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BIRDS OF A SECOND-GROWTH RAIN FOREST AREA OF NICARAGUA

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Although Nicaragua is, with the exception of México, the largest of the Central American republics, its avifauna is probably the least known. The extensive Caribbean-slope rain forest of Nicaragua has been especially neglected in recent years, for apart from papers by Rendahl (1919; based on collections made in 1881–82) and Huber (1932) no publications devoted primarily to the birds of this interesting region have appeared since the latter part of the nineteenth century. Few ornithologists have ever visited Nicaragua, and most of the specimens from there were obtained by the professional collector W. B. Richardson. The American Museum of Natural History has a large series of Richardson's specimens from the Caribbean slope of the country, but most of the records these represent are either unpublished or have appeared only among the lists of "specimens examined" in Zimmer's Studies of Peruvian Birds (Amer. Mus. Novit. Nos. 500 *et seq.*). The present paper, based on a relatively small collection, is intended to supplement the available information on the taxonomy, distribution, and ecology of the birds of Caribbean Nicaragua.

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Lastly, I am particularly indebted to Don R. Eckelberry for his typically outstanding illustrations.

ITINERARY

Almost all of the field work was carried out at El Recreo, 10 miles west of Rama, Department of Zelaya, where an agricultural experiment station of the Servício Técnico Agrícola de Nicaragua is located. The station, where excellent accommodations were provided, lies on the Río Mico, a tributary of the Río Escondido; it is reached by river boat from the east coast town of Bluefields. In 1953, Montrello and I worked at El Recreo from August 5 to 27, spending August 1 to 4 at Bluefields and in river travel. In 1954, Nieland, Zoeger, and I spent the period from June 24 to July 14 at El Recreo.

CLIMATE

Temperature.—Customarily mild temperatures prevailed both years at El Recreo. The mean maximum for both periods was almost exactly 86°F., and the mean minima were 73°F. (1953) and 69°F. (1954). The highest temperature recorded in the course of our visits was 89°F., and the lowest was 65°F.

Precipitation.—In the summer months (paradoxically called the *invierno* [winter] by the residents), eastern Nicaragua is swept by rain clouds moving westward from the Caribbean Sea. In the first 25 days of August, 1953, 19.6 inches of rain fell at El Recreo —slightly more than the 10-year average of 16 inches for that month. From June 24 to July 14, 1954, 26.5 inches of rain fell, including a prodigious 8.4 inches on July 7. There was some rain every day and occasionally it was continuous for more than 12 hours. Rain might fall at any time of the day or night; usually there were many brief showers, often hard but over within a few minutes, alternating with periods of overcast or, more rarely, sunshine. Constant run-off of water kept most streams and rivers swollen and loaded with silt. After especially heavy rains the Río Mico, a large stream about 100 yards wide at this season, would rise as much as 15 or 20 feet overnight.

The flooded condition of streams and ponds was probably responsible for a scarcity of observed water birds, for they seem to prefer quieter and clearer waters than those present at El Recreo in the summer.

We found that the frequent but intermittent rain did not seriously hamper field work, for only the hardest downpour halted all detectable singing or feeding by birds. Often the cessation of a shower at any time of day was followed by a resurgence of avian activity which was favorable for observing and collecting, and even during continuous moderate rain we found flocks calling and foraging vigorously. Drying of specimens was facilitated by dusting the inside of the skins with plaster of Paris as well as arsenic before stuffing, and with this treatment only the larger specimens were excessively slow to dry.

HABITATS

At El Recreo there are numerous experimental plantings of African oil palm (*Elaeis guineensis*), rubber (*Hevea brasiliensis*), mahogany (*Swietenia macrophylla*), bamboo, and other commercial species as well as food plants such as orange trees, sugar cane, pineapple, and corn. Forest has been cut to provide space for the plantings, but big trees such as *Ceiba pentandra* and "*almendro*" (*Dipteryx oleifera*) have often been left standing in the fields. Other large trees found in or near open areas are the introduced breadfruit (*Artocarpus altilis*), found near habitations, and fig (*Ficus* sp.); the latter is commonly found along the banks of rivers. Smaller trees such as wild avocado (*Persea* sp.) and wild "guava" (*Inga* sp.) may be found at the edges of fields and along stream gulleys too steep for planting. Usually the stream border vegetation also includes a dense tangle of vines, shrubs, and large coarse weeds.

The oil palm, mahogany, and rubber plantings were less than 10 years old in 1953–54, and the larger trees did not exceed 15 feet in height; the faster growing bamboo is much larger and is found in tall, dense stands. Between the plantings, and in areas cleared of trees but not cultivated, the ground is covered with a type of broom-sedge grass (*Trichachne insularis*), locally called *cola de burro,* that grows to a height of three or four feet. Also abundantly present is a large grass called *gamalote* (*Olyra latifolia*). Small herbaceous plants are found mixed with the grasses, especially at the edges of fields, and lawns margined with decorative plants such as croton have been planted near the buildings. The forest is continually encroaching on the grassy fields, and the

edges of all but the most recent clearings show a merging of grasses, large herbs, shrubs, and small trees.

There is little primeval forest left in the immediate vicinity of El Recreo, but various levels of regrowth may be found there. Characteristic elements of newer forest are trumpet tree (*Cecropia mexicana*), the slender "laurel" (*Cordia alliodora*), balsa (*Ochroma* sp.), and berry-bearing trees of the family Melastomaceae. Some areas of forest consist largely of huge trees with dense foliage crowns only in the topmost reaches, and below there is deep shade and a relatively sparse undergrowth. Some trees such as giant *almendros* and mahoganies are probably remnants of primeval forest, but other elements seem to be well-grown examples of trees that were not part of the original growth. As these stands appear to approximate more closely the mature or primary or climax condition than they do the less-developed secondary growth, I have referred to them in the following discussions as "mature forest." This term is used advisedly as it may imply unintendedly an entirely primeval condition, and I have employed it in the present instances only for want of a more suitable designation.

In the less mature second growth where sunlight may penetrate more easily, the understory includes numerous seedlings, broad-leaved herbs, shrubs, dense bamboo clumps, and vine tangles. In this lower growth are two especially common and conspicuous plants—wild "*raicilla*" (*Cephaelis tomentosa*), the flowers of which bear red bracts and blue berries, and wild plantain (*Heliconia* sp.), with brilliant red and orange flowers. It often seemed as though *Heliconia* flowers always had a hummingbird at them or close by, and the gut contents of many small birds were found on dissection to be blue with *Cephaelis* berries.

ANNOTATED LIST OF SPECIES

An author who deals with avian systematics must take special notice of recent discussions of the subspecies concept as initiated by Wilson and Brown (1953) and of proposed revisions of various families (Beecher, 1950, 1951; Tordoff, 1954; Stallcup, 1954) or entire orders of birds (Mayr and Amadon, 1951; Beecher, 1953). A critical review of all this work would be out of place in the present paper, but a few comments accounting for the procedure followed here should be included.

My present opinion is that trinomials are useful in expressing the current stage of knowledge of variation in a given population. If a thorough analysis of this variation compels change in or abandonment of trinomials, there should be no objection. Otherwise, until a substitute system more satisfactory than any I have yet seen is proposed, I prefer to use subspecific names as I see no reason why a flexible concept of intraspecific variation may not be maintained within the framework of a latinized nomenclature.

I have employed the currently conventional family classification in the following sections purely for convenience. There is disagreement among the authorities mentioned as to how these groups should be rearranged, and I feel that no useful purpose would be served here by adopting, without the necessary detailed explanation, one or another or a combination of these revisions. I have therefore used such presently artificial groupings as the Thraupidae and Fringillidae as they will nevertheless connote to most readers a certain assemblage of species; the question of relationships among these assemblages is outside the scope of this paper.

In the following list the habitat or habitats where each species was found is given, and data on molt, colors of unfeathered parts, reproductive condition, voice, and behavior are included when available. The vernacular names used are chiefly those of Eisenmann (1955). This list of species cannot be considered complete, for even on our

last days in the field we found birds not previously seen by us. We worked the forested areas more thoroughly than the others, but there is no doubt that many of the more secretive birds escaped our notice. Sight records are included in cases in which I have no reasonable doubt of the identification. Very few North American migrants had reached Nicaragua even by late August, and it is likely that practically all other species recorded are resident in the area. All records are for El Recreo unless otherwise stated.

Florida caerulea. Little Blue Heron. A single adult was seen flying over the Río Mico at dusk on August 25. On June 29, four immature birds in mottled blue and white plumage were seen in a semi-flooded pasture.

Butorides virescens. Green Heron. An adult male collected on July 1 was the only one seen. The testes measured 12×7 mm.—only slightly, if at all, enlarged. Its stomach contained 16 minnows 20 to 40 mm. long. I am unable to identify this specimen subspecifically with any certainty. It is a large individual (wing, 180 mm.; exp. culmen, 65 mm.), and thus resembles typical *virescens* rather than the resident race *maculatus*. It matches both these forms in color. July 1 seems quite early for migrant *virescens,* but it is not an impossible date of occurrence; on the other hand, the bird may be merely an unusually large example of *maculatus*. Subspecific identity, then, remains in doubt.

Sarcoramphus papa. King Vulture. Four were seen on August 21 in a large tree at the edge of an open field, drying their wings in company with a large group of Black and Turkey vultures. On June 26, one was seen in the same tree. Single birds were seen soaring on July 8 and 9, both times in company with the other two species.

Coragyps atratus. Black Vulture. This was the most abundant of the three species of vultures, and it was seen daily in large numbers over open areas and edges of the forest. We were told by local residents that vultures sometimes feed on the fruit of the African oil palm, but we have no eyewitness accounts. Once I flushed a Black Vulture from one of the low fruiting palms but could not determine if it had been feeding, and I did not see vultures in the palms on any other occasion. It would be interesting if the New World species develop habits similar to those of the Palm-nut Vulture (*Gypohierax angolensis*) of Africa, which feeds extensively on palm fruit.

Cathartes aura. Turkey Vulture. This vulture was also seen daily and in the same situations as the preceding species, but it was about one-half to two-thirds as numerous.

Elanoïdes forficatus. Swallow-tailed Kite. This beautiful kite was seen daily in August, 1953, usually in flocks of about 15 or even 30 individuals, but only a few single birds were seen in July, 1954. We never saw one perched.

Leptodon cayanensis. Gray-headed Kite. One male was collected from the top of a tall dead tree in second-growth forest on August 8; no others were seen. The testes were not enlarged, and the wings and tail were in molt.

Ictinia plumbea. Plumbeous Kite. This species was not encountered in August, 1953, but was abundant and conspicuous in late June and July, 1954, when adults were seen almost daily about the forest edge. Two males were collected on June 24 and 27; one bird had the crop and stomach packed with insect remains; the testes were not enlarged. A female taken on June 26 and prepared as a skeleton had an incubation patch, but the ovary was not enlarged. Its crop was filled with hymenoptera only 8 mm. long; they seemed unusually small prey for a kite, and could not possibly have been grasped by the feet. In all three birds the iris was red and the tarsi and feet were deep yellow.

Buteo magnirostris argutus. Roadside Hawk. Adults and immatures of this noisy and conspicuous species were seen daily in both 1953 and 1954, usually at the forest edge, along riparian thickets, and over fields. One adult female in worn plumage was taken on July 10; the ovary was not enlarged, and the stomach contained remains of cicadas. Molt of the remiges was almost complete, and the longest primaries were fully grown and measurable. This specimen has the short wing (225 mm.) characteristic of *argutus,* but in this worn plumage the color characters of that race are not apparent.

Buteogallus anthracinus. Common Black Hawk. An immature female was seen daily in August, 1953, among the wild guavas along a small stream at the edge of a clearing, and the bird was finally collected on August 22. The ovary was not enlarged. The confusing taxonomic situation within this genus has most recently been discussed by Amadon and Eckelberry (1955). The single specimen from

El Recreo (wing 375 mm.) fits Friedmann's (1950) key for the race *anthracinus* but sheds no light on the systematics of the group.

Geranospiza caerulescens nigra. Crane-Hawk. An immature male, the only one of this species seen, was taken on August 7 while perched about 10 feet up in a thick clump of trees in second-growth forest. The bird was completely unwary. The iris was orange, the tarsi and feet were orange yellow, and the testes were not enlarged; the wings were in molt. After examining specimens of the form *balzarensis,* the coloration of which bridges the gap between *nigra* and *caerulescens,* I follow Hellmayr and Conover (1949) in considering those two conspecific.

Herpetotheres cachinnans cachinnans. Laughing Falcon. One was seen at the edge of a wet meadow on August 15, and a pair was seen at the edge of a new clearing on June 26. A male was collected from a tree top at the forest edge on July 12; the testes were not enlarged, and the primaries were in molt. Another bird was seen and heard giving loud calls near the same place later that day and again on July 13. The call usually heard was a continuous loud *kow-kow-kow-kow* that gradually rose in pitch as though the bird were becoming increasingly excited.

In the crop of the collected bird were the head and foreparts of a small rodent and parts of the anterior half of a coral snake (*Micrurus*). The head of the latter was missing, and it had apparently been severed and discarded. The stomach contained the rest of the snake, neatly coiled and entire, as well as a hind foot and some flesh of the rodent and a single unidentified feather. Evidently the bird devoured its prey from posterior to anterior. This specimen and the ingested snake (which was preserved) are those discussed by Brattstrom (1955).

Falco albigularis albigularis. Bat Falcon. These falcons were seen almost daily in 1953 and less often in 1954, usually in the tops of tall dead trees at the edge of clearings. On August 18, each bird of a pair was observed several times to drop down from its high perch, sweep over a field in a wide arc of about 250 yards radius while about six to 10 feet above ground, and return to the same perch. Presumably the birds were foraging, but no taking of prey was noted. An immature male was collected on August 22; the testes were not enlarged. The cere, skin around eye, and tarsi and feet all were yellow.

Ortalis garrula cinereiceps. Chestnut-winged Chachalaca. Flocks of about 5 to 10 individuals were often encountered in thickets and low second-growth forest at the edges of clearings. An adult female taken on August 17 had the ovary perhaps slightly enlarged (largest follicles 2 mm.). An adult male taken on July 1 had testes measuring 14×7 mm.; the iris was gray and the gular skin was purplish red. In both birds molt of the remiges and rectrices was well advanced, and the male was acquiring new feathers on the nape. Body plumage appears in good condition.

Except for a darker brown back, the coloration of these specimens does not correspond to that of the supposed northern race *frantzii* said by Hellmayr and Conover (1942) to inhabit Nicaragua and Costa Rica. In color of breast and tail tips these birds are identical with two *cinereiceps* from Guabo, Almirante Bay region, Panamá, and are slightly paler gray on the pileum and much whiter, less brownish on the abdomen than the Panamá birds. The latter two characters are just the opposite of those claimed for *frantzii,* and I therefore follow Friedmann (1946) in considering that form to be inseparable from *cinereiceps.*

Aramides cajanea pacifica. Gray-necked Wood Rail. An adult female collected on August 23 in a small bog in mature forest was the only one seen. The ovary was somewhat enlarged, with the largest follicles 4 mm. in diameter. Colors of soft parts were recorded as follows: basal half of bill, yellow; distal half, pale greenish; iris and skin around eye, red; tarsi and feet, pinkish crimson.

Laterallus exilis. Gray-breasted Crake. This species is widely distributed in South America but has been found in Central America only on the Caribbean slope of Nicaragua north to Honduras. The Río Segovia (= Río Coco), "Honduras," is claimed in entirety by Nicaragua; on most maps it is given as the boundary between the two countries, and specimens taken along the river (Ridgway, 1887) can be assigned to either one. A female crake obtained on August 21 seems to be the third specimen from this area. It was brought to our door in perfect condition by a house cat that presumably caught it in the tall grass of the semi-flooded fields nearby. The ovary was slightly enlarged, with the largest follicles 2 mm. in diameter. Colors of soft parts were recorded as: culmen blackish with a light greenish blotch on either side at base; mandible greenish; tarsi and feet greenish; iris vermilion. Measurements in mm. are as follows: wing, 67.7; tail, 27.8; tarsus, 21.6; middle toe without claw, 28.5;

exposed culmen, 14.5. The small size of this specimen in most dimensions as compared with South American females (Hellmayr and Conover, 1942) confirms the view that the supposedly large form *vagans,* described by Ridgway from the Río Segovia specimen, is not valid.

Laterallus melanophaius cinereiceps. White-throated Crake. An adult male (testes 13×7 mm.) was taken in tall grass at the edge of the Río Mico on July 9, and another bird was seen at the same time. Another adult male (testes 11×4 mm.) was taken on July 11 among cut vegetation at the edge of a small creek in the forest. The stomach of the bird taken on July 9 contained unidentified arthropod fragments. Colors of soft parts were recorded as follows: bill greenish at base; legs and feet greenish gray; iris red. The bird taken on July 9 is heavily rufous on the anterior underparts, but the bird taken on July 11 is much whiter on the breast. Both birds have the gray auriculars of the race *cinereiceps.* After examining a series of *L. melanophaius* from South America, I follow Hellmayr and Conover (1942) in considering the Central American birds to be conspecific with that form.

Tringa solitaria solitaria. Solitary Sandpiper. Two were seen in a flooded field on August 17, and an immature male was taken there on August 18. This bird, which was moderately fat, has white dorsal spotting, a distinct loral streak, and unspotted primaries, all of which characterize the race *solitaria.* A single bird was seen at the same place on August 25.

Actitis macularia. Spotted Sandpiper. One was seen at Bluefields on August 1, and individuals were seen regularly in August at El Recreo on the silt bars at the edge of the Río Mico. Five were seen on August 22, and at least one was in spotted plumage. None was seen in June and July of 1954.

Columba speciosa. Scaled Pigeon. This large pigeon was seen frequently in both years either singly or in small groups in the tops of dead trees near the forest edge. An adult male (testes 16×9 mm.) was collected on August 14, and another (testes 13×6 mm.) was taken on June 27. Notes on the latter specimen are: bill crimson except for distal 7 mm., which is white; orbital skin crimson; tarsi and feet horn color with slight purplish red cast; crop filled with hard green berries. Both birds were molting the primaries.

Columbigallina talpacoti rufipennis. Ruddy Ground Dove. This species was abundant in cleared fields and cultivated areas. A male and a female taken on August 16 and 18 had slightly enlarged gonads, as did a male and a female taken on June 28 and July 12. The male taken on August 16 had the crop filled with small seeds. Colors of soft parts of both sexes were: bill dusky; iris dull ivory; tarsi and feet flesh color.

Claravis pretiosa. Blue Ground Dove. This beautiful dove was seen frequently at the interface of field and forest, sometimes associated with the preceding species. In June and July, 1954, they seemed less abundant than in August, 1953, when they were usually paired or in family groups or small flocks. In August many young males were changing from brown plumage into the blue-gray of adult males. An adult and a changing immature male were collected on August 18, and a pair of adults was taken on August 21. All but the immature had slightly enlarged gonads. The outermost primary of the immature male was much less attenuated terminally than that of adult males. Colors of soft parts of adult males were: bill ivory; iris red; tarsi and feet flesh color.

Ara macao. Scarlet Macaw. Macaws were seen in 1953 but at too great a distance to identify as to species. In July, 1954, two Scarlet Macaws were seen regularly shortly before sunset as they flew west up the Río Mico.

Aratinga finschi. Crimson-fronted Parakeet. Noisy flocks of large parakeets were seen regularly in 1953 in the tops of several large trees standing in a wet meadow, but we were unable to obtain specimens. In 1954 two immature birds, one unsexed and one female, were collected at the same place on June 24 and 25. Presumably the birds seen in 1953 were also of this species. Parakeets were almost always found at this same place in both years.

Brotogeris jugularis jugularis. Orange-chinned Parakeet. These little parakeets were commonly seen in flocks in large trees left in fields and at the edges of clearings. It was somewhat surprising to find this species on the humid Caribbean slope of Nicaragua as it is more characteristic of the arid Pacific slope of most of Central America. A female was collected on August 13, and a male was taken on August 22. Neither had enlarged gonads.

Dickey and van Rossem (1938) separated the populations from El Salvador and possibly all those from México to Costa Rica under Lesson's name *chrysopogon,* the supposed characters being more yellowish, less bluish green coloration and paler brown wing coverts. Nicaragua specimens would pre-

sumably represent *chrysopogon* if that form were recognizable, and I have consequently examined the following series of specimens: 17 from El Salvador; 6 from Nicaragua; 6 from Costa Rica; 10 from Panamá; 5 from Colombia. I can find no support for Dickey and van Rossem's contention that birds from El Salvador and the more northern part of Central America are distinguishable from populations inhabiting Panamá and Colombia. The most that can be said is that El Salvador birds show less individual variation than those from other localities examined by me. Three from eastern Panamá, one or two from Costa Rica, and one from western Nicaragua are more bluish dorsally, especially on the pileum, than any of the specimens from El Salvador, but the great majority of birds from the other localities match El Salvador material exactly. There is some variability in specimens from El Salvador and the other areas in the overall paleness or darkness (including the wing coverts) and in the yellowness of the underparts, especially the breast. Some of this is caused by wear and soiling, and some is the result of individual variation. My only possible conclusion is that *chrysopogon* is not recognizable and that all the specimens listed above are referable to *jugularis*.

I have also examined 12 specimens from Oaxaca and five from Chiapas, México, in the Moore Collection. The Chiapas birds and, to a lesser extent, two of those from Oaxaca match El Salvador and Nicaragua specimens, but the other 10 from Oaxaca seem less yellow on the underparts. All the latter are decidedly worn and a little soiled, but one Chiapas bird is in similar condition and looks definitely yellower. Freshly-plumaged specimens from Oaxaca are needed to show if there are any real differences in the parakeets of that area.

Amazona autumnalis. Red-lored Parrot. This was the most abundant member of the parrot family at El Recreo, and individuals, pairs, and flocks were seen daily in all situations. One particular orange tree seemed to be a favorite feeding place in July although it was no different to human eyes from many other adjacent trees. A male was taken on August 14, and a pair was collected on June 26. The specimen taken on August 14 shows molt of the wings, and all three birds have a few pin-feathers in the head region. The gonads were not enlarged in any. Colors of soft parts were: skin around eye, whitish; iris, orange. These three, like other Nicaragua specimens, are intermediate between *autumnalis* and *salvini*. El Recreo birds vary in the amount of yellow on the cheeks, but appear to me to be a little closer to the virtually all-green condition of *salvini*.

Piaya cayana thermophila. Squirrel Cuckoo. These cuckoos were seen fairly often at the edge of and just within second-growth forest. A male was collected on August 21; the testes measured 5×3 mm., and the tail was in molt. The female of a pair shot on June 28 had follicles up to 5 mm. in diameter and an incubation patch, but the testes of the male were only slightly enlarged.

Crotophaga sulcirostris sulcirostris. Groove-billed Ani. This species was abundant in thickets at the edge of open fields, especially those inhabited by livestock. One male, with testes measuring 8×5 mm., was taken on August 13.

Neomorphus geoffroyi salvini. Rufous-vented Ground-Cuckoo. An adult of this large species was encountered on July 12 in company with a group of formicariids at an army ant trail in mature forest. I shot the bird with a light load and knocked it over, but after a moment of vigorous thrashing it regained its feet and ran off through the undergrowth with great speed. As it fled it uttered a series of loud snapping sounds that became fainter and fainter in the distance. The next day I returned to the same place, and although the ants had moved on I soon heard snapping sounds like those of the previous day but much softer. Moving closer, I flushed a young bird from a branch about two feet above ground, and the bird ran and fluttered to another shrub where it again perched about two feet above ground. This bird, a juvenal female, was then collected; its stomach contained a hairy caterpillar and two hard oblong seeds about 5 mm. long. The plumage is largely dark sooty brown, with bronze, green, and purple reflections on the wing and tail feathers; it will be described in detail in a later paper. No others of this species were seen.

Tyto alba guatemalae. Barn Owl. On June 29, a male was flushed from a sparse cluster of small trees in an open field. It flew into a clump of rubber trees about 100 yards away, and an hour later it was collected in that place. The testes were not enlarged. This bird is a pale one, only very slightly darker than some examples of *pratincola*, and not nearly as distinct from that form as are the dark examples of *guatemalae*. The Nicaraguan bird is matched perfectly by an example of *guatemalae* taken on May 5, 1923, at Las Cañas, Guanacaste Province, Costa Rica, and may be assigned to that subspecies with reasonable certainty.

Fig. 1. Striped Owl (*Rhinoptynx clamator*), approximately × ½.
Drawing by Don R. Eckelberry.

Rhinoptynx clamator forbesi. Striped Owl (fig. 1). An adult female taken on June 29 is the first record for Nicaragua although there was no doubt that it must occur there, as the species ranges from México to South America. The bird was flushed from the same clump of trees as the Barn Owl; it had been perched about 10 or 15 feet up. It was mildly scolded by Tropical Kingbirds and Blue Honeycreepers, and when flushed a second time it alighted in a palm tree where it was collected. The stomach contained some hair and limb bones of a mouse-sized mammal. The ovary was not enlarged; the iris color was tawny. The primaries were in molt, but the longest ones were fully grown and measurable. The size of this specimen (wing, 247 mm.; tail, 138 mm.) places it in the race *forbesi.*

Nyctidromus albicollis. Pocoyo. I have never heard the term "Pauraque" used by anyone who had not read an ornithological text, and since the name is not descriptive of the bird's calls, there is little reason to retain it. The species is known in Nicaragua as "Pocoyo" (exact spelling uncertain), and as this and also "Cuiejo" approximate the call notes, either one seems a more suitable name.

These birds became active every evening just after sunset, calling frequently, and several could almost always be seen at that time hopping about the lawns by the houses in the manner described by Dickey and van Rossem (1938). Many were also seen and heard in roads and around fields, and they called less often as the hour grew later. Occasionally one was flushed inside the forest edge in the daytime.

Six specimens were taken, ranging in color from strongly rufous through an intermediate condition to predominantly gray. Males were taken on August 13, 22, and 23, and on June 25 and July 6; the only female obtained was collected on the latter date. The gonads were not enlarged in most of these birds; only the males taken on August 13 and 23 showed slight enlargement. All except the birds taken on August 22 and 23 were molting the primaries, and the bird taken on July 6 shows replacement of rectrices also.

The subspecific allocation of these and most Central American specimens is problematical. Griscom (1929:8) examined over 500 specimens from Central America and concluded that birds from Guatemala through Panamá and into South America for an undetermined distance should be grouped into a single race which he named *intercedens.* He commented on the great variability of birds within this large area, but distinguished *intercedens* from *albicollis* on the basis of "underparts averaging paler and much larger, the wing of males averaging about 156 mm. as against 148 mm." However, Griscom lists no more than eight specimens of *albicollis* examined, only five of which were adult males. The average wing measurement of 148 mm. is presumably based on only those five. Peters (1940) considered *intercedens* a synonym of *albicollis,* but Wetmore (1944) recognized the former as valid and gave its range as southern Chiapas, México, to northern Colombia. Wetmore, however, found no size difference between the races but said that those he called *intercedens* were "definitely lighter in color." Thus, Griscom recognized *intercedens* primarily on size characters, considering most coloration too variable, while Wetmore finds size unreliable but makes color distinctions.

The birds from El Recreo are all much darker dorsally and usually so ventrally than any of 42 from El Salvador, three from western Nicaragua, and four from western Costa Rica; in color, they match exactly specimens of *albicollis* from eastern South America. The wing measurements of the four males from El Recreo in which the longest primary is not in molt vary from 146 to 159 mm. (av. 150); the average of these few is slightly closer to Griscom's figure for *albicollis* than for *intercedens.* The wing length of 22 males from El Salvador and one each from western Nicaragua and northwest Costa Rica ranges from 148.2 to 159.0 mm. (av. 152.8), and the average is almost exactly half way between the averages given by Griscom for *albicollis* and *intercedens.* The paleness of El Salvador and western Nicaragua birds and, according to Wetmore, of those from Chiapas to northern Colombia suggests that there may be a valid pale form on the Pacific slope of Central America, but Griscom's remarks on the occurrence of pale or dark birds in any arid or humid area, respectively, makes this quite uncertain. For these reasons, I can reach no conclusion on the validity of *intercedens* or the racial status of El Recreo specimens. Certainly a thorough study of variation in this species is needed.

Chaetura vauxi richmondi. Vaux Swift. In August, 1953, flocks of small swifts were seen almost every afternoon and often during the rest of the day, and the only specimen obtained, a male taken on August 17, was of this species. Replacement of remiges and rectrices was almost complete in this bird. In 1954 collecting was more successful, and to our surprise the flocks contained both this and

the following species. As the two are indistinguishable in the field, no estimate of relative abundance could be made and no difference in habits was noted.

Two males and a female were taken on June 26, and one of each sex on July 11. The birds taken on June 26 were not in molt, but the primaries of the birds of July 11 are in the process of replacement. None, including the August specimen, had enlarged gonads. There were about 100 birds in the flock on June 26, and they were concentrated around a large *almendro* tree standing in a pasture. The stomachs of those collected were filled with a small hymenopteran which presumably was attracted to the flowering tree. Swifts were seen at the same place on many other days as well. On July 11, a flock of about 20 swifts was active and presumably feeding over low forest and fields even during heavy intermittent rains. Other flocks of varying size were seen almost daily in similar situations.

The wing measurements of the six specimens range from 104.5 to 109.2 mm. and are all within the size range of *richmondi*. As the longest primaries were not yet molted and not heavily abraded in any of the specimens, the measurements should be reliable.

Chaetura cinereiventris phaeopygos. Gray-rumped Swift. This species was not detected in 1953 but in all probability it was present. Two males collected on June 26 and a female taken on July 11 were in company with the preceding species; all notes on the habits of the latter apply to this form as well. One of the males had testes measuring 8×5 mm., but those of the other male were only slightly enlarged and the ovary of the female showed no enlargement. Molt of the primaries was just beginning in the latter two birds.

Cypseloides cryptus. White-chinned Swift. On August 9 there was continuous rain for at least 12 hours. At 6 p.m. it was still drizzling, and a flock of about 35 medium-sized swifts, all presumably of this species, was found feeding over clearings and the forest edge. One female was obtained, and the ovary was not enlarged. Molt of the wing and tail feathers was in progress. Its stomach was crammed with small insects that I think were hymenopterans. This represents the first Nicaraguan record for this swift and provides the basis for the inclusion of Nicaragua in its range by Eisenmann (1955). Zimmer, the describer (1945), kindly verified the identification of my specimen. This form closely resembles the Black Swift, *C. niger*, but appears slightly smaller and has a much shorter wing. The white chin is quite inconspicuous. Re-examination of Central American specimens identified as *niger* and future collecting will doubtless show that *cryptus* is not nearly so rare as it seems at present.

Phaethornis superciliosus. Long-tailed Hermit. This striking hummingbird was moderately common in the less open parts of the forest, usually around the flowers of wild plantain. Like the following species, this one has the habit of suddenly appearing and hovering vertically in front of the observer within arm's length and then as suddenly flying off. The curved bill fits neatly into flowers with curved corollas, but the bird is also adept at picking insects off the underside of leaves. This hummer seems to confine itself to the lower strata of forest growth, from almost ground level to about 10 feet up. An unsexed bird was taken on June 27, and a male and a female were collected on August 12. Both had enlarged gonads (testes 3×2.5 mm.; follicles 1.5 mm.) but no territoriality was noted. The proximal two-thirds of the mandible was yellow; the rest of the bill was blackish.

Subspecific designation in this species is problematical. The race *cephalus*, described from Nicaragua, is supposed to be more strongly barred on the sides of the throat and chest than is the more northern form *longirostris*. I have examined two specimens from Chiapas, México, 18 from Guatemala, 6 from Honduras, 17 from Nicaragua, and 37 from Costa Rica and western Panamá. Variation seems to be clinal, with a tendency toward darker coloration of the sides of the throat from north to south, without any noticeable break or steepening. The darker appearance (hardly "barring") results from more evident exposure of the blackish central and basal parts of the feathers on the sides of the throat; in some cases this may be due to wear or to the make of the skin. A bird from Catacombas, northwest Honduras (presumably *longirostris*), is indistinguishable from "dark" Costa Rica birds, and one from Pózo Azúl de Pirrís, western Costa Rica (presumably *cephalus*), is identical with the two Chiapas birds. Several other Costa Rica birds, however, are definitely darker on the sides of the throat and chest, and Nicaragua birds are variously intermediate. All in all, the differences between the extremes are exceptionally slight, and probably few (?) taxonomists would care to apply a name to the population now called *cephalus* if this had not already been done. I feel that this race is not sufficiently distinct from *longirostris* to merit recognition.

Zimmer (1950*a*) believed that this and other Central American races are of the species *malaris*

Fig. 2. Scaly-breasted Hummingbird (*Phaeochroa cuvierii*), natural size. Drawing by Don R. Eckelberry.

rather than *superciliosus*; the Nicaraguan specimens shed no light on this question, and I have tentatively retained the older classification of this complex group.

Phaethornis longuemareus saturatus. Little Hermit. The smaller of the hermits was also moderately common in the same situations as the preceding species. The Little Hermit was much more difficult to collect, however, for it rarely paused or perched for more than a few seconds within sight of the observer. One male taken on August 9 was the only one obtained although the species was seen daily. The testes were not enlarged. It seems primarily a low-level feeder but was occasionally seen about 15 to 20 feet up in flowering trees.

Phaeochroa cuvierii roberti. Scaly-breasted Hummingbird (fig. 2). This rather plain-colored species was encountered several times, usually at the edge of small streams bordered by low growth. Three birds, all males, were taken on August 7 and 24 and on July 11. The testes of all three were enlarged, measuring 3×2 mm. The rectrices of these specimens all have the broad black subterminal band characteristic of *roberti*, but the birds show some approach to the more southern form *maculicauda* in that the basal half of the mandible is flesh color instead of blackish.

Anthracothorax prevostii gracilirostris. Green-breasted Mango. In the mangroves and wooded borders of the bay at Bluefields this species was common, but only one was encountered at El Recreo. A female was collected on July 10 from its perch in a lone tree in an open field at the edge of the Río Mico; the ovary showed no enlargement. The exposed culmen length of 25.5 mm. places this specimen in the race *gracilirostris*.

Klais guimeti merrittii. Violet-headed Hummingbird. The white auricular patch is a good field mark in this small species, which was common within and at the edge of second-growth forest. We usually found these birds around the blossoms of flowering trees of medium height. Frequently several individuals were seen feeding at such trees, which often were visited by flocks of honeycreepers at the

same time. Three specimens, all females without enlarged ovaries, were taken on August 6, 9, and 17. Females of this species cannot be distinguished subspecifically, but males of the Central American form can be told by their more violet crowns as opposed to the blue color of the South American race, as pointed out by Zimmer (1950*b*). I have compared Nicaraguan males with others from Central and South America and concur with Zimmer's treatment of the species.

Thalurania furcata venusta. Blue-crowned Woodnymph. The dark but brilliant green and violet males were seen more often than any other hummingbird in both years. Although we constantly watched for females, none was obtained until one was taken on July 2; no others were identified with certainty. The ovary of this specimen was not enlarged. Nine males were taken from August 6 to 23. Only two males, taken on August 6 and 7, had enlarged testes. The bird taken on August 6 was molting extensively on the wings and back, and a male taken on August 19 also showed wing molt.

This species seemed especially attracted to flowers of wild plantain and it often appeared that one of these hummingbirds could be found at any time merely by watching a convenient plantain flower for a few minutes. Perhaps because of their association with this flower, the birds were always found within second-growth or mature forest and were usually seen from about four to eight feet above ground. When wild plantain is not in flower the habits may be quite different, and it should not be inferred that the species is restricted to such a narrow stratum. In July, males were noted regularly on certain perches, suggesting that they were on territory, but defense of a specific area was not noted with certainty.

Zimmer (1950*c*) examined 20 specimens from the Caribbean slope of Nicaragua (mostly from the northern part) and considered them all intermediates between *townsendi* and *venusta*. However, he later examined my specimens from El Recreo and agreed that they are typical *venusta*.

Amazilia amabilis costaricensis. Blue-chested Hummingbird. This moderately common species seems to be found mostly at heights from about 6 to 15 feet up just within second-growth and at least sometimes in deeper forest. Males were taken on August 12 and 17, both with the primaries in molt, and on June 26; females were collected on August 9 and 15, and both have the wings in molt. The male of August 17 had testes measuring 3×2 mm.; none of the other birds had enlarged gonads.

Amazilia tzacatl tzacatl. Rufous-tailed Hummingbird. This species was not quite as abundant as the preceding one, but it was found in more open situations and never in mature forest. Rufous-tailed Hummingbirds were usually seen at the edge of second growth and just within it or along riparian thickets. On August 20, one was seen gathering fluff from heads of *cola de burro* grass, presumably for nesting material. Two females with follicles not enlarged were collected, one on August 11 and another on June 27. The former shows wing molt well advanced. Colors of the bills were: basal two-thirds of mandible flesh color; rest of bill, black.

Microchera albo-coronata parvirostris. Snowcap. This tiny hummingbird is one of the most attractive members of a family noted for its remarkable color patterns. It was a common bird at El Recreo in second growth and it was occasionally seen in mature forest. This was another fairly low-level species, usually being found between 5 and 10 feet above ground. Many years ago Thomas Belt (1874) remarked on the startling whiteness of the crown patch of the male, and it is indeed striking when one of these dark plum-colored birds, hovering vertically before the observer, suddenly tips forward and reveals this immaculate marking. One male habitually perched on a trailside branch just inside a patch of second-growth forest in both years, and several times he was aggressively chased by a Rufous-tailed Hummingbird. However, the Snowcap always returned after some resistance and a short flight. Four specimens were taken—an adult male on August 15, an adult female on August 7, and immature males on August 11 and 14. The latter two are intermediate between the green and white female-type plumage and the dark color of the adult male; none had enlarged gonads.

Chalybura melanorrhoa. Dusky Plumeleteer. Only females of this second-growth and mature-forest dweller were identified with certainty, and the species was seen regularly but always singly and not in abundance. The individuals seen were found about six to eight feet above ground. Two females were collected, on August 7 and 19; the ovary of the bird taken on August 7 was slightly enlarged and molt of the inner primaries had just begun. Colors of soft parts were: tarsi, feet, and mandible flesh color; culmen black. This form is sometimes considered conspecific with *C. urochrysia* of Panamá and South America. The males of both are extremely similar, but in *urochrysia* the females are colored like the males instead of having the drab plumage of the female *melanorrhoa*. I prefer to retain

the latter as a full species until intergradation or other additional evidence of conspecificity with *urochrysia* is demonstrated.

Heliothrix barroti. Purple-crowned Fairy. One male with a fairly short tail was collected on August 14 in a sparse grove of trees at the edge of the Río Mico; the testes were not enlarged, and no others of this species were seen. Zimmer (1953) considered *barroti* conspecific with *H. aurita* of South America. The only noticeable color difference is that in *aurita* both sexes have a green crown (concolor with the back), whereas in *barroti* the male has a purple crown. As such a marking is often important in species and sex recognition and in courtship, I prefer to retain specific rank for *barroti* until intergradation or other additional evidence of conspecificity with *aurita* is demonstrated. This case is similar to the preceding, but in this instance the color patterns of the sexes are reversed.

Trogon massena massena. Slaty-tailed Trogon. Although this species was encountered regularly in mature forest and second growth in 1954, none was seen in August of 1953. The loud, repetitious *kowp-kowp-kowp* calls attracted us to the two males that were collected on July 3 and 10. The testes of these birds measured 6×4 and 4×3 mm., respectively. Colors of soft parts were: iris, buffy gray; orbital ring, orange red; bill, orange. The stomach of the bird taken on July 3 contained cicada remains and two hard, round seeds about 7 mm. in diameter. Unfortunately, the longest primaries of both birds are in molt and cannot be measured accurately; the tails are also in molt. Zimmer (1948) assigned all Nicaragua birds to the race *massena* and his treatment is followed here.

Trogon rufus. Black-throated Trogon. A brown-backed, yellow-bellied trogon was shot at close range on July 3 and could not be preserved. It could only be this species and was presumably a female of the race *tenellus.*

Trogon violaceus braccatus. Violaceus Trogon. An immature female (ovary not enlarged) was collected on August 12; another bird was seen with this one, but no others were identified with certainty. The wings and tail of this specimen are in molt and cannot be measured accurately, but it has a deep yellow abdomen as in the race *concinnus.* Dr. Zimmer examined this bird, however, and considered it, insofar as it can be subspecifically determined, to be a richly colored individual of *braccatus.*

Chloroceryle amazona. Amazon Kingfisher. One was seen along the Río Mico on August 16.

Chloroceryle americana. Green Kingfisher. A pair of these birds was seen on July 11 and 12 along a small creek that flowed into the Río Mico, but none could be collected. Presumably the race *isthmica* was represented.

Galbula ruficauda. Rufous-tailed Jacamar. One was seen and heard on August 10 and once or twice thereafter in that month along a small stream in a strip of mature forest. None was seen in 1954.

Notharchus macrorhynchos hyperrynchus. White-necked Puffbird. One was seen high up in a tall dead tree at the edge of a forest on June 27, and on July 13 a female was collected from a similar tree near the same spot. The ovary was perhaps slightly enlarged (largest follicle 1.5 mm.); the iris was red. The wings and tail were in molt.

Malacoptila panamensis. White-whiskered Puffbird. The only one seen was an adult female in mature forest that was collected on July 3. The ovary was slightly enlarged, with follicles measuring 2 mm. in diameter. The iris was red. The bird had on its bare abdominal skin four welts about 3.5 mm. wide, each with a little crater in the center containing a cluster of brilliant red eggs, possibly those of mites. Unlike the preceding species, this one inhabits primarily mature forest from almost ground level up to about 15 feet. Although the type locality of the race *fuliginosa* is the Río Escondido only a few miles east of El Recreo, the bird discussed above has hardly any pectoral streaking and thus resembles the more southern form *inornata.* The plumage is worn, however, and the specimen cannot be identified unequivocally. As Richmond's type of *fuliginosa* is said to be an abnormally colored bird, other specimens from southern and central Nicaragua should be examined to see if this name may properly be applied to this and more northern populations.

Pteroglossus torquatus torquatus. Collared Aracari. Small groups of several birds each were seen regularly in both years in second growth and high up in mature forest. One of a pair seen on June 26 was carrying food. A male in worn plumage was collected on June 29 and had enlarged testes measuring 11×7 mm. The iris was yellow.

Ramphastos sulfuratus brevicarinatus. Keel-billed Toucan. In 1953 these toucans were seldom seen, but a male with unenlarged testes was taken at the edge of some second growth on August 20. The species was noted regularly in 1954, however, often in two's. On July 5, two birds were watched

Fig. 3. Black-cheeked Woodpecker (*Centurus pucherani*), × 2/3.
Drawing by Don R. Eckelberry.

as they seized each other's bill by the tip and then pushed and tugged back and forth. One bird or the other would break away and retreat a little, perhaps to another branch, but the activity did not seem aggressive.

Ramphastos swainsonii. Chestnut-mandibled Toucan. Like the preceding species, this larger one was seldom seen in 1953 but was observed more often in 1954. The habits seem very similar to those of *R. sulfuratus* and they are often seen together in the same situations. One male of a group of several birds was taken on July 13; the wings and tail were in molt.

Piculus rubiginosus. Golden-olive Woodpecker. One bird was seen on August 13 among trees bordering a small stream running through cultivated fields.

Dryocopus lineatus. Lineated Woodpecker. One was seen and heard drumming on a large dead tree in mature forest, but it was not collected and no others were seen.

Centurus pucherani pucherani. Black-cheeked Woodpecker (fig. 3). At El Recreo these woodpeckers were almost always found in tall dead trees at the forest edge, but elsewhere I have often seen them in other situations. Several birds could be found in both years high up in one hole-riddled tree that was clearly a nesting site at some time or other. A male was taken there on August 13 and a pair was collected at the same tree on July 5. None of the birds had enlarged gonads. The male taken on July 5 had not completed wing molt and was in generally worn plumage, but the female collected at the same time was in fresh plumage. The specimen taken on August 13 was also in generally fresh plumage. These birds are referable to *C. p. pucherani* as they lack the white spotting on the wing coverts that characterizes the more northern form *perileucus.*

Veniliornis fumigatus sanguinolentus. Smoky-brown Woodpecker. This small species was encountered only a few times and always within 4 to 10 feet of the ground in rather dark places—dense thickets or second-growth or mature forest, often with a group of ant tanagers and other passerines. An immature female was taken on August 4 and a male was collected on July 2; neither had enlarged gonads. The bird taken on August 4 had the wings and tail in molt.

Phloeoceastes guatemalensis. Pale-billed Woodpecker. This large species ranges from almost ground level to the tops of large trees, and it is so often found on such small-boled, sound-looking trees that it may be a surface-feeder to some extent. A pair was seen near the ground among small trees at the edge of mature forest on August 5; a male was seen and heard giving its double-rap at the top of a large dead tree at a forest edge at dawn on June 25, and another bird was seen working in a dead stub about 30 feet high on July 12. In the absence of specimens, subspecific identity is uncertain.

Glyphorhynchus spirurus. Wedge-billed Woodcreeper. This was the most common of the woodcreepers at El Recreo and was found in both second-growth and mature forest, usually at low to medium height. Only one bird was obtained in 1953, a female with follicles not enlarged taken on August 18. Two females were taken on July 4; neither had enlarged follicles. Two males taken on July 9 and 12, however, had enlarged testes measuring 9×6 and 7×5 mm., respectively. In all but the male taken on July 9 the rectrices were being replaced, and the process had been completed in that bird. The two central rectrices, which are the longest, are the last to come in. Wing molt was under way in all five specimens. These birds were seen in pairs in July of 1954, and males were heard singing. The song, a rather weak one, is described in my notes as a "whistled whinny." A loud *chink* is sometimes given as a call note.

The specimens have slightly more streaking on the underparts than any of eleven birds from Panamá examined, and they are thus closer to the more northern race *pectoralis* than to *sublestus* of farther south, although they are not typical of the former. I am doubtful about the usefulness of throat color as a subspecific character in this species.

Dendrocolaptes certhia sancti-thomae. Barred Woodcreeper. The only one of these birds seen, an adult male with enlarged testes (12×7 mm.) and an incubation patch, was collected on July 9. My attention was attracted to the bird by its scolding notes and loud song, which I recorded in my notes as *téw-wee, téw-wee, téw-wee.* The bird readily approached in response to crude imitations, and there was probably a nest nearby.

Todd (1950) described a race, *nigrirostris,* from Costa Rica largely on the basis of an allegedly shorter and virtually all-black bill. He had examined no specimens from Nicaragua and indicated doubt as to what form was found there. Consequently, I examined a series of adult birds from Central America (excluding examples of *D. c. hesperius*) with the results as given below. I have measured

the culmen (in mm.) from the anterior edge of the nostril as this seems much more accurate than a measurement of the "exposed" culmen, which varies according to wear of the feathers at its base.

Nine males from México, Honduras, and El Salvador:	25.4 to 29.2 (av. 27.7)
Eight females from the same localities:	26.1 to 28.7 (av. 27.4)
Five males from Nicaragua:	26.0 to 29.5 (av. 28.1)
Four females from Nicaragua:	24.0 to 27.5 (av. 26.3)
Eleven males from Costa Rica:	28.0 to 31.0 (av. 29.0)
Ten females from Costa Rica:	27.0 to 30.0 (av. 28.2)

These measurements indicate a tendency toward slightly longer bills in Costa Rican birds, with bill length (at least in males) gradually increasing from México on south. The greater average bill size of males from Costa Rica as compared with birds from more northern areas is not only too slight and includes too much overlap to merit nomenclatural recognition, but it represents the opposite of the findings of Todd; he reported that the exposed culmen averaged shorter in nine males from Costa Rica. As for bill color, all birds from México, Honduras, and El Salvador have light-colored areas on the mandible; seven out of nine Nicaragua birds are similar, but two have all-black bills. Of 24 specimens from Costa Rica (including three with unmeasured, broken culmens), only four have all-black bills; the rest have a variable light marking at the base of the mandible. Four unmeasured birds from Panamá have all-black bills. There seems, then, to be a tendency toward more heavily pigmented bills from north to south, but it is not correlated with bill size. All-black coloration was found in both short (24.0) and long (30.2) bills, as were pale mandibular markings (26.0 and 31.0). Todd also gave slightly darker plumage color as a character of *nigrirostris* but did not emphasize it. There is so much individual variation in this species, not to mention the effects of post-mortem change, that slight average differences are of little or no taxonomic value. The series listed above are quite variable irrespective of locality. In view of the information presented, I find it impossible to recognize *nigrirostris* and must consider the name a synonym of *sancti-thomae*.

Xiphorhynchus guttatus costaricensis. Buff-throated Woodcreeper. Except for the preceding species, this was the least abundant of the woodcreepers at El Recreo. A male in generally worn plumage and with enlarged testes (9×7 mm.) collected on August 9 was the only one seen in 1953. The wings were in molt in this specimen. In 1954 several were seen, usually in company with formicariids around army ants, and two more males were collected. One, an adult taken on July 2, had enlarged testes (11×8 mm.); the other, an immature bird with a shorter bill and darker plumage, was taken on July 5. The four lateral rectrices on the left side of the adult bird are fresh, but all the others are still retained and are quite worn. No other molt is evident. The skull of the immature was single-layered whereas that of the adult was double-layered.

Lepidocolaptes souleyetii compressus. Streak-headed Woodcreeper. Both in 1953 and 1954 this species was seen regularly but singly and it could not be called common. Birds were usually found in small trees at the edge of second-growth forest or along stream borders. Three males were taken on August 14, 16, and July 11; the first of these had slightly enlarged testes, but those of the others were not enlarged. One female was taken on August 6; the ovary was not enlarged. El Recreo birds match exactly four specimens of *compressus* from Costa Rica and are thus referable to that race.

Synallaxis brachyura nigrofumosa. Slaty Spinetail. This was a common bird in all low thickets along fence rows, stream borders, and forest edges, but its chattering call is heard much more often than the bird is seen. Three males were collected on August 8, 17, and 19; all had enlarged testes (7×4, 4×3, and 6×3 mm.). Two females were taken on August 15 and 21, and the former bird had a slightly enlarged ovary. The specimens taken on August 8, 19, and 21 were molting the rectrices, and the two central ones are the first to come in. The bird taken on August 21 also showed molt of the primaries. This species has a definite musky odor that is retained for many years by study skins.

Automolus ochrolaemus hypophaeus. Buff-throated Foliage-gleaner (fig. 4). An adult male collected on July 10 was the only one seen; the skull was double-layered, and the testes measured 4×2 mm. The base of the mandible and the tarsi, feet, and claws were all buffy. The primaries were in molt, and new feathers were coming in on the throat. Characteristically, the bird was gleaning dead foliage when discovered; it started about six feet up in a mass of old plantain leaves and had descended to within one foot of the ground when it was collected.

Subspecific allocation of this and other specimens from Nicaragua requires detailed comment.

Ridgway (1911) gave the range of the race *cervinigularis* as southeast México through Nicaragua and that of *hypophaeus* as the Caribbean slope of Costa Rica to western Panamá. He had seen only two specimens from Nicaragua. Ridgway commented (1911:218) on the fact that "Mexican specimens average decidedly deeper in color than others, especially the buff . . . and brown of pileum, the latter almost sooty." Subsequently Peters (1929) described a pale race, *amusos,* from northeast Honduras. Huber (1932) assigned his one specimen from Eden, on the Caribbean slope of Nicaragua, to *hypophaeus* but Zimmer (1935) placed all Nicaragua specimens seen by him (all from the Caribbean slope or its western edge) in *cervinigularis*. More recently, Peters (1951) gave a complex range for *cervinigularis* that included "Nicaragua," but he placed birds from the "Caribbean slope of Nicaragua (Eden)" in *hypophaeus*. Actually, the range of *cervinigularis* as given by Peters (1951:138) is divided into two parts, for Nicaragua is nowhere in contact with the other localities listed and most of the intervening area is evidently occupied by the subspecies *amusos*.

Fig. 4. Buff-throated Foliage-gleaner (*Automolus ochrolaemus*), approximately × ¾. Drawing by Don R. Eckelberry.

I have examined a series of Mexican specimens in the Moore Collection that includes 14 from Veracruz, nine from Oaxaca, and four from Chiapas; many of these were taken as recently as 1953 and have undergone little if any post-mortem color change. These accord well with Ridgway's description. The deep buffy (almost orange) tone of the underparts is well marked, and there is usually little or no contrast in color between the throat and the breast and abdomen, although the feathers of the lower throat may have very dark margins and thus sharply demarcate this region. The pileum is indeed almost sooty and contrasts with the back although the latter is also quite dark. The name *cervinigularis* undoubtedly applies to populations having these characteristics, for the type locality is Córdoba, Veracruz, México. I have also examined the type series of *amusos,* 11 specimens from Catacombas, northwest Honduras, 5 from north-central Nicaragua, and 3 from the Caribbean slope of Costa Rica. The specimens of *amusos* are distinctly paler than those of *cervinigularis* or *hypophaeus*. However, I am unable to see any distinctions between Nicaraguan birds and those from Costa Rica and must consider all of them (including the specimen from El Recreo) representatives of *hypophaeus*; they do not resemble examples of *amusos* or of *cervinigularis* from México. The Nicaragua birds are all fresh (1953–1955) and thus reasonably comparable to the Mexican series; the Costa Rican specimens are much older (1927–1934), but as they do not show a tendency toward more rufous coloration, as is usual in post-mortem change, they are considered valid for comparison.

Although Peters (1951) specifically included Catacombas, Honduras, in the range of *cervinigularis*, the 11 specimens I have seen from that locality (taken in 1933) seem to me much closer to *hypophaeus*. I doubt that post-mortem change is involved as no reddening of the browns is evident; also, such change would lessen rather than increase the resemblance to *hypophaeus*. Possibly Peters envisioned the range of *cervinigularis* as extending through western Honduras into northern Nicaragua; I am inclined to think instead that the range of *hypophaeus* may extend north through Nicaragua as far as northwest Honduras (Catacombas).

Xenops minutus. Plain Xenops (fig. 5). Although this was a moderately common species in second-growth forest, only two specimens were obtained—one female on August 6, and another, with a double-layered skull, on June 30. Neither had enlarged ovaries. The former bird was acquiring new throat feathers, and the latter bird had the wings and tail in molt. New central rectrices were present, and new lateral ones were beginning to grow out. This soft-tailed species ranges vertically from almost ground level to about 15 or 20 feet up in trees and vine tangles, where its actions often suggest a parid of some kind. I have compared these two specimens with 14 examples of *mexicanus* (taken 1939–1946) from Oaxaca and Chiapas, two from Honduras (1933), and four examples of *ridgwayi* (1906, 1924–1928) from Costa Rica. The Nicaraguan birds seem to be intermediate but appear closer to *ridgwayi* in being slightly darker on the underparts and less buffy on the throat than *mexicanus*.

Thamnophilus doliatus intermedius. Barred Antshrike. This species was found in riparian thickets, fence rows, or low forest edge, and males were seen and heard singing in both years. The crown feathers are raised and the tail vibrates while the bird sings. A female taken on August 19 had enlarged follicles (2×1.5 mm.), and the plumage is rather heavily marked with black on the underparts. The throat streaks are quite distinct, and the underparts are narrowly barred with black.

Thamnophilus punctatus atrinucha. Slaty Antshrike. Two females of this species were collected. One taken on August 19 was accompanied by what appeared to be a juvenal male, but the ovary of the female seemed like that of an immature bird. The second specimen was one of a pair encountered on June 30, and the birds were quite uwary. The latter female had follicles measuring 3 mm., an incubation patch, and a double-layered skull. In both instances this species was encountered about eight feet up in dense second growth.

Cymbilaimus lineatus fasciatus. Fasciated Antshrike. A few of these birds were seen in both years, but they were not common. All those observed were at the edge of mature forest or in well-developed second growth and were found 8 to 15 feet up in trees or vine tangles. Two males were taken, one on August 24 and one on July 12. Both had slightly enlarged testes (3×2 mm.); the skull of the bird taken on July 12 was noted as double-layered. The iris was red.

Taraba major melanocrissus. Great Antshrike. One immature male taken in dense second growth on August 21 was the only individual seen. I located the bird on its perch about three feet above ground only by its repeated call, a low *churr*. The testes were not enlarged, and the iris was pale grayish brown, not red as in adults.

Myrmotherula fulviventris costaricensis. Fulvous-bellied Antwren. This was a fairly common species in dense second-growth and mature forest, and it ranged from almost ground level to the tops of large trees although usually it was found at lower levels. In both years these antwrens were found in small flocks or perhaps family groups, often in company with other small passerines. Several times they were found associated with Sulphur-rumped Flycatchers (*Myiobius barbatus*) with no other species present. One adult male with enlarged testes (4×2 mm.) was taken on August 11, and females were taken on August 10 and 23 and on July 12, the latter from a tree-top flock. None had enlarged ovaries. All birds of both sexes had grayish white irides, and the adult male and the female taken on August 23 had the primaries in molt.

Microrhopias quixensis virgata. Dot-winged Antwren. Small flocks of these birds were seen regularly in second-growth and mature forest, especially around clumps of wild bamboo. Like the preceding form, this one may be found from low growth to the tree tops. Two males were taken on August 15 and one on August 16, and a female was taken on August 23. None had enlarged gonads, but the two males showed molt of remiges and rectrices. On August 11 I watched a female feeding a moth to a full-grown juvenile; the moth was too big, and both birds tugged at it until it broke up into pieces small enough to swallow. This species is unusual in that the skin can be turned over the skull only with difficulty and usually splits in the process; this is not true of *Myrmotherula fulviventris*.

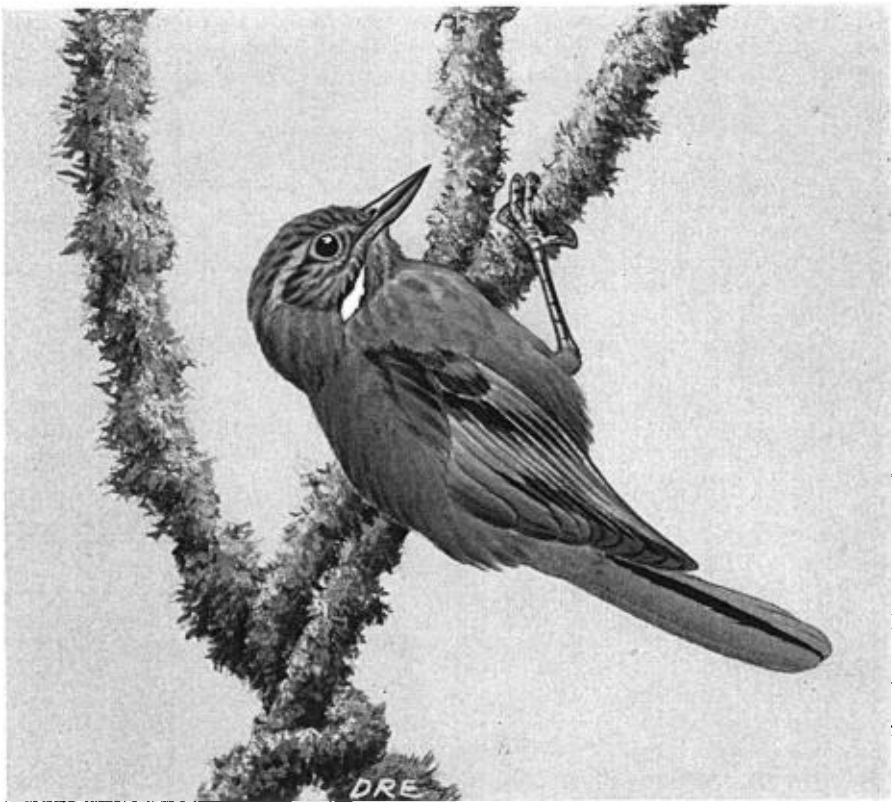

Fig. 5. Plain Xenops (*Xenops minutus*), natural size. Drawing by Don R. Eckelberry.

Cercomacra tyrannina crepera. Dusky Antbird. This was probably the most common formicariid at El Recreo and was abundant in second growth and at the edge of mature forest. The species is generally found less than six feet above ground in dense vegetation, and it was often mistaken for something more desirable from the standpoint of the collector. Consequently, six males were taken on August 6, 8, 10, 11, 16, and 22; all but the last had slightly enlarged testes (3×1 to 5×2.5 mm.). Females with slightly enlarged ovaries were taken on August 16 and 22. All but the males taken on August 10 and 22 show molt of the remiges and rectrices.

Gymnocichla nudiceps chiroleuca. Bare-crowned Antbird. A pair of these birds was encountered in a dense thicket at the interface of a clearing and a section of second growth on August 21. The male was giving a rolling chatter, and the female was hopping along a slender horizontal branch two feet above the ground. I collected her but could not obtain the male. The female's stomach was crammed with insect remains and also included a small young lizard (*Anolis limifrons*). The bird's ovary was not noticeably enlarged and the skull was single-layered; the bare skin of the face was bright blue.

On July 12, two or three pairs of this species were among a group of birds around a trail of army ants in mature forest. The group included *Gymnopithys, Hylophylax, Henicorhina,* and the adult *Neomorphus* mentioned previously. The brown female Gymnocichlas were much more retiring than the conspicuous males. Both sexes ranged from just a few inches above ground up into vine tangles as high as eight feet; I did not see them alight on the ground itself. The males frequently gave a *whee-eép* call, and the wings were drooped and the tail fanned open and shut somewhat like a *Euthlypis* or *Setophaga*; sometimes the tail was wagged up and down slightly. The crown is not actually bare, but the feathers on its anterior part are sparse and bristle-like so that the bright blue skin shows

through clearly. The naked skin of the face is also bright blue, and this color and the white wing bars contrast with the glossy black of the rest of the plumage to make the adult male a striking bird. Although these and the other formicariids seemed much agitated in the presence of the ants, I did not see them eat any or do much feeding of any kind.

A lone immature male without the white wing bars was taken from a vine tangle where it perched quietly a few yards from the main flock. Its testes were not enlarged, the skull was single-layered, the facial skin was bright blue, and the tarsi and feet were bluish gray. This specimen is extensively in molt.

Myrmeciza exsul exsul. Chestnut-backed Antbird. One adult male was collected on August 3 in dense second growth at the edge of the airstrip at Bluefields; the testes were slightly enlarged (3×1.5 mm.). An immature male with unenlarged testes was taken at El Recreo on August 11, and another male, probably sub-adult, was collected on July 10 (testes 2×2.5 mm.). The latter two birds have a few brown feathers on the underparts and lack the white streak along the bend of the wing that adult males have. The skin of almost the entire head of the fully adult male was bright chalky blue, paler than in the preceding species; this color extended over the face, anterior part of crown, and chin of the sub-adult, and it was less bright over about the same area in the immature. However, only the facial area is unfeathered and the skin color is not visible on other parts of the head in the living bird.

This species was often heard in a small patch of mature forest although the birds were not frequently seen. The vocalizations heard were as described by Eisenmann (1952), except that one adult was heard on June 30 giving a single-note, whistled call and a song consisting of a loud series of whistles ascending in pitch. As was true of others heard, the bird could be traced by its calls as it moved through the forest at about the same speed as a slowly-walking man; it finally flew up on a branch about five feet above ground at the edge of a trail. My shot missed, and no sound could be elicited from the bird by any imitated calls after that. This species was usually seen less than four feet above ground and occasionally on the ground. Several times individuals were found associated with *Myrmotherula* and *Gymnopithys* around army ants.

Formicarius analis umbrosus. Black-faced Antthrush. In 1953 only one of these birds was recorded, a male taken on August 16, but this was probably because we had not learned its calls. Three other males were taken on June 27, July 2 and 6, and a female was collected on July 9. All of these birds, including the August one, had enlarged gonads; the testis size ranged from 9×4 to 15×6 mm., and the follicles of the female were 2 mm. in diameter. Notes on skull condition are: June 27, male, skull double; July 2, male, single-layered but granular. Color of soft parts: iris, brown; skin around eye, whitish with faint bluish tinge. The stomach of the bird of July 2 contained a lizard (*Anolis* sp.) that was 15 mm. in snout-vent length. As one of the Bare-crowned Antbirds had also eaten an *Anolis*, it may be that small lizards form a regular part of the diet of these formicariids.

The usual call of this species consists of three wistful-sounding whistles, the first higher than the latter two which are on the same pitch, as described by Eisenmann (1952). Occasionally only the first two notes are given, and sometimes as many as eight notes were heard following the first. I did not hear the series of ascending whistles described by Blake (1953). The birds were heard calling at almost all times of day in heavily shaded second-growth and mature forest. Imitation of the calls usually brought replies and often a close approach by the bird, which resembles a small chicken or rail as it walks along craning its neck and twitching its cocked-up tail. This is essentially a terrestrial species, but one flew up and alighted on a branch five feet up in response to an imitation of the call. All others were seen walking on the ground. They seem to be solitary birds, at least in the summer months, and they were never seen in company with other formicariids around army ants although their calls were sometimes heard close by.

Gymnopithys leucaspis olivascens. Bicolored Antbird. Two pairs only were seen in 1953, one on August 10 and the other on August 16. Each time the two birds suddenly flew up and alighted close together, not venturing more than a few inches above the ground. In each instance the male was collected, and in both the testes were enlarged (6×4 mm.). The wings of both birds were in molt. In 1954, several individuals were usually found around army ants in company with other formicariids such as *Gymnocichla, Myrmeciza,* and *Hylophylax.* Two males and a female were taken on July 2. All three had double-layered skulls, and the skin of the face was chalky blue. The testes of both males were enlarged (5×3 mm.), and the female had an incubation patch although the ovary was not enlarged. Another female with unenlarged follicles was taken on July 5.

I rarely observed this species on the ground although it was usually seen less than three feet up. Even when no ants are present, the birds often cling to small vertical stems an inch or so above ground in what looks like an awkward position when it would seem much easier to alight on the soil itself. The only call heard was a low *chirrr,* as described by Eisenmann (1952).

Hylophylax naevioides capnitis. Spotted Antbird. This rather small species was not seen more than six feet above the ground and was not observed to alight on it. One female was taken on August 16 in a second-growth thicket along a river bank with a large mixed flock of passerines including other formicariids, flycatchers, wrens, honeycreepers, tanagers, and fringillids. The ovary of the specimen was perhaps slightly enlarged, and the tail was in molt. The male of a pair was taken in mature forest on August 24; the song of this bird was as described by Skutch (1946). On July 5, a female with unenlarged follicles was collected from a flock including ant tanagers, wrens, woodcreepers, and several formicariids that was following a trail of army ants. The stomach of this bird contained spider parts but no ant remains. Two males were observed on July 12 with another group of formicariids and wrens over army ants; these birds took no notice of me as I stood motionless, and several times they came to within arm's length. One of these males kept chasing the other, approaching with spread tail and raised body feathers. The chestnut-colored back feathers were especially fluffed out, revealing conspicuously the large white patch that is ordinarily concealed. This threat display has also been described by Skutch (1946). Many short notes were uttered with the display.

Phaenostictus mcleannani saturatus. Ocellated Antthrush. The only one identified with certainty was an adult male collected on July 5 from the group of birds mentioned in the account of the preceding species. This bird had a double-layered skull and enlarged testes measuring 6×3 mm.; it was collected as it alighted on a vertical stem about two feet above ground in dense second-growth forest. The stomach contained spider parts but no ant remains. The skin of the face was bright blue, and the tarsi and feet were grayish flesh color; the wings and tail were in molt. Two other long-tailed formicariids seen in the same flock were probably this species. The brilliant blue face and the warm-toned ocellated plumage make this one of the handsomest of Central American formicariids.

Grallaria fulviventris dives. Fulvous-bellied Antpitta. Although this was one of the commonest formicariids at El Recreo, only two individuals were actually seen. This terrestrial species inhabits the densest thickets in second-growth and mature forest, and except for its distinctive call it might go completely undetected. The song consists of a rapid series of about 11 whistled notes (rarely as few as seven) slightly ascending in pitch. At least one and often two or three singers could be heard in almost any part of the forest at any time of day. The birds were heard regularly from the same thickets; they averaged about 100 yards apart and they are presumably rather sedentary. The song is easily imitated and the birds respond readily, but getting a glimpse of one is another matter altogether. The utter exasperation that follows endless futile attempts to coax into view a vocalizing bird that is only a few feet away but which remains defiantly invisible can only be experienced and not described. Were it not for a happy accident on July 4, when an adult male was "called" into an open area on the ground and was collected, I would still be unaware of the identity of this common species. The specimen had a double-layered skull and enlarged testes (4×4 mm.); the tarsi and feet were pale grayish flesh color. One other was decoyed into partial view at a later date, but my shot missed.

It is interesting that the very similar-appearing species *G. perspicillata* has a similar song (Eisenmann, 1952) but one which differs in having three couplets at the end; this was never the case with *G. fulviventris.*

Pipra mentalis mentalis. Red-capped Manakin. The green females and immature males were seen much more often than the colorful adult males, especially in August, 1953, when only one of the latter was seen. In 1954 adult males were encountered more often and several times were seen regularly in certain thickets. The species was common in both second-growth and mature forest from almost ground level up to about 12 feet. One adult male with a double-layered skull was taken on June 24; the testes were not enlarged, and the new feathers of the head and wings are not yet fully grown out. Immature males in green plumage were taken on August 10 and 18, and females were collected on August 6, 11, and 17. None had enlarged gonads and none was in molt. An unsexed bird in green plumage was taken on July 11.

Manacus candei. White-collared Manakin. The loud snapping by the males of this common species was heard regularly in both second-growth and mature forest from almost ground level up to about

eight feet. Green-plumaged birds were often seen a few feet higher, but in general the adult males at least seemed to range a little lower than those of the preceding species.

The adult males make both a loud, sharp, snapping sound and an equally loud but rolling *crrrack*. The snap seems to be accompanied by a quick flit of the wings, while the rolling or ripping sound is associated with a rapid, spasmodic flutter. These and several other sounds on which I do not have accurate notes seem to be quite similar to those of *Manacus vitellinus* (Chapman, 1935). In August, an adult male was seen and heard regularly in a small patch of mature forest around an oval area measuring about 4×3 feet that was clear of all leaves so that only bare earth showed; presumably this was a display area.

On July 13, two birds in green plumage of unknown sex were observed in an interesting performance. From a branch about 15 or 20 feet away and about 12 feet up, a bird swooped to a horizontal strand of vine, often uttering a *zweeep* note in flight. The vine was also about 12 feet high. On alighting, the bird bowed so that its head was level with the perch and turned itself at an angle of about 30° to the long axis of the vine. In this position it backed along the vine for a few inches to as much as two or three feet, quivering noticeably all the while. No note was given. Often the bird quickly changed position by about 60° in a right-left direction, so that its head and tail each moved to the opposite side of the vine, or it reversed itself completely and then moved backward in the opposite direction. Both birds performed in this manner several times. Once both birds alighted at opposite ends of the vine and backed toward each other, but they stopped when still a few inches apart. Once one gave several moderately loud snaps, accompanied by a rapid wing-flit, just after alighting and before starting its back-up. This behavior is so similar to that described in *Pipra mentalis* (Chapman, 1935; Skutch, 1949) and *P. erythrocephala* (Snow, 1956) that it causes me to doubt the correctness of my identification of these green-plumaged individuals. Nevertheless, my field notes are quite specific that the birds in question were the orange-legged *Manacus candei,* and the best course seems to be to refer the observation to that species pending future confirmation or refutation.

Adult males were taken on August 15 (testes 5×3 mm.) and July 4 (testes 7×3 mm.); two adult females and a juvenal female were taken on August 6, and three other adult females were collected on August 7 and July 9 and 12. None had enlarged gonads. The color of the tarsi and feet was orange in all specimens.

Schiffornis turdinus verae-pacis. Thrush-like Manakin. As this plain-colored, un-manakin-like species is easily overlooked or mistaken for an immature ant tanager in the dim light of the forest undergrowth, it is hard to make an accurate estimate of its abundance. Two specimens were obtained —a female on August 9 and a male with slightly enlarged testes (5×2 mm.) on August 24. Another was seen on the latter day, and all three birds were noted no higher than four feet above ground in mature forest.

Pachyramphus polychopterus cinereiventris. White-winged Becard. Adult males were seen on June 25 and on August 14, and specimens were collected on July 2 and August 10. Both had enlarged testes measuring 8×6 and 8×4 mm., respectively. On August 24 an adult female and an immature male were taken; the ovary of the female was slightly enlarged. The young male's plumage is similar to that of a female but a bit darker and more richly colored, with a blackish pileum, and the mandible is black instead of horn color.

This species was usually encountered at the forest edge at heights of 8 to 10 feet on up to the crowns of large trees. On July 10, an adult male and a female-plumaged bird were both heard singing; the song consisted of four or five variable notes followed by seven or eight soft, whistled notes of a sweet quality. A second female-plumaged bird was present and approached the first as though begging to be fed, and I therefore feel that the singing one was probably an adult female. Skutch (1954*b*) has described the songs of this species in detail.

Tityra semifasciata. Masked Tityra. Three specimens of this species were collected. The species was seen only in 1953 in small flocks among berry-bearing trees along a stream border. Two adult males were taken on August 15 and 22, and both had much enlarged testes; one female (an immature?) without enlarged follicles was collected on August 12. The wings of the males measure 121 and 119 mm. The inner primaries are being replaced on one of these, but the longest ones are still unmolted and the measurement is thus valid. The plumage of both birds is generally worn. I have compared them with examples of *personata* from Chiapas, México, in comparable plumage condition and with specimens of

costaricensis from Costa Rica, and I find them intermediate—paler on back and pileum than *personata* but not as whitish as *costaricensis,* and closer in size to the latter race. I have not been able to compare the female with a bird in comparable plumage, but it is even paler than adult females of *personata* I have seen. These specimens indicate that the range of *costaricensis* probably extends farther north on the Caribbean than on the Pacific slope of Central America (Wetmore, 1944).

Colonia colonus leuconota. Long-tailed Tyrant. This striking species was found at two locations among large dead trees in semi-open fields. These birds were always seen on high lookout perches at least 40 feet up and usually higher. A female taken on July 5 did not show enlargement of the ovary, but one taken on August 22 had follicles 3 mm. in diameter.

Tyrannus melancholicus chloronotus. Tropical Kingbird. These birds were found abundantly in all open or edge situations where lookout perches from three to 100 feet above ground were available. An adult male in worn plumage taken on July 10 had testes 5×4 mm. in diameter, and an adult female collected on August 11 was in worn plumage with the tail in molt; the ovary was not enlarged. A nest with two juveniles almost ready to leave was found on July 12 in a small tree in a wet meadow. The nest was six feet above ground and quite conspicuous.

Myiodynastes luteiventris luteiventris. Sulphur-bellied Flycatcher. A small stream running through cleared fields was bordered by bamboo clumps and slender trees that bore an abundance of berries in August, and in that month the trees fairly swarmed with birds of many species, including several kinds of flycatchers. Only two individuals of this species were encountered, however, an adult male taken on August 13 in worn plumage with slightly enlarged testes, and a second bird seen on August 22 at the same place.

Myiozetetes similis texensis. Social Flycatcher. This and the following species were abundant and conspicuous at the forest edge and wherever there were suitable perches in cultivated and cleared areas. Two specimens were taken—an adult female in worn plumage on June 28 (ovary not enlarged), and an adult male on August 13 with the wings, tail and throat feathers in molt; the testes were not enlarged. On July 4, one of this species was seen carrying nesting material, but no nests were seen.

Both *M. similis* and *M. granadensis* seem to have very similar habits, and as their appearance is also quite similar they are often difficult to distinguish. However, both species are highly vocal and the calls as described in my notes differ as follows: *similis* sounds like the Spanish word *cuchillo* (knife)—*chee, chee, cu-chi'llo cuchi'llo*; *granadensis—kis, kis, kis-ka'dee kis-ka'dee.* I was unable to detect any behavioral differences and never noted any interspecific conflict even when the birds perched only a few feet from one another in the same small tree. Large numbers of adults and juveniles of both forms were seen feeding on berries along the stream border noted in connection with *Myiodynastes.* The lack of conflict between these very similar congeneric species occupying the same ecologic niche is in accord with the observations of Skutch (1951).

Myiozetetes granadensis granadensis. Gray-capped Flycatcher. A pair was collected on June 28, 1954; both were in worn plumage, and the testes of the male measured 10×7 mm. The iris was grayish. Two males in molt and with slightly enlarged testes were taken on August 13 and August 20. For discussion of habits, see *M. similis.*

Pitangus sulphuratus guatimalensis. Kiskadee Flycatcher. Although this was a fairly common species along stream borders, only one specimen was collected. This was a female taken on August 22; it had slightly enlarged follicles (1.5 mm.). The bird had not completed its molt but most of its new feathers are present; it is even darker and more richly rufous on the back, wings, and tail than nine adults of *guatimalensis* from El Salvador. On July 1, one was seen repeatedly snatching something from the surface of the water of a small pond, and on August 22 several were seen feeding on berries in company with the three preceding species and several others.

Myiarchus tuberculifer nigricapillus. Dusky-capped Flycatcher. The melancholy note of this species was heard daily at the forest edge, where these birds were common among the smaller trees. Six specimens, none with enlarged gonads, were collected in varying states of plumage, as follows: female, June 27, entire plumage very worn; male, June 30, very worn, pin feathers on right side of crown; male, August 10, fresh body plumage, wing and tail in molt; female, August 11, same; male, August 20, all feathers fresh except several outer remiges and rectrices; male, August 21, entire plumage fresh. Flycatchers of this species appeared to be feeding on berries on August 22.

Contopus cinereus brachytarsus. Tropical Pewee. This was another common bird around forest

edges, stream borders, and cultivated areas where perches were available. The Tropical Pewee seems to be a low-ranging form that is usually found from 5 to 15 feet above ground. Four specimens, all males with unenlarged testes, were taken on August 13, 18, 21 and 22. The bird taken on August 18 is a full grown juvenile, and the others all show molt of the remiges and rectrices. In these specimens, the replacement of rectrices is from lateral to medial, which is just the reverse of the sequence in the other flycatchers discussed here.

Terenotriccus erythurus fulvigularis. Ruddy-tailed Flycatcher. This small species was seen infrequently and always within rather mature forest. An immature male in worn plumage was taken on August 7. The call is a high, thin-sounding *cheé-twit*.

Aphanotriccus capitalis. Tawny-chested Flycatcher. Only one of these small flycatchers was seen, and this was an adult male taken about eight or ten feet above ground in an area of well-shaded second growth on July 9. The testes were not enlarged. The species is known only from the Caribbean slopes of Nicaragua and Costa Rica, and it is apparently very rare in collections; the present specimen seems to be the first from Nicaragua since Nutting (1884) obtained one at Los Sábalos.

Myiobius barbatus aureatus. Sulphur-rumped Flycatcher. One specimen of this moderately common species was collected—a female on August 6, ovary not enlarged, with the ventral plumage extremely worn. On August 7, a full-grown juvenile was seen begging from two adults. These flycatchers inhabit well-shaded second-growth or mature forest at low levels, usually about 3 to 12 feet above ground; they are generally active and frequently spread and close the rectrices in a "fan-tail" manner. Often they are seen in company with manakins, ant tanagers, and formicariids, especially *Myrmotherula fulviventris*. I have examined specimens of *M. barbatus* from South America and agree with Zimmer (1939) that the Central American forms are conspecific with that species.

Onychorhynchus mexicanus fraterculus. Northern Royal Flycatcher. Two individuals only were encountered. On June 25, one was seen in shady second growth gathering food and flying off with it in its beak; evidently there was a nest in the vicinity. On August 24, an immature female was collected in a similar habitat; like the other one seen, it stayed low—5 to 10 feet above ground. The measurements of the one specimen (wing, 76.5; tail, 63.7; exposed culmen, 21.5 mm.) and its color place it in the race *fraterculus*.

Platyrinchus coronatus superciliaris. Golden-crowned Spadebill. One male with a granular but not double-layered skull, unenlarged testes, and wings and tail in molt was collected on July 5. It was perched about five feet above ground in mature forest. Two others were seen in a similar habitat on August 24 when they flew up suddenly, scolding each other and raising their golden crown feathers.

Tolmomyias sulphurescens cinereiceps. Yellow-olive Flycatcher. A female with an unenlarged ovary was taken on August 6; no others were seen.

Todirostrum cinereum finitimum. Common Tody-Flycatcher. This was a common bird in the trees along streams, especially those running through open fields. A male taken on August 7 and two collected on August 13 did not have enlarged testes; those of a male taken on August 8 were slightly enlarged. An unsexed bird was also taken on August 13. On July 1, a nest was being built by a pair of these birds about 12 feet up near the end of a small branch of a wild guava tree along a stream.

Todirostrum sylvia schistaceiceps. Slate-headed Tody-Flycatcher. This species was as common as the preceding, but it was always found at the edge of or within second-growth forest at low levels (3 to 10 feet up) and usually where there were thickets or tangles. A male with slightly enlarged testes was collected on August 6, and a female with an unenlarged ovary was taken on August 7. The call note is an easily recognized *chik purr*.

Capsiempis flaveola. Yellow Tyrannulet. Flocks of these little flycatchers were commonly encountered at the forest edge and along stream borders, always at levels less than 10 feet above ground. When quiet, these birds usually perch more or less upright like tyrannids, but when on the move they remind one of a flock of Bush-tits (*Psaltriparus*) or small parulids. A female taken on August 8 had slightly enlarged follicles, and a male taken on August 12 had testes measuring 6×4 mm. A male collected on August 22 apparently had two pairs of testes—one pair only 1 mm. in diameter, and the other pair enlarged to 5×3 mm. Zimmer (1955) suggested that the Nicaraguan population may differ from *semiflava* of southern Central America; I have not seen specimens from Costa Rica and Panamá and thus cannot comment.

Elaenia flavogaster saturata. Yellow-bellied Elaenia. Along stream borders and trees at the edges

of clearings this was a common bird. Two males, one an immature and one an adult with slightly enlarged testes, were taken on August 22, and two females with unenlarged ovaries were collected on August 25. All were molting the wing and tail feathers. These Nicaragua birds all show the dark dorsal and ventral coloration used by Brodkorb (1943) to distinguish the race *saturata,* and compared with examples of *subpagana* from El Salvador they appear much darker. In fact, they are darker ventrally than two topotypes of *saturata* from Palenque, Chiapas, in the Moore Collection, but this is probably because of the fresh condition of body plumage in the Nicaragua specimens.

Tyranniscus vilissimus parvus. Paltry Tyrannulet. Two males were collected, both in small trees at the forest edge. One in worn plumage, with testes not enlarged, was collected on August 20; one in fresh plumage with enlarged testes (4×3 mm.) was taken on August 21.

Progne chalybea chalybea. Gray-breasted Martin. These birds were usually seen in flocks over the Río Mico or high over open fields. A female taken on June 25 had an incubation patch and follicles 1 mm. in diameter; it was in worn plumage.

Stelgidopteryx ruficollis uropygialis. Rough-winged Swallow. No birds of this species were identified with certainty in 1953, but some were seen at close range on July 1, 1954, and an adult female in worn plumage, follicles not enlarged, and with the primaries in molt, was collected on July 9. Even in worn condition the color characters of *uropygialis* are evident, and the pale rump seems to be a good field mark. Doubtless many individuals of this species were among the flocks of swallows seen high up over the river and fields at various times in both years.

Atticora cyanoleuca patagonica. Blue and White Swallow. A female of this migrant form from South America was taken on July 9 in company with the other three species of swallows. The skull was double-layered, but the sparseness of steel blue feathers among those of the back suggest that the bird is a subadult individual. The plumage was generally worn, and the follicles were not enlarged. This specimen has been discussed in a previous publication (Howell, 1955).

Iridoprocne albilinea albilinea. Mangrove Swallow. In both years these swallows were seen daily along the Río Mico, and they usually perched on branches and snags that projected just above the surface of the water. In late June and in July, 1954, Mangrove Swallows were more often seen over fields away from the river, and a pair apparently had a nest under the galvanized iron sheeting on the roof of the station's main building. An adult male with unenlarged testes was collected on June 28 and an adult female with an incubation patch but without enlarged follicles was taken on July 9.

Psilorhinus mexicanus cyanogenys. White-tipped Brown Jay. These jays were found everywhere except inside mature forest and were usually encountered in groups of three to six that ranged from almost ground level to the tops of large trees. A male and a female were collected on June 28; the gonads of the male only were slightly enlarged, and the plumage of both birds is very worn. A male and a female were taken on the same day for parasitological examination but were not saved as skins. They were in very worn plumage and had double-layered skulls and dark brown bills with yellow bases; the testes of the male were enlarged (8×6 mm.), and the ovary of the female was well-developed although no follicles were enlarged. A female collected on August 16 had completed molt of the head, breast, back, most of the wings, and the central pair of rectrices; the abdominal feathers seem fairly unworn and may also be fresh. The ovary of this bird appeared slightly enlarged.

Thryothorus thoracicus thoracicus. Stripe-breasted Wren. This species was found in second-growth and mature forest from the ground itself (under thickets) up to about 12 feet in trees or vine tangles. On July 4 these wrens were heard singing, and the song consisted of about six high-pitched, piercing whistles, all on the same note but increasing in volume. An adult male collected on this day had testes measuring 6×3 mm.; the plumage is in good condition, and the iris was red. Two females were collected on August 11, and the ovaries were not enlarged. A full-grown juvenal female taken on August 12 was in molt, with streaked throat and breast feathers replacing the uniform gray of a juvenile.

Thryothorus nigricapillus costaricensis. Bay Wren. This handsome species was encountered only a few times, always less than five feet above ground and usually in dense thickets. Birds were heard singing a loud, ringing song on July 10 along a large stream, at the exact locality where a single bird was seen gathering nest material on August 14 of the previous year. The latter bird gave a harsh, chattering call. Single birds were also seen on August 10 and July 12. No specimens were obtained at El Recreo, but a male in good plumage with unenlarged testes was taken at Bluefields on August 3.

Thryothorus maculipectus. Spot-breasted Wren. Like *T. thoracicus*, this species is an inhabitant of thickets near the ground and of vine tangles that extend up into trees for about 12 to 15 feet. At El Recreo this wren was the less common of the two. A juvenal male and juvenal female were taken on August 6 and 7, respectively, and both of these birds were replacing the plain dusky feathers of the throat and breast with black and white ones. These specimens are of the same age as the juvenile of *T. thoracicus* taken on August 12, indicating that the breeding season of the two species coincides at least in part. Three or four birds, possibly a family group, were seen working through a vine tangle on August 8.

Although there are only two published records (Ridgway, 1887; Huber, 1932) of this species in Nicaragua (both overlooked by Hellmayr, 1934, who lists none), the Spot-breasted Wren is found throughout the entire Caribbean slope of the country. In the U.C.L.A. collection and that of the American Museum of Natural History there are specimens from the Río Coco in the north to Los Sábalos on the Río San Juan in the south. On the basis of geographical probability these birds should represent the race *petersi*, described by Griscom (1930) in his review of the species. This form is said to differ from adjacent ones in having a stouter bill and either "less russet" (Griscom, 1930:7) or "more russet" (Hellmayr, 1934:204) coloration of the upper parts. I have compared Nicaragua birds with a large series at the American Museum of Natural History from México, Guatemala, and Honduras, and I have also examined the type and type series of *petersi* at the Museum of Comparative Zoology and compared them with specimens from other parts of Central America. I must confess that the alleged color differences of *petersi* escape me completely. The bill size also seems to vary so much individually over the range of several races that it is at best of dubious taxonomic value. Some birds from Guatemala ("*varians*") have bills just as massive as some "*petersi*" from Honduras, and some of the latter have slender bills. I am therefore unable to recognize *petersi* as distinct from *umbrinus*; re-examination of the other races might show that recognition of even fewer is in order.

After examining a large series of the *maculipectus* and *rutilus* groups from Central and South America, I am not convinced that Hellmayr (1934) was correct in uniting the two as a single species. *T. maculipectus* occurs from México through Nicaragua, and *T. rutilus* ranges from western Costa Rica south through Panamá and much of South America. The ranges of the two are nowhere known to be in contact, but there is no evident ecologic barrier separating them. The two forms are closely similar in color pattern of the upperparts but are usually quite different ventrally. Several South American races of the *rutilus* group resemble *maculipectus* in having various amounts of black spotting on the breast and abdomen. One of these, the race *paucimaculatus* of Ecuador and Perú, resembles *maculipectus* quite closely, but *paucimaculatus* and the other "spotted" races are separated from the range of *maculipectus* by a great distance and by a race (*hyperythrus*) of the unspotted *rutilus* type. The genus *Thryothorus*, like many others in the Troglodytidae, includes some unquestioned species that are very similar in appearance. The fact that *maculipectus*-like color characters appear in far-removed *rutilus* populations is not necessarily evidence of specific identity and is less convincing than if the characters of the two groups merged together where (and if) their ranges met. For these reasons, I prefer to retain *maculipectus* as a species until more definite evidence to the contrary is available.

Troglodytes musculus intermedius. Southern House Wren. At El Recreo this species seems to have become at least partly as domesticated as its northern congener, for the birds were always found around the houses or along hedges at the edges of clearings. These wrens were seen and heard singing every day as they hopped over the lawns and around the base of the guest house where we stayed. The four specimens collected are all in extremely worn plumage and had enlarged gonads—a male, July 3, testes 6×3 mm.; a male, August 13, testes 6×6 mm.; and two females, August 18, with follicles as large as 3 mm.

Henicorhina leucosticta tropaea. White-breasted Wood-Wren. These wrens were found on or near the ground in well-shaded second-growth or mature forest, often in company with ant tanagers or formicariids. Songs were heard at almost any time, even during hard continuous rain. I noticed one of these birds that was hopping about among army ants pick up a small green caterpillar, but no feeding on ants was seen. An adult male, testes 5×3 mm., was taken on June 24, and another with gonads of the same size was collected on August 23. An immature male and female were taken on August 10 and 16, respectively, and a full-grown juvenal male was collected on August 24. The latter has a gray breast and is strikingly similar in color to the adult *H. prostheleuca*.

Cyphorhinus phaeocephalus richardsoni. Song Wren. The calls and songs of these wrens always announced their presence; they were usually found moving along less than a yard from the ground but occasionally a few feet higher. The notes are as described by Eisenmann (1952). The females sing at least occasionally, for both members of a pair collected on June 24 were vocalizing. The wrens were usually seen in pairs, and often they were in company with ant tanagers, wood-wrens, and formicariids. Nine specimens of this abundant species were collected. Of the pair taken on June 24, the male but not the female had enlarged gonads; the latter bird was molting the primaries and had pin-feathers on the throat and breast. Another female taken on that day had an unenlarged ovary and was not in molt. An adult male taken on July 5 was extensively in molt. A female with slightly enlarged follicles was taken on August 9, and males were taken on August 11, 16, and 24. Three of these had slightly enlarged testes (3×2 and 3×3 mm.), including one bird taken on August 24 with a single-layered skull; the other taken on that date had minute testes.

El Recreo birds are near topotypes of *richardsoni,* and this series of nine confirms Zimmer's (1932) diagnosis that *richardsoni* could hardly be distinguished from *lawrencii* of Panamá were it not for the existence of the intervening race *infuscatus* in Costa Rica.

Turdus grayi. Clay-colored Robin. These robins were abundant in low second growth, stream borders, cultivated areas, bamboo groves, and on the lawns about the houses. They were especially numerous in berry-bearing trees where flycatchers were also common in August. Many spot-breasted juveniles were seen in that month and in late June and July of 1954 also. On August 8, as I took shelter from a sudden rainstorm under a large *Ficus* tree at the river's edge, a robin flew in hurriedly and settled on a nest about 15 feet up just as the rain arrived.

Two adult males collected on July 1 and 3 had greatly enlarged testes (12×8 and 16×7 mm.); the first bird was in very worn plumage, but that of the second was fresh. An adult female taken on July 4 had an incubation patch, two large follicles 5 and 8 mm. in diameter, and was molting the secondaries and rectrices. An adult female collected on August 8 also had an incubation patch but only slightly enlarged follicles; it was in worn plumage and was not molting. These data suggest a long breeding season of the species in this area.

The worn condition of all but one of these specimens makes subspecific identification impossible. Miller and Griscom (1925) described a supposedly large race, *megas,* from Nicaragua, but it has not been widely recognized, possibly because the authors gave measurements of only four specimens of the new form. The one unworn bird is rather large (wing, 128.5 mm.; tail, 106.5 mm.), but more fresh material is needed to reach a satisfactory conclusion.

Polioptila plumbea superciliaris. Tropical Gnatcatcher. Gnatcatchers were seen fairly regularly at the edge of fields where small trees grew, and once, on August 23, a small mixed flock of this species and *Hylophilus decurtatus* was seen moving and feeding through the trees about 20 feet above ground in a narrow strip of mature forest. Two males collected on August 8 did not have enlarged testes and were not in molt; the plumage was worn. I have followed Zimmer (1942*a*) in the taxonomy of this species.

Ramphocaenus melanurus rufiventris. Long-billed Gnatwren. This species was usually found in second growth and at the forest edge, but it was occasionally encountered in mature forest. The birds were always seen at levels from just above ground to about eight feet up. Often they were seen in small groups with other small passerines and the gnatwren's song, a slow trill, was occasionally heard. On August 11, three birds of a flock of six were collected. These included a male with slightly enlarged testes and two females (at least one an immature) with unenlarged ovaries. Probably this was a family group. An immature male taken on July 1 had the throat feathers in molt.

On July 1, a nest of this species was found less than one foot from the ground in new second growth about 15 feet from the edge of a much-travelled road; the nest is described in detail below. On this date it contained two eggs; they were white, lightly speckled with brown. The nest was kept under observation for 10 days. There was usually an incubating bird present, and it could be approached closely but not touched. As the bird left the nest, it fluttered away just above ground level until out of sight in dense vegetation. On July 8 I watched the nest from 2:30 to 3:30 p.m. No bird was present for the first 35 minutes, but one returned and sat quietly for the next 25 minutes. On July 10 a bird was incubating, but on July 11 the nest was found deserted and damaged. A hole had been pushed through the bottom and both eggs, undamaged, had dropped through.

The nest was then collected and kept as a specimen, but the eggs were broken in handling. The top of the nest was only 10 inches above ground, and the nest is 4 inches deep on the outside and 1¾ inches deep inside. It is open at the top (diameter 1¾ inches) with no constriction of the opening, and it is attached to three small vertical stems that are in the same plane, so that the nest is suspended beside them and is not in a fork or crotch. The outside of the nest is made up of a woven matting of narrow elongate leaves, probably from bamboo; the shrub to which the nest was attached had broad green leaves. The inner cup of the nest is lined with fine grass and plant fiber, especially a black, horsehair-like fiber that is extended out of the cup and loops around one of the stems to which the nest is attached. No feathers or other soft materials are in the lining, and no lichens are present on the outside.

As I was detaching the nest from its surroundings, I noticed that a large green leaf seemed to be sewed to one side of it by several stitches of the black fiber used in the lining. Unfortunately, I was not aware at the time that this might be of interest; I removed the leaf, and my observation cannot be verified from the nest as it now exists. Eisenmann (1953) has described a nest of this species that is similar in all details, including placement, suspension, and attachment of large leaves. Rand and Traylor (1953), in discussing the relationships of *Ramphocaenus*, mention one nest "loosely attached to broad leaves of a plant, 18 inches from the ground." These descriptions, and the sewed leaf mentioned above, are suggestive of the highly developed sewing habit of the Old World Tailor-bird (*Orthotomus*) which has the nest contained in a large, stitched-up leaf; certainly, the nest of *Ramphocaenus* does not resemble that of the North American Polioptilini. Delacour (1946) placed the African genus *Macrosphenus* in the Orthotomini, and Rand and Traylor (*op. cit.*) present evidence that *Macrosphenus* is closely allied to the neotropical *Ramphocaenus* and *Microbates* although this seems unlikely on zoogeographic grounds. Beecher (1953) also discusses this point, and he is of the opinion that *Ramphocaenus* is convergent with but not closely related to the similar-appearing Old World genera. The few observations on the nest of *Ramphocaenus* listed above by no means resolve the problem of the relationships of this genus, but they indicate that more data on the habits of even the more common species would be helpful.

I have examined examples of *R. melanurus* from South America and follow Zimmer (1931) in uniting *R. rufiventris* with that species.

Hylophilus ochraceiceps ochraceiceps. Tawny-crowned Greenlet. Three birds were encountered on July 5 in mature forest in company with woodcreepers, formicariids, wrens, and ant tanagers near a trail of army ants. The greenlets, which stayed about five feet above ground, seemed quite agitated by our presence and fluttered around uttering loud *whee-whee-whee* notes. Two were collected, and these proved to be male and female adults. The testes of the male were enlarged to 4×3 mm., but the ovary of the female was not enlarged. Both were in good plumage, and the color of the iris was light gray.

There is considerable variation in color of the underparts in this species, and subspecific distinction based on this character is inadvisable until a large series from the entire range in Central America is re-examined. The two birds from El Recreo, when compared with specimens in the Moore Collection, are much paler on the breast and abdomen than two from Oaxaca, five from Veracruz, and five from Catacombas, northwest Honduras, but match well with two from Palenque, Chiapas, although the Nicaragua birds are slightly less rufous on the breast. Also, a pair in the Dickey Collection from Volcán de Oso, southwest Costa Rica, is much darker than the Nicaragua specimens, although the former is within the range of the supposedly pale form *pallidipectus*. In view of this variability, I follow Todd (1929) in not recognizing the latter subspecies.

Hylophilus decurtatus decurtatus. Gray-headed Greenlet. A small flock of these birds was encountered on August 23 in company with gnatcatchers, and one specimen was obtained. This bird, an immature female in perfect fresh plumage, is both brighter and deeper colored than examples of *pallidus* from El Salvador and is thus referable to the nominate race.

Chlorophanes spiza arguta. Green Honeycreeper. Adult males were seen far less often than the less colorful females and immatures of this abundant species, which was found from the tree tops in mature forest to six or eight feet up in small trees at the forest edge and in new second growth. Often these birds were in company with Masked Tanagers and Olive-backed Euphonias or with other honeycreepers. Family groups or females with several full-grown young were frequently seen, espe-

cially in August. On July 12 a group was noted feeding on berries. Nine specimens were collected between August 5 and 25. An adult male taken on August 12 did not have enlarged testes, but those of adult males taken on August 19 and 25 were enlarged. One adult female, with the mandible yellow, was obtained on August 21, and two immature females (mandible black) were taken on August 5 and 21. Three immature males in female-type plumage were taken on August 5, 12, and 15; the mandible of the last is yellow and that of the others is black.

The wings of the three adult males were in molt, but in each the longest primary was fresh and fully grown; the rectrices were not in molt. Measurements (in mm.) of these birds are as follows: August 19, wing, 71.0, tail, 47.5; August 25, wing, 70.5, tail, 43.0; August 12, wing, 69.0, tail, 45.0.

Hellmayr (1935) tentatively stated that the race *guatimalensis* ranged into Nicaragua, but he had not seen any specimens from that country. The preceding measurements are too small for *guatimalensis* and are in accord with those of the more southern form *arguta*. An adult male in good plumage taken on January 13, 1955, in the state of Nueva Segovia, north-central Nicaragua, has the wing 68.5 mm. and the tail 43 mm., indicating that the measurements of El Recreo birds are not due to incomplete growth and that *arguta*, not *guatimalensis*, occurs throughout the Caribbean slope of Nicaragua.

Cyanerpes cyaneus carneipes. Red-legged Honeycreeper. Flocks of this colorful species were abundant among flowering trees at medium height (about 10 to 30 feet) at the forest edge and in second growth. All stages of plumage from fully adult male to female-plumaged immatures were noted. Two adult males were collected, one with enlarged testes (7×5 mm.) on July 3, and one with unenlarged testes on August 6. Two males in changing plumage were taken on August 18 and August 25; both had black, adult-type remiges and rectrices and variable numbers of blue and green body feathers; the tarsi and feet were red. The remiges were in molt, with worn black feathers being replaced by new ones of the same type. An immature male taken on August 7 was in completely green plumage with black tarsi and feet. Two adult females taken on August 8 and 9 were beginning molt of the primaries, and their ovaries were not enlarged.

Skutch (1954*a*) has shown that at least some adult males of this species molt the blue and black body feathers and go into a green "eclipse" plumage following the nesting period. The male taken at El Recreo on August 18, 1953, tends to support Skutch's observation. The ventral body plumage of this bird is a mixture of blue and green feathers; new, partly-ensheathed green feathers are present on the throat and abdomen, but no such new blue feathers are evident. Dorsally, the plumage is a mixture of green, blue, and black. One of the innermost greater coverts on each side is a new, partly-ensheathed green feather; all the others are black. The presence of incoming green feathers in a bird showing much of the blue and black of an adult male is consistent with Skutch's suggestion of an eclipse plumage. Skutch (1954*a*:401–402) wondered if Dickey and van Rossem (1938), in their account of molt in this species, may have confused adults and immatures as those authors were unaware of seasonal changes in adults. I have examined the eight "immature males" from El Salvador now in the Dickey Collection, and these are in varying stages of acquisition of adult nuptial plumage. New, partly-ensheathed blue feathers are present but there are no incoming green ones. This series was collected between January 3 and February 12, when acquisition of nuptial plumage in this area is to be expected. Some of these mixed-plumaged birds could be adults changing from eclipse plumage to nuptial plumage, but this cannot now be ascertained. Even if some are adults, Dickey and van Rossem's account of molt sequence in immatures may still be correct.

Cyanerpes lucidus. Shining Honeycreeper. One adult male was seen with a group of the preceding species on July 3 in a small flowering tree at the edge of mature forest; no others were seen. Zimmer (1942*b*) tentatively referred one male from Nicaragua to the race *lucidus*.

Coereba flaveola mexicana. Bananaquit. These birds were moderately common about the forest edge and in second growth at levels of about 5 to 20 feet above ground. They were not seen in flocks. On July 8, one was seen carrying material to a partly constructed nest about 12 feet up in a wild guava tree along a stream running through an open field. Another was seen gathering nesting material on August 15. An adult male taken on August 12 had enlarged testes measuring 7×5 mm.

Dendroica petechia. Yellow Warbler. Migrant Yellow Warblers were first seen on August 13, and an immature male was collected on that day. Some were seen occasionally during the rest of August, usually in trees along streams in open situations. The specimen matches closely several immature males

from El Salvador identified as *aestiva* by H. C. Oberholser, and this Nicaragua bird (insofar as a single immature can be identified) probably represents that race.

Chamaethlypis poliocephala caninucha. Gray-crowned Yellowthroat. Although this species was commonly found in the tall grass of open fields and in the herbaceous growth just above ground where the grass had been cut, some birds were often seen and heard singing from perches on the electric wires running 15 feet above ground at the edges of fields. Yellowthroats were frequently associated with the several species of small fringillids that occupied the same habitat. Adult males were taken on June 28, 29, and July 4; all had enlarged testes and are in worn plumage. Immature males in female-type plumage were taken on June 26 and July 1; both specimens are worn, and the latter bird was acquiring new rectrices on the right side. Adult females were taken on June 29 (with incubation patch, follicles not enlarged, plumage worn) and on August 21 (no evidence of reproductive activity; plumage worn). An immature female was collected on August 22.

Basileuterus rivularis. River Warbler. Two were seen at the edge of a small creek on July 10, in the same place where one was seen on August 14 of the previous year. No specimens were obtained. Zimmer's (1949) evidence for conspecificity of *rivularis* and *fulvicauda* is persuasive, and his treatment is followed here.

Gymnostinops montezuma. Montezuma Oropendola. These large icterids were common in open situations where large trees were found, in large trees within forest, and also down to within a few feet of the ground among trees in cultivated areas. On August 25, I saw a male oropendola displace a brown jay from a clump of fruit on an oil palm. The strange calls and acrobatics, described most recently by Skutch (1954*a*), were noted frequently. However, the only evidence of nesting nearby was the presence of a few old nests in a huge ceiba tree in a wet, open meadow. An adult female taken on July 8 and an adult male collected on August 19 showed no evidence of breeding activity. Color notes on both were: distal half of bill orange, proximal half black; skin of face pale blue; on the female, the skin was pinkish along the mandibular rami. Both birds were rather worn but not in molt.

Amblycercus holosericeus holosericeus. Yellow-billed Cacique. This species was regularly encountered in thickets along stream borders, at the forest edge, and in second growth; all were seen between three and eight feet above ground. Adult males were taken on June 29 and July 2; both birds had much enlarged testes. On August 19, an adult male and an immature accompanying him were both collected. The testes of the adult were enlarged but the immature bird could not be sexed. An adult was seen carrying food on August 20. Color notes on adults were: bill, pale greenish ivory; iris, pale yellow. The bill of the immature was like an adult's but the iris was dark grayish brown. This bird also had pin-feathers among the wing coverts and auriculars.

Icterus prosthemelas prosthemelas. Black-cowled Oriole. These orioles were seen regularly along stream borders, usually in trees of medium height. In August, small groups of both adults and immatures were seen, and one of the latter was collected on August 25.

Icterus mesomelas. Yellow-tailed Oriole. This species was surprisingly scarce around El Recreo, and the only one definitely identified was an adult female collected at the edge of low second growth on July 5. This bird had an incubation patch and slightly enlarged follicles, and it was in very worn plumage.

Tanagra luteicapilla. Yellow-crowned Euphonia. These small birds were found in August only in flocks in berry-bearing trees along a stream (see *Myiodynastes*) and in a large ceiba tree standing in an open field nearby. The euphonias ranged from the tree tops to no lower than 15 feet above ground. In June and July of the following year the large ceiba had been cut down and the berry trees were not yet in fruit; no birds of this species were seen. Three specimens were collected. A male taken on August 13 had unenlarged testes; the wing and tail were in molt (rectrices on right side farther along than those on left), and many green feathers were among the steel blue ones of the back. Another male taken on August 19 was in similar but less advanced plumage, mostly green on the back and with green rectrices. An adult female taken on the same date was in fresh plumage except for a few outer primaries; the ovary was not enlarged.

Tanagra gouldi praetermissa. Olive-backed Euphonia. Like the preceding species, this one was not commonly seen but it was noted in both years. Olive-backed Euphonias may be found high up in large trees in semi-cleared areas, but they seem to be found more often at lower levels (down almost to the ground) and in both mature and second-growth forest. This species was seen once or twice in

small flocks that included Green Honeycreepers and Masked Tanagers. A female with the ovary not enlarged was taken on August 7; this bird has a short wing measurement (50.5 mm.) that places it in the race *praetermissa* and represents the northernmost record of that form.

Tangara nigro-cincta larvata. Masked Tanager. This species was found in a wide range of habitats, from the tree tops in mature forest to lower levels in second growth and even out into thickets or sparsely-wooded cultivated areas where the birds ranged down to within about five feet of the ground. Four specimens were obtained—an adult female, worn plumage, follicles slightly enlarged, on June 25; an adult male, body plumage fresh, tail in molt, primary replacement almost complete, on August 15; a female, same date, in worn, dull body plumage, wings and tail fresh, evidently an immature; an adult male, testes 7×5 mm., fresh body plumage with a few pin-feathers, wing molt almost complete, tail molt almost complete, with symmetrical lateral rectrices not yet fully grown, on August 24. These specimens support Zimmer's (1943) treatment of all Nicaragua birds as *larvata*. I have not seen examples of *nigro-cincta* from South America, but tentatively follow Hellmayr (1936) in considering *larvata* conspecific with it.

Thraupis episcopus diaconus. Blue-gray Tanager. This was a common species in open situations such as cultivated groves, sparse second growth, and the forest edge, and especially in *Cecropia* trees. It occasionally ranged into the tops of tall trees but usually it stayed within 15 feet of the ground. An adult female taken on July 10 was in worn plumage, with molt of the remiges and rectrices just beginning. Another adult female, collected on August 22, was in good plumage and the ovary was not enlarged. One was seen carrying food on August 23.

Thraupis abbas. Yellow-winged Tanager. This species was not as common as the preceding one, but its habits seem similar and the birds are found in the same situations. The Yellow-winged Tanager was seen regularly in both years and it is surely not rare, but it seems to have been recorded from Nicaragua only once before (Huber, 1932) and the present record is evidently the southernmost for the species. Two adult males, both with much enlarged gonads, were obtained on August 8 and 15; each was in worn body plumage, with molt of the wing and tail feathers begun.

Ramphocoelus passerinii passerinii. Scarlet-rumped Tanager. One of the most abundant and conspicuous birds of the Caribbean slope of Nicaragua is this tanager. It is perhaps most common among the tall grasses, cane, and thickets along the edges of streams, but it is also found frequently at the forest edge, in second growth, or in cultivated areas. Usually these birds range low, from about 10 feet down almost to the ground, but I have occasionally seen one 15 or 20 feet up in a tree. A series was collected in order to obtain gonad samples. Eleven adult males were taken in different years between June 25 and August 22; all had much enlarged testes. Only those adults taken from middle to late August show molt (of the wing and tail feathers) but many young males that were changing from dull greenish plumage to the brilliant red and black of adult males were seen in both years although more often in August. Pairs were noted in late June and early July of 1954, and I did not note evidence of polygamy or numerical superiority of females. An immature male in female-type plumage with minute testes was taken on August 25, and a full-grown juvenal female with the tail in molt was collected on July 11. Adult females were taken on June 24 and July 6. The former had an incubation patch and follicles enlarged to 2×2 mm.; the latter had follicles slightly less enlarged.

This species is called "Sargento" in Nicaragua although that name is more properly applied to the Redwing (*Agelaius phoenicius*) with its red "chevrons." The two species do not occur in the same parts of Nicaragua, and the tanager is far more common.

Phlogothraupis sanguinolenta aprica. Crimson-collared Tanager. These tanagers were seen regularly at the forest edge, usually from about 5 to 15 feet up. On June 24, an immature female was taken; the plumage was dull with very little red, and the bill was bluish white. The ovary was not enlarged.

Habia gutturalis discolor. Red-throated Ant Tanager. One of the first species in the forest to respond to "squeaking" is this tanager, and its harsh scolding note is a characteristic sound at the low levels of both second-growth and mature forest. Ant tanagers were always encountered in flocks of several individuals, and these were often accompanied by manakins, formicariids, wrens, and other passerines. The tanagers range from almost to the ground up to about 10 feet, usually at the lower levels; they seemed equally common whether or not a trail of ants was nearby. Four out of six specimens collected are in molt. A female taken on June 29 is moderately worn but not molting. An adult male in red plumage, testes 10×7 mm., was in very worn plumage; wing coverts were in pin-feathers,

and molt of the remiges was just starting. Two immature males in greenish plumage collected on July 11 were farther along in molt of the wing feathers. A female taken on August 6, its ovary not enlarged, was in worn plumage but not in molt. A male in red plumage collected on August 9 had unenlarged testes; the throat, crown, and wing coverts were in pin-feathers, and the remiges were in molt. In all of these specimens the worn rectrices were still present.

These birds are less blackish than examples of *fuscicauda* from Costa Rica and thus represent the race *discolor*.

Eucometis penicillata spodocephala. Gray-headed Tanager. Only one individual of this species was seen, and that was an immature male collected in well-shaded second-growth forest on August 24. The skull was single-layered, the testes were not enlarged, and a few green feathers were mixed in with the gray ones of the head. The primaries were in molt. This species is generally considered an inhabitant of more arid habitats north of Costa Rica and finding it in the Caribbean rain forest in Nicaragua is of interest.

Tachyphonus luctuosus axillaris. White-shouldered Tanager. These small tanagers were encountered only twice at El Recreo. On July 8, a small group of about two males and two females was seen working rapidly through some small trees at the edge of a road through mature forest. On August 12, 1953, a slightly larger group was encountered in a bamboo clump at the edge of second-growth forest, and the only adult male seen was collected. This bird had enlarged testes (4×3 mm.) and was in worn plumage; the wing feathers alone were in molt.

Tachyphonus delattrii. Tawny-crested Tanager. On July 3, two males of this species were seen in a large tree at the edge of mature forest. A few moments later, a female was collected near the same spot. This bird had an incubation patch and large follicles up to 5 mm. in diameter. On August 21, in a similar habitat, I saw two males as they moved rapidly past about 12 feet up in some small trees.

Huber (1929) described the subspecies *longirostris* on the basis of larger size, especially culmen length, and he gave the range of the race only as "the Caribbean slope of Nicaragua and adjacent highlands southward." Average measurements are given for birds from Costa Rica and Colombia, but extremes of the measurements taken are given only for three adult males of *longirostris* from the type locality (Great Falls, Pis Pis River) and from Eden, only 10 miles away. Huber presumably included Costa Rica in the range of *longirostris*, but this is not definitely stated in his paper. Hellmayr (1936) assigned Costa Rica birds to the race *delattrii* but said that they averaged slightly larger and thus approached the characters of *longirostris*. He had seen one male from Nicaragua, exact locality not given, and said that it had "a longer bill than any specimens from farther south." The single female from El Recreo measures (in mm.) as follows: wing, 67; tail, 59; exposed culmen, 12. The average of two adult females from Colombia, as given by Huber, is: wing, 63.3; tail, 52.4; exposed culmen, 12.9. This Nicaragua female, apparently the only one of this species ever taken there, is thus slightly larger in wing and tail measurements but has a shorter culmen than the Colombian "average." A single female from Carillo, Costa Rica, has measurements differing less than 1 mm. from those of the Nicaragua female and does not differ in color. It is impossible to say on the basis of available information whether or not *longirostris* is a valid form, but the limited data suggest that there may be a cline in size from Nicaragua at least to Colombia.

Saltator maximus magnoides. Buff-throated Saltator. These saltators were abundant at the edge of clearings, along stream borders, and in the trees in both second-growth and the edge of mature forest, often ranging high up in large trees although usually they were found lower down. The calls and songs of this species were as described by Skutch (1954*a*). It appeared that these saltators were in small flocks rather than in pairs; these may have been family groups. An adult male taken on August 23 had enlarged testes, and an adult female with the ovary slightly enlarged was taken on August 13; both were in moderately worn plumage. Juvenal males, with a few blackish bars on the underparts and no buff on the throat, were collected on August 10 and 23.

Saltator coerulescens grandis. Grayish Saltator. This species was much less common than the preceding and tended to be more secretive. The Grayish Saltator was found only along stream borders and at the forest edge, usually within 10 feet of the ground. One song, as recorded in my field notes, is a four-note *wheép wut-wut teet*. One singing bird was collected and proved to be a female; probably both sexes sing in this species as in the preceding one (Skutch, 1954*a*). An adult male with enlarged testes (12×7 mm.) taken on July 6 was not much worn, but a male taken on August 20 (testes

9×6 mm.) was well worn and showed irregular molt of the rectrices. An adult female taken on August 22 had slightly enlarged follicles; the plumage was very worn but there was no molt.

Pitylus grossus saturatus. Slate-colored Grosbeak. A few of these grosbeaks were encountered in well-shaded second-growth forest, usually about 10 to 15 feet up in the trees along small creeks. A presumed pair was seen on August 7, and the male, an adult with unenlarged testes, was collected. One bird was seen on August 12. An adult female with unenlarged follicles was taken on August 14. On July 1, an adult male with slightly enlarged testes was collected; the wings were in molt, and the throat and crown were in pin-feathers. In all specimens the bill was orange-red.

Cyanocompsa cyanoides caerulescens. Blue-black Grosbeak. A few were seen at the forest edge and along stream borders in both years. Males seemed somewhat warier than females. One specimen, an adult male with enlarged testes, was obtained on July 14. Except for a few pin-feathers on the forehead this bird was in complete fresh plumage.

Caryothraustes poliogaster scapularis. Black-faced Grosbeak. Flocks of this species were encountered among berry-bearing trees at the edge of the forest, or, more usually, within it. These grosbeaks range from the tops of the tallest trees in mature forest down to within six feet of the ground, but the higher levels seem preferred. On August 21, a flock of about 15 birds was observed singing and feeding vigorously on berries during moderate rainfall. The song consists of a harsh *brrack* followed by a few warbled notes. An adult male taken on July 5 had enlarged testes (4×3 mm.) and was in worn plumage; an adult female taken on the same day was in similar plumage but did not have enlarged follicles. Females were taken on August 8 and 16; the ovaries were not enlarged, and the plumage was slightly worn. None of these birds was in molt.

Tiaris olivacea pusilla. Yellow-faced Grassquit. There seem to be no definite published records for this species from Nicaragua. Neither Nutting (1884) nor Richmond (1893) nor Huber (1932) recorded this bird although these authors found other small fringillids of similar habits in abundance, and Hellmayr (1938) was unable to list a single Nicaragua record. As the Yellow-faced Grassquit was present at El Recreo in great numbers, and as I have found it common in other parts of the Caribbean slope of Nicaragua, it is difficult to account for the lack of previous records. However, I feel certain that the species was somehow overlooked and that it has not arrived in this part of Central America only recently.

Next to the Variable Seedeater, this was the most abundant of the fringillids inhabiting the tall grass and adjacent cultivated areas; the Blue-black Grassquit was perhaps less numerous. In June and July, small family groups were seen—a pair of adults with one or two juveniles. In August, much larger flocks of adults and immatures, up to 25 or 30 birds, were noted. In June and July, adult males were observed singing while directing a "begging display" to a female. The males sang from a low perch, leaning forward, tail raised, with wings drooping and fluttering. This display is as described by Skutch (1954*a*), and my observations accord with his also in that the females were not seen to respond in any way. Three males of this species were collected. An immature in female-type plumage was taken on June 28, and a subadult with the black and yellow head pattern partly developed was collected on June 25. Both birds had single-layered skulls and unenlarged testes, and neither was in molt. One with enlarged testes (5×4 mm.) and in fully adult, worn plumage was taken on August 25.

Sporophila torqueola morelleti. White-collared Seedeater. A few pairs of this species were seen in both years in the same habitat—grassy fields—as *S. aurita*; the latter was far more abundant. The habits of the two species seemed similar, but the songs are quite different; that of the White-collared Seedeater has a much "sweeter" quality and sounds more musical to the human ear. One adult male was taken on August 25. This bird had enlarged testes (7×5 mm.) and was in worn plumage; except for a few buffy-brown feathers on the right side of the breast, the plumage was entirely black and white.

Sporophila aurita corvina. Variable Seedeater. This was the most abundant of the small fringillids and was found in great numbers in grassy fields and low thickets at the forest edge. These birds were so numerous that it was difficult to tell whether some were paired or if they consorted entirely in flocks. Almost no individuals in changing plumage were seen, but collecting showed that numerous immature males in female-type plumage were present.

Skutch (1954*a*) has recently discussed the habits of this species, and my observations in the main agree with his. I noticed Variable Seedeaters displaying while singing to females in the same "begging"

Fig. 6. Nicaraguan Seed-Finch (*Oryzoborus nuttingi*), natural size. Drawing by Don R. Eckelberry.

manner as did the Yellow-faced Grassquits. On at least one occasion there seemed to be some mimicry involved; sounds like those of the White-tipped Brown Jay, Social Flycatcher, and Tropical Kingbird were included. Mimicry in the song of this species was reported by Richmond (1893) in his paper on birds in this same part of Nicaragua, but Skutch (1954*a*) states that he has never heard mimicry in other populations.

Eight adult males were taken between August 8 and 25; all had much enlarged testes and were not in molt. An immature male taken on August 8 was in greenish-brown plumage; new primaries were coming in, and they were dark but not black as in adult males. An adult female and three males were

collected on June 25. The female had slightly enlarged follicles and was in worn plumage. Two of the males were fully adult, with enlarged testes; in one bird the rectrices and throat feathers were in molt. The other male also had enlarged testes and a skull that was partly double-layered, and its plumage was changing to that of an adult. The tail was all black, the body plumage was about seven-eighths black, and the wing feathers were still mostly of the immature type.

Oryzoborus nuttingi. Nicaraguan Seed-Finch (fig. 6). A pair of these birds was taken in a large wet meadow adjacent to a small stream and bordered by forest. The male was immediately recognizable by his large pale bill as he perched in the open about four feet above ground. The female appeared out of the tall grass after the male was collected. The testes of the male measured 9×7 mm., and the female had an incubation patch and follicles 2 mm. in diameter; undoubtedly this was a nesting pair. Colors of the fresh specimens were as follows: male, bill ivory flesh color; iris brown; female, bill blackish except for distal part of mandible, which is pale pinkish ivory; iris brown. Both birds are in worn plumage but were not in molt. The crop of the female contained small seeds.

This form, so far as known, is restricted to eastern Nicaragua, although the habitat in which it is found extends considerably north and south of this region. Its nearest relative is undoubtedly the similar *O. crassirostris* of South America, from which *nuttingi* differs chiefly in having a larger bill, an all-black wing in the male, and darker brown coloration in the female. Whether or not Hellmayr (1938) is correct in considering the two forms conspecific is purely a matter of opinion. My feeling is that the unaccountably great distance separating *nuttingi* from *crassirostris* populations, the restricted range of the former, and the observable morphological differences are indicative of long isolation and independent development that has probably reached the species level of differentiation.

Oryzoborus funereus. Thick-billed Seed-Finch. This species was moderately common at the forest edge, sometimes coming out into the fields with the similar-appearing Variable Seedeaters. The seed-finches are rarely seen as high as 15 feet above ground, and this height is usually reached as a song perch for males.

A pair of adults was collected at Bluefields on August 3. The male had much enlarged gonads, but the ovary of the female was unenlarged. An adult male taken at El Recreo on June 29 also had enlarged testes, as did another male in transitional plumage (acquisition of black feathers less than half complete) collected on June 29. An immature male in female-type plumage was taken on August 10; it was acquiring new feathers that are still of the brown female-type coloration in the tail and nape regions. An adult female taken on July 3 had both the tail and wings in molt, but one taken on August 10 had only the wings in molt; the old rectrices were still present.

Volatinia jacarina splendens. Blue-black Grassquit. One of the three most abundant fringillids in the grassy fields was this species. In August, 1953, it seemed decidedly less numerous than the Yellow-faced Grassquit, but in June and July of the following year their numbers were almost equal. At this time the male Blue-black Grassquits were observed frequently in their song-display, as described by Eisenmann (1952). Otherwise, the habits appeared similar to those of the other small fringillids. Adult males with enlarged testes were collected on June 27 and August 8; both birds were in worn plumage.

Arremon aurantiirostris rufidorsalis. Orange-billed Sparrow. Unlike most of the other sparrow-like birds of the area, this species was found only in well-shaded second-growth and mature forest. It was always seen on the ground or within four or five feet of it. Skutch (1954*a*) has described the habits and song of the Orange-billed Sparrow, and my observations agree with his in all details. An adult male with much enlarged testes was collected on August 12; an adult female with enlarged follicles (2 mm.) was taken on July 13. A juvenal male taken on July 6 had little trace of the adult color pattern; this bird was mostly dark greenish, paler and streaked on the abdomen, with black wings and tail. Two immature females taken on August 6 and one on August 7 were approaching the adult color pattern but were only partly black in the pectoral area and have much dusky and greenish color in the center of the abdomen. An immature male taken on August 18 had essentially the adult pattern, but the pectoral band was poorly defined and the bill, like that of all the other immatures, was black.

Arremonops conirostris richmondi. Green-backed Sparrow. This species was abundant in cultivated fields and in thickets along stream borders and the forest edge. Pairs were noted in June and July, and flocks of adults and immatures were seen in August. On June 24, a domed grass nest of this species containing two pure white eggs was found on the ground among tall grass. The embryos were well developed, and this was doubtless a full clutch. Birds in song were heard in all three months.

Skutch (1954*a*) has discussed this species fully, and I can add nothing of importance to his account. Three adult males and four adult females were taken between August 8 and 25; the testes of all males were enlarged, and the ovaries of the females showed slight enlargement. All were in very worn plumage. An incubating female was taken on June 24, and four juveniles including both sexes were taken between August 10 and 19.

DISCUSSION

In Nicaragua, as in other parts of Central America, primeval forest has already disappeared from many areas and is disappearing at varying rates from others. A discussion of the avifauna of a second-growth region should include an attempt at comparison with that of relatively undisturbed forest, noting changes in the status of those species affected by alteration of the habitat. The brief studies in the limited area of El Recreo will not support sweeping generalizations, particularly where negative evidence is involved, but some notes on the abundance or scarcity of certain forms seem worthy of record. In the following list, the status at El Recreo of families that include tropical rain forest species that may have been affected by habitat changes is given.

Certain families of aquatic or marsh birds and others (such as the Pandionidae) for which no suitable habitat was present and of which no records were obtained are omitted. In some instances an absence of records may have no significance from the standpoint of changes in habitat, and the following categories and symbols are used to designate such cases: *inconspicuous or secretive, could have been overlooked; **rare or locally distributed throughout its range, not necessarily "to be expected" anywhere; †absence or scarcity clearly due to lack of suitable habitat (certain water birds).

Tinamidae.—Absent.* Ardeidae.—Scarce.†

Cathartidae.—Black and Turkey vultures abundant; King Vulture scarce.

Accipitridae.—Forest-dwelling types such as *Accipiter, Spizaëtus*, absent**; *Elanoïdes, Ictinia* abundant, probably migratory; *Leucopternis* absent; *Buteo magnirostris* only abundant buteonine.

Falconidae.—Forest-dwelling *Micrastur* species absent**; *Herpetotheres, Falco albigularis* present; *Daptirus* absent.

Cracidae.—Forest-dwelling *Crax, Penelope* absent; thicket-dwelling *Ortalis* abundant.

Phasianidae.—Absent.*

Rallidae.—Three species recorded.

Columbidae.—Abundant. Ruddy and Blue ground doves numerous; Scaled Pigeon present in good numbers; at least one other large, unidentified species present also.

Psittacidae.—Macaws scarce; *Amazona autumnalis, Aratinga finschi, Brotogeris* abundant; *Aratinga astec, Pionus senilis* absent.

Cuculidae.—Edge and pasture-dwelling *Crotophaga* abundant; *Piaya* moderately so; *Neomorphus* breeding in mature forest.

Tytonidae.—One specimen.*

Strigidae.—One species, *Rhinoptynx clamator,* found in cultivated area; one other species heard but not identified.*

Nyctibiidae.—Absent.*

Caprimulgidae.—*Nyctidromus* abundant; others absent.*

Apodidae.—Two species of *Chaetura* abundant; *Cypseloides* encountered once; *Streptoprocne* absent.

Trochilidae.—Low-level feeders abundant, including both forest types and edge species.

Trogonidae.—Scarce. Three species recorded, but only one encountered more than twice.

Alcedinidae.—Scarce.† Momotidae.—Absent. Galbulidae.—Scarce.

Bucconidae.—*Notharchus, Malacoptila* scarce; *Monasa* absent.

Ramphastidae.—Three most common lowland species present in fair numbers.

Picidae.—Only *Centurus pucherani* present in fair numbers; *Phloeoceastes, Dryocopus, Piculus, Veniliornis* scarce.

Dendrocolaptidae.—*Glyphorhynchus, Lepidocolaptes souleyetii* fairly common; *Xiphorhynchus, Dendrocolaptes* rather scarce.

Furnariidae.—Thicket-dwelling *Synallaxis* common; *Xenops* present in fair numbers; one record for *Automolus*; no others.*

Formicariidae.—Many species present, some abundant.

Cotingidae.—Only two (principally open-area dwellers) present (*Tityra, Pachyramphus*); several primeval forest types (*Cotinga, Carpodectes, Rhytipterna, Lathria*) absent.

Pipridae.—Two species abundant, one other present.

Tyrannidae.—Open area and edge dwellers abundant; low-level forest types also present; *Megarhynchus* absent (overlooked?).

Hirundinidae.—Abundant.

Corvidae.—*Psilorhinus* abundant; no other corvid to be expected.

Troglodytidae.—Abundant.

Turdidae.—*Turdus grayi* abundant in wide variety of habitats; *T. assimilis* absent.

Sylviidae.—Both *Polioptila* and *Ramphocaenus* present in numbers.

Cyclarhidae.—Absent (?†). Vireolaniidae.—Absent.** Vireonidae.—Scarce.

Coerebidae.—Abundant. Thraupidae.—Abundant. Fringillidae.—Abundant.

Parulidae.—Only the grassland and edge-dwelling *Chamaethlypis* abundant.

Icteridae.—Except for *Gymnostinops* and *Amblycercus*, surprisingly scarce; *Zarhynchus, Cassidix, Psomocolax* absent; species of *Icterus*, rare.

The trends indicated above are principally those that would be expected. Larger species (*Crax, Penelope*, probably some falconiforms) that usually inhabit primeval or mature forest are likely to disappear in second-growth areas, but other large types that are inhabitants of edge situations or open regions may not only persist but may increase their numbers (*Cathartes, Coragyps, Buteo magnirostris, Ortalis*). Some of the larger to medium-sized forms are rather eurytopic and seem to adapt adequately to disturbances of the original habitat (*Ramphastos, Pteroglossus, Amazona autumnalis*, some columbids); others were unexpectedly scarce (trogons) or absent (motmots). I am at a loss to account for the absence of motmots, and it seems most unlikely that we could have overlooked them, if present, in over six weeks of field work. *Brotogeris* probably would not be found in such numbers on the Caribbean slope were it not for the man-made open areas and edge situations. Aerial feeders such as swifts and swallows do not seem adversely affected by reduction of primeval forest. Puff-birds and jacamars were surprisingly scarce. *Notharchus* is a bird of open country, *Malacoptila* and *Galbula* inhabit low levels of the forest, and both types of habitat were present over large areas.

Among non-oscine passeriform birds, it was encouraging to find that many characteristic rain forest species were present in good numbers in this second-growth area. Many forms that are terrestrial or inhabit the lower levels of the forest (manakins, formicariids) seem to find suitable niches in well-shaded second growth; this is also true of other passerines such as ant tanagers and several kinds of wrens. However, other non-oscine species that are more arboreal (many cotingas, some woodcreepers) appeared decidedly reduced as compared with those in primeval forest regions. Tyrannids seemed especially successful in the habitats at El Recreo, particularly, as would be expected, those species inhabiting edge situations and open areas.

Of the other passerine families, including some that are largely or entirely neotropical, little need be added to the preceding sections of this paper. A few species (*Tangara nigro-cincta, Caryothraustes*) usually found in the tops of large forest trees were frequently encountered close to the ground and in open growth. Some forms, such as *Cassidix*, that would seem well suited to the environment around El Recreo have either not reached it or not become established. The abundance of edge- and grassland-inhabiting tanagers and fringillids, considerably greater than in undisturbed forest areas, has already been noted; some species were probably at maximum possible density.

In summary, although one deplores the inevitable reduction or disappearance of certain species as primeval rain forest is destroyed, there is some compensation in the persistence or increase of many interesting and characteristic tropical forms inhabiting low levels of forest, edge situations, and open areas.

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