113) found its song like that of the birds in eastern United States. I thought that *aureola* sang much better, that is, more musically, more richly, and louder. Two commonly joined phrases I transcribed as "chewty chew tss·tss—ts·ts cheww chewtywee" (the last syllable rising). I saw none but freely singing adult-plumaged birds on the island. Clearly, my visit was timed to the "spring" of the year for this species. The season's dull offspring would not be out and about until later.

Dendroica coronata

MYRTLE WARBLER

The migrant Myrtle was present probably as a transient rather than a visitant during my stay in the spring of 1963, at Wafer Bay. I noted three occurrences: on February 27, again on March 10, and regularly from March 19 until my notation of its having been absent for a few days on March 30.

The first two observations were of a bird or two high in foliaged trees, flitting in company with Tennessee and Bay-breasted warblers. The daily meetings onward from March 19 were with a single individual, joined by a second only on March 22, which was fre-

quenting the beach. Sparrow-like, the bird hopped on the sand and ran, accenting one of the legs. The gaited head-down runs were aimed at jumping or flitting, small, invertebrate prey. The attempts often failed, yet a number were caught through perseverance.

The specimen that I took on February 27, a male with unenlarged gonads and in fat condition, is assignable to the nominate race.

Dendroica castanea

BAY-BREASTED WARBLER

The Bay-breasted was the second in frequency, after the Tennessee, among the migrant warblers. Particularly in the period April 15–24 could I anticipate finding one to a few birds almost daily, especially at a late hour on a sunny afternoon, in the broad-limbed trees at one end of the beach. Previously I had seen the species singly on March 23, in small numbers around March 11, and once or twice on February 25. The observations of single birds were probably each an indication of the presence of others. Only toward the end of my stay did an occasional bird appear to have brightened its nondescript plumage.

Dendroica discolor

PRAIRIE WARBLER

I did not hesitate to collect this Caribbean migrant the second time I saw it, on February 26, 1963. I was too surprised the first time. The specimen (A.M.N.H. No. 789466), a female with slightly enlarged ovary, belongs with the nominate race. The bird had been keeping below medium heights in shrubs.

Dendroica palmarum

PALM WARBLER

The out-of-place occurrence of this species in the tropical eastern Pacific greeted my arrival at Wafer Bay on February 21, 1963. I saw this bird the next several days, usually in the morning. It kept close to the ground and on the floor amid open secondary type of vegetation in lower Wafer Valley, often in company with a few Cocos finches. I collected it on February 27. The specimen (A.M.N.H. No. 789467) matches those of the nominate race.

Seiurus noveboracensis

NORTHERN WATERTHRUSH

Northern Waterthrushes were present during the length of my stay, their status being undoubtedly that of previously arrived visitants. Some half dozen were dispersed over the shaded muddy floor of lower Wafer Valley. Unless frightened into low flight, they walked about warily, bobbing their heads, jetting their tails, and giving their constant metallic hard "chip." At times they flicked fallen leaves or tossed aside trash with the beak. I watched a bird pull to one side a leaf several times larger than itself.

The ones around camp seemed each to occupy a circumscribed area which they patrolled afoot. The range boundaries began to be violated the second week in April, when I noted two exposed individuals at the edge of the upper beach. These, however, might have been transients. At any rate, the territorial disintegration was complete by the time I heard the species sing on April 25.

The one bird I collected, on February 27, was a female, the ovary of which was slightly enlarged. Its wing measurement of 69.5 mm. is slightly shorter than that of the shortest-winged Northern Waterthrush analyzed by Eaton (1957), who found among breeding populations a trend toward short-wingedness eastward from southern Ontario across the continent.

Setophaga ruticilla

AMERICAN REDSTART

The migratory American Redstart was noticed in lower Wafer Valley on February 27, again on April 23, 1963. A female-plumaged individual on each occasion, it was very active and agile as it flitted in the foliage below medium heights in the trees. A year later, on March 9, Paul DeBenedictis (personal letter) found two female-plumaged birds in the trees a bit inland along the shaded creek that empties into Chatham Bay.

Icterus galbula

BALTIMORE ORIOLE

This species occurred in transience April 19–21, 1963, at Wafer Bay. At least two individuals, both probably females, one of them higher plumaged than the other, were pres-

ent. Either bird regularly attracted my attention during its sojourn in the trees behind the beach.

Dolichonyx oryzivorus

BOBOLINK

Swarth (1931, p. 136) commented on the status of this bird in the tropical eastern Pacific: "The . . . occurrences are numerous enough to justify us in regarding the species as of something more than casual occurrence in the Galapagos. Apparently in the far reaching southward migration of the Bob-o-link there are every year individuals along the western margin of the movement that alight upon the islands. Presumably such migrants are birds that strike out due southward from the coast of Mexico."

At Cocos Island, Chapin (MS) noted on April 18, 1930, during the northward migration, at Wafer Bay: "Large trees grow near the shore, many of them laden with Tillandsias and ferns. Here and there between patches of low trees are open spaces with low green herbaceous vegetation. In one of these I was surprised to see a blackish bird with white rump fly up. As it went it gave a familiar 'pink,' and as it lit in the top of a bushy tree I saw it was a male bobolink in fresh nuptial dress, the feathers still edged with brown. I felt no desire to collect such an old friend."

Chapin's experience was duplicated during my visit in 1963, when a buff-naped male Bobolink with the black of the plumage appearing scaly occurred on March 28. Resting with an alert show of interest, first low in the trees, then in short grass, it attracted the attention of the Cocos finches. In flight it gave a repetitive "pink."

On April 22, 25, and 26, a female kept returning to the same place. Changing position from a low branch to a high branch to the ground, but preferring the lower stations to the higher, it moved about arbitrarily. It walked, with bobbing head, on the ground, also on a log, passing its bill along the grasses for seeds.

Pinaroloxias inornata

COCOS ISLAND FINCH

The endemic finch was the most abundant land bird on Cocos Island. It was also the one with the widest tolerance. Gifford remarked (1919, pp. 242–243): "It was found commonly in September, 1905, everywhere we went . . . , being adapted both to cultivated ground and virgin forest. It made itself at home in and about the houses of the settlement at Wafer Bay." Beebe (1926, p. 227) observed further that "a favorite feeding ground was at the limit of high tide." In sum, the species has overspread the height and breadth of the island, from the ground to the tops of the trees and from the edge of the beach into the most enclosed of ravines. I found it most commonly in disturbed mixed vegetation close to shore.

The species was to be seen singly and in family-sized groups. Chapin (MS) estimated the ratio at "about one in five being a black adult male." The birds were tame if not entirely confiding. Campbell (1931, p. 168) phrased it familiarly: ". . . we were visited by a squad of small black and brown birds, more diminutive than sparrows and having very short tails. These little birds were very friendly and we saw a lot of them while we were on the island. Whenever we were resting three or four of them always came and perched close to us and chirped away the whole time." Often the same bird or two came to the table at which I was working or eating, then poked about for grains of rice among the appurtenances in the lean-to. The fact that I could recognize several of the individuals around camp was an indication of their sedentariness. At any rate, the activities of three, possibly four, striking black males with flashing white-sided tails (two of which I collected) were confined to a 50-yard-square, physiographically undifferentiated sector in lower Wafer Valley.

Townsend (1895, p. 123) termed the species "finch-like in its habits, always actively flitting from branch to branch." Gifford (*loc. cit.*) noted that it "combines the habits of a ground-feeding finch with those of a tree-feeding warbler" and "much of its food was obtained by hanging head downward from twigs and leaves." Chapin (MS) saw it "hopping about in undergrowth, at times like a warbler, but often like a titmouse, as it explores the bark of boughs and upright stems, often leaning way over to reach the underside . . . . [*Pinaroloxias*] . . . comes first [to

squeaking], looks one over, and goes on feeding in titmouse fashion. I saw one hang by one foot, holding some small object in the other. Then it seized this tidbit with beak, and finally flew off." Beebe (*loc. cit.*) reported similarly: "They flitted from twig to twig, playing at warblers, finches and titmice in their feeding habits." It was the impression of Fisher (Fisher and Wetmore, 1931, pp. 61–62) that "the general movements and actions of this little bird were more like those of a honey creeper than any other finch that has come under observation."

Some excerpted remarks from Hundley (1962, pp. 113–114) round out the characterization: "Once a female finch hopping along the ground came to a freshly torn piece of yellow petal. She picked it up, turned it over, and then dropped it, only to return several times and go through the same procedure. . . . A number of times I watched finches hop along a branch toward a frigatebird. When they found themselves blocked by the large birds, they merely hopped around them or else fed unconcernedly around the feet of the latter. . . . One of the finches' favorite methods of catching insects was to slide sideways down a liana prying open all leaves that were stuck together. This procedure was frequently rewarding. Once a male about 16 feet up in a liana in separating two leaves disclosed a black spider. The spider was too quick for the bird and dropped quickly about a foot on a thread of silk. The bird slid down a liana after it, trying again and again to snatch the spider. It became a race, the faster the bird slid after the insect, the more rapidly did the latter drop by means of its sticky pendulum . . . . The spider finally escaped to the ground. It seemed odd that a bird which by use of its wings could presumably very quickly have out-maneuvered the spider, chose instead to sideslip down the vine."

The bill of the bird in life impressed me as unesthetically long for the bodily proportions. Exploring anything and everything in its everlasting search for food, the bird kept the bill constantly employed as a tactile tool, at times even nosing it along. In the trees, the bird inserted its bill between the petals to extract the nectar from the bases of flowers. It probed the broken ends of branches or alternately pecked and peered into them with one eye. It picked at bark, or peeled it off, or flaked away loose bits while hugging a branch or side of a trunk. Clinging to the edge of a leaf or hanging horizontally upside down, the bird passed its half-opened beak along the rolled edges of a dried bromeliaceous whorl. In like manner it examined a curled dead leaf held in the toes of one foot while hanging by both feet from a spike of an airplant. It investigated brown spots in the foliage as if drawn to them by curiosity.

Afoot, at times in the exposed scree at one end of the beach, it both peered at and probed the pits and small holes in the rocks. Using its beak, the bird pried and turned over fallen leaves, fruits, and sticks, and levered up muddy small stones in mangrove-like low places. It obtained tiny seeds by passing the bill along grass stems, pecked at fallen fruits, picked apart blossoms, and it steadily gathered up specks of spilled corn meal. Only once did I see a bird with an earthworm. As a species it was hopeless at aerial sorties and usually unsuccessful though persistent in its attempts at simple fly-catching flutters. The content of the stomachs was uniformly a blackish fine mash. Perhaps the species is physically limited to handling minute bits of matter.

In the trees, the clinging, hanging, hopping, creeping birds often flicked the wings and tail as do warblers and some tanagers. When foraging on the beach, this unappealingly proportioned finch appeared positively short-legged. Its under parts, cradled by the tarsi, nearly brushed the sand, while the tarsi either inclined obliquely at a 30-degree angle or lay parallel to and barely above if not actually resting full length on the ground. The species progressed afoot in two-legged hops or jumps; I never saw it walk. It flew in a steadily directed flutter.

The known breeding season extends from February to September. Reproductive activities, whether courtship, nest building, incubation, or attention to fledged young, are apparently carried on contemporaneously during any of the above months by the population as a whole. Neither positive nor negative evidence of breeding during the remainder of the year is available.

Gifford wrote (*loc. cit.*): "One day I saw an

adult male fall to the ground from the branch of a bush. Upon approaching him he jumped up to a branch, where he hopped about with his wings spread and fluttering and his head and neck stretched forward, apparently indulging in a form of courtship, although I could not see the object of his affections." Hundley observed (*loc. cit.*): ". . . a black Cocos Finch with ruffled feathers was hopping up and down. The behavior of the female beside him was that of a young bird begging for food. The male finally hesitated long enough to present the female with a large insect. . . . The female . . . left after being fed, flew to a dried liana and slowly broke off a piece, but promptly dropped it in order to pursue an insect."

My notations include reference to an adult male feeding an adult female; two males, apparently courting the same female, their wings spread and fluttering and their backs rather humped, squaring off and continually churring, one of them returning with a presentation of stringy fibers in its beak, the other with a dead leaf; a male chasing another male away from a female; a female with tail partly upraised waiting "patiently" on a branch, approached and mounted by a male fluttering his wings like a fledgling.

Gifford (*loc. cit.*) reported nests presumably of this species that had been seen by R. H. Beck, "well out on slender limbs 20 or 30 feet above the ground . . . similar to *Geospiza* nests in shape and construction, though of finer material," in one of which "there were three broken eggs, red-spotted and about the size of the eggs of the smallest form of *Geospiza fuliginosa*." Fisher and Wetmore (*loc. cit.*) wrote: "Dr. J. B. Mathewson found a rounded nest which contained two unfledged young in the top of a sapling about 15 feet from the ground. The parent bird looked on while the doctor was examining the nest but did not show any anxiety." Hundley (*loc. cit.*) noted: "Nearly overhead, a bulky, rounded mass made from twigs, mosses, and the dried stems of lianas, showed an opening in one side. On the twig which formed the doorstep [was] a black Cocos Finch. . . ." The male, in my experience, participated in bringing material and building the nest.

Neither of two nestlings that fluttered out of a nest I wished to examine was tame, and both were noisy and tried to escape. Fledglings and immatures were everywhere about, recognizable by their light-colored or particolored bills and their importunate behavior. They seemed always to be flickering their wings and crying scratchily for attention. A mature female, or at times both adult sexes, were pestered by one to a company of four or five incessantly begging young. Like an affliction, they followed the parents which were trying to escape, and each sought for itself the tidbit in the bill of another. The attendant female, plagued by the leechlike offspring, was permitted no respite from this preoccupation with food. Pulsatingly she regurgitated her gleaned supply, virtually pecking into the young one's throat, spurred by each quiver of the fledgling's wings.

The Cocos finch is a poor vocalist. Gifford (*loc. cit.*) wrote: "The only call heard was a sort of chirp, in spite of the fact that the nuptial season was on, as attested by the testes of all the adult males skinned." Chapin (MS) did not hear the bird sing, but noted that it "has a nasal 'pă' or 'chă' as a call . . . . One black male only gave a sort of 'chee' as it prepared to fly, and repeated 2 or 3 times as it flew away." Hundley (*loc. cit.*) merely mentioned a song having been given by a male. The only sounds I heard from adults were: nasal squeaky whines, such as those of a gnatcatcher (*Polioptila*); a heavy "dee dee dee" of the kind made by a chickadee (i.e., *Parus atricapillus*); a chirpy whistle, short, high-pitched, sort of piercing; a bell-like chirp; a note similar to the chinking metallic one of the ani *Crotophaga sulcirostris*.

Passerculus sandwichensis

SAVANNAH SPARROW

A bird of this species appeared at Wafer Bay the morning of April 13, 1963. A high-plumaged individual, it was flitting about at ground level and in the scrub at the upper edge of the beach. I watched the bird until it took off in a westerly direction, following the shore line. Returning with a gun, I waited in hope of documenting this extraordinary occurrence, but the bird had gone for good.

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