

THE BIRDS OF SAN JOSÉ AND PEDRO GONZÁLEZ
ISLANDS, REPUBLIC OF PANAMÁ

By ALEXANDER WETMORE
Secretary, Smithsonian Institution

WITH FOUR PLATES

Until recently the natural history of the Archipiélago de las Perlas in the Gulf of Panamá has been known mainly from investigations on the largest island, Isla El Rey, called San Miguel by early collectors from its principal settlement, and on various others of the northern islands of the group. Isla San José, prior to 1944, had been visited by naturalists casually, so that only parts of its fauna and flora have been known. Its outlying position in the southwest of the group, distant from the other islands, its lack of settlements, and its forests without trails, have made the interior of San José difficult of access until the recent establishment there of a laboratory of the Chemical Warfare Service of the United States Army with roads and trails through which all sections of the island are now accessible.

Army engineers came to San José late in January 1944, established a temporary camp back of Ensenada de la Bodega, and began roads and other construction work immediately. Accompanied by Dr. J. P. E. Morrison, of the division of mollusks, United States National Museum, I arrived on San José on February 7, 1944, to make studies of the fauna. I remained until March 14 when I returned to Balboa, C. Z., while Dr. Morrison continued our investigations until October 3. Our work centered on San José, and this report on the birds deals principally with that island. In view of the comparatively small amount of published information on Pedro González, which lies immediately to the north, I have included also my notes made on that island during the days of March 9 and 11, as well as some data from later visits by Morrison. There are also a few notes on the birds of Moreno Island, lying off the western side of El Rey, which was visited by Morrison on May 19.

I have to thank Brig. Gen. E. F. Bullene for his interest and assistance in the arrangements for our work, and am deeply indebted to other officers and personnel. Among these I must mention especially Lt. Col. L. W. Glazebrook, who had charge of the arrange-

ments for the installations at the camp in the beginning, Col. H. M. Woodward, Jr., Col. Robert D. McLeod, Jr., and Lt. Col. D. W. Leavens, all of whom were uniformly interested and helpful. Our early studies were aided especially by Russell Foster, of the Engineer Division of the War Department, in charge of construction on San José, and by William Langenbruner, his assistant.

Our investigations centered on a survey of the principal land fauna of San José, including the mammals, birds, reptiles, amphibians, fishes, and the land and fresh-water mollusks. Reports on all these groups, as well as on certain echinoderms that we secured along the beaches, will be included in the series now under publication.

In addition to the field studies just outlined, the Smithsonian Institution had the cooperation of the Bureau of Plant Industry of the United States Department of Agriculture, through Carl O. Erlanson who made a series of ecological studies on the plants of San José. Mr. Erlanson reached San José April 6, 1945, and continued his work there until August 27, making detailed observations on the vegetation. His investigations were forwarded and assisted extensively by the work of Dr. Ivan M. Johnston, of the Arnold Arboretum, Harvard University, who has made systematic studies and collections of the flora during three visits at the end of 1944, for about 6 weeks in March and April, 1945, and for a further period at the end of 1945 and the early part of 1946. Dr. Johnston has supplied names for many species of the plants prior to publication of his own report. The account by Mr. Erlanson published in this same volume of the Smithsonian Miscellaneous Collections gives a general description of the vegetation of the island. His plant specimens have been placed in Dr. Johnston's hands for his use in the systematic account of the plants to be published elsewhere.

NATURAL FEATURES

San José, as noted, is the most southwestern of the islands of the Perlas group and is second in size, Isla El Rey being much larger. San José is of irregular shape, being roughly $7\frac{1}{2}$ miles long from north to south, and constricted to about a mile wide at the narrowest point near the center, the average width being $2\frac{1}{2}$ to 3 miles from east to west, with one extension of a little less than $1\frac{1}{2}$ miles on the east terminating in Punta Cruz. The principal bay on the west side is Ensenada de la Bodega (pl. 1, fig. 1) and on the east Ensenada Playa Grande.

The shore line is rough for much of the circumference, rising abruptly in rocky bluffs from 20 to 50 feet high (pl. 1, fig. 1; pl. 3,

fig. 1). At Ensenada Playa Grande there are sandy beaches extending for about 2 miles, with swamps at the mouth of the Río Marina near the southwestern end. Small sand beaches are numerous at the heads of indentations along the shore, and there are a number of rocky islets that have been cut off by erosion from the main island. The largest of these are found at the southeast.

The surface of San José is rolling, rising at the highest point to about 350 feet above sea level. The stream valleys are narrow, and in places steep-sided, with outcroppings of rock that form series of rapids and low falls. There are two streams of fair size, the larger being the Río Marina (pl. 2, fig. 2), draining a considerable area in the central and northern part of the island. The Río Mata Puerco, which cuts more than halfway across at the narrow central constriction already noted, is remarkable principally for the extent of its tidal channel, bordered by red mangroves that reach back for half a mile from the shore. There are numerous smaller streams. Water flowed to the sea in the larger of these throughout the dry season without dropping below a certain level, though smaller ones became dry.

Almost half of the island is covered with gallery forest, the trees rising to 60 and 80 feet with occasional arboreal giants of greater size (pl. 1, fig. 2; pl. 2, fig. 1). While there is considerable undergrowth, more or less tangled with vines, travel with a fair amount of cutting was not too difficult. Extensive growths of spiny-trunked black palms in lowland areas offered one of the principal difficulties. These blocked passage in many places, since the tough wood fibers turned and battered the edge on the best of machetes.

At the mouth of the Río Marina there was an extensive swamp, with tidal channels cutting through it, where the trees were tall, and the muddy ground beneath completely open. The red mangrove swamp at the mouth of the Mata Puerco was fairly large, and there was another small swamp where we collected regularly back of the main beach at Ensenada de la Bodega.

Near the sea, for the greater part of the circumference of the island, there were extensive areas of brush grown with creepers and vines so closely matted that they were completely impassible except by making trails with much hard labor. Mr. Erlanson, who investigated the plant ecology, is convinced that these represent old clearings that date back to some early period when there was agriculture on the island. One of the curious natural features is Bald Hill, a small savanna area in the north of the island. In several other sections, notably about midway between the Río Marina and East Harbor, and in another section on the East Loop Road near where this joins the East Road, the

forest is composed of a few scattered trees with little or no undergrowth. Small areas on the summits of some of the headlands were grown with grasses without shrubbery. The surrounding sea was shallow and supported an abundant marine life that, in turn, was attractive to many sea birds. My records for these were made on various launch trips.

Pedro González Island is third in size of the group, being less than 4 miles long by 1 to less than 2 miles wide. The north shore is very irregular with several indentations. Isla Trapiche (pl. 4, figs. 1 and 2) lies inside the northwestern point, and the village of Cocal (pl. 3, fig. 2) is situated on a low point looking across a bay to Trapiche and the sea beyond. The general conformation is like that of San José, the shore line being rocky and often precipitous, rising 30 to 60 feet or more from the sea. Sandy beaches, broken by exposures of rock, line the bays. There is an extensive beach at Cocal, and I noted others near the southern end in passing along the western side of the island. There is a small lagoon back of the seashore in the southwestern part of the island, but I did not have time to visit it. The interior of the island is rolling, with the highest point rising 390 feet above the sea. Pedro González is forested (pl. 4, fig. 2), but much of the original growth has been cut to allow planting. These clearings were being extended in the usual wasteful manner as the older fields were invaded by tough grasses and other growth.

ORNITHOLOGICAL INVESTIGATIONS

The earliest note of ornithological collections on San José that I have found is that of Dr. Carl Bovallius, of the Royal University of Upsala, who, during a 2-month survey of the Pearl Islands in the spring of 1882, visited San José for 2 days or so at the end of April. He came down in a schooner from Pedro González, landed in a cove, and followed a fair-sized stream inland. His description¹ was probably written some time later when some of the details of his observations had become obscure, since there is no river of the size he describes on the island. His collection of birds was identified by Hjalmar Rendahl,² who lists three birds collected on San José on April 26 and 27, *Buteo magnirostris alius*, *Buteogallus anthracinus subtilis*, and *Milvaga chimachima cordatus*.

Ludlow Griscom and Maunsell S. Crosby secured 39 birds on San José from February 15 to 17, 1927, during a cruise through the Pearl

¹ Ymer, 1886, pp. 13-14.

² Ark. för Zool., vol. 13, No. 4, 1920, p. 1-56, 1 map.

Islands and to eastern Panamá, their specimens being in the American Museum of Natural History. This was the first important gathering from the island, but was not reported in detail in publication. I have included pertinent records from this material through the courtesy of the American Museum of Natural History. Robert Cushman Murphy in the launch *Wilpet* on September 9, 1937, traveled southward through the passage between San José and El Rey, recording several species of birds. In 1941, during his investigations on the schooner *Askoy*, he passed along the east and south coasts of San José on February 13, landing at Playa Grande in the afternoon. On February 16 he made observations along the east and north coasts, and on February 21 passed west and south of the island. Later, on May 23, he sailed along the southern and eastern shores of the island. He returned to the island from November 7 to 28, 1945, and at that time, working from the headquarters of the Chemical Warfare Service, added several migrant species to the previously known list of birds. These data, together with the records from his earlier visit, mainly of aquatic species, he has very liberally placed at my disposal for the present paper so that the list might be complete to date. I am much indebted to him for this assistance.

There have been other observations but none of them extensive, and as far as I am aware nothing else has been published relating to the birds. Other naturalists among my friends who have visited San José include Thomas Barbour, James Zetek, and Gerrit S. Miller, Jr., who were interested in the main in other matters than the avifauna. I have not taken time to make an extended search for statements relative to the island in older publications, but may note that I have seen reference to descriptions of scorpions, and mention of a few other natural-history items.

Pedro González has been a little better known, as a good many have come to the fishing club on Isla Trapiche, an islet cut off from Pedro González by a shallow channel so narrow that Trapiche may be said to be almost a part of the adjacent island. Griscom and Crosby, mentioned above, secured 28 skins on Pedro González February 18 and 19, 1927, but did not publish on them as a collection. A few of their records are included in the present report. Mrs. Bertha B. Sturpis includes a number of observations from Pedro González in her Field Book of Birds of the Panama Canal Zone. My inclusion of this island in the present account has been mainly to record the notes that I made there personally on March 9 and 11, 1944, so that this paper relates almost wholly to San José.

DISCUSSION OF THE AVIFAUNA

The number of species of birds found in the whole of the Pearl Islands is remarkably small in comparison with the adjacent mainland. The resident birds of San José number between 40 and 50 species, uncertainty as to the actual number arising from lack of information as to the breeding of a number of aquatic or other wide-ranging species whose nesting colonies at present are not wholly known. Actually I have listed 46 species as probably breeding, omitting the brown pelican, Colombian booby, Brazilian cormorant, little blue heron, egret, snowy heron, black-crowned night heron, black vulture, and turkey vulture as uncertain. These nine species nest nearby, and some may rear young on San José, but this has yet to be ascertained. It is probable that the gray-breasted martin, *Progne chalybea chalybea*, may establish colonies now that there is human settlement, but at present this bird is only a visitor. The turkey vultures seem to be casual visitors, as is the blue-headed parrot, *Pionus menstruus*.

There is no form of bird, according to present understanding, that is restricted to San José Island alone. The nearest to this is the wood rail, *Aramides cayennensis morrisoni*, which is found also on Pedro González, the birds from these two islands differing from *Aramides c. latens* of Isla El Rey and Viveros in being slightly darker colored. In identifying the small resident land birds I have been interested to note in several a tendency toward larger bills that is visible only on close comparison and that is too slight to be evident in series of measurements. The tendency, however, is not always peculiar to San José but relates in some cases to the archipelago as a whole. This character is slightly indicated in *Formicivora grisea alticincta*, *Myiophobus fasciatus fuscus*, *Flaenia chiriquensis chiriquensis*, and *Coereba flavicola cerinocinctus*. It reaches a maximum in *Crotophaga ani*, in this case to an extent that more specimens should be collected for study. The heavy orange pigmentation of occasional specimens of the warbler *Dendroica petechia acuinotialis* is also worthy of notice, occasional males being so deeply colored that the difference is apparent in life, while in the hand they are more richly orange than any individuals of the other races of this bird that I have seen.

As San José and Pedro González are the outliers of the Pearl Islands, in spite of their relatively considerable size there are a number of species not known from them that are found on other islands, particularly on Isla El Rey (and Viveros, immediately adjacent) to the east and north and nearer the mainland. The more noteworthy of these are the following: a tinamou, *Crypturellus soni panamensis*; a woodpecker, *Centurus rubricapillus seductus*; a black ant-shrike,

Cercomacra nigricans; and a wren, *Thryophilus leucotis conditus*. A seed-eater, *Sporophila nigricollis nigricollis*, is known from Saboga, the Agami heron, *Agamia agami*, has been taken once on El Rey, the caracara, *Polyborus cheriway cheriway*, has been found on Pacheca, and a small kingfisher, *Chloroceryle inda inda*, was secured by Bovallius on Viveros. Three forms that are known from Pedro González have not been reported from San José, viz, a chachalaca, *Ortalis garrula cinereiceps*, a screech owl, *Otus choliba luctisonus*, and a barred ant-shrike, *Thamnophilus dolatus nigricristatus*. Only one specimen of the chachalaca is recorded from Pedro González, a bird killed by a pearl diver and brought to El Rey to W. W. Brown, and there is only one record to date for the screech owl, which was taken by Bovallius. The native boy who helped me in my two visits to Cocal described a small owl to me, so that it may be more common than the single record indicates. The barred ant-shrike is common.

San José Island has no resident land birds that are not known elsewhere in the archipelago. There is thus a regular diminution in the universally poor avifauna as regards number of species in proceeding from the islands nearest the mainland on the north and east to San José which is the most distant to the southwest.

MIGRANT SPECIES

Of the species at present recorded from San José 42 are migrants from the north, assuming that the laughing gull, *Larus atricilla*, Ca'ot's tern, *Thalassus sandvicensis acufavidus*, and gull-billed tern, *Gelochelidon nitotica vanrossemi*, come from the more northern colonies. Of these migrant species only the laughing gull, the spotted sandpiper, and the two races of the northern water-thrush are at all common, the others being found casually and in small number. The kingbird and dickcissel pass in migration in fair abundance but do not remain in winter. It is in the group of northern migrants that many additions to the list remain to be made, since there are numerous species that come through Panamá that have not been reported as yet from San José.

Richmond's swift, *Chaetura vauxi richmondi*, is recorded at present from southern México to Costa Rica, the one that we secured being the only report at present south of that area. It must be considered an unusual visitor. The swallow-tailed kite was seen in northward migration in March 1944 but is not known at present to breed here. The turkey vultures offer ground for interesting speculation since the six specimens examined seem to belong to three distinct races. One

of these, *Cathartes aura teter*, is a migrant from western North America; a second, *Cathartes aura aura*, is the resident form of Panamá. These two need no further comment except to state that the latter possibly may be found nesting. The third one, curiously enough, appears to be a representative of the form found in northwestern South America which at present is called *Cathartes aura ruficollis*. This must be considered a wanderer. More material of these birds is necessary to determine their status. The gray-breasted martin, *Progne chalybea chalybea*, and the blue-headed parrot, or casanga, *Pionus menstruus*, while present in numbers for a brief season, appear to be wanderers from breeding grounds on the mainland. Such species as the black petrel, *Loomelania melania*, the fluttering petrel, *Halocyptena microsoma*, and the skua, *Catharacta skua chilensis*, are wanderers over the ocean, to whose number there will be added other species with continued observation.

The plumbeous kite, *Ictinia plumbea*, arrived as a migrant, presumably from South America, on March 11, 1944, and immediately established itself on its nesting grounds. The annual movements of this species at present are not well understood. The yellow-green vireo was present in abundance on San José on our arrival early in February, but probably had not been there for long since this bird withdraws after its breeding season to South America. The period of its migration is not clearly known.

ANNOTATED LIST OF SPECIES

In the following list I have given the data that I secured during my stay when San José Island was being developed for the work of the Chemical Warfare Service, with the addition of records made by Dr. Morrison, to present as clear a picture as possible of the kinds of birds found on the island, as well as their abundance, at the time when the island forests were first disturbed and the avifauna was still in its original state. These data will serve for future record in further studies that it is hoped to make from time to time on changes and shifts due to the establishment of clearings, the presence of considerable numbers of men, and also the effect of the experiments of the Chemical Warfare Service. Through the kind assistance of Dr. Robert Cushman Murphy I have been able to add the additional species that he has found, mainly migrants and sea birds, so as to make the list as complete as possible. His field observations in November 1945, which it is hoped he will report in such detail as may be necessary, indicate that some interesting changes had already taken place.

Family PROCELLARIIDAE

PUFFINUS GRISEUS (Gmelin): Sooty Shearwater

Procellaria grisea Gmelin, *Systema naturae*, vol. 1, pt. 2, 1789, p. 564 (New Zealand).

Robert Cushman Murphy recorded this shearwater at sea near San José, February 21, 1941. The record is backed by specimens that he secured nearby during the *Askey* expedition.

Family HYDROBATIDAE

LOOMELANIA MELANIA (Bonaparte): Black Petrel

Procellaria melania BONAPARTE, *Compt. Rend. Acad. Sci. (Paris)*, vol. 38, No. 14, Apr. 3, 1854, p. 662 (near San Francisco, Calif.).³

Dr. Murphy observed these petrels near San José February 13 and 21, and May 23, 1941. As we crossed from San José Island to Balboa March 14, black petrels appeared in midpassage, flying singly or in couples just above the water. Though they passed regularly in front of us they did not follow the wake of the boat. I saw the last one on this day about 10 miles off Taboguilla Island.

OCEANODROMA TETHYS KELSALLI (Lowe): Peruvian Storm Petrel

Thalassidroma tethys kelsalli Lowe, *Bull. Brit. Orn. Club*, vol. 46, Nov. 4, 1925, p. 6 (Pescadores Islands off Ancón, Perú).

Robert Cushman Murphy recorded this petrel off San José September 9, 1932, February 21 and May 23, 1941. Specimens collected nearby belong to this race so that the sight records are assumed to be the same. It is probably this bird that I saw at a distance in crossing to Balboa March 14, 1944.

HALOCYPTENA MICROSOMA Coves: Least Petrel

Halocryptena microsoma COVES, *Proc. Acad. Nat. Sci. Philadelphia*, June 30, 1884, p. 79 (San José del Cabo, Baja California).

March 14 in midpassage from San José Island to Balboa I recorded half a dozen small petrels, uniformly dark in color with long, cuncate tails, which flew just above the surface of the water. Their wing motion was quicker and more fluttering and they moved more erratically than the black petrels about them. I was uncertain of their

³ For the use of the genus *Loomelania* instead of *Oceanodroma* for this species see Murphy, *Oceanic birds of South America*, vol. 2, 1936, pp. 726, 743.

identity at the time, but in subsequent investigation Dr. Robert Cushman Murphy showed me an excellent series of the least petrel from this same region, leaving no doubt as to the bird I had seen. He recorded it near San José May 23, 1941.

Family PELECANIDAE

PELECANUS OCCIDENTALIS CAROLINENSIS Gmelin:

Eastern Brown Pelican

Pelecanus carolinensis GMELIN, *Systema naturae*, vol. 1, pt. 2, 1789, p. 571 (Charleston Harbor, S. C.).

Brown pelicans are common in the Gulf of Panamá between the Pearl Islands and Balboa so that they were seen frequently during the crossing to and from San José on February 7 and March 14. At San José I saw them regularly in the small bays, and on those occasions when I was out in launches found them in numbers along the shores of the island. When schools of minnows (pl. 3, fig. 1) were about, sometimes as many as a hundred pelicans gathered, and several times I observed a bird with the pouch distended by small fishes which it gulped down as soon as the water had run off.

At Pedro González March 9 and 11, pelicans were even more abundant, so that they were continually passing, their shadows sweeping by me as I walked along the shore. Their constant movement remains as one of my clearest memories of my visit to this island. At various places along the steep shore line they had perches in the trees, the ground below being white with excrement.

On San José I shot a male in breeding dress on February 26, and Morrison secured two females in nonbreeding plumage September 23 and 27. We also found a skull of a recently dead bird on the beach. Colombian and Venezuelan laborers called them *pelicano*.

These birds of the Pearl Islands show some approach in darker hindneck in breeding dress, and in darker body coloration, to the race *murphyi*²² of western Colombia and Ecuador to the south, but are decidedly nearer to *carolinensis*.

Family SULIDAE

SULA NEBOUXII Milne-Edwards: Blue-footed Booby

Sula nebouxii MILNE-EDWARDS, *Ann. Sci. Nat. Zool.*, vol. 13, art. 4, 1882, p. 37, pl. 14 (Chile).

Robert Cushman Murphy recorded two of these boobies half a mile off the east coast of San José September 9, 1937. This is the

²² See Wetmore, *Auk*, vol. 62, 1945, p. 583.

only record to date, which seems strange as the birds are common on some of the northern islands.

SULA LEUCOGASTER ETESIACA Thayer and Bangs:
Columbian Booby

Sula etesiaca THAYER and BANGS, Bull. Mus. Comp. Zool., vol. 46, June 1905, p. 92 (Gorgona Island, Colombia).

To see the boobies at San José it is necessary to use a boat as they range offshore and only occasionally appear around the rocky headlands. They came especially along the eastern side of the island, flying and soaring steadily in the breeze from 2 to 20 feet above the waves. On March 4, in a run along the eastern side from the south end to East Bay, boobies passed every few minutes singly or in little groups of three or four. Others were observed March 9 and 11 in crossing to Pedro González, and on March 14 I recorded half a dozen in the passage to Balboa, one of them within 8 or 10 miles of Taboguilla Island. Morrison collected one on June 8.

The four taken show plumage change from the gray immature to the full adult. Two illustrate complete transition between these two stages, having varying mixtures of gray and white on the feathers of the abdomen.

Family PHALACROCORACIDÆ

PHALACROCORAX OLIVACEUS OLIVACEUS (Humboldt):
Brazilian Cormorant

Pelecanus olivaceus HUMBOLDT, in Humboldt and Bonpland, *Recueil d'Observations Zoologie et d'Anatomie Comparée*, 1805, p. 6 (Magdalena River, lat. 8°55' N., Colombia).

The cormorant, known to the American sailors as the Panamá duck, is one of the most prominent species of the sea birds about the islands, whose flocks and flights remain as one of my pleasant and interesting memories of my observations there. Usually I counted on one or two in any walk along the rocky headlands, and regularly I found large flocks whose presence seemed to be governed by the stage of the tide, and by the run of the schools of small fish that provided their food. Flocks, often numbering hundreds, came flying in early morning 300 to 500 feet above the sea, quartering about until fish were sighted, and then dropping precipitately to the surface to swim and dive among the plunging pelicans and boobies and the swooping man-o'-war birds and laughing gulls, while mackerel and amber-jack made the water boil in their surging rushes through the

close-packed masses of small fishes (pl. 3, fig. 1). There was no fighting apparent among the participants in these relentless assaults, though sometimes I wondered if there were not occasional collisions that might result in serious injury, so apparently heedless were the many birds joined in the melee.

At a distance the dark forms of cormorants suggested geese by their size, form, and method of flight. When not in search of food they rested on sandy beaches or on rocky headlands, standing close together in rows and columns, sometimes in the edge of the water. The mouths of streams were favorite places. Single birds rested anywhere along the rocks.

On Pedro González on March 9, and again on March 11, I found hundreds on the shore and in the water at the little village of Cocal. Flocks flew back and forth from these resting bands continually, with no regard for the people, and in turn completely unnoticed by the inhabitants of the little settlement. Their passing shadows constantly attracted my eye as long as I was near the shore.

In many places these birds frequent fresh or slightly brackish waters, so that it is interesting here to find them exclusively, and in large numbers, in the salt waters of the sea.

As stated above, these cormorants appear black in the air, though the immature birds are brownish or grayish. An adult male prepared March 12 has a few small filaments of the white of the breeding plumes on the flanks and neck. This specimen has the following measurements, which are usual for the typical form of this bird: Wing 285, tail 168, culmen from base 63.5, tarsus 68 mm. A fully grown female in brownish immature dress collected by Morrison August 11 measures as follows: Wing 279, tail 180, culmen from base 62.0, tarsus 57.2 mm.

Family FREGATIDAE

FREGATA MAGNIFICENS Mathews: Man-of-War bird

Fregata magnificens MATHEWS, Austr. Av. Rec., vol. 2, Dec. 19, 1914, p. 120.
(Barrington Island, Galápagos Islands).

The angular, long-winged forms of frigate-birds appear constantly in the sky of San José, following the shore line, beating with slowly flapping wings over the sea if fish appear, or soaring, especially in afternoon when steady winds blow, across the rocky headlands. It seemed strange at times in the heavy jungle of the center of the island, with no visible indication that the ocean was near, to look out

through some opening among the trees to see a frigate-bird or two high overhead in passage across the island.

These birds, here, were fishermen in their own right, swooping down over the waves to seize little fishes in their bills without alighting. It was interesting always to watch them descend swiftly from an elevation of 20 or 30 feet, glide forward just above the water, and then, dropping the head, grasp at a fish while the body continued its forward movement, seemingly leaving the head, attached by the long neck, behind to snap forward with a wriggling fish in the bill at the very second when it seemed as though the bird must overturn. Bill and sometimes head might be buried in the crest of a wave, but neither wings nor body touched the water. When large schools of small fish appeared offshore, frigate-birds joined the pelicans and cormorants in the swirling cloud of voracious predators that, in and out of the water, made constant attack on their unfortunate prey. Even under these circumstances the frigate-birds captured their own supplies, and I saw no instance where they robbed other birds. It must be added, however, that boobies and terns, which I have observed to be the bullied companions who have had to give up their fish to the frigate-birds of another species, *Fregata minor*, farther west in the Pacific, here were widely scattered.

February 13 and 16 we saw males flying with the distended red throat pouches that are developed fully only in the breeding season.

All the frigate-birds that I saw closely enough to identify were the present species, marked in the adult male by the plain wing, in the female by the blackish throat, and in the immature by pure white head and neck. There should be careful watch for the related form *Fregata minor* known from nearby waters both north and south. In this species, regardless of geographic race, the male has a distinct brown band across the middle and lesser coverts of the wing, the female has the throat grayish (not black), and the immature shows a varying amount of light reddish brown on the white of head, neck, and upper breast.

Family ARDEIDÆ

ARDEA HERODIAS Linnaeus: Great Blue Heron

Ardea Herodias LINNAEUS, *Systema naturæ*, ed. 10, vol. 1, 1758, p. 143 (Hudson Bay).

March 1 I saw one on the bench at the mouth of the Rio Marina. Robert Cushman Murphy recorded six or more during November

1945. These are supposed to be migrant individuals of the typical form from eastern North America.

BUTORIDES VIRESCENS MARGARITOPHILUS Oberholser:
Pearl Islands Green Heron

Butorides vireescens margaritophilus OBERHOLSER, Proc. U. S. Nat. Mus., vol. 42, Aug. 29, 1912, p. 553 (Isla El Rey, Archipiélago de las Perlas, Panamá).

An adult male taken March 1 has the following measurements: Wing 161, tail 51.8, culmen 60, tarsus 46.7 mm. The posterior part of the lower surface is distinctly dark in color, agreeing with a specimen from Isla El Rey, the type locality. Another male, secured by Morrison April 18, measures as follows: Wing 170, tail 59.5, culmen 61.8, tarsus 48.3 mm.; and a female taken April 18 as follows: Wing 162, tail 57.3, culmen 57, tarsus 45.1 mm. Another female shot July 25 has the following dimensions: Wing 166, tail 62.7, culmen from base 58.5, tarsus 47.7 mm. The second male is especially dark below, being nearly uniform grayish slate, while the females are colored about as in the first male mentioned.

These birds were found in small numbers in the mangroves at the mouth of the Rio Marina, and occasionally were seen in the woods along other small streams near where these entered the sea. The notes and mannerisms were those usual to these small herons.

FLORIDA CAERULEA (Linnaeus): Little Blue Heron

Ardea caerulea LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 143 (South Carolina).

March 1 I recorded an adult bird in blue-gray dress and two others in white phase at the mouth of the Rio Marina. I had glimpses of other herons here from time to time that may have been this same species but did not have opportunity to check their identity. Robert Cushman Murphy secured one in pied plumage in Navy Cove November 23, 1945, and recorded others, particularly along the lower Rio Marina and Playa Grande.

LEUCOPHOYX THULA THULA (Molina): Snowy Egret

Ardea Thula MOLINA, Sagg. Stor. Nat. Chili, 1782, p. 235 (Chile).

Robert Cushman Murphy recorded a few during November 1945 on San José, and November 26 collected a male that has the following measurements: Wing 248, tail 82.1, culmen from base 78.7, tarsus 90 mm. These small dimensions place it with the eastern race.

CASMERODIUS ALBUS EGRETTA (Gmelin): American Egret

Ardea Egretta Gmelin, *Systema naturae*, vol. 1, pt. 2, 1789, p. 629 (Cayenne).

On both San José and Pedro González Islands egrets were fairly common, so that I saw them daily whenever I worked along the shores. They fed along the sandy beaches, in the mangroves at the mouths of streams, and at low tide ranged over the rocky shelves exposed along the headlands. It was common at all times to see them perched on the black rocks of the rougher sections of the shore line, where their white bodies showed clearly at a considerable distance. Morrison shot an immature male on Pedro González July 21, and Dr. Murphy collected a male on San José November 21, 1945.

NYCTICORAX NYCTICORAX HOACTLI (Gmelin):

Black-crowned Night Heron

Ardea Hoactli Gmelin, *Systema naturae*, vol. 1, pt. 2, 1789, p. 630 (Valley of México).

An adult that I saw on February 21 at the mouth of the Río Marina seems to be the first report of this species for the Pearl Islands.

NYCTANASSA VIOLACEA CALIGINIS Wetmore:

Panamá Yellow-crowned Night Heron

Nyctanassa violacea caliginis Wetmore, *Proc. Biol. Soc. Washington*, vol. 59, March 11, 1946, p. 49 (San José Island, Archipiélago de las Perlas, Panamá).

On San José these herons were common in the mangrove swamps at the mouth of the Río Marina, and were seen elsewhere along the eastern side of the island, sometimes in woods at the summits of the rocky bluffs. On Pedro González they were common about the village of Coral as there were swampy areas nearby, and here they walked about on the beaches in midmorning like any other herons. Morrison shot an immature bird on Moreno Island May 19. Our five other specimens were taken on San José February 20, March 22, and April 6 and 18, and on Pedro González March 11.

The allocation of the Pearl Islands birds has led to an extended review of available specimens of the species with results of interest. The characters of the other subspecies are summarized in the following synopsis.

Nyctanassa violacea violacea (Linnaeus):

Ardea violacea LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 143.
(South Carolina).

Characters.—Adult, dark gray above and below, with the black central streaks on the dorsal feathers averaging wider; immature averaging dark; bill slender in adult and immature individuals.

Males (30 specimens from the eastern United States), wing 281-300 (294), tail 102.0-118.7 (109.2), culmen from base 64.5-75.6 (70.9), depth of bill at nostril 19.0-21.9 (20.8), tarsus 93.6-106.2 (99.4) mm.

Females (22 specimens from the eastern United States), wing 271-305 (290), tail 101.1-115.4 (107.8), culmen from base 64.2-75.3 (69.9), depth of bill at nostril 19.4-21.9 (20.8), tarsus 90.5-105.8 (97.1) mm.

Range.—Breeding from southern Texas, southeastern Kansas, southern Illinois and Indiana, New Jersey and Massachusetts (rarely) to South Carolina and Florida; probably to eastern México. In migration to the West Indies (specimens seen from Cuba, Jamaica, Hispaniola, Puerto Rico, Tortola, Sombrero, Barbuda, Montserrat, Guadeloupe, Mayer Island, Grenadines, Barbados, Swan Island, Great Corn Island), México (Nayarit, Rio Coahuylana between Colima and Michoacán, Guerrero, Tres Marias Islands, Tamaulipas, Tlascala, Quintana Roo, Chiapas), and Central America (Corinto, Nicaragua; Guanacaste, Costa Rica; Garray Creek, Permé, Bocas del Toro, Changuinola, and Darién, Panamá).

Remarks.—The slender bill is an excellent character for distinguishing individuals of this race in migrant status south of its breeding range where it enters the territory of the large-billed *bancrofti* and *caliginis*. The extent of its breeding range to the southwest is not now certain, but it seems probable that it nests in northeastern México, and that it may breed south through eastern México to the Caribbean coast of Central America. It is possible that one examined from Boca de Paila, Quintana Roo (February 2, 1926), and another from Rio Managua, Guatemala (January 31, 1895), represent resident groups. Specimens seen from the west coast of México are unquestionably migrants as they are found in the same area as typical examples of *bancrofti*.

Nyctanassa violacea bancrofti Huey:

Nyctanassa violacea bancrofti HUEY, *Condor*, vol. 29, May 15, 1927, p. 167
(Seamless Lagoon, Baja California).

Characters.—Adult, paler gray above and below, dark dorsal streaks averaging narrower; immature averaging paler; bill heavier and deeper in both adult and immature.

Adult males (28 specimens), wing 265-308 (286), tail 100.0-118.8 (110.7), culmen from base 64.6-79.0 (73.4), depth of bill at nostril 22.8-27.9 (24.5), tarsus 86.0-106.1 (92.8) mm.

Adult females (16 specimens), wing 260-300 (278), tail 98.4-114.8 (106.3), culmen from base 62.1-77.2 (71.3), depth of bill at nostril 22.3-25.2 (23.5), tarsus 75.9-96.3 (89.0) mm.

Range.—Breeding from central Baja California (lat. 28°31' N.) south along the Pacific coast through western México (María Madre, Tres Marias Islands), and from the Bahamas (Stranger Key, Exuma, Andros, Great Abaco) through the Greater and Lesser Antilles to Tobago; specimens examined from Cuba (Preston, Guantanamo), Jamaica (Spanishtown, Trelawney), Hispaniola (Petit Port l'Écu and Ile à Vache, Haiti, Caño Hondo and Samaná Peninsula, Dominican Republic) Mona, Puerto Rico (Bayamón), Vieques, St. Thomas, Tortola, Antigua, St. Eustatius, Barbuda, Dominica (Bath, Luzon Park), St. Lucia, St. Vincent, Montserrat (Cass Bay), Grenadines (Carriacou, Mayreau, Little St. Vincent), Grenada (Levera Lake, Beausejour Lake, St. Andrews), and Tobago (Plymouth); Panamá (Garray Creek, Almirante Bay).

Remarks.—The resident West Indian group of yellow-crowned night herons was recognized as distinct by Bangs and Penard in 1918,⁴ while Huey in 1927 pointed out that the birds of Baja California were different from those of the southeastern section of the United States. One of the wholly unexpected results of the present survey has been to find that the West Indian and Pacific coast groups are identical as far as I have been able to determine, so that both must bear the same name. Both are marked by heavy, swollen bills, and in the adult by paler gray color. The two populations seemingly are isolated from contact with one another.

The name to apply to this race, with the two groups considered identical, has required some study. Bangs and Penard called the West Indian bird *Nyctanassa violacea jamaicensis* (Gmelin), from *Ardea jamaicensis* Gmelin, *Systema naturae*, vol. 1, pt. 2, 1789, p. 625, which is based entirely on Latham's Jamaica night heron.⁵ In the work indicated Latham treats first (p. 52) what he terms the "Night Heron Male," which is the adult of *Nycticorax nycticorax*. This is

⁴ Bull. Mus. Comp. Zool., vol. 62, April 1918, p. 31.

⁵ Latham, General synopsis of birds, vol. 3, pt. 1, 1785, pp. 54-55.

followed (p. 53) by an account of the "Night Heron Female," based apparently on a bird in its second year, as the neck is said to be streaked, the under surface gray, and abdomen whitish, while above the markings, except on the neck and wings, seem to be largely absent. Then comes the "Jamaica Night Heron," basis of Gmelin's name, which Latham remarks he received from Jamaica "where it goes by the name of Clucking Hen, . . . Has a great affinity to the female Night Heron, but is larger." The description is that of an immature night heron, but of which species it is impossible to determine with certainty. It may be noted, however, that the length of the bill is given as 4 inches (probably measured along the gape), which points toward the longer- and more slender-billed *Nycticorax*. It may be added that in Jamaica the clucking hen of the countrymen is the limpkin and not a night heron. Under these circumstances it seems necessary to discard Gmelin's name *jamaicensis* as indeterminate, leaving *Nyctanassa violacea bancrofti* Huey available for the race here under discussion.

Nyctanassa v. bancrofti wanders to some extent, as I have examined one well-marked example with heavy bill (Carnegie Museum No. 103,973) from El Limón, Distrito Federal, Venezuela, taken by E. G. Holt, January 30, 1929, the depth of the bill at the nostril being 23.2 mm. The range south of western México is uncertain. Van Rossem has said that the birds of El Salvador are darker, so that it may prove that these belong with *colliginis*. In the southern Lesser Antilles there is apparent tendency toward the South American race *cayennensis*, beginning in St. Vincent and continuing through Grenada and the Grenadines to Tobago, as some specimens show a shortened wing and a more slender bill.

Nyctanassa violacea cayennensis (Gmelin):

Ardea cayennensis Gmelin, Systema naturae, vol. 1, pt. 2, 1789, p. 626 (Cayenne).

Characters.—Very similar to *N. v. violacea*, but averaging darker, with dark streaks on dorsal feathers averaging narrower; wing averaging very slightly shorter; bill slender as in *violacea*.

Males (six specimens), wing 271-292 (284), tail 101.5-114.8 (109.7), culmen from base 68.4-73.8 (70.2), depth of bill at nostril 19.0-22.0 (21.0), tarsus 98.3-103.0 (99.8) mm.

Females (five specimens), wing 263-288 (279), tail 97.4-107.8 (101.7), culmen 61.8-71.7 (67.2), depth of bill at nostril 20.3-21.0 (20.5), tarsus 92.7-99.2 (96.6) mm.

Range.—The north coast of Colombia (Bonda and Mamatoca, Depto. Magdalena; Loricá, Depto. Bolívar), Venezuela (Margarita Island, Corosal, Cariquito, Puerto La Cruz, near Mérida), and Trinidad (Caroni Swamp), to Surinam (Brazzaville, coast near Diana Creek) and northern and eastern Brazil.

Remarks.—Few South American specimens are available at present in collections in the United States, and from these it appears that the groups of the southeastern United States (typical *violacea*) and of northern South America are remarkably similar. Both are marked by slender bill, leaving a slightly darker color and an average shorter wing as the only characters for the far distant South American bird. Some specimens cannot be separated on this basis, especially since many museum specimens are discolored by grease which darkens them decidedly.

Birds seen from Trinidad seem identical with those of the South American mainland.

Nyctanassa violacea gracirostris van Rossem:

Nycticorax violacea gracirostris VAN ROSSEM, Occ. Pap. Mus. Zool. Louisiana State Univ., No. 15, Nov. 22, 1913, p. 266 (Socorro Island, Revilla Gigedo Group, México).

Characters.—Similar to *N. v. violacea*, but with brown wash on crown in adult darker and more extensive; bill strong and heavy; tarsus short; average size smaller.

Maics (two specimens), wing 255-275 (265), tail 96.5-105.3 (100.9), culmen 64.7-68.8 (66.7), depth of bill at nostril 21.0-23.0 (22.0), tarsus 80.1-85.7 (82.9) mm.

One adult, sex not marked, wing 264, tail 100.5, culmen from base 66.7, depth of bill at nostril 22.0, tarsus 82.9 mm.

Range.—Socorro Island, Revilla Gigedo group, México.

Remarks.—The curious adaptation by which this heron on Socorro Island has come to live in the dense, dry scrub that covers this hilly island, where no lagoons or marshes are available, has been mentioned by various naturalists. Apparently it is a habit of long standing, since it is reflected in the form of the birds, their differences from others being much more definite than can be indicated on paper. The short, heavy bill suggests that of *bancrofti*, while the darker color points toward *fauperi*.

The measurements of the three in the National Museum collection agree with the six examined by van Rossem in preparing his original description.

Nyctanassa violacea caliginis Wetmore:

Characters.—Similar to *N. v. violacea*, but with thicker, heavier bill; adult decidedly darker gray; Similar to *N. v. bancrofti* in size of bill, but decidedly darker in color.

Measurements.—Males (12 specimens), wing 282-299 (290.1), tail 101.7-116.9 (108.7), culmen 67.6-81.3 (73.8), tarsus 87.7-101.3 (92.1), depth of bill at nostril 22.2-25.1 (23.4) mm.

Females (2 specimens), wing 288-291 (289.5), tail 101.1-109.0 (105.0), culmen from base 73.7-74.7 (74.2), tarsus 96.5-97.4 (97.0), depth of bill at nostril 22.2-23.5 (22.9) mm.

Range.—Panamá (Balboa, Taboga Island, Obaldía) including the Pearl Islands (San José, El Rey, Saboga) to the Pacific coast of Colombia (Bahía de Cueva) and Ecuador (Isla de Jambeli and Vaquería).

Preliminary comparisons of our specimens taken on San José indicated that they were darker in color, but I was uncertain as to the stability of this character until I had examined the series in the Museum of Comparative Zoölogy from Isla El Rey (San Miguel) and Saboga, and found that they were likewise darker. It is interesting to observe that this tendency toward darker color is in the direction of the very dark *N. v. pauper* of the Galápagos Islands. Birds from the Pacific side of Panamá likewise belong with the new race which extends along the mainland of the Pacific coast from Panamá to Colombia and Ecuador.

Nyctanassa violacea pauper (Sclater and Salvin):

Nycticorax pauper SCLATER and SALVIN, Proc. Zool. Soc. London, 1870, p. 327 (Indefatigable Island, Galápagos Archipelago).

Characters.—Darker than other races, in both adult and immature plumage, especially on lower surface; crown in adult washed heavily with dark brown; size small.

Males (15 specimens), wing 259-282 (271), tail 98.0-110.6 (103.8), culmen 64.0-73.7 (68.9), depth of bill at nostril 20.2-23.9 (21.8), tarsus 85.9-95.4 (90.3) mm.

Females (4 specimens), wing 260-271 (265), tail 99.8-104.0 (101.9), culmen 63.8-70.8 (66.9), depth of bill at nostril 20.3-22.0 (21.1), tarsus 86.0-91.0 (88.2) mm.

Range.—Known from all the principal islands of the Galápagos Archipelago except Culpepper and Wemman in the north.

Remarks.—The dark color and small size make this the most distinct of the forms of this bird. Like the bird of Socorro Island it

is often found in the brush inland, though common also about the lagoons.

HETEROCNUS MEXICANUS (Swainson): Cabanis' Tiger Bittern

Tigrisoma mexicanus SWAINSON, in Murray, *Encycl. Geogr.*, July 1834, p. 1383 (México).

The four specimens, three adult and one immature, shot on San José appear to average darker when examined with a series from México and Central America, if comparison is made with birds that are in the same color phase. These herons, however, show great variation. There appear to be two distinct phases in this bird, one that is grayish, with the brown of the under surface considerably lighter and the neck grayer, and one that is more brownish, where the under surface is decidedly more rufous brown and the neck has a heavier brownish wash. In some birds, probably younger individuals, the breast is buffy and brown mixed with broad but indistinct bars of neutral gray. This is apparently an influence from the heavily barred immature dress that may carry over in some individuals through the first molt toward adult plumage.

The single immature specimen from San José, in the barred plumage usual to that stage, has the brown, especially of the dorsal surface, darker and more rufescent than most others seen. In fact in a considerable series I find no exact duplicate. Occasional specimens from elsewhere show the darker color in part but none carry it throughout.

A young bird, taken from the nest by Morrison March 24, has the pin feathers of the plumage just appearing. The down is very light grayish white, except that the filaments on the crown, which are longer than elsewhere on the body as is usual in herons, are pure white.

Van Rossem⁶ calls attention to the fact that the earliest specific name for this bird, usually called *Heterocnus cabanisi* from Heine's description in the *Journal für Ornithologie*, 1859, p. 407, is *mexicanus* Swainson which dates from 1834.

Van Rossem and Hachisuka have described a northern form⁷ on two adult birds that are said to have the barring on the forepart of

⁶ *Auk*, 1912, p. 572.

⁷ *Heterocnus cabanisi* (sic) *frenitus* van Rossem and Hachisuka, *Proc. Biol. Soc. Washington*, vol. 50, Sept. 30, 1937, p. 161 (Guiracoba, southern Sonora).

the body heavier, and the blackish streaks on the foreneck paler, while the size is said to be slightly larger, the wing being 365 mm. in the male and 375 in the female. These dimensions are definitely larger than those that the authors give for four adults from El Salvador. In the National Museum there is, however, an adult male from Los Reyes, Michoacán, with the wing 372 mm., a female from Hacienda Augustura, Rio Verde, San Luis Potosí, with the wing 365 mm., and a female from Chamelicón, Honduras, with the wing 375 mm. The alleged difference in size therefore is not definite.

This is the most common heron on San José, a matter of some interest since earlier collectors did not obtain it on Isla El Rey. Mrs. Stungis speaks of it as "fairly common on the Pearl Islands," and Bonallius shot one on Rayoneta.³

Occasionally I found tiger bitterns in heavy woods along the lower course of the Rio Marina, where they rested along the stream or flew up to perch in the trees 40 feet above the water, often uttering a harsh call. They were more common, however, along the sea, where they rested in low trees along the edge of the low cliffs, or on the rocks in more open locations. In habits they reminded me much of night herons, as they remained motionless for long periods, resting with neck drawn in when at ease, or with the head in the air when watchful. At such times the shortness of the legs in contrast with the length of the neck was very evident. Their appearance on the wing, both in method of flying and in shape, was especially similar to that of the black-crowned night heron. When perched in the partial concealment of low trees they often remained while I walked underneath and around them, but on the open rocks they were more wary, though here their colors blended with the background in such a way that often I did not see them until they flew. The native boys from Panamá knew them as the grulla.

A female taken February 9 was about to lay, and I saw one nest containing a small young on February 22. They appear to be solitary in breeding as the nests seen were placed singly, not associated with others. The usual location was on a tree limb projecting out from a cliff, where it was over water at least during high tide. The nests were flattened platforms of twigs somewhat bulkier than is often the case with herons.

³Reid, Ark. for Zool., vol. 13, No. 4, 1920, p. 17.

Family THRESKIORNITHIDAE

GUARA ALBA (Linnaeus): White Ibis

Guara alba LINNAEUS, *Systemae naturae*, ed. 10, vol. 1, 1758, p. 145 (South Carolina).

On February 18 I shot an adult female from a flock of a dozen resting on high limbs under the shade of the tall mangroves at the mouth of the Río Mata Puerco. White ibises or their tracks were seen here regularly until the end of the month, and on March 1 I saw two at the mouth of the Río Marina. Morrison shot a male April 30. On Pedro González Rendahl⁹ lists one shot by Bovallius high up in dense forest, and Mrs. Sturgis¹⁰ records a number seen on a wooded cliff.

Family CATHARTIDAE

CORAGYPS ATRATUS (Meyer): Black Vulture

Vultur atratus MEYER, *Zool. Annot.*, vol. 1, 1794, p. 290 (St. Johns River, Fla.).

Black vultures were few in number on San José Island and were restricted mainly to the beaches in search for food since these were the only natural open places except for the small savanna on Bald Hill in the north. They were observed regularly but usually not more than two or three together, and seemed rather wild, probably because there have been no houses here. While occasionally one or two passed the camp area they paid no attention to it because of the careful refuse disposal.

On Pedro González on March 9 and 11 I recorded several at the village of Cocal.

CATHARTES AURA (Linnaeus): Turkey Vulture

Vultur Aura LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 86 (Veracruz, México).

Turkey vultures, while not abundant in 1944, were recorded on most of the days that I was afield on San José, being seen regularly over the shore where they followed along the beaches, and also observed constantly soaring over the forested interior of the island. I found them on Pedro González March 11. Because of their relatively small number I did not have opportunity to shoot birds for

⁹ Ark. for Zool., vol. 13, No. 4, 1920, p. 18.

¹⁰ Field book of birds of the Panama Canal Zone, 1928, p. 79.

specimens until February 12. On this day, on the beach at Ensenada de la Bodega, I dropped one at long range. This one I laid on the sand with wings partly spread, when it served immediately to decoy down a companion which I also shot. Through the summer and fall Morrison observed turkey vultures regularly, and on May 12 secured a female that, while fully grown in every way, is shown to be a bird of the year by the dark-colored bill and the considerable amount of down on the back of the head and hindneck. These three proved so interesting that at my suggestion Dr. Murphy collected three more on November 24, 1945, which give much better understanding of the occurrence of forms of this bird on the island. The two that I obtained in February prove to be representative of two races. The first to be noted, a male, has the wing 485 mm., and the tail 245 mm., and is obviously of the typical form *Cathartes aura aura* (Linnaeus). A male (wing 470 mm.) and a female (wing 480 mm.) obtained by Dr. Murphy belong also to this race.

When skinning the two secured February 12 I noticed that one was decidedly heavier and larger in body than the other. And on examination in the Museum it develops that the larger specimen, a female, is the western turkey vulture, *Cathartes aura teter* Friedmann.¹¹ It has the wing 492 mm., and the tail 257 mm. A female collected by Dr. Murphy with the wing 511 mm. and the tail 264 mm. is also of this race. The longer tail and the more grayish shade of the brown edgings on the wing coverts are the characters that mark *teter* from typical *aura*. It has been known for some time that there is migration among the turkey vultures through southern México and Central America, but because of the failure of most collectors to prepare skins there is not much recorded concerning their races. The western turkey vulture, *C. a. teter*, has been recorded once before from Panamá by Aldrich and Dole, who secured one at Paracoté on the Azuero Peninsula.¹²

The specimen taken by Morrison May 12 is obviously distinct from the other two, and after comparison with available skins it is identified as of the race found in the northern part of the continent of South America, *Cathartes aura ruficollis* Spix.¹³ This race is distinctly blacker than the three known from North America, and in addition has the lighter margins on the wing coverts much reduced

¹¹ *Cathartes aura teter* Friedmann, Proc. Biol. Soc. Washington, vol. 46, Oct. 25, 1933, p. 188 (Riverside, Calif.).

¹² Sci. Publ. Cleveland Mus. Nat. Hist., vol. 7, Aug. 31, 1937, pp. 40-41.

¹³ *Cathartes ruficollis* Spix, Avium Spec. Nov. Brasiliam, vol. 1, 1824, p. 2 (Interior of Baía and Piauí, Brazil).

and very much darker brown. Although immature birds of the North American subspecies are blacker than the adults, none of them approach the South American birds in depth of color, while in addition the edgings of the wing coverts are much lighter. The San José specimen, a female, has the wing 495 mm. and the tail 257 mm.

The separation of these few specimens into so many subspecies is somewhat startling, and the identifications have been made only after careful and detailed study. It appears that there is far more movement among these vultures than has been known. The extent to which the South American individuals wander will be an interesting matter to ascertain, and there should be check made to determine more clearly their characters, as it seems probable from what I have seen in various visits to the range of what is known as *ruficollis* that the population now bearing this name will need to be further divided.

Family ACCIPITRIDAE

ELANOÏDES FORFICATUS (Linnaeus): Swallow-tailed Kite

Falco forficatus LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 89 (South Carolina).

On March 13, over an area of tangled vines and brush, two swallow-tailed kites turned in graceful circles with widely spread forked tails. As they passed on, a flock of six appeared briefly and then continued over the forest. Evidently these were migrants traveling northward. As the one that I shot fell at a distance where I could not find it, I was not able to ascertain which subspecies was represented. The species has not been recorded previously from the Pearl Islands.

ICTINIA PLUMBEA (Gmelin): Plumbeous Kite

Falco plumbeus GMELIN, *Systema naturae*, vol. 1, pt. 1, 1788, p. 283 (Cayenne).

The plumbeous kite is evidently a migrant in these islands, as it is elsewhere through much if not all of the northern part of its range outside South America. The first recorded were seen March 11 circling over the forested slopes of Pedro González Island. The following day I noted three flying high overhead near East Harbor on San José, and on March 13 I shot a pair near the center of the latter island. These two were mating, so that they had evidently arrived on their nesting grounds in readiness to breed. The female, ready to produce eggs, was extremely fat, the male, with testes fully developed, only moderately so. That these were newly arrived migrants from some other region was easily apparent as they are

conspicuous and could not have been overlooked, since I had been in the field daily on San José for several weeks. They soar and circle swiftly and gracefully, spending much time in the air. On the wing the adults appear entirely dark until, when they turn, the sun reflects from the lighter-colored gray head so that it sometimes appears almost white. The wings are long like those of a falcon, and the slight notch in the tail is usually evident. In the hand the dull gray body and the black wings and tail form a pleasing contrast, the wings showing bright brown inner webs on the longer primaries. Three of the outer primaries are notched on the inner web. At rest the birds are partial to the open branches of the guarumo (*Cecropia*) and similar exposed perches.

Morrison reports that this kite remained fairly common through the summer, at least until the latter part of September. He shot females April 23 and June 27, and also prepared one juvenile bird, with wings and tail less than one-third grown, with the light breast heavily streaked. This had been taken from a nest when in white down and kept alive for 3 weeks or so by one of our friends. Robert Cushman Murphy recorded one November 12, 1945.

Dr. George M. Sutton* in an instructive study of these kites has expressed the opinion that the Mississippi kite, *Ictinia mississippiensis*, and the plumbeous kite, *I. plumbea*, should be rated as geographic races of a single form. That the two are closely allied is evident on the most casual examination, but after careful study of a considerable number of birds I find that I cannot agree with my friend in this matter, since to my understanding the two groups are sufficiently different to be held as separate species.

In these interesting birds the criteria for distinction appear mainly in the immature plumage, which should show the greatest resemblance if the two were in reality closely allied. In the adult stage, through the parallelism of the general gray, gray-black, and black color, only slightly relieved by touches of white and of brown, little concrete difference is evident.

Turning then to the immature individuals we find that in the Mississippi kite the prevailing streaking of the lower surface is decidedly brown, in the darkest the feathers being only partly edged with Chestnut brown, while the brightest are much lighter. The throat is lightly or not at all marked, and on the grayer dorsal surface there is much concealed white on the inner wing coverts, scapulars, and back. In the plumbeous kite, on the contrary, the streaks are deep,

*Wilson Bull., vol. 56, 1944, pp. 3-8.

dark, or blackish mouse gray, without brown, the throat is heavily streaked, and there is little or no concealed white on the very black dorsal surface. The two are so completely distinct that any specimen may be identified as to its kind at a glance across the work table. The differences are not those used as modern criteria for subspecies, and the two are seen to be readily and entirely separate. The close alliance between the two kites is shown by their allocation in the same genus in which no others are included. In this genus I consider that they should be maintained as distinct though closely allied species.

The immature birds of both have the under side of the tail barred with white. In the adult plumbeous kite this mark always remains, while in the full adult of the Mississippi kite it is lacking. In those occasional individuals of the latter in which the white tail bar is found, this is due to a juvenile influence that usually is evident elsewhere in the plumage, often in a mottling of the inner webs of the flight feathers, and in barring or spotting of the under wing-coverts.

BUTEO MAGNIROSTRIS ALIUS (Peters and Griscom):
Pearl Islands Hawk

Buteo magnirostris alia PETERS and GRISCOM, Proc. New England Zool. Club, vol. 11, Aug. 30, 1929, p. 48 (San Miguel, Isla El Rey, Archipiélago de las Perlas.)

The large-billed hawk, well known in a variety of geographic races throughout much of tropical America, was fairly common on San José Island, where we secured specimens on February 14, March 3 and 6, April 14 and 16, and May 1. March 11 I heard one calling on Pedro González but did not collect it. Though these hawks seemed to be fairly uniformly distributed through the forests of San José, both near streams and away from them, it was somewhat difficult to ascertain their true abundance since it was their habit to remain quiet much of the time. As they perched in the upper branches of the trees they were usually hidden by leaves so that I observed them ordinarily only when I heard their querulous, squealing cries, or when the yellow-green vireos were scolding them. Occasionally one of the hawks came when I was squealing to call other birds. They were sometimes seen resting on open perches around the larger clearings. On February 15 I saw one calling near a partly completed nest of sticks placed in a tree 40 feet above the Río Marina.

The specimens from San José agree closely with those of Rey Island. The race, while not strongly characterized, is sufficiently distinct to merit recognition.

BUTEOGALLUS ANTHRACINUS SUBTILIS (Thayer and Bangs):
Mangrove Black Hawk

Urubitinga subtilis THAYER and BANGS, Bull. Mus. Comp. Zool., vol. 46, June 1905, p. 94 (Gorgona Island, Colombia).

On San José Island these hawks were fairly common. They were seen mainly along the coast in the borders of small mangrove swamps, or on the rocky headlands above the beaches. Occasionally I found them along the streams farther inland. They were usually unafraid so that undoubtedly I often missed seeing them when they were perched in the heavy forest. A pair came frequently to circle in the rising air currents back of the coastal bluffs at camp, maintaining position with skill and certainty. Sometimes I saw them standing on gravel bars along the lower course of the Rio Marina, and on other occasions resting on prominent rocks on the seashore. One hot day when I stopped to rest for a moment beneath a spreading tree at the border of a mangrove swamp I found that I was sharing the cool comfort of this shelter with one of these hawks which remained without fear 50 feet away.

February 11 I shot a female nearly in adult dress that decoyed to me in a growth of white mangroves, and on February 13 secured a male in immature dress in a similar location. I saw several on Pedro González Island March 11.

The male has the wing 322 mm., the female 352 mm. Dr. Murphy secured a male November 19, 1945, with the wing 342 mm. The present form is certainly only a geographic race of *Buteogallus anthracinus*, separated mainly by smaller size. As far as I could tell all those recorded were this small race, though the true status of this bird should be checked with more specimens.

Thayer and Bangs¹⁵ recorded these hawks from Isla El Rey under the name of the larger *anthracinus*, while Swann later described these specimens under the name *Urubitinga anthracina bangsi*.¹⁶ Griscom¹⁷ detected these errors and reported *subtilis* from the Pearl Islands. Rendahl¹⁸ lists adult females taken by Lovallius on Bayoneta April 19, with the wing 347 mm., and on San José April 26, with the wing 341 mm., under the name *anthracina*. From his measurements these two birds are certainly *subtilis*. This race therefore is the only one recorded now from the Pearl Islands.

¹⁵ Bull. Mus. Comp. Zool., vol. 46, September 1905, p. 144.

¹⁶ Syn. Accipitres, pt. 1, Sept. 28, 1921, p. 68.

¹⁷ Bull. Mus. Comp. Zool., vol. 78, April 1935, p. 300.

¹⁸ Ark. for Zool., vol. 13, No. 4, 1920, p. 20.

The adult in life appears black with a prominent white band across the tail. The immature is streaked irregularly with white and buffy white below.

Family PANDIONIDÆ

PANDION HALIAETUS CAROLINENSIS (Gmelin): Osprey

Falco haliaetor carolinensis GMLIN, *Systema naturae*, vol. 1, pt. 1, 1788, p. 263 (South Carolina).

The osprey, a winter migrant from the north, was seen February 21 at the mouth of the Rio Marina, and on February 21 and 26 along the shore at Ensenada de la Bodega. Dr. Murphy recorded it at intervals during November 1945, once seeing two together. These are the first reports of this bird for the Pearl Islands.

Family FALCONIDÆ

MILVAGO CHIMACHIMA CORDATUS Bangs and Penard:
Yellow-headed Caracara

Milvago chimachima cordata BANGS AND PENARD, *Bull. Mus. Comp. Zool.*, vol. 62, April 1918, p. 35 (Isla El Rey, Archipiélago de las Perlas, Panamá).

These small hawks, known to the native boys as *aguirre*, were only fairly common. On San José we secured specimens February 11, March 3, June 1, and September 23. On Pedro González I saw one March 9 and another on March 11, and Morrison collected two there June 8. I found them sometimes along the beaches half flying, half running actively across the sand to capture crabs. On other occasions I noted them inland near mangrove swamps along the roads, or in other places where the forest was not too heavy. Immature birds with streaked breasts were taken June 8 and September 23.

From a very limited series these Pearl Islands birds seem to average slightly deeper buff on head and breast than those from northern South America, but this does not appear a wholly definite difference, especially since this color is certainly affected by fading.

FILCO PEREGRINUS ANATUM Bonaparte: Duck Hawk

Falco Anatum BONAPARTE, *Geogr. and Comp. List*, 1838, p. 4 (Egg Harbor, N. J.).

Robert Cushman Murphy recorded one resting on a rocky islet near the northern coast of Ensenada de la Bodega on San José on November 20, 1945.

FALCO COLUMBARIUS COLUMBARIUS Linnaeus: Eastern Pigeon Hawk

Falco columbarius LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 90 (South Carolina).

On February 9 on my first visit to the forest along the Río Marina on San José Island one of these falcons knocked down an adult pale-vented pigeon in flight at my feet, striking its quarry only 10 feet from me. Instantly it saw me and rose to a branch where I shot it. The pigeon, actually larger than its attacker, lay bleeding under the wing, with most of its tail feathers torn out from this one blow. As I returned after retrieving the hawk, the other bird recovered and flew away.

The pigeon hawk is a winter migrant from the north that has not been recorded previously in the Pearl Islands.

FALCO ALBIGULARIS ALBIGULARIS Daudin: Bat Falcon

Falco albicularis DAUDIN, *Traité d'ornithologie*, vol. 2, 1800, p. 131 (Cayenne).

Though found regularly on the mainland, this is the first report of this small falcon in the Pearl Islands. Morrison secured a pair on May 12, a male on July 6, and saw several others during the summer. The two taken May 12 had a nest in a hole in a tree about 40 feet from the ground with two small young covered with pure white down. After 2 days in captivity they died and were preserved in alcohol. One of them when first taken regurgitated feathers of the yellow honey-creeper. Apparently the bat falcon is fairly common on San José, but is difficult to find because of the heavy forest and the solitary habits of the bird.

FALCO SPARVERIUS Linnaeus: Sparrow Hawk

Falco sparverius LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758 p. 90 (South Carolina).

One bird was seen over the clearing where we lived February 27, and March 6, 7, and 14, possibly the same individual. There is no question but that this was a migrant from the north. Dr. Murphy recorded the sparrow hawk frequently in November 1945. It has not been recorded previously from these islands.

Family RALLIDAE

AMAUROLIMNAS CONCOLOR GAUTEMALENSIS Lawrence:

Uniform Rail

Corchreus Guatemalaensis LAWRENCE, *Proc. Acad. Nat. Sci. Philadelphia*, vol. 15, June 1863, p. 166 (Guatemala).

Family HAEMATOPODIDAE

HAEMATOPUS PALLIATUS PALLIATUS Temminck: Oyster-catcher

Haematopus palliatus TEMMINCK, Manuel d' ornithologie, ed. 2, vol. 2, 1820, p. 532 (Venezuela).

Oyster-catchers were distributed around the rocky headlands of San José, and were seen March 9 near the village of Cocal on Pedro González. In February and March they were in pairs, and in the latter month I heard them calling both by day and by night along the sea below our camp. Occasionally they came out on the sandy beaches, but it was more usual to find them resting on rocks. While not abundant, they were seen frequently and seemed to be widely distributed. The specimens taken are two males February 16 and April 23, a female April 18, and a young bird half grown secured May 10. The stomach of one taken February 16 contained the opercula of the abundant mollusk *Nerita* and a bit of a barnacle. The fat in these birds is orange in color.

While some place this as a race of *Haematopus ostralegus* of the Old World, the characters of the two seem sufficient to maintain them as separate species. The white back and lower rump of *ostralegus* are found even in the juvenile, while in young *palliatus* this area is dark as in the adult. The three adults from San José agree with *palliatus* from the Atlantic part of the range, showing no points that verge toward the differences under which the more southern form *H. p. pitanay* has been established.

Family CHARADRIIDAE

CHARADRIUS WILSONIUS BELDINGI (Ridgway): Belding's Plover

Charadrius wilsonia beldingi RIDGWAY, U. S. Nat. Mus., Bull. 50, pt. 8, June 26, 1919, p. 112 (La Paz, Baja California).

Morrison collected a male on a beach on San José, August 2, that is typical of this form in the darker dorsal color.

CHARADRIUS HIATICULA SEMIPALMATUS Bonaparte:
Semipalmated Plover

Charadrius semipalmatus BONAPARTE, Journ. Acad. Nat. Sci. Philadelphia, vol. 5, August 1825, p. 98 (coast of New Jersey).

On February 18 I shot two females from a flock of a dozen at the mouth of the Rio Mata Puereo, and recorded them again on February 21. When the tide was in, they went far back from the open

beach among the roots of the mangroves. The two taken were beginning the molt into breeding dress. Morrison collected an immature male on August 13, an early date for the return of this migrant from the far north.

CHARADRIUS VOCIFERUS VOCIFERUS Linnaeus: Killdeer

Charadrius vociferus LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 150 (South Carolina).

Robert Cushman Murphy recorded one November 14 around the extensive clearing for military headquarters on San José, noting what was probably the same bird frequently on subsequent days.

Family SCOLOPACIDAE

ACTITIS MACULARIA (Linnaeus): Spotted Sandpiper

Tringa macularia LINNAEUS, *Systema naturae*, ed. 12, vol. 1, 1766, p. 249 (Pennsylvania).

Spotted sandpipers, as migrants from the north, ranged in small numbers on the rocky areas bordering the headlands along the shores of San José. Seldom were more than two or three seen during a day. Morrison shot a female beginning the molt into the spotted breast of the breeding season on April 6. August 13 he secured another female in worn breeding dress, apparently recently arrived. An adult male, beginning the molt, and an immature male were taken September 3.

CATOPTROPHORUS SEMIPALMATUS INORNATUS (Brewster):
Western Willet

Symphicaria semipalmata inornata BREWSTER, *Auk*, 1887, p. 145 (Larimer County, Colo.).

Our record for San José is of a female taken by Morrison on September 23. This bird has the wing 197 mm, and the culmen 58.7 mm. This is another northern migrant.

EROLIA MINUTILLA (Vieillot): Least Sandpiper

Tringa minutilla VIEILLIOT, *Nouv. Diet. Hist. Nat.*, vol. 34, 1819, p. 466 (Halifax, Nova Scotia).

On February 20 I shot three from a dozen found around some rocky headlands bordered by a sandy beach on the eastern side of San José.

Family STERCORARIIDAE

STERCORARUS PARASITICUS (Linnaeus): Parasitic Jaeger

Larus parasiticus LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 136 (coast of Sweden).

Robert Cushman Murphy recorded one near the coast of San José February 21, 1941, during his investigations on the *Askoy*.

CATHARACTA SKUA CHILENSIS (Bonaparte): Chilean Skua

Stercorarius antarcticus s. *chilensis* BONAPARTE, *Conspectus generum avium*, vol. 2, 1857, p. 207 (Chile).

On February 7 I saw two skuas between 3 and 4 miles outside the harbor of Balboa, and another 10 miles off San José Island. March 14 I noted one 15 miles out from San José as it crossed the bow of our boat. A short distance away it turned to pursue a laughing gull, buffeting it about without, however, securing any food, and then flew on its way. While this seems to be the first published record for these waters, the birds should occur regularly in migration.

Family LARIDAE

LARUS ATRICILLA Linnaeus: Laughing Gull

Larus atricilla LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 136 (Eshams).

On February 6 and March 14 I recorded laughing gulls in scattered flocks over the Bay of Panamá from Balboa across to San José and Pedro González Islands. February 24 I shot two females just beginning to molt into breeding dress from a flock of 300 off the southeastern shore of San José. The birds rested in a scattered flock on the water until our launch approached and then flew off in a long line. Later a flock joined pelicans, man-o'-war birds and cormorants in fishing. March 9 in a trip to Pedro González several hundred were scattered over the open sea, and I noted that many were acquiring the dark hood of the summer dress. Hundreds were seen March 14 in crossing to Balboa. They seemed at this season to remain in the open sea as it was rare to note one along the beaches. Dr. Murphy recorded them around San José February 13 and May 23, 1941, and November 27, 1945.

THALASSEUS MAXIMUS MAXIMUS (Boëdaert): Royal Tern

Sterna maxima BOËDAERT, Table des planches enluminées, 1783, p. 58 (Cayenne).

Dr. Murphy recorded the royal tern between San José and El Rey September 9, 1937, and reported others around San José February 13 and 21, 1941. He found them frequently during his work in November 1945.

THALASSEUS SANDVICENSIS ACUFLAVIDUS (Cabanot): Cabot's Tern

Sterna acufavida CABANOT, Proc. Boston Soc. Nat. Hist., vol. 2, 1847, p. 257 (Tancab, Yucatán).

On March 14 about midway between San José Island and Balboa one passed near at hand, the light tip of the bill shining clearly.

GELOCHELIDON NILOTICA VANROSSEMI Bancroft:

Western Gull-billed Tern

Gelochelidon nilotica vanrossemi BANCROFT, Trans. San Diego Soc. Nat. Hist., vol. 5, No. 19, Dec. 10, 1929, p. 284 (Salton Sea, Imperial County, Calif.).

On February 6 several hundred gull-billed terns were feeding over the open sea from 10 to 30 miles offshore from San José. Allocation to subspecies is made on geographical grounds as none were taken.

CHLIDONIAS NIGRA SURINAMENSIS (Gmelin): Black Tern

Sterna surinamensis GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 604 (Surinam).

Robert Cushman Murphy recorded this tern at sea near San José on February 21 and May 23, 1941.

Family COLUMBIDAE

COLUMBA CAYENNENSIS PALLIDICRISSA Chubb: Pale-vented Pigeon

Columba pallidicrissa CHUBB, Ibis, 1910, p. 60 (Costa Rica).

This was the most conspicuous pigeon on San José, distributed universally through forested areas, absent only in sections of brush completely overgrown with matted creepers. Many frequented the growths of mangroves where streams entered the sea. In late afternoon and evening birds alone, or in little groups of two to six, flew in swift, direct flight over the forest, often passing the clearing at camp. As I walked quietly through the trees they often flushed overhead with clapping wings. They had considerable curiosity and some-

times swung in on sighting me to alight in the tops of the trees. As they detected any movement on my part, however, they walked or fluttered behind the cover of leaves, or flew precipitately.

February and early March marked the breeding season, and I heard their hooting calls, like the notes of some owls, constantly in the forest. Males often soared over the trees or through openings with the wings held stiffly, sometimes elevated above the back, and sometimes extended straight and flat. After the first week in March they were less noisy and many then had nests. February 19 I located a nest 12 feet from the ground below the top of a spiny-trunked black palm. It was a shallow and frail structure of twigs and contained one egg which I broke in attempting to obtain it. March 5 I picked up the shell of an egg that had just hatched, and on March 13 in the northern part of the island I flushed several birds from nests placed in tangles of vines.

March 11 on Pedro González I saw several and collected a full-grown squab.

Our series of five adult males from San José averages definitely darker than specimens from Costa Rica, the type locality of the race *pallidiorissa*. There is, however, considerable variation in these birds so that it does not seem desirable to attempt separation of another race, occasional continental specimens being as dark as those from the Pearl Islands.

COLUMBIGALLINA TALPACOTI NESOPHILA (Todd):

Pearl Islands Ruddy Ground-dove

Choempelia rufipennis nesophila Todd, Ann. Carnegie Mus., vol. 8, May 8, 1913, p. 590 (Isla El Rey, Pearl Islands, Panamá).

This ground dove, in 1944, was of local distribution on San José, being restricted to fairly open grassy areas on a headland at the East Harbor and the small, open section at Bald Hill in the north of the island. During February and March we did not penetrate into these two places, but as trails opened, Morrison found the birds and collected specimens on March 28 and 29, and May 6 and 18. It is probable that they will spread to other sections in recent clearings that have been made. On Pedro González these birds were more abundant, ranging around abandoned fields. The natives there told me of them on my two visits, and later on May 16 and 18 Morrison collected two males.

The series from San José includes four females that agree with Todd's observations that three females he had examined from the

Pearl Islands were darker colored, and so substantiate the race that he named tentatively. When compared with a good series from Central America and Panamá they are darker and browner both above and below, though more especially so on the lower surface. An occasional bird from the mainland is fairly close, but even these in the main are slightly more grayish in tone. Males, as far as the four obtained show, two from San José and two from Pedro González, are identical with those from the mainland. The race in a way thus is not wholly definite, possibly being in what may be considered a formative stage. Todd's findings have been discounted on the possible ground that his specimens were immature males instead of females as marked by the collector. This supposition cannot apply to the four females in the present collection. As my findings, made independently, substantiate completely those recorded by Todd, I have no hesitance in recognizing the Pearl Islands birds as distinct.

LEPTOTILA VERREAUXI VERREAUXI Bonaparte: Verreaux's Dove

Leptotila verreauxi BONAPARTE, Compt. Rend. Acad. Sci. Paris, vol. 40, 1855, p. 99 (Colombia).

This dove was widely distributed through the forests, particularly where tree growth was high and the ground level fairly open below. They ranged alone or in pairs, and usually I saw several on each trip afield. In February and March they were nesting, and I heard their calls regularly. February 14 I flushed one from a compact, cup-shaped nest made of dried vegetation, firmly woven, in the crown of one of the spiny-trunked black palms, and placed about 8 feet from the ground. The nest was empty. The birds were tame and often exhibited curiosity; as I moved quietly through the undergrowth one might fly toward me to alight near at hand and peer at me. Suddenly the tip of the tail would be lowered, then brought quickly up above the back and spread widely, while simultaneously the head was nodded quickly. In early morning, if the air was damp, these doves remained quiet until the sun had warmed the forest, when they became active. When the early morning air was dry they seemed to move around early, and on such occasions I found them sometimes walking about the roads that had been cut through the forest. On Pedro González Island also they were fairly common, two being taken. These, with seven others from San José, average a little darker above and below than our series from the mainland, being especially darker than those from western Costa Rica. The differences, however, are bridged by individual specimens.

OREOPELEIA MONTANA MONTANA (Linnaeus): Ruddy Quail-dove

Columba montana LINNAEUS, *Systema naturae*, ed. 10, vol. 1, 1758, p. 163 (Jamaica).

It has been a surprise to see a male of the ruddy quail-dove taken by Morrison on San José March 31. He recorded three others at various times in the forest, but did not have opportunity for another shot. Dr. Murphy recorded one November 10, 1945. These are the first records for the Pearl Islands.

Family PSITTACIDAE

AMAZONA AUTUMNALIS SALVINI (Salvadori): Salvin's Parrot

Chrysotis salvini SALVADORI, *Catalogue of the birds in the British Museum*, vol. 20, 1897, p. 271 (Lion Hill Station, Canal Zone, Panamá).

Salvin's parrot, distinguished by the red forehead and the bluish edgings on the feathers of head and nape, was common on San José Island in the more heavily forested areas. I found them especially in the wooded swamp at the mouth of the Río Marina, and in the region beyond toward the East Harbor. In early morning parrots flew across the sky in pairs, appearing at sunrise and continuing active and noisy until about 10 o'clock. From then until evening I came across them at times feeding on figs and other fruits, and at sunset they began flying again but with less noise. They were always in pairs at this season. They nested in hollow trees in the swamp mentioned above, and here, in the early part of the day, were extremely noisy. There were a few on Pedro González, where I shot a female March 9. Eleven were taken on San José February 28 and 29, March 7, June 25, July 16, and August 23. These birds do not differ from those of the mainland. The voice is more varied, and with more chattering calls, than in the other species found here. When Salvin's parrot is flying, the longer tail is plainly evident. There seemed to be some competition between the two species, as occasionally I saw the present one flying aggressively at the yellowheads when they came too near.

AMAZONA OCHROCEPHALA PANAMENSIS (Cabanis): Panamá Parrot

Chrysotis panamensis CABANIS, *Journ. für Ornith.*, 1874, p. 349 (Panamá).

The Panamá parrot, marked by yellow on the crown and by the distinctly shorter tail when on the wing, was less common than Salvin's parrot, but still was present on San José Island in fair numbers. The two species inhabited the same areas, as their nesting

places and their food are similar, but they did not mix in friendly fashion. The voice in the Panamá parrot is much louder, and though present in smaller number, it was this species that contributed mainly to the noise in early morning in the wooded swamp at the mouth of the Río Marina, that at times completely covered all other bird sounds. We secured specimens February 28 and 29, May 26, and August 10. On Pedro González I saw several on March 9 and collected a male. There was also a young bird kept as a pet in the village of Cocal. Mrs. Sturgis¹⁹ has reported this species as seen on Pedro González, this being the only previous record for the Pearl Islands.

Our specimens do not differ from those of the mainland.

PIONUS MENSTRUUS (Linnaeus): Blue-headed Parrot

Pittacus menstruus LINNAEUS, *Systema naturae*, ed. 12, vol. 1, 1766, p. 148 (Swinam).

The first of these birds was recorded on San José at the beginning of May with the ripening of the fruit of the membrillo near the camp in the southern part of the island. Morrison secured a pair here May 3 and another May 4. At first they were quiet and shy, but in a month a flock of 40 or more was present, including one partial albino, and the birds flew about in a noisy group like other parrots. Others were taken June 3, 4, and 17, and two were secured from high trees back of the settlement of San Sebastian on Pedro González Island June 8. These specimens, including immature birds and adults in worn plumage, appear identical with those of the mainland.

This parrot, small in size with head and neck completely blue, has not been recorded previously in the Pearl Islands. As we did not find it until 3 months of constant field observation had passed, and then in areas that we had covered repeatedly, it appears that it may be a wanderer from Panamá and not resident on the islands.

Family CUCULIDAE

COCYZUS ERYTHROPHthalmus (Wilson): Black-billed Cuckoo

Cuculus erythrophthalmus WILSON, *American ornithology*, vol. 4, 1811, p. 16, pl. 28, fig. 2 (near Philadelphia, Pa.).

The migrant female secured by Morrison on San José April 28 is the first record for the Pearl Islands.

¹⁹ Field book of birds of the Panamá Canal Zone, 1928, p. 158.

CROTOPHAGA ANI Linnaeus: Ani

Crotophaga ani LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 105 (Jamaica).

On San José Island I found the ani fairly common in little groups of four to eight that frequented the densest growth of canes and matted vines outside the areas of high forest. I saw them or heard their complaining calls almost daily but did not obtain specimens for some time as it was hard to get near them in the tangles that they frequented. And when I did shoot one it was difficult to find. In the end we secured three males and one female, and later on July 21 Morrison shot two females on Pedro González. This ani has been familiar to me for years in many widely separated localities. My first impression of the San José birds was that they seemed large, and on comparing specimens in the Museum it was evident that they were different from most of those of continental areas in the greater development of the keel on the bill. Specimens in the Museum of Comparative Zoölogy from Isla El Rey, however, bridge the gap, and there are some specimens from the mainland of Panamá that are quite similar to those of San José. At first I believed that a distinct form was indicated, but it appears on examination of more material that attempt to make a separation is hardly warranted as the differences, while evident, do not seem trenchant.

Family TYTONIDÆ

TYTO ALBA GUATEMALÆ (Ridgway): Central American Barn Owl

Strix flammea var. *guatemalæ* RIDGWAY, Bull. Essex Inst., vol. 5, December 1873, p. 260 (Chinandega, Nicaragua).

The first record for the Pearl Islands is a male shot by Morrison on San José, June 24. The bird rested in broad day in a tree at the edge of the open savanna at Bald Hill in the north end of the island, being visible for a long distance. Its stomach was stuffed with young iguanas. Others were seen or heard occasionally at night.

The specimen is a male in light phase, quite different in appearance from the more common darker examples of this owl. From examination of available specimens the characters of *guatemalæ*, as distinguished from the North American barn owl *Tyto alba pratincola*, are darker color in general, a heavier mottling of gray on the dorsal surface, and more vinaceous on the facial disk. The southern race may average slightly smaller, though this is not wholly certain as most of the skins of *guatemalæ* at hand do not have the sex marked. Examples in light phase are quite similar to darker speci-

mens of *perlata*, but differ in average greater extent of gray on the dorsal surface, which also is slightly darker, and in the darker and more extensive vinaceous markings of the facial disk.

Recently I have had occasion to examine *Tyto alba subandana* Kelso,²⁹ described from a trade skin marked "W. Evans" and entered in the National Museum catalog February 17, 1860. In the original description this was compared with *tuidara*. It appears now that it is an example in light phase of *guatemalae*, as is a specimen received from Dr. Armando Dugand from Los Pendales, Depto. Atlántico, Colombia. This therefore extends the range of *guatemalae* into Colombia.

Family CAPRIMULGIDAE

NYCTIDROMUS ALBICOLLIS INTERCEDENS Griscom: Central American Parakee

Nyctidromus albicollis intercedens Griscom, Amer. Mus. Nov. No. 370, Oct. 17, 1929, p. 8 (Tela, Honduras).

Our principal observations on these birds were made at night as we traveled the roads in jeeps. From time to time ahead of us we would see what seemed to be an orange-red coal, as the eye of the bird reflected our headlights. Or the rays of a flashlight would pick one up in the brush alongside. The eye color was exactly that of the live coals of the burning logs from the road clearing, so that sometimes I had to look carefully to determine which was bird and which the remains of fire. Occasionally I heard one calling. They were reported to me on Pedro González.

Our series of six males and five females collected from February 10 to August 23 agrees with skins from Panamá, as other workers have indicated; and birds from this area are referred under present understanding to *intercedens* of Central America. The San José specimens as a whole average dark with the under surface rather heavily barred, but are matched in this by dark specimens from Costa Rica and elsewhere.

CHORDEILES ACUTIPENNIS INFERIOR Oberholser: Central American Nighthawk

Chordeiles acutipennis inferior OBERHOLSER, U. S. Nat. Mus. Bull. 86, Apr. 6, 1914, pp. 24, 100, 109 (Trinidad, Baja California).

The only record is that of a female taken near Bald Hill on San José by Robert Cushman Murphy November 13, 1945. This bird

²⁹ *Tyto alba subandana* Kelso, Biol. Leaflet No. 9, Apr. 21, 1938, p. 1. ("Bogotá," Colombia).

has the wing 168 mm., and the color characters of this race. It is a migrant, and one from near the extreme southern limit of this form.

Dr. Murphy reports further that on November 22 he heard the booming of the other species of nighthawk, *Chordeiles minor*, above the clearing at headquarters.

Oberholser, in the reference given above, described the breeding nighthawks of this species from México and Central America as two distinct subspecies, *Chordeiles acutipennis inferior* from Baja California, and *C. a. micromeris* from the rest of the area. Van Rossem²¹ has demonstrated that the supposed characters of the bird from Baja California do not hold, a fact that is evident on comparison of specimens. He unites them under the name *micromeris*, the full account of which is found on page 100 of Oberholser's work while the account of *inferior* comes on page 109. Peters, however (in litt.), calls my attention to the fact that in a key to the races on page 24 Oberholser gives his two supposed forms with the characters clearly indicated that separate them from the nearest relative. In this key the name *inferior* is given first. Under the rules of nomenclature, therefore, on line anteriority, *inferior* becomes the name for the Mexican and Central American race instead of *micromeris*.

Family MICROPODIDAE

CHAETURA VAUXI OCHROPYGIA Aldrich: Pale-rumped Swift

Chaetura vauxi ochropygia ALDRICH, Sci. Publ. Cleveland Mus. Nat. Hist., vol. 7, Aug. 31, 1937, p. 68 (Paracoté, 1 mile south of the mouth of the Rio Angulo, Montijo Bay, Veraguas, Panamá).

These small swifts were constantly present on San José Island during our work, but were easily overlooked as usually they flew over the forest where they were hidden from below. I recorded them most often from low hills where roads had been opened, and found them most active in the warmer hours of the day and in early evening. In February and March they were often seen in pairs that at intervals set the wings at an angle above the back and so sailed close together for short distances. Usually a dozen or so fed together, with occasional flocks of 50 or more. They circled rapidly with quickly beating wings, moving back and forth above the trees. Their high-pitched, chattering calls were heard infrequently. They were seen all through the summer, but I feel certain that they shifted constantly back and forth from the mainland to the islands, which they could do with ease.

²¹ Condor, 1942, p. 73.

Between February 16 and September 10 we secured a long series of specimens, 39 in all, in which the characters of more grayish brown in lower back, rump, and upper tail coverts that Aldrich pointed out in separating this race from *richmondi*, appear constant. In addition, with this larger series, it is evident also that *ochropygia* is grayer below, with the extreme upper breast, foreneck, and throat lighter, more whitish. Immature birds, taken July 6, have the rump and upper tail coverts grayer, less brownish. Molt is evident in the wing coverts of occasional birds taken June 27 and July 4, and primaries were being renewed September 10.

CHAETURA VAUXI RICHMONDI Ridgway: Richmond's Swift

Chaetura richmondi RIDGWAY, Proc. Biol. Soc. Washington, vol. 23, Apr. 19, 1910, p. 53 (Guanabo, Costa Rica).

The only swift secured on Pedro González Island is a female taken by Morrison May 16. This bird is distinctly browner on the back, rump, and under tail coverts than the others collected, and agrees with *richmondi* of farther north, seeming only slightly intermediate. It is assumed to be a migrant.

Family TROCHILIDÆ

PHAETHORNIS ANTHOPHILUS HYALINUS Bangs: Pearl Islands
Hermit Hummingbird

Phaethornis hyalinus BANGS, Auk, vol. 18, January 1901, p. 27 (Isla El Rey, Pearl Islands, Panamá).

This interesting hummer was found on San José in the more open areas of the forest, often along the banks of the larger streams. It was seen infrequently, so that our eight specimens represent much hunting. The dates are as follows: March 5, 14, 15, April 9, 26, May 13, July 14, and September 13. March 11 I saw two on Pedro González along an open, shaded trail adjacent to new clearings. These decoyed to a squeaking sound several times, but on each occasion came flying swiftly to me to hover a few inches from the openings in the barrel of my gun, to examine them curiously, and then, as I moved slightly, darted away out of sight. The birds obtained on San José differ uniformly from typical *anthophilus* in darker green, less bronzy dorsal surface, with less brownish evident. They are slightly darker on the crown than the only other specimen of *hyalinus* at hand, a female from Isla El Rey.

CHLOROSTILBON ASSIMILIS Lawrence: Allied Emerald Hummingbird

Chlorostilbon assimilis LAWRENCE, Ann. Lyc. Nat. Hist., New York, vol. 7, 1861, p. 292 (Lion Hill Station, Panamá Railway, Canal Zone, Panamá).

This was the most common of the hummingbirds on San José, where it was distributed through the forests, usually near water. I found them especially in mangroves at the mouths of the streams. Occasionally I saw them gleaning insects over the trunks of trees. The call was a low *cherep cherep*. The males did not seem particularly aggressive, so that it was usual to find several near one another. The morning of February 26 the thermometer in my tent dropped to 69.5° F., and we all felt cold in contrast to the warmer temperature to which we had been accustomed. At the mouth of Rio Mata Hueco soon after sunrise I found a male of this hummer fluttering about on the ground unable to rise so that I caught it in my hand. It was in a place exposed to the wind, and I was inclined to believe that it was merely numb from cold as it was in perfect condition, and showed no mark of any injury.

On Pedro González I saw several, and collected two on March 9 and 11.

Our series of a dozen specimens, when compared with birds from the mainland, averages darker green, particularly in the males, without the brassy sheen that shows in most of the latter. However, two birds from Taboga Island are similar to those from the Pearl Islands.

SAUCEROTTIA EDWARD MARGARITARUM Griscom:
Pearl Islands Hummingbird

Saucerottia edwardi margaritarum GRISCOM, Amer. Mus. Nov., No. 282, Sept. 12, 1927, p. 4 (Pedro González Island, Pearl Islands, Panamá).

This hummingbird was fairly common in the forests of San José, usually along the streams. I found them in the mangrove swamps, as well as inland. Our eight specimens were taken February 11, 12, 13, and 15, and March 1, 7, and 18. On Pedro González, where they were fairly common, two were taken March 9 and 11. The series bears out fully the characters assigned in the original description of this well-marked race.

Family ALCEDINIDAE

MEGACERYLE ALCYON ALCYON (Linnaeus): Belted Kingfisher

Alcedo alcyon LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 115 (South Carolina).

Single belted kingfishers, migrants from the north, were seen on the rocky shores of San José February 25 and 26. Dr. Murphy collected one that he preserved in alcohol. This bird, from the plumage a female, is an individual of the eastern race, which is the only one recorded to date from Panamá.

MEGACERYLE TORQUATA TORQUATA (Linnaeus): Ringed Kingfisher

Alcedo torquata LINNAEUS, *Systema naturae*, ed. 12, vol. 1, 1766, p. 180 (México).

A few of these large kingfishers were found at the mouths of the larger streams, along channels bordered by mangroves. And once I saw one fishing in salt water along the open shores of East Harbor, where the habitat was beach and shore with no fresh water near. We collected four on March 1, 10, and 30, and May 28.

Family FORMICARIIDAE

THAMNOPHILUS DOLIATUS NIGRICRISTATUS Lawrence:

Black-crested Ant-shrike

Thamnophilus nigricristatus LAWRENCE, *Proc. Acad. Nat. Sci. Philadelphia*, 1865, p. 107 (Lion Hill, Panamá Railroad, Canal Zone, Panamá).

March 9 on Pedro González Island as I came up the trail from the beach beyond Cocal into the brushy upland forest I heard the characteristic note of this bird, and presently secured a female. March 11 I made special search for them and found them common, taking six. Morrison secured another May 16. They ranged in thick growth in pairs, moving quietly behind cover, but constantly uttering their peculiar calls.

On San José we searched for them without success, and I was certain that they were not found on that island. To date they are recorded from El Rey, Viveros, and Pedro González Islands. The series from Pedro González has the bill averaging slightly heavier than skins from the mainland, but there is considerable variation.

FORMICIVORA GRISEA ALTICINCTA Bangs: Pearl Islands Ant-bird

Formicivora alticincta BANGS, *Proc. New England Zool. Club*, vol. 3, Mar. 31, 1902, p. 71 (Isla El Rey, Pearl Islands, Panamá).

This small bird, known as the pavita, is the most common of the avian species found on San José Island, being distributed universally through the forest, and from this cover penetrating into the borders of the mangrove swamps, and the matted growths of the more open slopes. In the forested areas they ranged from tangles of vines just

above the ground to the lower and middle branches of the trees. In the dark shadows of the denser growths they were seen with difficulty, but they had considerable curiosity and often came near me. Males show flashes of black and white as they fly, and both sexes flit the wings and jerk the tail continually. By March 7 a few males began singing in early morning, uttering a repetition of a single note that suggested the song of the black-crested ant-shrike of Pedro González and the mainland. By the middle of the month this singing increased, and the sexual organs of birds taken indicated that the breeding season was beginning. They were as common on Pedro González as on San José.

Our series of specimens has the bill averaging somewhat heavier than those from El Rey, the type locality, but in some the dimensions are identical.

Family TYRANNIDÆ

TYRANNUS TYRANNUS (Linnaeus): Eastern Kingbird

Lanius tyrannus LINNÆUS, *Systema naturæ*, ed. 10, vol. 1, 1758, p. 91 (South Carolina).

On San José Morrison found the kingbird common in migration at the end of April and early May, and collected a female May 12, the last one for the season. In fall they were also present in fair numbers, and he secured another September 10.

TYRANNUS MELANCHOLICUS CHLORONOTUS Berlepsch:

Lichtenstein's Kingbird

Tyrannus chloronotus BERLEPSCH, *Ornis*, vol. 14, 1907, p. 474 (Tmax, Yucatán).

This tropical kingbird was found in small numbers along the beaches of San José, and in the more open areas inland. It is a conspicuous species that rests on open perches where it is easily seen, so that it was recorded regularly. March 7 two that were evidently a pair, from their difference in size, flew high overhead in the cool air of early morning, finally ending with the male pursuing the female. Several were seen this day, and it may be that there was some migratory movement among them. I secured five on San José in February and early March, one on Pedro González March 11, and Morrison collected two on Moreno Island May 19.

MYIARCHUS FEROX PANAMENSIS Lawrence: Panamá Flycatcher

Myiarchus Panamensis LAWRENCE, *Ann. Lyc. Nat. Hist. New York*, vol. 7, May 1860, p. 284 (Panamá).

Like the crested flycatcher of eastern North America this species is an inhabitant of forests, though it frequents the open branches

among and under the canopy tops of the trees, rather than remaining hidden above. It is therefore easily seen. Though resembling the northern bird in color pattern—having a gray throat, yellow lower breast and abdomen, and olive-green upper surface—it is conspicuously different in the color of the tail, which is dark without rufous-brown markings. The birds rest quietly to watch for insects, but seem to have much curiosity as frequently when I remained quiet for a few minutes one flew to nearby perches to peer at me with craning neck. They were found also among the more open trees at the forest edge bordering the beaches.

March 9 and 11 I recorded this species on Pedro González Island, taking three specimens. Morrison shot a female and a juvenile male on Moreno Island. The young bird has the inner primaries, outer secondaries, and the rectrices edged prominently with bright brown. Most of these flycatchers have the bill fuscous or brownish in color but in an occasional one it is black. This seems to be individual variation, though I note that in the juvenile listed above the color is black.

On close scrutiny of our series of 12 from San José and 3 from Pedro González the bill appears very slightly heavier than in birds from the mainland. The difference is only a tendency and is so slight that it does not stand out in measurements.

EMPIDONAX VIRESCENS (Vieillot): Acadian Flycatcher

Platyrhynchus virescens Vieillot, Nouv. Dict. Hist. Nat., nouv. ed., vol. 27, 1818, p. 22 (near Philadelphia, Pa.).

Robert Cushman Murphy collected a male on San José November 21, 1945. The bird is recorded as a migrant in Panamá though this is the first report of it from the Pearl Islands.

MYIODYNASTES MACULATUS DIFFICILIS Zimmer: Noble Flycatcher

Myiodynastes maculatus difficilis Zimmer, Amer. Mus. Nov., No. 963, Nov. 18, 1937, p. 91 (Bebebero, Costa Rica).

These flycatchers lived in the higher branches of the forest trees, where they were probably more common than the 14 specimens taken on San José and Pedro González indicate. At the end of February they seemed to be mated, and Morrison collected a young bird just out of the nest on April 3. I saw them feeding on berries.

The series of specimens does not seem to differ from the birds of the mainland. There is much variation in the size of the bill.

MYIOPHOBUS FASCIATUS FURFUREOSUS (Bangs): Bran-colored Flycatcher

Myiobius naevius furfureosus BANGS, Bull. Mus. Comp. Zool., vol. 46, September 1905, p. 152 (Saboga Island, Pearl Islands, Panamá).

The first of these small flycatchers that I saw on San José, on February 27, was in the lower branches of the trees in fairly open forest on the banks of the Rio Marina. It rested quietly watching for insects. On March 8 while looking for land rails, Col. W. H. W. Komp, my companion, located a pair at the edge of an open area on the road to East Harbor. They acted like the small flycatchers of the genus *Empidonax*, resting quietly until insects passed, and then making short sallies to capture them. Subsequently, as the trails on the island were opened, Morrison found more of them so that in all we secured 17. They are fairly common but because of their quiet habits are easily missed in the dense growths in which they live. A juvenile bird, recently from the nest, is cinnamon brown above, with the under surface colonial buff, washed heavily with honey yellow across the breast, which is streaked indistinctly as in the adult. In the next plumage the abdomen is white and the breast chestnut, while often they are brighter brown above, being tawny. My impression of this series is that the birds of San José average brighter brown above than five seen from the Canal Zone. There is much variation among them, however, some being inseparable.

MYIOCHANES RICHARDSONII RICHARDSONII (Swainson):

Western Wood Pewee

Tyrannula richardsonii SWAINSON, Fauna Boreali-Americana, vol. 2, 1831 (1832), p. 146, pl. 45, lower fig. (Cumberland House, Saskatchewan).

Among the wood pewees collected by Dr. Murphy there is an adult male, taken November 18, 1945, of this race. The wing measures 88.4 mm. and the tail 66.4 mm. This is the first record for any wood pewee from the Pearl Islands.

MYIOCHANES RICHARDSONII SORDIDULUS (Selater):

Central American Wood Pewee

Contopus sordidulus SELATER, Proc. Zool. Soc. London, May 1859, p. 43 (Orizaba, Veracruz).

Of the four wood pewees collected by Dr. Murphy 3 males taken November 10 and 21, 1945, belong to the present race, which breeds from southern México to Guatemala. They are marked by shorter tails, measurements being as follows: wing 76.5, 79.7, 81.8 mm., tail 59.2, 59.4, 59.8 mm. Two are immature as is shown by the

definite whitish bars on greater and middle coverts. The adult is slightly darker above than the adult *richardsonii* secured. The two immature birds are browner above, and have the dark breast band more or less interrupted in the middle. One is much yellower below and browner above than the other, the color of the underparts in fact suggesting *Myiochanes virens*. On careful comparison, however, it is seen to be darker above, and is also separated by the short tail.

PIPROMORPHA OLEAGINEA PARCA (Bangs): Bangs' Pipromorpha

Mionectes oleagineus parca BANGS, Proc. New England Zool. Club, vol. 2, Sept. 20, 1900, p. 20 (Loma del León, Panamá).

On San José this bird was found resting on high perches in heavy forest along the Río Marina. It was quiet, and because of its colors was difficult to find. Our seven specimens were taken February 10, April 11, 14, 21, May 3, 27, and August 8. The last one listed is an immature male, barely grown. It is like the adults but with more extensive buffy bars on the wing coverts.

The series is similar to specimens of *parca* from the Canal Zone.

MYIOPAGIS VIRIDICATA ACCOLA Bangs: Panamá Plain Flycatcher

Myiopagis placens accola BANGS, Proc. New England Zool. Club, vol. 3, Jan. 30, 1902, p. 35 (Boquete, Chiriquí, Panamá).

This small flycatcher, identified by the partly concealed yellow in the crown, on San José is found in the denser forest near the streams. It ranged in the lower limbs and was difficult to find. We secured adults February 17, March 1, April 14 and 26, and August 8. Morrison shot an immature male April 11. This differs from the older specimens in having an indefinite brownish-gray band across the chest, and in being darker above. In addition the yellow in the crown is restricted to a small, concealed, central spot.

ELAENIA FLAVOGASTER SILVICULTRIX Wetmore: Pearl Islands Elaenia

Elaenia flavogaster silvicultrix WETMORE, Proc. Biol. Soc. Washington, vol. 59, March 11, 1946, p. 51 (San José Island, Archipiélago de las Perlas, Panamá).

The Pearl Islands elaenia was found near the streams, where it ranged from the lower branches of the trees to their summits. February seemed to be the beginning of the mating season, and I heard their loud, wheezy notes constantly. The birds were quite active, and often posed with raised crests. A female taken February 12 would have laid within a week, and another secured March 5 was about

to lay. There seems to be variation in their breeding, however, as I shot a young bird in juvenal dress March 3, and by the end of the first week in March they were less noisy than during February. I saw them eating berries of various kinds. We secured 11 specimens on San José, and 3 more on Pedro González, where I found them in fair numbers on March 9 and 11.

ELAENIA CHIRIQUENSIS CHIRIQUENSIS Lawrence: Lawrence's *Elainea*
Elainea Chiriquensis LAWRENCE, Ann. Lyc. Nat. Hist. New York, vol. 8, 1867,
p. 175 (David, Chiriquí, Panamá).

These *elaineas*, marked by smaller size, were less common on San José than the larger species, but still were not rare as we secured 13 specimens. They ranged in the forests but also appeared in more open sections, and in early morning as the sun came over the island were prone to come out into the branches where its rays penetrated. In February and early March they were nesting, and on March 6 a mating pair flew through camp several times, once coming into my tent. The call is a clear *whets*.

This series is like a similar set of specimens from the Canal Zone. Morrison shot an immature male August 6 in which the wing bars are grayish brown, with the lighter adult feathers in these bands just appearing. A juvenile only recently from the nest has the abdomen dull white, the breast grayish brown, and the dorsal surface grayish brown without the greenish-olive cast that comes later. Though Griscom²² records this bird "throughout the arid tropics of Pacific slope" it ranges also into the more humid areas, as we have one specimen taken by Goldman at Majagual, near Colón, March 13, 1911.

SUBLEGATUS GLABER ARENARUM (Salvin): Smooth Flycatcher

Elainea arenarum SALVIN, Proc. Zool. Soc. London, August 1863, p. 190 (near Puntarenas, Costa Rica).

These small flycatchers, much like *elaineas* in form and habits, were fairly common on San José, usually frequenting the border of the higher forest, where light and air enter freely. I found them also along the course of the Río Marina, where similar conditions prevail, and occasionally at the border of mangrove swamps. The note is a low *steeet*.

I shot two and saw several others on Pedro González March 11, and Morrison secured a juvenile male on Moreno Island May 19.

²² Bull. Mus. Comp. Zool., vol. 78, 1935, p. 353.

The latter is cross-banded with grayish white on head, wing-coverts, and back, like a young chinca.

The identification of these birds as *arcuatum* is tentative and subject to later revision. Zimmer, in his paper in American Museum Novitates (No. 1109), has assigned birds from the Pearl Islands to *atrivestris* (type locality Cartagena), but the series of 12 skins that I have from San José and Pedro González is definitely duller colored than one from Cartagena. There is considerable variation in these birds and the whole group is subject to further revision.

CAMPTOSTOMA OBSOLETUM MAJOR Griseom:
Pearl Islands *Camptostoma*

Camptostoma pusillum major Griseom, Bull. Mus. Comp. Zool., vol. 72, January 1932, p. 353 (San Miguel, Isla El Rey, Pearl Islands, Panamá).

The only specimen available from San José is one secured by Robert Cushman Murphy November 17, 1945, at Enseñada de la Bodega. This bird is slightly grayer above than a series from the Canal Zone, as are two from Isla El Rey (San Miguel) in the National Museum. The difference is very slight but seems sufficient to characterize the island race as distinct. The alleged difference in size, the Pearl Islands birds having been said to be larger, seems to me very slight, and I doubt that it will hold. The sex of the specimen from San José could not be ascertained.

On two occasions in early March, 1944, I saw one of these tiny flycatchers flying near the road to East Harbor, but did not succeed in collecting one. Griseom and Crosby shot one on Pedro González February 18, 1927.

Family **HIRUNDINIDAE**

PROGNE CHALYBEA CHALYBEA (Gmelin): Gray-breasted Martin

Hirundo chalybea Gmelin, Systema naturae, vol. 1, pt. 2, 1789, p. 1026 (Cayenne).

On San José Island, about 9 in the morning on March 7, six or eight martins flew overhead near East Harbor, these being the first I had seen. They crossed high overhead, traveling directly without circling to feed. On March 14, when crossing to Balboa, I saw one flying north across the gulf. Martins did not nest on San José, but appeared again early in July, being noted through September. On July 20 Morrison collected 10 from a flock of 40 or 50, all being immature birds. He took another immature bird September 1, and two adults September 10.

HIRUNDO RUSTICA ERYTHROGASTER Boddaert: Barn Swallow

Hirundo erythrogaster BODDAERT, Table des planches enluminées, 1783, p. 45 (Cayenne).

On March 11 I recorded one at sea midway between San José and Pedro González Islands, flying to the northwest toward distant Panamá. On San José, Morrison shot an adult male April 18, and in the fall secured an immature female September 10, and adult and immature females September 24. Robert Cushman Murphy recorded one between San José and El Rey September 9, 1937, and collected one at Bald Hill November 12, 1945. He found them common around open areas during November.

RIPARIA RIPARIA RIPARIA (Linnaeus): Bank Swallow

Hirundo riparia LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 192 (Sweden).

March 14, midway between San José Island and Balboa, I recorded several flying north across the sea. Morrison collected three on San José September 10.

PETROCHELIDON PYRRHONOTA (Vieillot): Cliff Swallow

Hirundo pyrrhonota VIEILLIOT, Nouv. Dict. Hist. Nat., nouv. ed., vol. 14, 1817, p. 519 (Paraguay).

While we were crossing the Gulf of Panamá on March 14, en route between San José and Balboa, several passed our boat flying north.

Family TROGLODYTIDAE

TROGLODYTES MUSCULUS INQUIETUS Baird: Panamá House Wren

Troglodytes inquietus BAIRD, Review of American birds, vol. 1, September 1864, pp. 158, 143 (Panamá Railroad).

Though the house wren has been reported only twice from the Pearl Islands, once from Isla El Rey and once from Isla Trapiche, I found it fairly common. It inhabited tangles of vines in forest, and was so shy that it was difficult to secure specimens. Our series of 10 from San José and 1 from Pedro González was obtained only by much hunting. Males were singing in February and March, and it was through their songs that I usually found them. But when I attempted to approach they slipped away into heavy cover. They were not nesting at that season. Morrison secured young birds not fully grown July 14, August 8, and September 12.

Compared with specimens from Panamá, these from the Pearl Islands average very slightly brighter brown on the flanks, and somewhat browner above. In addition the bill is slightly heavier, though this does not appear in measurements. The variation appears to be slight, and as yet only a tendency that from this material does not warrant a name.

Family BOMBYCILLIDAE

BOMBYCILLA CEDRORUM Vieillot: Cedar Waxwing

Bombycilla cedrorum Vieillot, Oiseaux de l'Amérique septentrionale, vol. 1, 1803, p. 88, pl. 57 (eastern North America).

On February 29 on San José I had a clear view of a flock of about 25 flying over the large open area near East Harbor. The birds were traveling north. While this is a sight record, I have no hesitation in including it here as a valid occurrence, as there was no question as to the identity of the birds.

Family VIREONIDAE

VIREO FLAVOVIRIDIS FLAVOVIRIDIS (Cassin): Yellow-green Vireo

Vireosylta flavoviridis Cassin, Proc. Acad. Nat. Sci. Philadelphia, vol. 5, 1851, p. 152 (San Juan de Nicaragua, Nicaragua).

These vireos were distributed throughout the forests of San José on my arrival the first week in February, and remained among the most common of the birds of the island throughout my stay. By the first week in March they were mating, and by the middle of the month a good many seemed located on their nesting grounds, as at camp at this time I noted two that sang daily from two different clumps of trees. In display males posed with spread tail and crest feathers raised. All through this period it appeared that migrants were passing also.

The song in general is like that of the red-eyed vireo (*Vireo olivaceus*) of eastern North America, but differs so definitely as to be characteristic. The sound, in part, is the same in both birds, but in the yellow-green vireo the utterances are less regular, the spacing in time between the different phrases varying widely and irregularly, so that the song does not proceed with the steady, almost mechanical insistence of that of the northern bird. Some of the sounds, too, are more sturred. These vireos ranged in the middle and upper branches of the trees, searching for their food in the usual leisurely vireo fashion. On March 9 and 11 I found them on Pedro González Island and collected specimens.

As these birds were common we secured a series of 21 skins to check on the question of the supposed form *insularis*, described by Bangs²¹ from Rey Island and later considered to be the bird of Panamá also. There is variation in depth of color among these, some being decidedly darker, but this seems to be entirely individual. As far as this material goes, *insularis* seems identical with *flavoviridis*.

VIREO FLAVIFRONS Vieillot: Yellow-throated Vireo

Vireo flavifrons VIEILLOT, Oiseaux de l'Amérique septentrionale, vol. 1, 1808, p. 85, pl. 54 (eastern United States).

March 11 collected a female in the mangrove swamp at the mouth of the Río Marina on San José Island.

Family COEREBIDÆ

COEREBÆ FLAVEOLA CERINOCLUNIS Bangs: Pearl Islands Bananaquit

Coereba cerinoclunis BANGS, Proc. New England Zool. Club, vol. 2, Feb. 8, 1901, p. 57 (San Miguel = Isla El Rey, Archipiélago de las Perlas, Panamá).

This honey-creeper was common through the forest on San José, but could be easily overlooked because of its small size and weak notes. Our series of specimens includes a juvenile taken February 13, while on February 21 I noted a nest partly constructed. On Pedro González these birds were decidedly common on March 9 and 11.

CYANERPES CYANEA CARNEIPES (Salater): Blue Honey-creeper

Coereba carneipes SALATER, Proc. Zool. Soc. London, 1859 (February 1860), p. 375 (Playa Vicente, Oaxaca).

This honey-creeper was common in the forests of San José, where it ranged usually in the tops of the taller trees, often in little flocks of half a dozen. In flight, even when near at hand, the males appeared blackish, only occasionally displaying a flash of color. In the tree-tops they were difficult to see because of their small size. In the mangrove swamp at the mouth of the Río Marina, where fresh water entered, I found them coming down to drink, and here secured specimens with ease. Once, while I was watching here, two females came tumbling through the branches together to rest a few feet away, posing with bills at a 45° angle, threatening one another with flitting wings while they called softly. Presently they were followed by a

²¹*Vireo insularis* Bangs, Proc. New England Zool. Club, vol. 3, Mar. 31, 1902, p. 23 (San Miguel = Isla El Rey).

male that assumed the same attitude and pecked insistently at one female until she left. The six males and six females taken appear identical with birds from the mainland.

Griscom and Crosby collected a male on Pedro González February 18, 1927.

Family MNIOTILTIDAE

MNIOTILTA VARIA (Linnaeus): Black-and-white Warbler

Motacilla varia LINNAEUS, *Systema naturae*, ed. 12, vol. 1, 1766, p. 333 (Hispaniola).

This northern migrant was seen on three occasions on San José, February 12 when I shot a female, February 17, and March 12. Its habits in the Tropics are identical with those in the north.

VERMIVORA PEREGRINA (Wilson): Tennessee Warbler

Sylvia peregrina WILSON, *American ornithology*, vol. 3, 1811, p. 83, pl. 25, fig. 2, (banks of the Cumberland River, Tenn.).

On March 1 there was a small migration of these birds in mangroves near the mouth of the Río Marina. The three that I shot were females. Griscom and Crosby secured a female on San José February 16, 1927.

PROTONOTARIA CITREA (Boddaert): Prothonotary Warbler

Motacilla citrea BODDAERT, *Table des planches enluminées*, 1783, p. 41 (Louisiana).

This is a common winter resident. On February 12 we secured one on the Río Marina on San José, and February 20 saw another in an extensive mangrove swamp. Dr. Murphy obtained specimens November 10, 17, 26, and 27, 1945.

DENDROICA PETECHIA AEQUATORIALIS Sundevall: Panamá Golden Warbler

Dendroica petechia *b) aequatorialis* SUNDEVALL, *Öfvers. Kongl. Vetensk.-Akad. Förhandl.*, vol. 26, 1869 (1870), p. 609 (Panamá City, Panamá).

In the excellent series obtained on San José Island there is evident a tendency toward heavier pigmentation when these birds are compared with those from El Rey and from the mainland. This is apparent in the deeper golden color of the lower surface, in the somewhat darker chestnut of the crown, and in the tendency toward heavier and more abundant streaking on the sides and lower breast.

Birds from Pedro González agree with those from San José in these characters. One male from the latter locality shows this trend toward deeper color to an abnormal degree as the entire plumage is suffused with orange that covers the yellow normal in the lighter markings, and that shows even in the more greenish shades of the dorsal surface. While an average difference for specimens from the two outer islands may be shown, there are birds from the other localities, particularly one (U.S.N.M. No. 41534) from near Panamá City, so closely similar that it does not seem valuable to indicate this difference by name, at least not until more specimens from the whole coastal area of Central America are at hand.

This was one of the common birds of both islands that was recorded regularly, and of which we secured a good series of specimens illustrative of the considerable variation in plumage. My first encounters with them were in or near mangroves near the mouths of the streams, but as I became more familiar with the area I found that they were distributed widely through the higher forest growths. On San José I recorded them away from the shore majuly in the taller trees near or over water, but on Pedro González March 9 and 11 they were common over the forested hills far from any such habitat. Because of the heavy vegetation they were more evident along the shores, as elsewhere they remained concealed in the leaves 60 to 75 feet from the ground. In various places small trees with thin, light green leaves grew along the shore, often projecting out from rocky ledges or sandy banks over the tide line. These were favorite haunts, as were open-branched trees growing at the tops of higher, steeper bluffs.

Many times these warblers were shy so that they were seen with difficulty, and usually I located them by their chipping notes or songs. It was especially hard to find them where the wind was agitating the leaves, as then they slipped away unnoticed. February 19 in the mangrove swamp at the mouth of the Río Marina I shot a fine male nearly in breeding stage, and a young female molting into adult dress came down to it immediately. It appeared that the two were mated.

DENDROICA FUSCA (Müller): Blackburnian Warbler

Metacilla fusca MÜLLER, *Natursyst. Suppl.*, 1776, p. 125 (French Guiana).

The only present record is one collected on San José by Robert Cushman Murphy November 17, 1945.

DENDROICA CASTANEA (Wilson): Bay-breasted Warbler

Sylvia castanea Wilson, American ornithology, vol. 2, 1810, p. 97, pl. 14, fig. 4 (Pennsylvania).

This warbler was present in small numbers as a winter resident in the heavy forest along the Río Marina. February 10 I secured a male that was beginning to molt into spring plumage. The flanks are chestnut, and brown feathers are appearing on breast and crown. Two females, shot February 27 and March 6, are in winter dress, and one taken April 14 is in spring plumage. In addition to these I recorded two March 12.

SEIURUS NOVEBORACENSIS NOVEBORACENSIS (Gmelin):

Northern Water-thrush

Metacilla noveboracensis Gmelin, Systema naturae, vol. 1, pt. 2, 1789, p. 958 (New York).

These water-thrushes were fairly common on San José in February and March, some being apparently in northward migration as early as February 11. I assumed this, since I found them frequently in trails across dry hillsides far from water, where no bird of this group would normally range. It was more usual to encounter them among the jumbled boulders behind the sandy beaches and rocky points, which is a normal habitat, so that probably some of these latter were of the winter resident group. Though they were found in the open, usually they flew to cover immediately when I appeared. On the beaches this meant retreat behind the huge boulders where endless shaded passages offered a safe hunting ground, completely screened from observation. On the open trails they had only to fly into the adjacent coverts to be hidden from sight in an instant. They were silent at this time, seldom calling. It is impossible to distinguish the races of this bird in life, and I was at some trouble to secure the 10 skins found in our collection. Four birds of the typical form were obtained on February 11, March 5 and 8, and April 11.

One recorded March 9 on Pedro González was not collected and is therefore of unknown race.

SEIURUS NOVEBORACENSIS NOTABILIS Ridgway:

Grinnell's Water-thrush

Seiurus naevius notabilis RIDGWAY, Proc. U. S. Nat. Mus., vol. 3, 1880, p. 12 (Black Hills, Wyo.).

The six specimens from San José attributed to this form were taken February 20 and 23, March 1, 3, 5, and 12. These are more

slaty, less brownish above, and usually, but not always, less yellow below. Dr. Murphy secured one at Bald Hill November 9, 1945.

SEIURUS MOTACILLA (Vieillot): Louisiana Water-thrush

Turdus motacilla VIEILLON, Oiseaux de l'Amérique septentrionale, vol. 2, 1807, (1808?), p. 9, pl. 65 (Kentucky).

These birds appeared early in fall migration, as Morrison secured a male on August 26. He shot a female on September 12.

SETOPHAGA RUTICILLA (Linnaeus): American Redstart

Motacilla ruticilla LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 186 (Virginia).

On Pedro González Island I collected an adult male March 11. Morrison secured a female on San José September 7.

Family ICTERIDAE

CASSIDIX MAJOR PERUVIANUS (Swainson): Great-tailed Grackle

Quiscalus Peruvianus SWAINSON, Animals in menageries, Dec. 31, 1837, p. 354 (Perú).

The grackle was common along the shores of San José and Pedro González, the natives at Cocal on the latter island calling it changamé. The birds ranged along sandy beaches and rocky areas, feeding on the ground and perching in the trees above. In these forested islands they did not go inland, except into the mangrove swamps at the mouths of the streams. They were especially in evidence when low tide exposed extensive feeding grounds. A female was observed carrying nesting material on February 16. They were often found in pairs.

Swainson's description of his *Quiscalus Peruvianus* from "Mr. W. Hooker's Collection Mus. Nost.," taken from a bird from Perú, applies in every detail to a male of this grackle as pointed out by Hellmayr.²⁴

Family THRAUPIDAE

PIRANGA RUBRA RUBRA (Linnaeus): Summer Tanager

Fringilla rubra LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 181 (South Carolina).

Morrison secured males of this northern migrant April 2 and 16.

²⁴ Cat. Birds Amer., Publ. Field Mus. Nat. Hist., vol. 13, pt. 10, 1937, p. 92.

TERAUPIS EPISCOPUS DIACONUS (Lesson): Blue Tanager

Tanagra (Aglaiá) diaconus LESSON, Rev. Zool., June 1842, p. 175 (Realejo, Nicaragua).

The blue tanager was fairly common on San José so that we obtained a series of eight specimens in February and March. These birds delight in long, undulating flights over the forests, dropping down into the tops of the tallest trees. At such times they seem very small, so that they give the impression of being some other bird. Because of their strong flight it seems probable that they may move from island to island, or even cross to the mainland.

Griseom and Crosby secured one on Pedro González February 18, 1927.

**RAMPHOCELUS DIMIDIATUS LIMATUS Bangs:
Pearl Islands Crimson-backed Tanager**

Rhamphocelus limatus BANGS, Auk, January 1901, p. 31 (San Miguel = Isla El Rey, Pearl Islands, Panamá).

This beautiful tanager, in the adult male crimson with black wings and tail, was common on San José and Pedro González though the heavy forests made it difficult to judge the actual number present. The birds were found frequently in small parties of half a dozen or more, with a predominance of those in immature plumage. They were attracted readily, and frequently uttered a low *cheep cheep*. At the end of February they were mating. A male in immature dress taken February 12 had the testes half developed.

Our excellent series agrees with birds from Isla El Rey, the type locality.

Family FRINGILLIDAE

SPIZA AMERICANA (Gmelin): Dickcissel

Emberiza americana GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 872 (New York).

Morrison found these birds in the open area at Bald Hill and secured five specimens on April 29 and 30. Robert Cushman Murphy collected a female November 12, 1945, noting several small flocks during the month.

**SALTATOR ALBICOLLIS SPERATUS Bangs and Penard:
Pearl Islands Streaked Saltator**

Saltator striatipictus speratus BANGS and PENARD, Bull. Mus. Comp. Zool., vol. 63, June 1919, p. 33 (Saboga Island, Pearl Islands, Panamá).

These streaked finches were among the commoner birds on San José and Pedro González Islands, ranging in the undergrowth and

through the lower branches of the trees, more rarely going up into the forest crown. Their sweet, cardinal-like songs made them the principal song birds of the island forests, and in February and March I heard them constantly. A young bird under care of its parents was taken February 26. Morrison secured a male on Moreno Island May 19.

This race is rather poorly differentiated from *S. a. isthmicus* of the mainland, but our series of 17 skins indicates that it is separable.

VOLATINIA JACARINA ATRONITENS Todd: Blue-black Grassquit

Volatinia jacarina atronitens Todd, Proc. Biol. Soc. Washington, vol. 33, Dec. 30, 1920, p. 72 (Campeche, Campeche).

On Pedro González Island the blue-black grassquit was common around the little open gardens of the natives. I shot an adult male here March 11, and Morrison secured a small series on May 16 and 18. Morrison also found a few in the opening at Bald Hill on San José, and secured specimens there April 29 and May 6.

ORYZOBORUS FUNEREUS Sclater: Lesser Rice Grosbeak

Oryzoborus funereus P. L. SCLATER, Proc. Zool. Soc. London, 1859 (February 1860), p. 378 (Suchapam, Oaxaca).

February 18 I collected a male still in brown juvenile dress back of the sandy beach at the mouth of the Río Mata Puerto. It rested in a bush 6 feet from the ground, and sang a sweet but indefinite warbling song. Morrison secured a small series April 30, August 11 and 24, and September 1.