# AVIFAUNA OF THE CATEMACO BASIN OF SOUTHERN VERACRUZ, MEXICO

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Rising from the coastal plain of southern Veracruz is a volcanic range known as the Sierra de Tuxtla or Los Tuxtlas (fig. 1). This region is situated in the Veracruz Biotic Province of Goldman and Moore (1945); and although cultivation is underway in many sections of this range, extensive tracts of undisturbed rain forest are still to be found from sea level up to 4000 to 4500 feet, with cloud forest coming in above this altitude. Leopold (1950) refers to the vegetation zone of this area as tropical evergreen forest rather than true rain forest; however, the high annual rainfall of the eastern Catemaco basin (up to 5248 mm.) would indicate that some portions of the Sierra de Tuxtla should be capable of supporting tropical rain forest.

An account of the bird life of a segment of the Tuxtlas range was reported by Wetmore (1943); and since then Firschein (1950), Goodnight and Goodnight (1954), and Firschein and Smith (1956) have written on other aspects of its fauna. All these studies have been limited to the northern portion of this range, principally to the slopes of Volcán San Martín. The investigations have revealed an unusual fauna which can, in all probability, be attributed in part to both the ecological isolation and to the unusual climatic factors. In view of these features, Firschein and Smith (1956) have proposed that the area be designated as a distinct faunal entity, the Catemacan Faunal District, which includes all of the range of the Sierra de Tuxtla above approximately 1000 feet.

Our main purpose in undertaking this study was to learn more of the distribution and population ecology of the avifauna of the Sierra de Tuxtla in a fairly representative locality. Since the village of Coyame on the northeastern shore of Lake Catemaco was roughly centrally located in the Tuxtlas range, we decided to base our operations there from June 28 to July 22, 1954. Our collecting and observations were carried out within approximately a four-mile radius of Coyame at elevations of about 1400 feet with occasional excursions up to 2000 feet.

We wish to acknowledge the courtesy of Mr. John Eiler for making living accommodations available to us during our stay at Coyame. We should also like to thank the authorities of the United States National Museum for the use of their bird collections for comparative material. Almost all of the specimens we collected at Coyame are now in the Carnegie Museum of Pittsburgh. The remaining few are in the George M. Sutton collection at the University of Oklahoma.

## CLIMATE

The Lake Catemaco basin opens to the north by a valley to the Gulf of Mexico, thereby permitting the humid air masses from the Gulf ready access into this region. During the months from October to February cold, moist, air masses (nortes) from the Gulf frequently penetrate this region. As these air masses rise, owing to the orography of the Tuxtlas foothills, they very often produce rain. Because of this feature there is no well defined dry season, and the remaining months from March to September are characterized by a rainy season which is favored by the above mentioned orographic lift.

The average yearly rainfall for typical localities within and surrounding the Sierra de Tuxtla were as follows from 1947 to 1953: Coyame, 3781 mm.; Santiago Tuxtla, 2314 mm.; Catemaco, 1963 mm.; San Andrés Tuxtla, 1855 mm.; Alvarado, 1466 mm.; and Acayucan, 1358 mm. From these figures it can be seen that the region around Coyame appears to be a center of high precipitation. During 1952 the annual rainfall

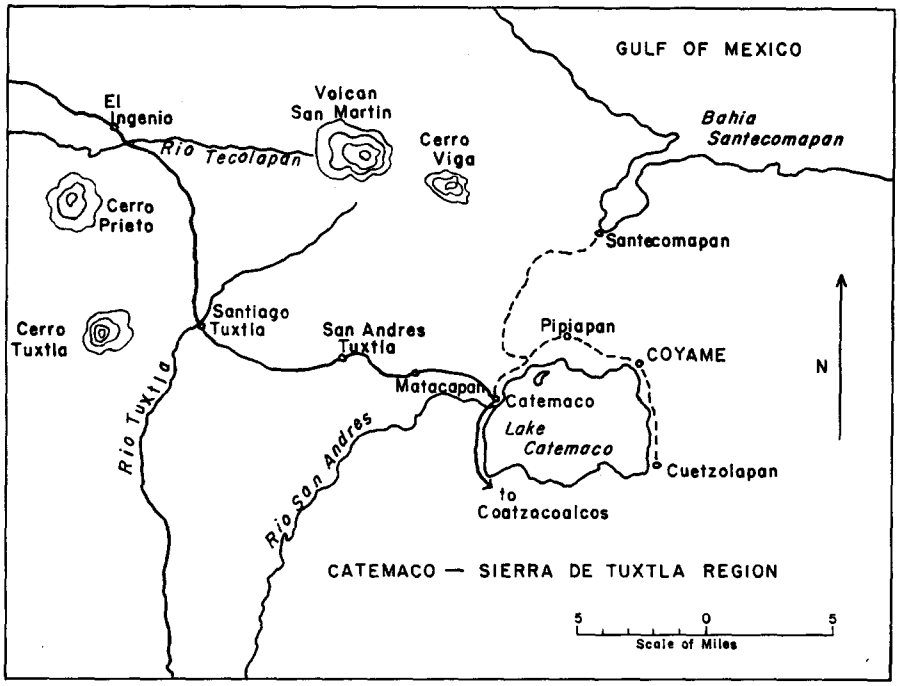


Fig. 1. Outline map showing the Sierra de Tuxtla region of southern Veracruz, México.

reached 5248 mm. at Coyame and 2806 mm. at Catemaco. It is rather remarkable that Coyame should receive about twice as much rainfall as Catemaco which is at a similar altitude some 15 miles to the west.

The average monthly temperatures for 1952–1953 in these two areas were very similar, ranging from a low of 18.5°C. at Coyame and 19.5°C. at Catemaco in January to highs of 26.3°C. at Catemaco and 27.4°C. at Coyame in March.

During our 26-day stay at Coyame, the rainfall averaged about 40 mm. a day, and on 10 of these days it exceeded 60 mm. The temperature remained quite uniform, never dropping below 21°C. or rising above 28°C. A somewhat higher range of 22.8° to 32°C. was recorded from the rain forest of northern Chiapas (Palenque) from July 7 to 20, 1949, by Goodnight and Goodnight (1956). The wind at Coyame was invariably from the northeast.

## ECOLOGICAL DISTRIBUTION AND RELATIVE ABUNDANCE

As we planned to confine our study to the avifauna of a rather limited area, it was felt that a descriptive analysis of the relative abundance and distribution of its species could be undertaken. After the first few days at Coyame, the pattern of our trips into the surrounding region was established so that representative habitats were visited over the same trails and approximately between the same hours of the day (8:00 a.m. to 2:00 p.m.). The relative frequency of occurrence of each species was then determined by dividing the number of days it was recorded in a particular habitat by the total number of days spent in observation. All of the frequency data were based on a total of 21 days. Obviously, the abundance of secretive and nocturnal species, as well as some treetop species, could not be adequately estimated by this method.

*Rain forest.*—The predominant habitat in the vicinity of Coyame was the rain forest, and as would be expected, a large proportion of the resident birds and other animals were closely associated with it.

Situated as it was near the higher mountains of the Sierra de Tuxtla, it was not surprising that the forest of our study area showed a few species usually associated with cloud forest. As Wetmore (1943) suggests, it is apparent that the high and constant rainfall, along with the cold winter air masses which characterize this region, are largely responsible for maintaining the cloud-forest and high rain-forest species at levels down to about 1200 feet. These species, all present in relatively small numbers, included the following:

*Odontophorus guttatus*, Spotted Partridge
*Aulacorhynchus prasinus*, Emerald Toucanet
*Myadestes unicolor*, Slate-colored Solitaire
*Catharus mexicanus*, Black-headed Nightingale-Thrush
*Piranga leucoptera*, White-winged Tanager

With the exception of the Chestnut-capped Atlapetes (*Atlapetes brunnei-nucha apertus*), we did not find any of the other unusual species reported by Wetmore (1943) from the upper slopes of Volcán San Martín. The atlapetes was a common resident of the rain-forest understory, even though it was previously known only from above 2500 feet on Volcán San Martín and Cerro Tuxtla (*ibid.*). We found the Slate-colored Solitaire to be rare in our area although it was reported (*ibid.*) as the most common bird on Volcán San Martín.

The birds which seemed to be specifically associated with the interior of the forest (although some of these could often be found near the edge) were as follows, in order of relative frequency of occurrence, excluding the five typical cloud-forest species noted previously:

| Species | Frequency (per cent) |
|---|---|
| *Henicorhina leucosticta*, White-breasted Wood Wren | 100 |
| *Turdus assimilis*, White-necked Robin | 100 |
| *Caryothraustes poliogaster*, Black-faced Grosbeak | 100 |
| *Momotus momota*, Blue-crowned Motmot | 95 |
| *Cyanerpes cyaneus*, Blue Honeycreeper | 95 |
| *Habia gutturalis*, Rosy-throated Ant-Tanager | 95 |
| *Amazilia candida*, White-bellied Emerald | 86 |
| *Cyanocorax yncas*, Green Jay | 86 |
| *Habia rubica*, Red Ant-Tanager | 81 |
| *Xiphorhynchus flavigaster*, Ivory-billed Woodhewer | 76 |
| *Automolus ochrolaemus*, Buff-throated Automolus | 76 |
| *Leptotila verreauxi*, White-fronted Dove | 71 |
| *Hylophilus decurtatus*, Gray-headed Greenlet | 67 |
| *Basileuterus culicivorus*, Golden-crowned Warbler | 62 |
| *Amblycercus holosericeus*, Prévost Cacique | 57 |
| *Atlapetes brunnei-nucha*, Chestnut-capped Atlapetes | 52 |
| *Columba nigrirostris*, Short-billed Pigeon | 48 |
| *Trogon violaceus*, Gartered Trogon | 48 |
| *Columba speciosa*, Scaled Pigeon | 43 |
| *Platyrinchus mystaceus*, Spade-billed Flycatcher | 43 |
| *Pipromorpha oleaginea*, Oleaginous Pipromorpha | 43 |
| *Sittasomus griseicapillus*, Olivaceous Woodhewer | 38 |
| *Phaethornis superciliosus*, Hermit | 33 |
| *Trogon collaris*, Collared Trogon | 33 |
| *Hylophilus ochraceiceps*, Tawny-crowned Greenlet | 33 |
| *Cyanocompsa cyanoides*, Blue-black Grosbeak | 33 |
| *Geotrygon montana*, Ruddy Quail-Dove | 29 |
| *Campylopterus hemileucurus*, DeLattre Sabre-wing | 29 |
| *Dendrocincla anabatina*, Tawny-winged Woodhewer | 29 |
| *Xenops minutus*, Least Tree-runner | 29 |
| *Myiobius sulphureipygius*, Sulphur-rumped Flycatcher | 29 |
| *Leucopternis albicollis*, White Hawk | 24 |
| *Lanio aurantius*, Shrike-Tanager | 24 |

| Species | Frequency (per cent) | Species | Frequency (per cent) |
|---|---|---|---|
| *Phaethornis longuemareus,* Longuemare Hermit | 19 | *Rhynchocyclus brevirostris,* Eye-ringed Flat-billed Flycatcher | 14 |
| *Lepidocolaptes souleyettii,* Streaked-headed Woodhewer | 19 | *Hylomanes momotula,* Tody Motmot | 10 |
| *Eucometis penicillata,* Gray-headed Tanager | 19 | *Tolmomyias sulphurescens,* Sulphury Flat-billed Flycatcher | 10 |
| *Crax rubra,* Curassow | 14 | *Oncostoma cinereigulare,* Bent-billed Flycatcher | 10 |
| *Leptotila plumbeiceps,* Gray-headed Dove | 14 | *Accipiter bicolor,* Bicolored Hawk | 5 |
| *Celeus castaneus,* Chestnut Woodpecker | 14 | *Pionopsitta haematotis,* Red-eared Parrot | 5 |
| *Formicarius analis,* Black-faced Antthrush | 14 | *Pipra mentalis,* Yellow-thighed Manakin | 5 |

All the foregoing species with a frequency rating of 50 per cent or greater seemed to be especially successful in meeting the demands of the rain forest. All strata from the ground to the upper tree story were inhabited by one or more of these species; these ranged from such typical ground feeders as *Leptotila verreauxi* and *Atlapetes brunneinucha* to *Hylophilus decurtatus* and *Caryothraustes poliogaster* of the treetops. These 16 abundant species showed a variety of nesting habits, but none built a hanging nest with a thatched roof, which would seem to be the most advantageous type. None fed on flying insects to any great extent.

Within the rain forest the feeding activities of the birds were governed largely by the duration of the rain showers. On many days there seemed scarcely a moment when the birds could feed uninterrupted by moderate to heavy rain. On other days, when the rains were not excessive, the birds were noticeably active between showers. Many of the nests that we found were built in holes or under some overhanging object, or else they were roofed over. Selection in such an environment must favor those types which can find food easily during the brief lulls in the rain as well as those which build well-sheltered nests.

The following facts regarding the birds associated with the interior of the rain forest were evident. Birds of prey were not common. Pigeons and doves were numerous and varied, either seed eaters of the forest floor or fruit eaters of the uppermost canopy. Only one small flock of parrots was seen on one occasion. Hummingbirds were more abundant and varied in the forest than in the forest edge or open fields. Woodhewers were much more common than woodpeckers, and the only woodpecker restricted largely to the interior of the forest, *Celeus castaneus,* was not common. The Tropical Pileated Woodpecker and the Guatemalan Ivory-billed Woodpecker, usually reasonably common in somewhat similar situations in other areas, were not observed. Six kinds of flycatchers occurred here, but were far less numerous than their close relatives in the forest edge and open fields. None of the other groups was represented by more than three species except the tanagers with two abundant and three uncommon species.

*Interspecies flocking.*—In a study of eight loose flocks of birds observed in the rain forest in mid-July, only two consisted entirely of interior rain-forest species; the other six included some forest-edge species as well. However, the nuclear species of these flocks seemed to be interior rain-forest birds such as *Caryothraustes poliogaster* of the high forest, *Xiphorhynchus flavigaster* of the middle and lower levels, and *Automolus ochrolaemus* and *Henicorhina leucosticta* of the low trees and shrubs. All these were noisy and active birds, and each of them was to be found in some five of the eight flocks. None of the flocks contained fewer than two of these species. Other species which could be found in as many as three of the eight flocks were: *Habia gutturalis, Basileuterus culicivorus, Turdus assimilis,* and *Cyanerpes cyaneus*; all are interior forest species. Thirty-four other species were associated with one or another of the flocks as circumferential

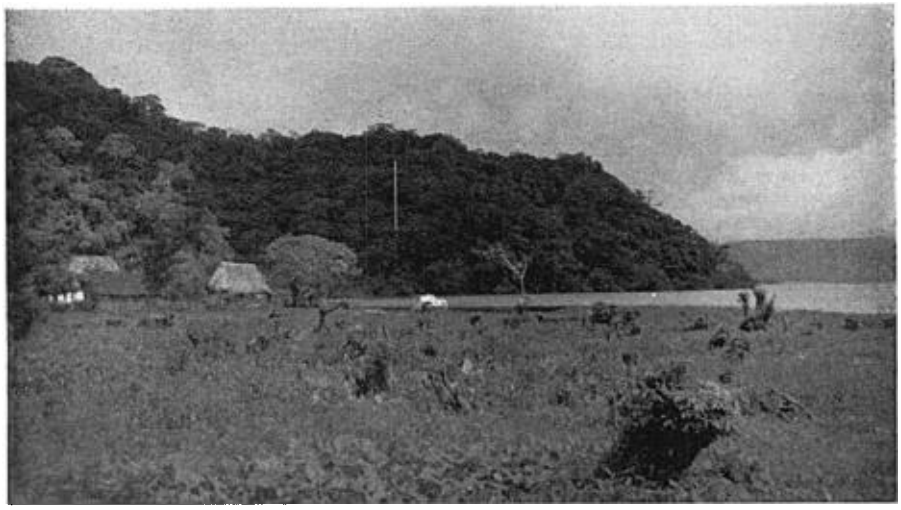

Fig. 2. Rain forest and cleared field bordering Lake Catemaco at Coyame.

species, and several of these were characteristic species of the forest edge. The most common of these apparently circumferential forms included: *Hylophilus decurtatus, Habia rubica, Lanio aurantius, Hylophilus ochraceiceps, Myiarchus tuberculifer, Pipromorpha oleaginea, Cyanocorax yncas,* and *Trogon violaceus* (see frontispiece, opposite p. 305), and some of these may actually have been serving as nuclear species on some occasions. The remaining forms did not appear to be instrumental in forming any of the observed flocks.

The two ant-tanagers, *Habia rubica* and *H. gutturalis,* were never observed together in the same flock unless other species of birds were present. These ant-tanagers could be readily distinguished in interspecies flocks by their calls, the chatter of *H. gutturalis* being slower, lower in pitch, and much more rasping than that of *H. rubica.*

*Forest edge.*—The edge of the rain forest seemed to provide a suitable habitat for many species which seldom penetrated far into the forest and likewise were not well adapted for life in the open fields. Some of these birds also occurred in hedgerows or patches of second growth, although others did not frequent such places. These forest-edge species were perhaps influenced even more by the heavy rains than were the interior forest birds, since many of them fed on flying insects. The following list indicates occurrence and relative abundance of distinctively forest-edge species:

| Species | Frequency (per cent) |
|---|---|
| *Columbigallina talpacoti,* Talpacoti Dove | 100 |
| *Campylopterus curvipennis,* Sabre-wing | 100 |
| *Centurus aurifrons,* Golden-fronted Woodpecker | 100 |
| *Myiozetetes similis,* Vermilion-crowned Flycatcher | 100 |
| *Thryothorus maculipectus,* Spotted-breasted Wren | 100 |
| *Turdus grayi,* Clay-colored Robin | 100 |
| *Dives dives,* Sumichrast Blackbird | 100 |
| *Tyrannus melancholicus,* Tropical Kingbird | 95 |
| *Ramphastos sulfuratus,* Keel-billed Toucan | 90 |
| *Myiarchus tuberculifer,* Olivaceous Flycatcher | 90 |
| *Thraupis abbas,* Abbot Tanager | 90 |
| *Saltator atriceps,* Black-headed Saltator | 90 |
| *Columba flavirostris,* Red-billed Pigeon | 86 |
| *Claravis pretiosa,* Blue Ground Dove | 86 |
| *Pitangus sulphuratus,* Kiskadee Flycatcher | 86 |
| *Vireo olivaceus,* Red-eyed Vireo | 86 |
| *Myiodynastes luteiventris,* Sulphur-bellied Flycatcher | 81 |

| Species | Frequency (per cent) |
|---|---|
| *Megarhynchus pitangua*, Boat-billed Flycatcher | 81 |
| *Gymnostinops montezuma*, Montezuma Oropendola | 81 |
| *Saltator coerulescens*, Gray Saltator | 81 |
| *Arremonops rufivirgata*, Olive Sparrow | 76 |
| *Tityra semifasciata*, Masked Tityra | 70 |
| *Phlogothraupis sanguinolenta*, Crimson-collared Tanager | 70 |
| *Elaenia flavogaster*, Yellow-bellied Elaenia | 67 |
| *Tanagra lauta*, Thick-billed Euphonia | 62 |
| *Piculus rubiginosus*, Red-capped Green Woodpecker | 57 |
| *Synallaxis erythrothorax*, Rufous-breasted Spinetail | 57 |
| *Myiarchus tyrannulus*, Wied Flycatcher | 57 |
| *Campylorhynchus zonatus*, Banded-backed Wren | 48 |
| *Piaya cayana*, Squirrel Cuckoo | 43 |
| *Ramphocaenus rufiventris*, Long-billed Ant-wren | 43 |
| *Nyctidromus albicollis*, Parauque | 38 |
| *Thraupis virens*, Blue-gray Tanager | 38 |
| *Amazilia tzacatl*, Rieffer Hummingbird | 33 |
| *Troglodytes musculus*, Southern House Wren | 33 |
| *Basileuterus rufifrons*, Rufous-capped Warbler | 33 |
| *Psilorhinus morio*, Brown Jay | 29 |
| *Tangavius aeneus*, Red-eyed Cowbird | 29 |
| *Buteo nitidus*, Gray Hawk | 24 |
| *Falco albigularis*, White-throated Falcon | 24 |
| *Ortalis vetula*, Common Chachalaca | 24 |
| *Richmondena cardinalis*, Cardinal | 24 |
| *Buteo magnirostris*, Insect Hawk | 19 |
| *Contopus cinereus*, Tropical Pewee | 19 |
| *Icterus prosthemelas*, Black-cowled Oriole | 19 |
| *Centurus pucherani*, Pucheran Woodpecker | 14 |
| *Thamnophilus doliatus*, Barred Antshrike | 14 |
| *Attila spadiceus*, Polymorphic Attila | 14 |
| *Scardafella inca*, Inca Dove | 10 |
| *Crotophaga sulcirostris*, Groove-billed Ani | 10 |
| *Veniliornis fumigatus*, Smoky-brown Woodpecker | 10 |
| *Legatus leucophaius*, Pirate Flycatcher | 10 |
| *Aimophila rufescens*, Rusty Sparrow | 10 |
| *Buteogallus anthracinus*, Crab Hawk | 5 |
| *Columbigallina minuta*, Plain-breasted Ground Dove | 5 |
| *Glaucidium brasilianum*, Streaked Pygmy Owl | 5 |
| *Platypsaris aglaiae*, Rose-throated Becard | 5 |
| *Myiodynastes maculatus*, Streaked Flycatcher | 5 |
| *Icterus mesomelas*, Yellow-tailed Oriole | 5 |

Stratification as to forest level was much less pronounced along the forest edge than in the forest, with fewer species strongly associated with any particular stratum. Among the Columbidae there was the contrast between the ground-feeding *Columbigallina talpacoti* and the treetop *Columba flavirostris*, but in most families the birds ranged regularly from near the ground to the treetops. Most of the birds of prey were in this type of habitat and doubtless found hunting more rewarding in such relatively open areas. Pigeons and doves were at least as numerous here as within the forest. The Golden-fronted Woodpecker (*Centurus aurifrons*) and the Red-capped Green Woodpecker (*Piculus rubiginosus*) showed frequencies of 100 and 57 per cent, respectively, in contrast to the rarity of woodpeckers inside the rain forest. At least six species of flycatchers were abundant in the forest edge, and several others occurred there in lesser numbers. This was easily the predominant family of the forest edge, and there was no group within the forest which had so many species in abundance. Seven kinds of these forest-edge flycatchers habitually rear their young in tree holes, roofed hanging nests, or globular nests with side entrances; however, some of these species were not as numerous as others which had open-topped, bowl-shaped nests. It is somewhat surprising that the Yellow-bellied Elaenia, which was abundant in the present study, was found by Wetmore (1943) to be exceedingly rare. Among the wrens, thrushes, and vireos, *Thryothorus maculipectus*, *Turdus grayi*, and *Vireo olivaceus* were abundant. The Icteridae, Thraupidae, and Fringillidae were each represented by several species, and usually at least two of these were abundant. Wetmore (1943) lists the Montezuma Oropendola (*Gymnostinops montezuma*) and the Black-cowled Oriole (*Icterus prosthemelas*) as rare around Tres

Zapotes. *Icterus prosthemelas* was likewise uncommon in our study area; *G. montezuma,* however, was an abundant forest-edge species.

*Open fields.*—In the few open fields which had been cleared and were being used for pasture, only the following four species occurred in regular association with the grassland:

| Species | Frequency (per cent) | Species | Frequency (per cent) |
|---|---|---|---|
| *Sporophila torqueola,* White-collared Seedeater | 100 | *Volatinia jacarina,* Blue-black Grassquit | 57 |
| *Tiaris olivacea,* Yellow-faced Grassquit | 95 | *Chamaethlypis poliocephala,* Ground Chat | 48 |

*Lake and shore.*—Twelve species were noted regularly associated with the lake, its shore, and nearby marshes, as follows:

| Species | Frequency (per cent) | Species | Frequency (per cent) |
|---|---|---|---|
| *Ceryle torquata,* Ringed Kingfisher | 100 | *Chloroceryle amazona,* Big Green Kingfisher | 29 |
| *Phalacrocorax olivaceus,* Olivaceous Cormorant | 86 | *Iridoprocne albilinea,* Mangrove Swallow | 24 |
| *Butorides virescens,* Little Green Heron | 76 | *Pelecanus occidentalis,* Brown Pelican | 5 |
| *Podilymbus podiceps,* Pied-billed Grebe | 52 | *Leucophoyx thula,* Snowy Egret | 5 |
| *Chloroceryle americana,* Little Green Kingfisher | 48 | *Jacana spinosa,* Jacana | 5 |
| | | *Larus atricilla,* Laughing Gull | 5 |
| | | *Sayornis nigricans,* Black Phoebe | 5 |

Although some fledgling Little Green Herons (*B. virescens*) were seen, the marshes in our study area did not appear to support a large number of characteristic marsh species.

*Wide ranging forms.*—The King Vulture (*Sarcoramphus papa*), Black Vulture (*Coragyps atratus*), Turkey Vulture (*Cathartes aura*), and Vaux Swift (*Chaetura vauxi*) ranged widely over all of the major habitats. Black Vultures were observed many times feeding on a dead cow in an open field near the lake; the other two species of vultures, however, were never seen to feed. No nests of these wide-ranging birds were located.

## MISCELLANEOUS NOTES

The following is a discussion of the nesting, behavior, and taxonomy of selected species.

*Columba nigrirostris.* Short-billed Pigeon. Although moderately common, this pigeon did not appear in flocks. It called persistently from the rain forest, a soft *waddle, wat-wat-waddle.*

*Claravis pretiosa.* Blue Ground Dove. Belying its name, this dove usually called from the tops of high trees. Its call, a low-pitched *hoot,* was sometimes given in loose combinations of two.

*Geotrygon montana montana.* Ruddy Quail-Dove. An occupied nest was found on July 19, a light structure of sticks and dead leaves located about five feet from the ground on an almost horizontal section of a large bent tree trunk (fig. 3). The nest varied in depth from two inches on the lower side, to the thickness of a leaf on the upper side. One of the two pale flesh-colored eggs measured 31 by 23 mm. It was possible to approach to within about six feet of the nest before the incubating bird would leave. The bird sat with its tail feathers held tightly together and pointed almost vertically upward (fig. 4). It was interesting to note that the bird turned to keep its tail toward the observer, as one walked around the nest. The first nestling hatched on the third day of observation (July 22) and was covered with pale buff down. The second egg was pipped at this time. Wetmore (1943) reports a breeding male on May 9 from Tres Zapotes.

*Phaethornis superciliosus veraecrucis.* Hermit. This hummingbird had the habit of frequently hovering directly in front of the observer, at which time the long central tail feathers were usually held together.

*Phaethornis longuemareus adolphi*. Longuemare Hermit. The behavior of this species is much like that of *P. superciliosus*.

*Campylopterus curvipennis excellens*. Sabre-wing. In large head size, thickness of bill, and long tail, our specimens are quite distinct from other individuals of this species from other portions of its range. It seems more likely, however, that this form is a well-marked subspecies rather than a separate species. In behavior, including its bubbling call, it appears indistinguishable from *C. curvipennis* in other parts of its range.

Fig. 3. Nest of the Ruddy Quail-Dove (*Geotrygon montana montana*) soon after first egg hatched.

Fig. 4. Nest of the Ruddy Quail-Dove showing characteristic posture of incubating bird when disturbed.

*Campylopterus hemileucurus hemileucurus*. DeLattre Sabre-wing. A nest with two young was discovered in a narrow ravine on July 12. The nest was saddled on two palm leaf petioles at the point where they crossed each other. It was cup-shaped and constructed almost entirely of trailing moss plus a few small plant stems and rootlets inside the cup. The diameter of the nest was 45 mm. on the inside and 70–100 mm. on the outside, while the cup was 25 mm. deep inside and roughly 50 mm. outside with several loose strands of moss and rootlets hanging down. The nest was protected from above by an overhanging leaf and a rock wall.

*Amazilia tzacatl tzacatl*. Rieffer Hummingbird. A nest of this hummingbird, constructed of buff-colored plant down and covered on the outside with lichens, was found on July 8. It was situated about five feet above ground in the crotch of a shrub (fig. 5) at the forest edge. The nest was 22–25 mm. deep inside and 43 mm. outside. Its inside and outside diameters were 28 and 40–42 mm., respectively. Wetmore (1943) discovered a nest with eggs of this species on April 2 in heavy forest.

*Automolus ochrolaemus cervinigularis*. Buff-throated Automolus. This abundant ovenbird of the rain-forest understory had a great variety of calls, from a high-pitched whinny or loud, full trill to a musical *quirt* and a rasping *cr-a-a-k*.

*Formicarius analis moniliger*. Black-faced Antthrush. The song of this secretive antbird was a series of musical notes, mostly on one pitch, but with the last two or three notes on a higher pitch. Its alarm note was a loud *pul-lawt* or *pu-tewt*. The bird walked along the ground with its tail pointing up.

*Pipra mentalis mentalis*. Yellow-thighed Manakin. Its song was a long high-pitched note, sliding up and then down the scale, preceded by some quiet chips and succeeded by a rather loud *pit*.

*Sayornis nigricans nigricans*. Black Phoebe. One specimen, an immature male, taken on July 20 at lake level, was unexpected at such a low elevation.

*Myiobius sulphureipygius sulphureipygius*. Sulphur-rumped Flycatcher. The actions of this fly-

catcher were reminiscent of those of a redstart, and the yellow flash of the rump heightened the impression of similarity to *Setophaga ruticilla*. It was not seen to make any sorties into the air for flying insects.

*Platyrinchus mystaceus cancrominus*. Spade-billed Flycatcher. Noted in dense thickets, or in more open areas within the rain forest close to the ground. It often sat quietly, but when calling it could be readily located. The call was a rather rasping, petulant *pit-di-di-dit,* or *pit-di-dit,* with the first note sharply accented. Frequently the bird would quickly reverse its position on a twig just before flying off to a new perch.

Fig. 5. Nest of the Rieffer Hummingbird (*Amazilia tzacatl*).

*Tolmomyias sulphurescens*. Sulphury Flat-billed Flycatcher. Although no specimens were obtained, one pair was observed feeding young in its hanging, enclosed nest. The nest was much farther above the ground (approximately 40 feet) than any other nests of this species previously observed by us.

*Elaenia flavogaster subpagana*. Yellow-bellied Elaenia. This flycatcher behaved at times somewhat like a robin, flying rather rapidly for some distance, perching in the branches of large fruit trees, and actively feeding on small drupes. At other times its actions and calls were like those of a Tropical Kingbird (*Tyrannus melancholicus*) on a more subdued scale. Its usual call was a slow, rasping *wee-e-e-r,* much like that of the Western Wood Pewee (*Contopus richardsonii*).

*Pipromorpha oleaginea assimilis*. Oleaginous Pipromorpha. The actions of this species were often more like those of a vireo than of a conventional flycatcher. In a forest ravine, on July 12, a nest was found hanging from a small root which stuck out from a low cliff about 16 feet above a stream bed. The root was so flexible that the weight of the nest made it extend straight down with the nest resting against the cliff. The nest was an enclosed structure with a side entrance, the outer shell consisting

almost entirely of straight, slender plant runners, many of which were still growing in the humid environment. Three pure white eggs were in the nest. One of these eggs measured 22 by 15 mm. The incubating bird remained on the eggs until approached to within about three feet. Wetmore (1943) records breeding birds of this species between March 29 and April 21 from the Sierra de Tuxtla.

*Campylorhynchus zonatus zonatus.* Banded-backed Wren. Our one specimen differs from all specimens of *C. z. restrictus* from southern Veracruz in the United States National Museum except for one from San Andres Tuxtla. The individuals from the Sierra de Tuxtla are probably intergrades between *restrictus* and *zonatus* (Pac. Coast Avif. No. 33, 1957:150).

*Myadestes unicolor unicolor.* Slate-colored Solitaire. An occupied nest was discovered on July 12, in the same low cliff which held the nest of *Pipromorpha oleaginea.* The solitaire's nest was made like that of a phoebe, constructed partially of mosses and set in a little niche in the cliff about 12 feet above stream level. When flushed from its nest, the incubating bird flew to a perch nearby and sang. A specimen from the Sierra de Tuxtla in the United States National Museum was nesting on May 12.

*Ramphocaenus rufiventris rufiventris.* Long-billed Ant-wren. This inconspicuous ant-wren frequented dense thickets and was rarely seen except when singing. Its song was a musical trill, sometimes rising or falling in pitch toward the end.

*Hylophilus ochraceiceps ochraceiceps.* Tawny-crowned Greenlet. The usual song of this vireo was quite different from that of *Hylophilus decurtatus,* being usually an ascending trill followed by a lower-pitched single note.

*Thraupis abbas.* Abbot Tanager. A pair nested about 12 feet from the ground in an orange tree. The parents often came to the nest, which contained young, without any obvious food in their bills.

*Habia gutturalis salvini.* Rosy-throated Ant-Tanager. Judging from one of our specimens and a few in the United States National Museum, some males of this species come into breeding condition before molting into the full red adult plumage. A breeding male (May 9) in immature plumage is also recorded by Wetmore (1943) from the Sierra de Tuxtla.

*Lanio aurantius aurantius.* Shrike Tanager. This uncommon bird of the heavy forest had a wide variety of calls and songs, one of the calls closely resembling the several-noted call of the Summer Tanager (*Piranga rubra*).

*Eucometis penicillata pallida.* Gray-headed Tanager. Its call note is a high-pitched *chewt.* The bird is somewhat thrush-like in its actions, standing high on its legs, and flicking its tail and wings nervously. It usually frequented the heavy forest undergrowth.

*Saltator atriceps suffuscus.* Black-headed Saltator. All of our adult specimens are comparable to material in the United States National Museum from Tres Zapotes, Veracruz, showing the buffy-brownish throat color. One of the immature males has the lower mandible, tomium, and terminal portion of the upper mandible yellowish buff, and the throat largely whitish. A nest occupied by two nestlings was discovered on July 21 in a partly overgrown field. It was located about eight feet above the ground in the crotch of a small tree and was constructed mainly of twigs and lined with small vines. The nest measured approximately nine by five inches across and five inches deep on the outside, and it was four by three inches across and two and a half inches deep on the inside.

*Cyanocompsa cyanoides concreta.* Blue-black Grosbeak. One of our male specimens was a subadult, largely dark brown, but with some blue-black feathers coming in. Its call was a metallic clinking note, reminiscent of that of the Tropical Pileated Woodpecker (*Dryocopus lineatus*). Several notes were given in succession at times.

*Tiaris olivacea pusilla.* Yellow-faced Grassquit. A nest of this grassquit was located on July 8, about a foot from the ground between weed stems in a pasture. It was ovoid in shape and completely enclosed except for a side entrance. The eggs were white with brownish vermiculations.

*Atlapetes brunnei-nucha apertus.* Chestnut-capped Atlapetes. Individuals were collected in various stages of development, including one stub-tailed fledgling. These young birds did not differ markedly from the young of other races of *A. brunnei-nucha* in comparable stages (Parkes, 1957). The call note of the adult is a very high-pitched *zeet,* and the song is a series of high-pitched notes. What appears to be the first known nest of *A. b. apertus* was discovered on July 21. The adult bird was flushed from the nest (fig. 6), which was situated about seven and a half feet above the ground in the center of a small chocha palm in the heavy forest. The nest was an open cup made almost entirely of leaves with a few twigs woven in, and the cup was lined with rootlets. The entire structure was eight and a half

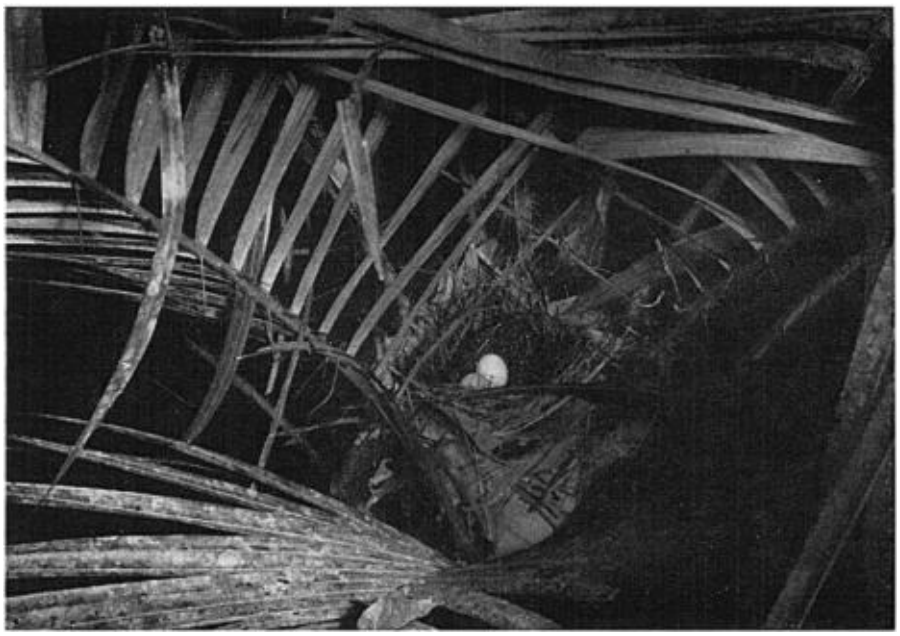

Fig. 6. Nest of the Rufous-capped Atlapetes (*Atlapetes brunnei-nucha apertus*) in chocha palm.

inches high and five inches wide outside and three and a half inches wide and two inches deep inside. There were two stubby, pure white eggs measuring approximately 20 by 15 mm.

## SYSTEMATIC LIST

The following is a complete list of all forms collected or observed. Of the 134 species found in our study area around Coyame, 72 forms or about 54 per cent were common to Wetmore's list (1943) from Volcán San Martín and Cerro Tuxtla. Fifteen species, however, had not previously been recorded from the Sierra de Tuxtla, and these are designated with an asterisk.

The breeding condition of the birds is indicated as either gonads markedly enlarged (GE) or nesting (N), where applicable.

**Podilymbus podiceps*
*Pelecanus occidentalis*
*Phalacrocorax olivaceus*
*Fregata magnificens*
*Butorides virescens virescens*
**Leucophoyx thula*
*Sarcoramphus papa*
*Coragyps atratus*
*Cathartes aura*
**Accipiter bicolor fidens*
*Buteo magnirostris*
*Buteo nitidus*
*Leucopternis albicollis ghiesbreghti*
*Buteogallus anthracinus*
*Falco albigularis*
*Crax rubra*
*Ortalis vetula*
*Odontophorus guttatus*
*Jacana spinosa*
*Larus atricilla*
*Columba flavirostris flavirostris*
**Columba speciosa*
*Columba nigrirostris*
*Scardafella inca*
*Columbigallina talpacoti rufipennis* (GE)
*Columbigallina minuta interrupta* (GE)
**Claravis pretiosa* (GE)
*Leptotila verreauxi fulviventris*
*Leptotila plumbeiceps plumbeiceps* (GE)
*Geotrygon montana montana* (N)
**Pionopsitta haematotis haematotis*
*Piaya cayana thermophila*
*Crotophaga sulcirostris sulcirostris*
*Glaucidium brasilianum ridgwayi*

*Nyctidromus albicollis yucatanensis*
**Chaetura vauxi*
*Phaethornis superciliosus veraecrucis*
*Phaethornis longuemareus adolphi*
*Campylopterus curvipennis excellens*
*Campylopterus hemileucurus hemileucurus* (N)
*Amazilia candida candida*
*Amazilia tzacatl tzacatl* (N)
*Trogon collaris puella*
*Trogon violaceus braccatus*
*Ceryle torquata*
*Chloroceryle amazona*
*Chloroceryle americana septentrionalis*
*Hylomanes momotula momotula*
*Momotus momota lessonii*
*Aulacorhynchus prasinus prasinus* (GE)
*Pteroglossus torquatus torquatus*
*Ramphastos sulfuratus*
*Piculus rubiginosus yucatanensis*
*Celeus castaneus*
*Centurus aurifrons veraecrucis*
**Centurus pucherani perileucus*
*Veniliornis fumigatus sanguinolentus*
*Dendrocincla anabatina anabatina*
*Sittasomus griseicapillus sylvioides*
*Xiphorhynchus flavigaster eburneirostris*
**Lepidocolaptes souleyettii insignis*
*Synallaxis erythrothorax furtiva*
*Automolus ochrolaemus cervinigularis* (GE)
*Xenops minutus mexicanus*
*Thamnophilus doliatus intermedius*
*Formicarius analis moniliger* (GE)
*Attila spadiceus flammulatus*
*Platypsaris aglaiae sumichrasti*
*Tityra semifasciata personata* (GE)
**Pipra mentalis mentalis* (GE)
**Sayornis nigricans nigricans*
*Tyrannus melancholicus chloronotus* (N)
*Legatus leucophaius variegatus*
*Myiodynastes luteiventris luteiventris*
*Myiodynastes maculatus insolens* (GE)
*Megarynchus pitangua mexicanus*
*Myiozetetes similis texensis*
*Pitangus sulphuratus derbianus*
*Myiarchus tuberculifer lawrencei*
**Contopus cinereus brachytarsus* (GE)
*Myiobius sulphureipygius sulphureipygius*
*Platyrinchus mystaceus cancrominus*
*Tolmomyias sulphurescens cinereiceps* (N)
**Rhynchocyclus brevirostris brevirostris*
*Oncostoma cinereigulare*
*Elaenia flavogaster subpagana* (GE)
*Pipromorpha oleaginea assimilis* (N)
*Iridoprocne albilinea*
*Cyanocorax yncas*
*Psilorhinus morio*
*Campylorhynchus zonatus zonatus*
*Thryothorus maculipectus maculipectus*
**Troglodytes musculus intermedius*
*Henicorhina leucosticta prostheleuca*
*Turdus assimilis leucauchen* (GE)
*Turdus grayi grayi* (GE)
*Catharus mexicanus mexicanus* (GE)
*Myadestes unicolor unicolor* (N)
*Ramphocaenus rufiventris rufiventris* (GE)
*Vireo olivaceus flavoviridis*
*Hylophilus ochraceiceps ochraceiceps*
*Hylophilus decurtatus decurtatus* (GE)
*Cyanerpes cyaneus cyaneus* (GE)
*Seiurus motacilla*
*Chamaethlypis poliocephala caninucha* (GE)
*Basileuterus culicivorus culicivorus*
*Basileuterus rufifrons salvini*
*Gymnostinops montezuma*
*Amblycercus holosericeus holosericeus*
*Tangavius aeneus*
*Dives dives dives*
*Icterus prosthemelas prosthemelas* (GE)
*Icterus mesomelas mesomelas*
*Tanagra lauta lauta* (GE)
*Thraupis virens diaconus*
*Thraupis abbas* (N)
*Phlogothraupis sanguinolenta sanguinolenta*
*Piranga leucoptera leucoptera*
*Habia rubica rubicoides* (GE)
*Habia gutturalis littoralis* (GE)
*Lanio aurantius aurantius*
*Eucometis penicillata pallida*
*Saltator atriceps suffuscus* (N)
*Saltator coerulescens grandis*
*Caryothraustes poliogaster poliogaster*
*Richmondena cardinalis coccinea*
*Cyanocompsa cyanoides concreta* (GE)
*Tiaris olivacea pusilla* (N)
*Sporophila torqueola morelleti* (GE)
*Volatinia jacarina splendens* (GE)
*Atlapetes brunnei-nucha apertus* (GE, N)
*Arremonops rufivirgatus crassirostris* (GE)
**Aimophila rufescens pyrgitoïdes*

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